CHOICE AND CONSTRAINT IN FLOOD HAZARD MITIGATION: THE ENVIRONMENTAL ATTITUDES OF FLOODPLAIN RESIDENTS AND ENGINEERS.

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ABSTRACT

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Choice and constraint in flood hazard mitigation:
the environmental attitudes of floodplain residents and engineers.

This research examines the importance of environmental factors in the choice, promotion and implementation of flood defence schemes in England and Wales. It focuses on the attitudes of National Rivers Authority (NRA) engineers and floodplain residents to low-frequency flood events and investigates the role of NRA engineers in influencing, the choices of floodplain residents.

The theoretical focus includes an examination of the appropriateness of the dominant (North American) hazards research paradigm as an explanatory model in the British context and the development of a conceptual model applicable to this socio-political and cultural milieu. The research extends existing, primarily quantitative, research designs to include more qualitative approaches which provide descriptive richness and context beyond that afforded by quantitative data alone.

The quantitative and qualitative studies of floodplain residents show environmental factors to be an important influence on their attitudes to proposals for flood hazard mitigation and to existing flood defence schemes. This is conceptualised as a 'risk-environment trade-off'. The case studies of floodplain residents further identify an unmet information need concerning both flood risk and flood defence.

The qualitative study of NRA engineers highlights the differences in perception and attitude between engineers and residents to flood risk, flood defence, public consultation and environmental factors. It underlines the complexity of the interactions which occur between individual, institutional and societal levels.

The research concludes that the dominant paradigm model is inappropriately focused at the individual level and does not take sufficient account of institutional and structural influences. Furthermore, the concentration on choice rather than constraint ignores the social conflict and self-interest of actors in the decision-making environment. The research suggests that a systems approach is inadequate for dealing with the complexities of flood hazard mitigation.

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LIST OF ABBREVIATIONS

AODN	Above Ordinance Datum Newlyn
AONB	Area of Outstanding Natural Beauty
DoE	Department of the Environment
DWSC	Datchet, Wraysbury, Staines and Chertsey Study
EA	Environmental Assessment
EC	European Community
EIA	Environmental Impact Assessment
ES	Environmental Statement
FHRC	Flood Hazard Research Centre
FoE	Friends of the Earth
HMSO	Her Majesty's Stationery Office
IWEM	Institution of Water and Environmental Management
MAFF	Ministry of Agriculture, Fisheries and Food
MPFHRC	Middlesex Polytechnic Flood Hazard Research Centre
NCC	Nature Conservancy Council (now, in England, English Nature)
NRA	National Rivers Authority
NT	National Trust
RSNC	Royal Society for Nature Conservation
RSPB	Royal Society for the Protection of Birds
SI	Statutory Instrument
SSSI	Site of Special Scientific Interest
USACE	United States Army Corps of Engineers
WWF	Worldwide Fund for Nature (previously World Wildlife Fund)

PART ONE

1. INTRODUCTION

1.1 Background to the study

Floodplain management raises issues of both academic and public policy interest. The present study arises from a real world problem and thus is not solely of academic value but aims to bridge theory and application. In Britain major floods have an infrequent and largely unpredictable occurrence. After such events there can be an outcry from the public who generally want to know the cause of the event (and possibly where to apportion blame) and swift action to prevent a recurrence. However, preventative action can take many years to come to fruition, during which time much of the anger, distress and fear that generated the call for action, has subsided and many of the original residents who experienced the event have moved away. When a proposal for a structural flood defence scheme is finally presented to the public there can be considerable opposition, often on the grounds of unacceptable environmental impact.

It was the need by the National Rivers Authority (NRA)[1], one of whose responsibilities is flood defence, to understand and forestall such opposition that was the original impetus for this research. The Thames Region of the NRA is producing a hydraulic master plan of the whole of the River Thames (The River Thames Flood Defence Strategic Initiative), which aims to provide an engineering, planning and environmental overview of the Thames floodplain with the objective of finding a 'solution' to the flood problem (Thames Water, 1988). Part of the NRA Thames Region's framework for assessment asserts a commitment to the concept of public consultation (Thames Water, 1988:68). An element of this consultation process, as seen by the NRA Thames Region, was a survey of public attitudes to the flood risk and flood defence proposals. It is this research which forms the empirical basis of much of this study.

In the later part of the 1980s, NRA Thames Region had experienced some difficulty in promoting a major flood relief scheme (The Maidenhead Flood Alleviation Scheme) in a part of the Thames floodplain which had not experienced major flooding for forty years. The proposals for the scheme had met with considerable opposition despite the fact that the scheme had been designed to be environmentally sensitive. Thus, for the NRA, an important

[1] Prior to privatisation and the splitting of the water management functions in 1989, the ten regions of the NRA were part of the respective Regional Water Authorities.

objective of the research was the facilitation of scheme implementation.

The research design aimed to provide the NRA with information to aid future scheme promotion - in particular, the next stage of the flood defence studies for the River Thames - and to further existing models of floodplain decision-making. Although the research was jointly funded, the empirical research was closely tied to NRA needs and the NRA made detailed comment on the targeting of survey populations and the content of questionnaires. As research design advanced beyond the most general level, it became clear that the NRA was anxious to protect its public image and was not prepared to disclose publicly certain of the information that it held. Despite the perceived need by the NRA to combat the low flood hazard perception in the floodplain, there was much concern at the questionnaire design stage not to alarm residents by informing them too strongly that they were at risk. Similarly with the proposals for flood defence, there was concern that there should be no leak of a possible scheme or route that might arouse residents to oppositional action.

After some months of collaborative work, the initial design for this thesis - which had been strongly influenced by the (NRA) engineering culture - was extended to include an examination of this culture and the interaction of NRA engineers with the floodplain decision-making environment. This was felt to be necessary to understand how far the engineers influenced the nature of the information reaching the public and to place in context the empirical data being collected from the public[2].

Joint funding created the opportunity to expand the areas of research interest away from those solely of concern to the NRA and provided an element of independence. Thus, while a study of NRA engineers was not perceived to be of immediate value to the NRA, arguments justifying its academic value were accepted. In addition to a series of interviews with engineers, observation and, to a lesser extent, participant observation were also employed to examine the engineering culture and working environment. While never being a complete participant in the sense of doing the same work as the engineers being studied, the author's role as consultant afforded a degree of acceptance by the organization but also an expectation of support for its aims and needs. However, an element of tension developed over time for the author as it became increasingly difficult to adhere to the role of participant when a 'critical observer' role became more dominant. For the author it began to appear duplicitous

[2] A major element in this research, as in many earlier studies, was to be an examination of the flood hazard perception of the floodplain resident; however, in areas of very infrequent flooding it was hypothesized that much of their perception would be based on information from NRA engineers.

at times.

Teamwork has been the dominant mode of working throughout the life of the Project although certain of the research modules were designed and managed independently by the author. All data was analyzed or reanalysed by the author for the completion of this thesis. The author's personal input to each of the research modules is as follows[3]:

1. **Thames Perception and Attitude Survey, 1989 (DWSC/89): Baseline Study**:
   Major input to the design of the survey. Daily administration of the survey and its team of interviewers. Data entry and supervision of data entry. Data analysis and contribution to the (at time of writing) draft final report (Tunstall et al, 1990). Extensive analysis undertaken subsequently.
2. **'The River Environment and You' Postal Survey, 1990 (DWSC/90)**:
   Major input to the design of the survey. Project administration, later delegated. Some analysis and contribution to the (at time of writing) draft final report (Tapsell et al, 1991). Extensive analysis undertaken subsequently.
3. **The River Thames Maidenhead Flooding Survey, 1990 (Maidenhead 1990)**:
   Major input to the design of the 'public perception' section of the survey. Project administration, later delegated. Extensive analysis undertaken subsequent to completion of the (at time of writing) draft final report (Sangster et al, 1990).
4. **The Lower Stour Flood Alleviation Scheme: Christchurch, 1990**:
   Complete responsibility for the design, administration and execution of the study and for the analysis and report writing (Fordham, 1991a).
5. **The Bridport Flood Alleviation Scheme: West Bay, 1990**:
   Complete responsibility for the design, administration and execution of the study and for the analysis and report writing (Fordham, 1991b).
6. **Interviews with NRA flood defence engineers**:
   The examination of engineers' attitudes did not form a part of the NRA's information needs but was specifically related to the academic and theoretical needs of the thesis. These interviews were carried out as a separate research module subsequent to the main data collection period; the design and implementation of this module were entirely under the control of the author.

[3] The author was also involved in interviewing, data analysis and contribution to the final report (Tunstall et al, 1989) for the 1988 Eton Wick Survey (which was a pilot study for the Public Perception of Rivers and Flood Defence Project, but which is not discussed in detail in this thesis.

Throughout this document the term 'the study' refers to the thesis: including its theoretical underpinnings, all forms of its data collection, and the written document itself. The 'Project' or 'the research project' refer to the jointly funded 'Public Perception of Rivers and Flood Defence' research project. 'Modules' refer to the separate research enterprises undertaken for the study: i.e. case study surveys and interviews, and the interviews with engineers.

1.1.1 Theoretical roots of the study

The study follows a now well-trodden academic path which began with the 'Chicago School' of geographers who, since the 1960s, have produced a considerable body of empirical research into floodplain occupance, management and decision-making. Their research hypotheses and methodology have, at times, been imported virtually unchanged into the markedly different British cultural and political milieu. One reason the North American model could be transposed so easily was its focus on the 'natural' hazard event and the response of the individual, and its apparent disregard of the socio-political environment within which such responses are made.

Thus, with minor changes to accommodate differences in geomorphology, and therefore in the spatial and temporal behaviour of rivers in flood, the model of perception and response by individual floodplain managers[4] formed the basis of a similar body of empirical research in the quite different socio-political and cultural environment of Britain. It became apparent, however, that this model was less than satisfactory in representing British floodplain management decision-making.

The research discussed below aimed to widen the focus to that most appropriate to the British situation, by including both the individual and the organizational levels of investigation (neither being solely satisfactory by themselves) while remaining substantially bound by the behavioural research paradigm. More specifically it aimed to investigate the previously under-researched role of environmental factors in floodplain decision-making, and to concentrate more closely on attitudes to possible adjustments rather than the flood hazard. Thus the conceptual model around which the survey research was designed and the survey instruments themselves were based closely on earlier hazards research.

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[4] Floodplain managers are defined in the literature (Kates, 1962:30) as individual owners or tenants of residential properties, or managers or tenants of commercial businesses or public establishments. This would seem an inappropriate aggregation of the residential and the commercial populations who one might expect to have different objectives and resources at their disposal. In the present study the term is avoided when it might result in ambiguity.

However, a later re-examination of the place of hazard-response theory in the context of a wider body of geographical theory, supported by the findings of both the empirical investigations and immersion in the decision-making environment, led to the ultimate conclusion that both individual and organizational units of analysis lack **conclusive** explanatory power, because both are fundamentally controlled at higher socio-political levels. Nevertheless, this should not preclude further examination at either the individual or organizational levels (as dogmatic adherence to opposing epistemological theories might suggest) but rather that caution should be exercised in the assessment of the degree of explanation provided by these units of analysis.

1.1.2 Research focus

The research proceeded through an examination of two key decision-making groups in floodplain management: floodplain residents and NRA engineers. These two groups were chosen to illustrate the importance of interactions in the decision-making environment which constrain individual choice, and the inadequacy of concentrating primarily on the flood hazard perception of individual floodplain residents in explanations of floodplain occupancy and management.

While it is recognized that there exist a number of other key decision-makers in the floodplain decision-making environment (such as representatives of the Ministry of Agriculture Fisheries and Food (MAFF), local authority planning officers, land drainage/flood defence committee members, interest group representatives, commercial and industrial floodplain occupants, property developers, etc.), in such a complex research area, focus was imperative if the study was not to become too diffuse and superficial; the choice was restricted to two groups in order to create a manageable research study. This research strategy represented, therefore, a compromise between possible levels of analysis: individual, organizational and societal. The concentration on the individual unit of analysis should not be interpreted as meaning other scales of analysis have been either ignored or regarded as unworthy of further study.

The justification for the choice of these two groups lies in their more direct association with the physical consequences of floodplain management policy decisions: NRA engineers design and build the physical structures of flood defence with which the residents have to live. In addition, they are the two groups most closely in contact, and sometimes in conflict, regarding these structures.

While the need to communicate risk and act in mitigation of hazards is accepted, some of

what follows might appear to be in opposition to this position. This is not the intention but rather to show how limited opportunities for public participation, mishandling of public consultation, and - at its extreme - an abuse of institutional power, militate against effective and efficient risk communication and response. The stated position adopted by this study[5] is critical of existing decision-making structures in flood defence and it is this factor, perhaps, that makes this research different from much previous work which has tended to start from an unstated position of congruence with the engineering perspective[6].

1.2 Boundaries of the study

This study should be viewed in the context of certain prescribed boundaries. It does not set out to examine flood hazard per se but rather to focus on attitudes to flood defence, and largely on a particular level of infrequent flooding, in England and Wales. These boundaries are discussed below.

1.2.1 Floodplain Occupance

The study is located within the field of disaster or hazards research which is now a substantial research area covering natural and anthropogenic hazards and, what might more accurately be termed, quasi-natural hazards, because of the frequent blurring of these distinctions. Much of this work, particularly in the earlier years of its development, has concentrated on the occupance and management of floodplains.

The density of population in Britain has encouraged substantial development in floodplain environments. This has necessarily caused problems when, as part of the natural behaviour of rivers, periodic flooding of surrounding land occurs and when the socio-political processes of land use have had an impact on the hydrological regime of river catchments.

Flooding will continue to occur despite efforts to mitigate the risk because the highest levels of adjustment can always be exceeded by an extreme environmental event (Mileti, 1980:329) albeit, possibly some decades or centuries into the future.

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[5] It is argued below that all research is value-laden and subjective to a degree, and thus it is incumbent upon a researcher to state their position, vis a vis the study problem, to avoid misleading the reader.

[6] Indeed, this research started from this very position by asking why it was that floodplain residents persisted in living in a hazardous environment, why do they - irrationally - refuse flood defence, how best can they be persuaded to change their attitudes.

1.2.2 England and Wales

This study addresses itself solely to floodplain management in England and Wales. Scotland has a different institutional and legal framework within which floodplain management decisions are made (although, historically, all have been dominated by landowning and agricultural interests (Parker & Penning-Rowsell, 1980:203)) and which have influenced the development of policies and institutions.

In England and Wales two central government departments are involved in floodplain management: MAFF and the Department of the Environment (DoE). The ten regions of the NRA have chief responsibility for floodplain management on coastal floodplains and main rivers[7] although there are also significant overlaps with local (planning) authorities who have responsibility for managing non-main rivers. There are further, more minor, overlaps with local authority engineering and drainage departments. While the role of county and local authority planning departments is arguably a significant factor in the management of flood hazard, it is only comparatively recently that detailed attention has been given to the way the institutional liaison procedures have operated and to methods for the development of joint strategic planning opportunities.

This lack of engagement between land use planning bodies has similarly been reflected in much of the academic research literature which has often failed to address the constraints placed on floodplain management by what are essentially political bodies. While acknowledging the fundamental importance of these links, this research study has not made an empirical investigation of them but does, through its development and critique of 'traditional' forms of hazard research, highlight both earlier omissions and future needs.

1.2.3 Urban river floodplains

There has been a significant policy shift in recent years with regard to the relative importance of agricultural land drainage and urban flood defence initiatives. As mentioned above, the landowning and agricultural dominance of land drainage/flood defence committees ensured for many years the support of land drainage in the interests of greater agricultural production. However, two related factors have combined to reduce the power and influence of this lobby: firstly the recognition of agricultural overproduction in Europe and, secondly, more

[7] Main and non-main rivers are so designated by MAFF on statutory maps. The NRA is principally concerned with main rivers but it has a general supervisory responsibility over all land drainage and flood defence matters in its respective regions.

generalised public concern over the environmental impact of agribusinesses.

The fact that the Ministry with responsibility for flood defence is also the Ministry with responsibility for agriculture led to the continued support of the land drainage function until, in the national interest, a more rational policy on public expenditure (and arguably a need for NRA personnel to protect their jobs) led to a shift from rural to urban protection (Penning-Rowsell et al, 1986).

Thus, in latter years, the majority of flood defence funding has been placed in urban and coastal flood defence initiatives; making it a more fruitful area for study. The wider range of interest groups in the urban environment creates a more diverse research field in terms of the conflict that is sometimes generated.

For many urban floodplains the most frequent flooding problems have been alleviated to some degree and this study focuses on the more infrequent flood events which lie in the area of greatest decision-making uncertainty (Kates, 1962). NRA flood defence personnel base their decision-making on historical records and statistical analysis of flood frequency which lead them to prepare for the (inevitable, as they see it) repeat of a rare event. However, the general public depend to a major degree on experience: both personal and secondary (i.e. that of relatives, neighbours or other members of the community). In the urban environment personal and community experience may be limited due to more frequent relocation by residents. Thus, the urban floodplain resident must make decisions in situations of relative ignorance and extreme uncertainty.

1.2.4 Residential and institutional (NRA) attitudes towards structural flood defence measures

During the process of flood hazard management, NRA officers appraise the flood problem in their area and, in consultation with a range of individuals and organizations, design and implement a solution to the problem. The majority of NRA flood defence personnel (in senior decision-making positions) are engineers and this concentration of engineering expertise leads to an emphasis on structural solutions. This structural bias also arises from the limited powers of the NRA to influence wider land use management decisions which may influence the hydrology of the floodplain.

In addition, the nature of the majority of floodplains and hydrological regimes in Britain has meant that structural solutions have been generally successful, in contrast to the markedly

different situations in North America and Australia, for instance, where considerably more powerful rivers and vast floodplains can lead more frequently to truly catastrophic events when structural works are breached or overtopped (Parker and Penning-Rowsell, 1983; Penning-Rowsell et al, 1986).

The study of individual engineers' attitudes complements the study of residential attitudes and provides evidence of how the policies of the institution operate on both the individual floodplain resident or engineer and also within the social environment of the floodplain.

During the following discussion, the terms 'organization' and 'institution' are used interchangeably as indicative of a level of analysis greater (no value judgement implied) than the individual but less than the societal. In following the Shorter Oxford English Dictionary definitions of the terms, an organization is understood to be a purposive arrangement and is incorporated within the definition of institution which, importantly, is more specifically associated with the promotion of some object for public utility.

1.2.5 Attitudes examined at different points on a scheme-development continuum

Two recurring themes emerged from personal discussions with NRA engineers and from a study of the academic literature: firstly, that the most important factor in flood hazard management decisions is flood experience and, secondly, early opposition to flood defence scheme proposals will fade soon after the scheme has been constructed. While the importance of flood hazard perception is acknowledged, the primary focus of this study, and where it diverges from earlier work, is on attitudes to structural flood defence works and not, flood hazard perception. However, their inevitable interaction, through what is later termed a 'risk-environment trade-off', is not denied.

The study is structured to examine attitudes at different stages of scheme development in order to investigate the validity of the latter theme but has adopted a form of case study approach which allows for an examination of scheme attitudes and flood hazard perception in tandem. The stages that have been examined are:

- the pre-scheme design, baseline study stage (sometimes known as the feasibility stage);
- the post-scheme design, option generating, baseline study stage;
- and the post-scheme construction, project appraisal stage.

1.3 Aims and objectives of the research

The research aimed to examine the following broad questions:

- what are the important factors in flood hazard management decision-making?
- how important are environmental factors in making decisions about flood hazard management?
- do floodplain residents and professional flood defence managers make a risk-environment trade-off?
- in what way do NRA engineers influence flood hazard management?

1.3.1 Theory

The research aimed also to examine the appropriateness of the dominant hazards research paradigm as an explanatory model in the British context. A common criticism of much hazards research has been that it is atheoretical (Watts, 1983). This study aimed to make a more overt and conscious use of theory than previous research had done. However, theory was used as a practical aid to interpretation and understanding rather than as a restraining dogma. Thus, no single, clearly definable theoretical position is recognizable but an amalgam of theoretical strands have been incorporated where they have been deemed useful.

1.3.2 Application

The research has had a strongly applied element from its inception. The NRA, as joint funding body, had specific information needs that were to be addressed in the separate research modules, with the objectives of providing an input to the NRA's consultation programmes and to gather data to explore opportunities for policy change. Early findings of the research have already found application in floodplain management[8] and it is expected that there will be a continued input to institutional decision-making as the research project progresses.

[8] For example, the recognition by some flood defence engineers that early public consultation can identify sensitive areas and issues of which the professionals were unaware has led to moves to instigate consultation programmes at an earlier stage of scheme promotion.

1.3.3 Conceptual model

The development of existing conceptual models of flood hazard mitigation and adjustment was one of the earliest objectives of the research. The research design was based on a variant of generally accepted North American models of flood hazard perception and mitigating adjustment (Kates, 1971; O'Riordan, 1971a; Mileti, 1980; Penning-Rowsell et al, 1986). However, as the research progressed, the utility and appropriateness of such deterministic models - even when adapted to British floodplain management - was questioned. This is discussed in greater detail below.

1.3.4 Methodological tools for research

The design and testing of data collection instruments were early objectives of the research project and to this end a range of techniques - both quantitative and qualitative - have been used. These have included long, structured questionnaires administered by interviewers; self-completion postal questionnaires; long, loosely structured interviews - taped and untaped; a brief ethnography; content analysis; observation and, in a limited form, participant observation. The need of the project to test the effectiveness of different survey instruments has had both positive and negative affects: it is recognized in the literature (Denzin, 1970) that the use of a range of techniques (i.e. triangulation, see below for discussion and full references) can strengthen validity and thus have a positive value in research. Nevertheless, the use of several techniques makes comparability across studies more difficult because it can become impossible to gauge whether differences are 'real' or simply a methodological artifact.

1.4 Structure of the thesis

The thesis is organized in two parts. Part One comprises the introduction to the study, including surveys of relevant literature, discussion of underlying theory and findings relating to hazards research, and a general methods section.

Part Two comprises the empirical studies of floodplain residents and engineers, a revision of the initial conceptual model and concluding discussion and recommendations.

2. THE DOMINANT PARADIGM IN HAZARDS RESEARCH

This chapter defines and discusses the dominant paradigm in hazards research and provides an outline of its theoretical antecedence. It discusses certain, key, elements within hazards research (the measurement of perception, attitude and behaviour, environmental perception studies, and risk analysis) and the 'dominant view' represented by the 'flood hazard school' and Kates' (1971) systems model of human adjustment to natural hazard. Finally it addresses the appropriateness of the application of the dominant paradigm to the conditions which obtain in England and Wales.

Broadly defined, the concerns of hazards research (also known as hazard and natural hazards research) are "the totality of factors which generate, sustain, exacerbate, or mitigate those characteristics of natural and man-made environments that threaten human safety, emotional security, and material well-being" (Mitchell, 1984).

Although the term hazards research has been adopted throughout this thesis, a more commonly used term has been 'natural' hazards research. Burton and Kates (1964:413) have defined natural hazards as elements in the physical environment harmful to man and "caused by forces **extraneous to him**" [my emphasis] which highlights the separation of man and environment which is such a feature of the dominant paradigm. It is also, perhaps, a 'commonsense' view of hazards/disaster as implying a negative cost but the beneficial aspects of hazards/disaster have also been noted (White, 1945; Kates, 1962; Mileti et al, 1975; Sorensen and White, 1980; Penning-Rowsell et al, 1986; Namafe, 1989).

In White's first published work (White, 1935) natural hazards (in this case droughts) were seen as 'acts of God' while the losses arising from them were seen as largely 'acts of man'. Thus White had already conceptually separated the non-manageable (act of God) from the manageable (act of man) in the hazard event. However, in the case of urban floods in particular, such are the interactions with and impacts upon 'natural' geophysical systems (to adopt the dominant paradigm concepts) that it has become increasingly inappropriate to use the word 'natural' for either the precipitating event or the resulting loss. Flooding must be seen as, at best, a quasi-natural hazard in most circumstances. Some have suggested that, so-called, 'natural hazards' should be regarded, more realistically, as "acts of men rather than acts of God" (Smith, 1979:7).

The term 'natural' becomes even less appropriate when attached to disasters - the sometimes catastrophic outcome of hazards. In less developed countries in particular, disasters are more

often associated with vulnerability, dependence and marginalisation and arise largely as a consequence of socio-economic rather than natural factors (Winchester, 1992; Susman et al, 1983; O'Keefe et al, 1976; Ball, 1975; Tiranti, 1977). This is not merely a question of semantics, for the perceived cause of 'natural' hazards/disasters will have an impact on perceptions of appropriate adjustment. Use of the word 'natural' can suggest an event for which nobody is to blame and whose solution is for everyone to 'pull together'. This, it has been suggested (Burgess, 1978), is an ideologically-based argument in favour of consensus and denies conflicts in the community arising from socially constructed inequalities of power and control.

Within what has been variously called the "dominant view" (Hewitt, 1983:4), and "a modest but universal research paradigm" (Kates and Burton, 1986:324), a flood hazard 'school' has been recognised (Waddell, 1977), closely associated with the work emanating from the Universities of Chicago, Toronto, Clark and, later, Colorado and dominated by the early work of the geographers White (1945; 1974), Kates (1962; 1971) and Burton (1961; Burton and Kates, 1964; Burton et al, 1978) - the "Kates-White-Burton paradigm" (Watts, 1983:240).

This work has examined the aetiology and perception of hazard events and the processes of adoption of hazard-reducing adjustments. A closely related area of study is disaster research which relates the impact of extreme geophysical events to patterns of human vulnerability and which is similarly concerned with the role of hazard perception as a factor limiting the mitigation of risk (Alexander, 1991). Although related, disaster research and hazards research have been distinguished by their differing emphases on response to disaster impacts, and adjustment to the risk of future disaster, respectively (Mileti, 1980; Burton et al, 1978; White and Haas, 1975).

2.1 General theoretical antecedence

The theoretical underpinnings of the dominant paradigm in hazards research lie with behavioural geography. More fundamentally they lie with positivism[9] and, subsequently, humanism. Arguably, the "positivist orthodoxy" (Hughes, 1990) is so ingrained in hazards research that it is rarely questioned or even noticed by those working within it: it has assumed a role akin to the Kuhnian concept of "normal science" (Kuhn, 1970): that is, the orthodoxy against which new theories are measured.

[9] As did (and to a considerable extent still does) much social science, in its attempt to gain academic respectability through the adoption of a natural science model.

Research workers in the hazards field have tended not to challenge or extend the fundamental theoretical base, but rather to make incremental changes within the paradigm. Quantitative measurement techniques have favoured the concentration of explanatory power at the individual unit of analysis, to the neglect of the political-economic context (similarly, concentration on the individual unit of analysis has favoured quantitative measurement techniques). This has led to accusations of banality and triviality (Watts, 1983; Waddell, 1977) which are not totally unjustified.

The theoretical discussion which follows examines some of these criticisms. It does not aim to provide a comprehensive discussion and analysis of the development of geographical theory: this can be found elsewhere (see, for example, Jackson and Smith, 1984). Its more modest aim is to highlight those theoretical areas of significance to the development and practice of hazards research and to suggest how the adherence to a particular (or, more accurately, composite), dominant, theoretical base has restricted the range of hazards theory.

2.1.1 Positivism/humanism/behavioural geography

Positivism can be characterised by the following elements: it stresses the primacy of sensory experience for an objective explanation of external reality; it claims the natural science model as an appropriate method for the examination of social reality; it supports a fundamental distinction between fact and value; it argues that it is by the systematic accumulation of facts that general theories and laws are produced (Hughes, 1990; Jackson and Smith, 1984).

Despite its initial development out of a reaction to certain positivist assumptions, the behavioural geography that emerged in the mid-1960s "was destined to become a typical product of its quantitative, positivist era" (Jackson and Smith, 1984:46). Behavioural geography developed an early interest in humanist concerns with meaning but was most strongly influenced by those who wished to make social science more scientific.

Behavioural geographers, working initially in the field of locational analysis, had sought a more realistic substitute for the rational, economic model of man the optimiser (discussed further below) which they found in Simon's 'satisficer' model (Simon, 1957) in which people adopt more modest goals and seek to avoid major risks (Jackson and Smith, 1984:48). This resulted in qualifications of, but little radical change to, the existing theoretical framework; however, it did stimulate considerable methodological variety and originality. The emerging geography included, inter alia, studies of human adaptation to natural hazards and environmental perception, with both positivist and humanist orientations. The latter, by

acknowledging the central and active role of human beings, places itself in opposition to both a positivist spatial science and to structural marxism (Jackson and Smith, 1984:8).

A major criticism of behavioural geography has been its over-emphasis on the individual actor and its neglect of the role of societal constraints. Rieser (1973) applies an epithet of Baran (1969) to accuse it of 'psychologism'; that is, a reduction of "complex social and historical trends to individual psychological processes" (Rieser, 1973:54). Rieser's research experience in housing led him to the conclusion that the concrete problems of the real world are not commensurable with the abstract orientations of the academic. He found that "the objective constraints were so great that the elucidation of constraints in subjective knowledge of the environment became meaningless" (Rieser, 1973:53). In Rieser's analysis, behavioural geography is not passive and value-free but, in its predication on the belief that all society's problems are solvable through a gradual reforming process, provides active support for the status quo. It obfuscates and mystifies objective reality and its methods hold the potential to be a tool of social control. This analysis suggests that the employment of survey research by NRA engineers to facilitate the development of a structural flood defence scheme could be construed as a form of social control through manipulation of public attitudes.

A further point made by Rieser and other analysts is that behavioural geography concentrates on **choice** when, in light of power relations in society, a more realistic focus should be on **constraint**; although, even this approach, he argues, maintains an inappropriate emphasis on the individual (Rieser, 1973:55). This position is best summed up by Marx (1972:10)[10], which encapsulates the central problems of the correct unit of analysis and the power of the individual to choose:

> "Men make their own history, but they do not make it just as they please; they do not make it under circumstances chosen by themselves."

Gray (1975) also addresses the issue of the individual and the failure of behavioural geography to deal with constraints on preference and choice. Indeed, Gray identifies preference and choice, in addition to aspiration, decision, perception and behaviour, as key words in the literature of behavioural geography, denoting the dominant explanatory referent, i.e. "that people exercise individual preferences made within a choice framework" (Gray, 1975:228-9). This he believes to be - as does Rieser (1973) - a "mythical and mystical" notion which has buttressed the status quo in society and proved a hindrance to "a true

[10] From "The eighteenth Brumaire of Louis Bonaparte", and quoted in Leach, 1978:35, Rieser, 1973:55 and Watts, 1983:244.

understanding of reality" (Gray, 1975:234).

Gray believes the key to understanding urban processes to be a political economy approach incorporating the study of institutions (as reflections of capitalist society) rather than individuals. The concentration of research on the individual unit has arisen, he believes, partly as a result of "the heritage of the discipline"; partly as a result of the inter-relation between the types of data used (often questionnaire surveys and census data) and the direction of the research; and partly because of a value judgement concerning the appropriateness of the individual household as the unit of analysis. These he links with an acceptance of 'establishment' modes of analysis found in much of geography's academic environment and its "intellectual weakness" (1975:232). Thus, an explanatory framework should stress the structural features of society. The North American heritage of hazards research has provided an emphasis on the role of the individual as a research focus appropriate to the North American cultural milieu but perhaps less so (despite a decade of individualistic 'Thatcherism' (Hall and Jacques, 1983) in Britain.

Relph (1976) has claimed from a phenomenological perspective that many positivist analytical models of behaviour are mechanical and abstract and ignore the subtleties of everyday experience. Furthermore, echoing Rieser (1973), such "simplified structures" are then used as the basis of "more efficient" modes of environmental design and manipulation (Relph, 1976:preface). However, the phenomenological approach can be criticized on the grounds that it too fails to address society beyond the individual and is unable to convey the "brutal objectivity of much everyday experience" (Smith, 1979:367).

Burgess (1978) sums up the debate so far and touches on criticisms pertinent to hazards research, i.e. that it has eliminated historical elements or that it has been guilty of historical specificity (Watts, 1983; Waddell, 1977):

> "The phenomenal and behavioural approaches in geography lead to a radical elimination of historical and social elements from the study of man's relationship to the environment and build an individualistic psychology into an explanatory mechanism for interpreting meanings, values and actions" (Burgess, 1978:9).

Although the above describes much theoretical divergence and opposition, Jackson and Smith (1984) remark on a more recent tendency towards convergence and compromise in behavioural geography (1984:50-64) and social geography generally (1984:185-6). To illustrate the point, their theoretical model is a structural-conflict model, of Weberian rather than Marxist influence but also influenced by Park and the Chicago School in respect for

experience. They argue that there is a need to reject the determination of the cultural by the politico-economic but also to recognize that cultural expressions may be structured by the political (1984:176-8). Theirs is a model of society as an ongoing process of social interaction involving both conflict and consensus in uneasy balance (1984:188).

> "Such a view acknowledges the contribution of subjectivist perspectives, while not neglecting the importance of historical context or existence of multiple constraints on social action" (Jackson and Smith, 1984:189).

They are not alone in suggesting the possibility of (and even the need for) theoretical and methodological plurality (Hughes, 1990; Silverman, 1985; Harvey 1990; Bryman, 1988). It is this research perspective that underpins this thesis and which is necessary, it is argued, to extend the horizons of hazards research.

2.1.2 Perception, attitude, values and behaviour

Perception studies, including environmental and hazard perception, have been a prominent sub-field of behavioural geography at least since the 1960s and the publication of an influential and seminal paper by Lowenthal (1961) which put forward a tentative geographical epistemology on the basis of experience and imagination and provided the impetus for many subsequent empirical perception studies; although the philosophical issues it raised received less attention (Jackson and Smith, 1984). Behavioural research has made considerable use of social surveys and structured questionnaires as research instruments and yet they focus, apparently paradoxically, on the study of attitudes rather than behaviour. This section outlines the definitions of perception and attitudes and their relationship to behaviour.

The problems of definition of terms have been noted by researchers (Saarinen, 1969; Goodey, 1973; Whyte, 1977) - particularly those who have crossed disciplinary boundaries - although Goodey (1973) notes also the usefulness of a certain lack of definition in the early stages of understanding.

Perception is the process by which an organism detects and interprets information from the external world by means of the sensory receptors. In psychology the concept is a narrow one of direct sensory perception; a broader definition in general usage is more closely related to 'cognition' in psychology (Whyte, 1977). At its simplest and broadest, perception is a process of being aware (Goodey, 1973) and is a function of past history and present situational conditions (Schiff, 1970).

An attitude is "a disposition to respond favourably or unfavourably to an object, person, institution, or event" (Ajzen, 1988:4). Attitude is a multidimensional concept comprising an affective, a cognitive and a conative, or behavioural, component. These can be defined respectively as comprising an individual's feelings of liking or dislike for an object; an individual's beliefs about an object; and an individual's behavioural intentions towards an object. The affective and cognitive components are organized systematically, producing a predisposition to respond in a way consistent with the system. Thus, an attitude is a collection of feelings (affects) and beliefs (cognitions) which predispose an individual to respond in a particular way to the object (Schiff, 1970).

Underpinning attitudes are values. Social groups have shared value systems which act as a frame of reference for the evaluation of attitude and behaviour. Rokeach (1968:ix) also takes a systemic view and argues that if beliefs, attitudes and values are elements in a functionally integrated cognitive system then, it follows, that a change in one part will effect change in other parts of the system and will culminate in a change in behaviour. Beliefs vary in importance: the more important the belief, the more resistant to change it will be and the greater will be the disturbance to the rest of the belief system in the event of such a change. Importance is defined by the functional connectedness with other beliefs: the more central the belief, the greater will be the implications and consequences for other beliefs (Rokeach, 1968:5; Lauer, 1971:248).

As hypothetical constructs, attitudes cannot be measured directly but must be inferred from responses - such as a number of attitude statement items in a structured questionnaire, for example. While a single item is unlikely to prove reliable in capturing such dispositions, aggregating responses over a number of items has been found to be a more reliable measure. An underlying assumption in the use of this research method is that understanding attitudes will enable us to understand, if not predict, behaviour. While the extent to which people act in accordance with their attitudes is variable - particularly with respect to **specific** behaviours - intuitively we can accept that people act in ways that are consistent with underlying relevant dispositions.

Ajzen (1988) acknowledges the role of experience ("past events") - central to much environmental and hazard perception research - which leaves an enduring mark on a person.

> "By assessing attitudes and personality traits we attempt to unveil the hidden factors that, as a result of past events, have come to predispose the individual to act in certain ways" (1988:146).

Ajzen does not promote a single method of measurement but believes the appropriateness of a given method is dependent on circumstances: different methods may all be used as valid measures of underlying dispositions. He stresses the importance of definition and measurement of dispositions at different levels of generality or specificity for reliability and predictive validity. Measures can only be considered indicators of a given disposition if they correspond in level of generality: broad response dispositions tend to be poor predictors of specific behaviours (Ajzen, 1988:148).

A lack of correspondence between what people say and what they do has been attributed, in part, to problems of measurement validity (Lauer, 1971). The possible presence of biases in the verbal response situation (such as a tendency to acquiesce or to respond in a socially desirable manner, for example) have received more attention than possible biases in observed behaviour which may also be influenced by social desirability or conflict avoidance, for example. However, Ajzen claims that few situations provide an incentive for a strong bias and that these should be overcome by the application of suitable measurement techniques.

Ajzen favours the concept of intention as the most useful predictive measure of specific action (1988:150). He states that "barring unforeseen events, people tend to carry out their behavioral plans." Further, that they are generally consistent in their behaviour patterns and are not controlled by external forces.

Ajzen's theory of planned behavior (1988:132), an extension of the earlier theory of reasoned behavior (Ajzen and Fishbein, 1980), has as a central factor the individual's **intention** to perform a given behaviour. The theory postulates three conceptually independent determinants of behaviour: attitude towards the behaviour, subjective norm and perceived behavioural control. The last determinant is stressed: thus if resources or opportunities to perform a given behaviour are absent then strong behavioural intentions will not be formed even in the presence of favourable attitudes towards the behaviour and the approval of significant others.

Lauer (1971:249), discussing the second of these behavioural determinants, presents a concept of attitude as an ecological variable: individuals function within the context of an attitudinal ecology. In order to understand behaviour it is necessary to establish how the behavioural situation is defined, the self-concept of the individual, and the individual's reference group.

O'Riordan (1983a) also acknowledges the importance of 'social milieu' in behaviour but has expressed doubts concerning the relationship between attitudes and behaviour (1983a, 1973). He has suggested that conflicting attitudes and inconsistent behaviour are quite probable given

the variety of meanings and situations for action inherent in many environmental issues, for example, and that measurement should be directed at behaviour rather than attitudes (1973). He points out that too often, attitude surveys attempt to elicit a response to likely behaviour far removed from the interview situation or concerning 'cosmic' questions for which a number of behaviours may be appropriate depending on the situation (1973:18). In effect, he suggests investigating behaviour to discover attitude (and other psychological, social and structural factors which promote or inhibit action).

As a response to O'Riordan's contribution to the 'attitude-action dichotomy', Svart (1974) suggests that, paradoxically, behaviour may be less significant than attitudes in understanding actions. Svart claims that O'Riordan's analysis fails to acknowledge the constraints placed upon behaviour by existing social systems and that investigations of actual behaviour that preclude potential behaviour can produce "ideologically-biased information about the desirability of alternative social policies" (1974:303).

While agreeing with the latter assertion, Massey (1975) argues that the focus of the debate is incorrect and that it is empiricism itself which is at fault and not just its application to behavioural studies. That the proper focus for geographical research is the systemic structure that produces the behaviour (1975:202). This argument takes the discussion to another fundamental problem of geographical research, that of finding a means to mediate between the individual and society.

An alternative model of the relationship between attitude and behaviour has also been posited (Bem, 1970), which suggests behaviour influences attitude. By observing his/her own behaviour, an individual will adjust his/her beliefs and feelings. However, O'Riordan (1983a) contends that perhaps neither model is satisfactory because they do not acknowledge the social and political forces, influencing attitudes and constraining behaviour (1983a:226).

2.1.3 Environmental perception/attitudes

Environmental perception research has been eclectic in its disciplinary contributions, sharing however a common orientation and philosophy relating to the centrality of human understanding, choices and behaviour as forces shaping the environment (Whyte, 1977).

Psychological techniques and approaches for the analysis of interactions between environment and human behaviour, which stress the individuality of perceptions of the environment and the irreducible uniqueness of private world views (Lowenthal, 1961:257) have been

prominent in geography and influential in hazards research. Environmental perception can be set within the wider context of social perception which, at its simplest, is concerned with the effects of social and cultural factors on the individual's cognitive structuring of the physical and social environment (Saarinen, 1969). Thus perception is dependent on more than just sensory data but is related to past experience, psychological set[11] (Saarinen, 1969), context, role and personality of the individual, and the operation of cultural forces (Craik, 1986). The importance of placing the 'cultural filter' within a political, economic and historical context has also been stressed (Pepper, 1989).

Research has examined variations in orientations or dispositions to the environment (McKechnie, 1977) which suggest that variations in 'worldviews' (Craik, 1986) or underlying value systems (Cotgrove, 1982) are important for understanding complex reality (Pahl, 1967:218-242). The simplest 'split' between differing orientations is Craik's dual conceptualisation between "Contemporary Worldview 'A'": favouring a highly technological, high-growth, free enterprise, materialistic society with rational, quantified decision-making processes and "Contemporary Worldview 'B'": favouring a low-growth, low-technology, socially and environmentally concerned, decentralised, non-materialistic society with participatory decision-making processes (Craik, 1986:54).

A similar but more detailed construction is that of Cotgrove (1982) (see Table 2.1) which contrasts the dominant social paradigm with an alternative environmentalist paradigm. Considerable variation has been found in attitudes and beliefs between industrialists (the dominant social paradigm) and environmentalists and also between (Cotgrove 1982) and within (O'Riordan, 1977; Pepper, 1989) different environmental groups themselves.

Environmentalism can encompass widely divergent social views. On the one hand it can be seen as radical in its approach to problems of resource management, on the other it can attract those with deeply conservative, hierarchically structured and authoritarian value systems. Environmental concern can be a manifestation of dismay at the loss of a certain social order and traditional authority structure (Lowe and Warboys, 1978). Far from being a homogeneous group, environmentalists can be categorised along a continuum of environmental concern from 'deep environmentalists' at the extreme of ecocentrism, to 'cornucopians' at the extreme of technocentrism (O'Riordan, 1983; Cotgrove, 1982). Arguably, it is the latter which more closely approximates the values expressed within the dominant paradigm, despite the widespread concern for environmental issues that has

[11] Saarinen (1969) defines 'set' as "attitude acting through values, needs, memories, moods, social circumstances, and expectations" (1969:5).

Table 2.1: Dominant and alternative environmental social paradigms

	DOMINANT PARADIGM	ALTERNATIVE ENVIRONMENTAL PARADIGM
CORE VALUES	Material	Non-material
	Natural env. valued as a resource	Natural env. valued intrinsically
	Domination over nature	Harmony with nature
ECONOMY	Market forces	Public interest
	Risk and reward	Safety
	Rewards for achievement	Incomes related to need
	Differentials	Egalitarian*
	Individual self-help	Collective/social provision
POLITY	Authoritative structures: (experts influential)	Participative structures: citizen involvement
	Hierarchical	Non-hierarchical*
	Law and order	Liberation*
SOCIETY	Centralized	Decentralized
	Large-scale	Small-scale
	Associational	Communal
	Ordered	Flexible*
NATURE	Ample reserves	Limited natural resources
	Nature hostile/neutral	Nature benign
	Environment controllable	Nature delicately balanced
KNOWLEDGE	Confidence in science and technology	Limits to science
	Rationality of means	Rationality of ends
	Separation of fact/value, thought/feeling	Integration of fact/value, thought/feeling

* Some environmentalists favour hierarchical, differentiated, stable, traditionally ordered communities/societies.

(After Cotgrove, 1982:27)

developed in recent years (see Chapter 3).

2.1.4 Risk perception/analysis

There is frequently some conflation of the two terms 'hazard' and 'risk' in the literature. A simple definition of the two terms is given as: "hazards are threats to people and what they value and risks are measures of hazards" (Kates and Kasperson, 1983:7027, quoted in Short, 1984:711). This definition emphasises the negative dimension but risk can be both more neutral (e.g. the probability of an event) or positive (e.g. voluntary risks associated with dangerous (hazardous) sports) (Short, 1984; White and Haas, 1975). Douglas (1986) has noted that risks are selected and that risk perception cannot ignore the social concerns that influence selective attention (1986:39).

Torry (1979a) has noted that Burton, et al (1978) confer three distinct meanings on the term 'hazard': the agent which produces the impact; risk of exposure to the agent; and the losses resulting from impact; this, he suggests, is a "muddling of core concepts" (Torry, 1979a:371). Notwithstanding this criticism, the present study uses both the first and second meanings.

Risk is commonly defined as the probability of an adverse event and its magnitude (Rayner and Cantor, 1987). However, while this definition may be adequate at the level of engineering calculations, it does not adequately define the issues of risk management in the wider social arena (Rayner and Cantor, 1987). There can be no single 'correct' perception of risk; risks are selected from a universe of risks and the selection is the result of social influences (Douglas 1986; Kasperson et al, 1988). This suggests that underlying value systems are likely to be as influential in risk perception as the physical properties of hazard events:

> "The important issues of risk perception can never be analyzed with an inventory of the physical features of events, their scale of damage, suddenness or duration" (Douglas, 1986:28).

While technical assessments of risk may be necessary, they are not sufficient as the basis of societal choices regarding risk management; "the technical concept of risk is too narrow and ambiguous to serve as the crucial yardstick for policy making" (Kasperson et al, 1988:178).

It has been acknowledged (White, 1966a, 1966b; Burton et al, 1978; Otway and Wynne, 1989) that there can be fundamental differences in professional and public perceptions of risk:

the former tend to view risk probabilistically; the latter tend to view it causally (Tunstall et al, 1990). Flood defence engineers (as professionals) estimate flood risk in terms of the statistical probability of a repeat event of a given magnitude and design control structures to meet these levels (plus a little more, termed 'freeboard'). It has been suggested (Green et al, 1991) that the engineering culture, which emphasises the design of safe structures, results in a conservative bias towards estimation in the interests of failure limitation (Gardiner, 1991:10/9). However, the resulting structure may conflict with public preferences of acceptable levels of 'failure'; that is, the result of a trade-off between standards of protection and levels of perceived environmental damage (Fordham and Tunstall, 1990).

While the engineer views floods as largely natural events, the public tend to view them as largely the result of human agency; they look for someone to blame for mismanagement (Fordham, 1991a). As an extension of this dichotomy of approach, the two groups are also divided in the degree of attention they give to values and ethics in their definitions of risk (Handmer and Penning-Rowsell, 1990; Kasperson et al, 1988). In fact, the professional/engineer is more likely to eschew such considerations as being beyond his/her (professional) brief and capabilities; while the member of the public is more likely to concentrate on just these factors to the virtual exclusion of the technical - and for the same reasons. Thus, in addressing questions of acceptable risk, the two groups will essentially be speaking different languages (Handmer and Penning-Rowsell, 1990). The differences in perception are marked between those (engineers) for whom the concept (the risk of a rare flood) is an abstraction and those (residents) for whom it has personal meaning.

Earlier research (Burton et al,1978) found that different time horizons seem to exist between the average floodplain resident (with a short-term time horizon) and the scientist/engineer/city planner etc. (with a long-term time horizon). On the basis of differences in livelihood expectations and other factors, a given hazard event will not constitute the same hazard to everyone (1978:97). For those who expect to occupy the floodplain for a short time period only, a flood risk of 1 in 50 appears remote and improbable. The flood defence engineer with a professional time horizon of 50 or 100 years regards the probability of such an event with a greater degree of certainty. Older persons are particularly prone to the former view because they do not project beyond their (limited) life expectancy.

The infrequency of extreme events means that few people will have sufficient experience to accurately assess future risk. This applies to both the public and the professional (Saarinen, 1990). To predict future flooding with any degree of accuracy requires many years of record which are not usually available. Thus the basis of the apparent factual nature of the

professional assessment of risk probability - which gains respectability through the use of numbers - is actually very uncertain.

The public, who are unlikely to have access to statistical data, judge risk in terms of their own experience and what they have heard or seen. This method is also prone to uncertainty. It is likely, in the case of the estimation of flood risk, that they will extrapolate on the basis of a very small sample. It has also been noted that people tend to focus on (and overestimate the probability of) events that are easiest to recall - the so-called 'availability bias' (Saarinen, 1990; Slovic et al, 1979) - such as those that are frequent or dramatic. This is allied to the 'image of damage' (Mileti, 1980; Marks, 1990) that is perceived will result from extreme events and which is likely to influence attitudes to mitigation.

The importance of risk communication has been stressed in the identification of new risks, the determination of acceptable risks and the minimisation of unacceptable risks (Handmer and Penning-Rowsell, 1990). However, risk information cannot be regarded as value-free but is culturally defined (Douglas, 1986) and an effective tool in the hands of the powerful (Handmer and Penning-Rowsell, 1990). A problem for the understanding and communication of risk is that the provision of information will not necessarily (or even probably) alter existing perceptions of risk; rather information is likely to be selected if it reinforces an existing position and rejected if it does not. While this is an accusation made most often against the layperson it applies also to the professional/expert.

2.1.5 Acceptable risk

Risk perception-communication paradigms have largely ignored the social context in which perception and communication take place (Otway and Wynne 1989) and have contained inherent assumptions about the direction of risk communication (i.e. unidirectional from the professional/authority to the layperson), and about relationships to authority (i.e. that authority figures are acting wholly in the public interest). Thus, if viewed in a wider social context, techniques for risk communication could be either benign or manipulative. This social relationship is of obvious importance where the decision to be made is one of the acceptability of risk: whether a level of acceptability is self-determined or imposed externally may significantly effect responses to it.

Rayner and Cantor (1987) suggest risk managers and policymakers[12] are addressing the wrong question when they ask "how safe is safe enough?"; they should rather be asking "how fair is safe enough?". The authors suggest at least three factors are of importance to the public ("policymakers' constituencies"):

1. Is the procedure by which collective consent is obtained for a course of action acceptable to those who must bear its consequences?
2. Is the principle that will be used to apportion liabilities for an undesired consequence acceptable to those affected?
3. Are the institutions that make the decisions that manage and regulate the technology [risk] worthy of fiduciary trust? (Rayner and Cantor, 1987:4).

When these three factors are answered satisfactorily, the risk-bearing population will hardly even regard as risks the low-probability/high consequence events that concern risk analysts and professional risk managers. Thus, there is a difference in the conceptualization of risk management between the managers and the managed and between different constituencies of the managed which suggests risk should be seen as a complex of interactions between different people and not only, as with typical engineering calculations, between people and 'nature' (Rayner and Cantor, 1987).

The connection between the theoretical and applied aspects of risk analysis (used as an inclusive cover term) has been close. A major aim of examining risk perception and communication, for example, is to understand how improvements in the latter can cause improvements in desired response. It has been noted (Otway and Wynne 1989) that there are difficulties in combining a critical, independent, researcher role with one of "enthusiastic advocacy" (1989:142); thus engendering suspicions of manipulative intent - whether or not they are justified. The production of research must be seen as part of the wider social relations of production with all the implications that holds for the social legitimation of research agendas and uses.

It has been noted (Short, 1984) that risk analysts have given insufficient attention to the positive aspects of risks and to social values other than economic and human (physical) health costs and benefits: social science research has not examined how people live with risks and interactive effects on perception and behaviour (Short, 1984:712). Douglas (1986) has discussed further the systematic neglect of cultural influences on the acceptability of risks and

[12] Rayner and Cantor's paper, and the research findings on which it was based, address specifically questions of societal technological risk but many of their findings and the underlying theories of risk analysis are easily transferable to the issues surrounding flood defence decisions; that is, what is more often (usually erroneously) called 'natural' risk.

the centrality they should occupy:

> "The question of acceptable standards of risk is part of the question of acceptable standards of living and acceptable standards of morality and decency, and there is no way of talking seriously about the risk aspect while evading the task of analyzing the cultural system in which the other standards are formed." (Douglas, 1986:82).

The next section focuses more closely on the place of the 'flood hazard school' in this wider view of societal risk management.

2.2 The flood hazard school

2.2.1 Disciplinary background

Hazards research has borrowed from, and been adopted by, a number of disciplines including geography, economics, psychology, anthropology and sociology (White, 1973). Despite such disciplinary interactions, the flood hazard school has been criticised (Torry, 1979a:375) for a lack of sociological sensitivity which has prevented it from adequately addressing the social processes which underpin hazard aetiology[13]. The geographical approach has been both formative - early examples of which were the work of Harland Barrows (Barrows, 1923) in the 1920s on human ecological adaptation to environment and White's seminal monograph on flood perception (White, 1945) - and dominant. Social science methods have been used extensively, emphasising the spatial and temporal distribution of risk, impacts and vulnerability (Palm, 1990; Alexander, 1991).

While for some (White, 1973; Kates and Burton, 1986) the links forged with other disciplines were regarded as a positive benefit through the cross-fertilization of ideas, others have claimed that hazards research has been oblivious to discoveries made by hazard researchers in other disciplines (Torry, 1979a:375) and has become fragmented through specialization[14] and that a fully interdisciplinary, ecocentric approach is now required within the framework

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[13] In the late 1970s and early 1980s the 'dominant view' was challenged by a number of researchers in geography and other disciplines (Hewitt, 1983). At its most positive this critical response suggested the potential for new directions to hazards research; at its most negative it showed a tendency to stray into the personal and vitriolic (Waddell, 1977; Torry, 1979a, 1979c).

[14] Alexander (1991) identifies 6 discernible specializations of approach: a geographical approach, an anthropological approach, a sociological approach, a development studies approach, disaster medicine and epidemiology and a technical approach prevailing among natural and physical scientists (Alexander, 1991:211-212).

of human-ecology (Alexander, 1991).

This orientation within an ecological conceptual framework is not new: under the broad, umbrella term of environmental research, hazards research has been aligned with human-cultural ecology (Watts, 1983:235) or human-ecology (Kates, 1971). The tradition of human ecology can be traced back to the work of the Chicago school of sociologists and ecologists, dominated by the work of Park (Jackson and Smith, 1984). Mileti (1980) however, has argued that hazards research is different from human ecology in that the former has sought to understand human adjustment to environmental extremes and has emphasised individual adjustment, while the latter has sought explanations for human adjustment to the environmentally routine and has focused on larger collective social units (1980:328).

Despite associations with human ecology, Torry (1979a) has remarked on the ("curious") absence of an ecological perspective (1979a:377) in natural hazards research, a criticism he bases on the absence of the essential organizational component in hazard response systems. There has been a noticeable lack of any in-depth studies of the role of environmental factors (the importance of concern for nature conservation and landscape) in floodplain decision-making.

An ecological perspective has been used or claimed by many researchers to indicate that their work (or others') is (or should be) holistic in nature; taking in the broadest possible area of inquiry by integrating physical and human social systems (Burton, Kates and White, 1968; Kates, 1971; Smith and Tobin, 1979). Yet, even in later works, and notwithstanding the point that 'ecological' does not equal 'environmental', the constraints imposed by environmental attitudes, values and imperatives are noticeably lacking (Smith and Tobin, 1979). Where environmental factors are addressed they are given cursory attention. Kates' (1971) somewhat vague "ecological setting" refers to "whether the hazard is intrinsic to the use characteristics or locational advantage of the site" (Kates, 1971:440). James (1974) lists environmental concern as a factor affecting response to structural measures but the recommended measurement measures (1974:37) are severely limited.

Waddell (1977) believes the dominant hazards methodology to be ahistorical (1977:75) and a product of, and relevant to, a particular type of society:

> "...a Western, urban-industrial, capitalist state characterized by a resolutely antienvironmentalist ideology, a population that both is massively mobile and has lost most of its sensitivity to the natural world, and a central government whose responsibility for managing environmental problems is ill-defined" (1977:73).

While the acerbic tone of his criticism has a tendency to alienate the reader, nevertheless, many of Waddell's observations are penetrating and apposite; having relevance also for a British analysis. The ahistorical approach adopted (not necessarily consciously) by the hazards school does not address the underlying social and political processes of hazardous phenomena and this factor may have been instrumental in (apparently) facilitating the transfer of methodology across national and cultural boundaries.

2.2.2 Underlying theories

Although social geography can be characterised as essentially eclectic (Jackson and Smith, 1984), nevertheless, positivism (albeit in a modified rather than a crude form) has held a dominant position in geography, and social science generally, with methodological implications. The belief that knowledge is derived from empirical evidence is pre-eminent in positivism (Hughes, 1990) and it is perhaps Britain's "unparalleled attachment to an empiricist tradition" (Jackson and Smith, 1984:130) (dating back to the philosophers Hume and Locke) that eased the transposition of the dominant paradigm across spatial and cultural boundaries.

It has been suggested above that a positivist-behavioural-humanist analysis (in which much hazard research can be placed) focuses overmuch on the individual and neglects wider cultural and socio-political constraints. Torry (1979a) has claimed that geographers have concentrated on the physical properties of land and weather that make societies hazard-prone, but "without the benefit of a coherent social systems frame of analysis" (Torry, 1979a:377).

While hazards studies have been made of larger social units, such as organizations (Haas and Mileti, 1976) and societies (Sorenson and White, 1980; White, 1974), arguably these have been aggregations of individual actions and beliefs (Kates, 1971; Burton, Kates and White, 1978; Mileti, 1980) and have never been successfully integrated within the analysis but rather have been used as a backdrop against which the focal study of the individual takes place.

Whilst remaining strongly associated with the dominant paradigm, Penning-Rowsell et al, (1986) adapted and extended it to a more appropriate research focus for the British situation, where the individual unit of analysis is less than adequate. Their aim was to advance hazard-response theory to include institutional and political forces and to provide an analysis with practical relevance to floodplain managers - a goal suggested earlier by Lewis (1976). They conclude that, while the debate on the relative importance of focusing on the role of the individual or the state cannot be settled with empirical analysis (because "both individualistic

and 'structural' explanations of policies and events can be vindicated by the same data"), more progress will be achieved through further policy analysis from a "holistic perspective" rather than individual perception and response (1986:177).

On the basis of the now extensive empirical studies, hazards research has developed several 'laws' (Alexander, 1991). For example, that high magnitude geophysical events tend to have a low frequency distribution and vice versa; that the distributive effects of hazards are such that as the magnitude of individual impacts decreases, so the size of the population affected increases (Burton et al, 1978); that there is a tendency to overestimate the impacts of large scale hazard events and to underestimate the minor and more frequent hazards; that the more frequent and well-known the hazard, the greater will be its integration within community culture and the less variation there will be in reaction to it; that, generally, the greater the physical or emotional distance from the hazard, the less the psychological impact (Alexander, 1991:213-214). The search for such 'laws' and "a general theory of response to flood hazard" (James et al, 1971) is indicative of an early, crude, empiricist approach that has been modified subsequently to some extent.

Nevertheless, underlying much hazards research there remains an assumption that there exists an objective reality which is capable of being perceived more or less realistically - although rarely achievable. This position is allied perhaps to the pragmatism of Park (Jackson and Smith, 1984:71) which is a hybrid between empiricism and humanism. This duality is reflected in White's (1966a) early recognition that "there can be no thoroughly objective perception of the environment, only degrees of distortion which are minimized in rigorous scientific description" (White, 1966a, quoted in Kates and Burton, 1986:225), which suggests, paradoxically, both the unlikely attainment of a truly objective perception and the mechanism (rigorous science) by which it might be possible.

2.2.3 The rationality question: bounded rationality

The early hazards research was strongly influenced by the tenets of economics, one of which suggests the existence of the 'rational, economic man'. Thus it was formulated that the floodplain manager's choices were based on individual economic optimization, as a result of relatively complete knowledge of the (flood) hazard and possible adjustments. This initial, 'optimizer' model was modified to one of subjective expected utility where optimization was sought but on the basis of limited knowledge. However, even this modified model failed to explain many research findings and thus a model of bounded rationality (Simon, 1957) was adopted and developed by Kates in his study of LaFollette (Kates, 1962) and later in his

general systems model of human adjustment to natural hazards (Kates, 1971).

Burton et al, (1978) later acknowledged that rarely do individuals have access to full information regarding natural hazards or choice of adjustment and that even if they were to have such information, it is unlikely that they would be able to process it adequately or select optimal adjustments (Burton et al, 1978:52).

The early research into floodplain adjustment tended to regard as irrational floodplain managers who failed to perceive the flood hazard or failed to adjust optimally (White, 1966b). Later work found that when attitudes or behaviour were placed in perceptional context then much could be seen to be rational within these bounds (Parker, 1976). Nevertheless, despite such modifications to a crudely empiricist approach, the attainment of rationality in decision-making remains a dominant theme.

The policy implications of such an analysis are that if existing (boundedly rational) attitudes/behaviours have been formed on the basis of inadequate knowledge, they can more closely approximate objectively rational attitudes/behaviours through education. This is the model on which the NRA operates: it assumes that, given an adequate amount of information on the flood hazard, the floodplain resident will act rationally by accepting floodplain management proposals put forward by professional flood defence managers. However, there is incomplete understanding of the relationship between knowledge and action and much of the literature points to a lack of causal relationship (Sims and Baumann, 1983). Furthermore, in a complex society, rationality is culturally bounded, dependent upon the differing experiences of different social groups and institutions (Douglas, 1978; Rayner and Cantor, 1987).

2.2.4 The standard survey instrument

The relationship between theory and method is complex and, arguably, its nature has yet to be determined definitively (see Chapter 5 for further discussion). Kates and Burton (1986), who have described natural hazards research as a "modest but universal research paradigm", claim that it is **the problem**, and not the discipline or available methodology, which dictates the research (1986:324). Conversely, Waddell claims, in a review article of White's 1974 volume ("Natural Hazards: Local, National, Global"), that the "configuration of the problem is dictated by the constraints of the methodology" (Waddell, 1977:76).

A standard survey instrument (White, 1974; Natural Hazards Research Working Paper

No.16, 1970) was developed for the collaborative research programme sponsored (from 1969) by the Commission on Man and the Environment of the International Geographical Union (a selection of whose results were published in White, 1974) based on early empirical work in North America (Burton et al, 1968; Kates, 1971).

The basic research design entailed an examination of the extent of occupance of hazard-prone areas, hazard perception and the adjustment choice process, the range of possible adjustments to hazard events and the effects on response of varying public policy (White, 1974). It has had an enduring influence on much hazards research, even up to the present day (the case studies discussed below owe much of their basic conceptual structure to the standard survey instrument).

While criticisms of this standard questionnaire have been extensive (Waddell, 1977), including some from those taking part in the original collaborative research programme (Rowntree, 1974; Kirkby, 1974, Saarinen, 1974), nevertheless it has been an undeniably productive research instrument, although it is sometimes argued that the subsequent research findings have been lacking in substance (Waddell, 1977): producing quantity but not quality.

Lewis (1976), in a review essay on White's "Natural Hazards: Local, National and Global", advocates an intermediate stage of research to investigate implementation of findings and to involve a management study to aid assimilation of the research results by those practitioners for whom they would be most useful. He also identifies a need for a methodology, to parallel the standard survey instrument, for the analysis of the socio-economic patterning within a given location (Lewis, 1976:232). Arguably, this remains an unmet need despite analysis of the institutional and political levels by later researchers (Penning-Rowsell et al, 1986).

The many criticisms of the standard survey instrument initiated improvements to existing techniques and searches for alternative methods. Some later work has used less structured, more in-depth studies, owing more to anthropological methods (Whyte, 1986; Lave and Lave, 1991). Schiff (1977) suggests three 'new' methodological approaches to aid understanding - specifically of the relationship between personality variables and coping behaviour.

Firstly to "abandon" structured interviews with large samples and to concentrate on in-depth interviews with fewer people. Secondly, to shift the emphasis from the independent variable suggested by theory to relate to adjustment adoption, to individuals known to vary on the dependent variable and look for the factors which differentiate between them. This is a model of research based on the deviant case which is a common focus in qualitative methods but in

quantitative methods may be excluded from analysis as an 'outlier'. Thirdly, to examine the adjustment process using the household rather than the individual as the unit of analysis. This third point acknowledges the limitations of decision-making at the individual level although the subsequent suggestions for analysis places it firmly back in a positivistic mode (1977:252).

Generally, however, questionnaire surveys modelled on the standard instrument have endured largely because their core structure has proved to be sufficiently reliable and valid (if not very innovative) to further the basic core theory; they are appropriate to a pre-structured research design which makes them more amenable to the construction of detailed research proposals; and the descriptive statistics produced are of a form to satisfy research sponsors.

2.2.5 Earlier research findings

This section discusses the broader research findings of hazards research, rather than individual results and significant variables: such reviews can be found elsewhere (White and Haas, 1975; Parker and Penning-Rowsell, 1983; Mitchell, 1984).

Early hazards research by geographers questioned why people occupied hazardous floodplains and examined the land use and economic effects of public action to reduce flood losses. The major finding to come out of this work was that increasing large-scale federal investment in flood control had resulted in an increase in total national losses (White et al. 1958). This was the so-called 'levee effect' (Burton et al, 1968:15) whereby the development of flood control structures induced floodplain encroachment which put greater numbers at risk of any future floods greater than the design flood (i.e. the level of flood which the control structure was designed to protect against).

Subsequent research examined the effects of non-structural adjustments to flood hazard and this was followed in the late 1960s by a collaborative research programme between the Universities of Chicago - later Colorado (i.e. White), Clark (i.e. Kates) and Toronto (i.e. Burton), which extended the flood studies to other geophysical events and to other countries (White, 1974).

As noted above, the amassing of empirical research results has generated several basic 'laws' but also, central to hazards research are a core of findings and hypotheses generally accepted within the paradigm. Firstly, there is the hypothesis that the apparently irrational behaviour of persistent floodplain occupance can be seen to be rational when the 'poor' perceptions of

the occupants are examined. This early contention by White formed the springboard for the ensuing perception research.

Secondly, the paradigm posits that variations in hazard perception can largely be explained by: physical hazard characteristics; recency and severity of flood experience; situational characteristics of the adjustment decision; and personality traits. The primacy of experience has been at the core of hazards research and was conceptualised as a 'prison' of experience (Kates, 1962:140).

Thirdly, there is the hypothesis that choice of adjustment is a function of: hazard perception; perception of available choices; and hazard experience (White, 1973, 1974; Burton et al, 1978). The latter has been modelled by Kates (1962) as a 'certainty-uncertainty scale', where it is on the basis of perceived frequency of flood events that adjustments are adopted. Thus few adjustments will be adopted in areas of low flood frequency and low flood hazard perception and vice versa.

It was recognized that extreme events in nature can produce both benefits (resources) and costs (hazards) (White, 1945; Kates, 1971; Burton et al, 1978); likewise, risks are sometimes tolerated because they too can entail benefits for the risk taker (James, 1974; Fordham, 1991a; Fordham and Tunstall, 1990; Green et al, 1991). The latter is a somewhat less researched area, most research having concentrated on the more desirable (in terms of the dominant paradigm) result of risk avoidance and adjustment choice.

Early research explained persistent floodplain occupance largely on the basis of faulty or inadequate information about the risk (Kates, 1962): i.e. subjective expected utility later modified to bounded rationality. This analysis suggested that adequate information would increase awareness of risk and this would lead inevitably (rationally) to the adoption of protective measures. However, this causal chain is unproven (Sims and Baumann, 1983) although intuitively attractive still. Later research found that many floodplain residents were aware of the flood risk and tolerated it to varying degrees because of the perceived locational benefits (James et al, 1971[15]; Moline, 1974; Fordham and Tunstall, 1990).

A recurring theme in hazards research is the threat denial response: when asked to estimate the probability of recurrence of flooding, common responses are "we have no floods here, only high water" or "it can't happen here" (Burton et al, 1978; Burton et al, 1968). A

[15] James et al (1971) found 7 factors influencing residential choice: access, space, low price, facilities for children, seclusion, attractiveness and nice neighbours.

theoretical explanation for this response was proposed by Kates (1962) and Burton (1972), based on cognitive dissonance theory (Festinger, 1957). This explanation suggests that the knowledge that one's environment is hazardous is inconsistent with the continuation to live there and creates dissonance that is removed by denying the threat.

Geographic proximity to the hazard is hypothesized to influence response to the hazard. Allied to this is the threat enhancement hypothesis which suggests that those living further from the source of hazard tend to enhance the threat posed by the hazard (by the circulation of fear-arousing rumours) to justify the fear they feel in the absence of visible hazard damage; thus they eliminate the dissonant state (Festinger, 1957). Shippee et al (1980) examined this concept and incorporated distance from the hazard source as an independent variable. They found enhanced hazard perception in those individuals who perceived themselves to live on and beyond the hazard area (defined by researchers) but no threat denial response was found in those living in close proximity to the hazard (Shippee et al, 1980).

Psychological explanations for attitudes and behaviour have also included personality traits related to whether a respondent feels in control of their destiny (internal locus of control) or whether they feel other forces - such as God or fate - are in control (external locus of control) (White, 1974; Sims and Baumann, 1983). There have been considerable measurement problems in the examination of this concept (Schiff, 1977) and it proved to be particularly susceptible to the claim of cultural and historical specificity (Waddell, 1977; Torry, 1979c).

An important theme in White's work has been the study of the perceptions of laypersons which, he noted, can conflict with those of 'experts' (White, 1966b). Although the perceptions of laypersons can be accepted as being boundedly rational, yet in much hazards research, the expert/technical perception is seen to be more closely allied to 'reality'. Respondents are classified as 'optimistic', 'pessimistic' or 'neutral', depending upon whether their future flood expectation, respectively, underestimates, overestimates or coincides with the scientific expectancy (Roder, 1961). This position is perhaps explained by the influence of White's humanism, which gives greater emphasis to meanings and values, and diverges from more assiduously positivist modes of explanation which tend towards quantification and are more closely allied to the expert/technical.

Apart from prior flood experience (which one would intuitively expect), associations of significant variables have been inconsistent across individual surveys (see Appendix A-2.1) and even the flood experience variable has not been entirely consistent (McKay, 1984). For this reason it is not proposed to discuss further findings here but they will be referred to

below wherever relevant.

Early hazards research recognized the issue of salience of hazards (Burton, 1962) but subsequently it has been "buried" as a research issue (Whyte, 1986:256). Furthermore, Whyte (1986) claims that "salience cannot be deduced from measures of perception and response" and that "by putting questions on hazard probabilities and future behavioural adjustments together in the same interview, the researcher can generate [...] spurious relationships" (1986:257).

Burton and Kates (1964) acknowledge the cultural influences in the occupance of hazardous coastal areas, in particular the recreational potential and attractions of the outlook, but rarely extend recognition (and examination) of these benefits to riverine floodplains in their comparison of locational advantages. They make the interesting observation that in river floodplain environments, the introduction of structural flood protection may encourage further development by increasing perceived safety behind it, while in coastal regions the reverse is likely, if such protective devices obliterate the view and thus reduce the amenity value of the site. They suggest that, in this situation, the removal of such protection, and thus the extension of a sea view and concomitant amenity value, is more likely to increase development (1964:380). This study has found that similar cultural influences are apparent in both coastal and riverine floodplains in Britain.

Burton and Kates found that managers of coastal properties, even those whose residence was seasonal, had a greater hazard awareness than city dwellers on river floodplains; "The city floodplain dweller with no knowledge of flood hazard is common. The coast dweller without a little knowledge of storm potential has not been found" (1964:384). However, they state that coastal dwellers also tend to be somewhat "optimistic" in assessment of frequency, likelihood, probability and severity of storm damage (1964:385). An urban-rural split (mirroring the riverine-coastal dichotomy above) in awareness and adjustment has also been noted in Britain (Penning-Rowsell, 1976).

2.3 Models of flood hazard perception and mitigating adjustment - general introduction

A fundamental feature of models is that they involve in their construction a highly selective attitude to information (Chorley and Haggett, 1967:23). The selection process creates a structure based on the connections between (perceived) significant aspects of reality.

> "A model is simply an ordered set of assumptions about a complex system. It is an attempt to understand some aspect of the infinitely varied world by selecting from perceptions and past experience a set of general observations applicable to the problem in hand" (Meadows et al, 1974:20).

A prerequisite of a geographical model is its reapplicability to the real world and a major function is its ability to bridge observation and theory (Chorley and Haggett, 1967:24).

Although the environment, as experienced, "is a seamless web", with the social and the physical interacting, yet there has been a common distinction - across a range of disciplines - between social and physical milieus (Lowenthal, 1972:334-5). Even when both are system components, integration is often lacking. Anderson (1973) notes, from the perspective of social and cultural anthropology, that there is a need to integrate 'environment' within the total system rather than viewing it as an external 'given' of the system. In many models (and this is applicable to the hazards research models) ecology-environment (the terms are often used interchangeably) is seen as an exogenous factor, a backdrop against which the primary components are placed. Environment - when used as an explanatory variable - is an external factor influencing the socio-cultural system under study but not actually a part of it; however, the treatment of culture and environment as independent is a move away from an ecological perspective (Anderson, 1973:207).

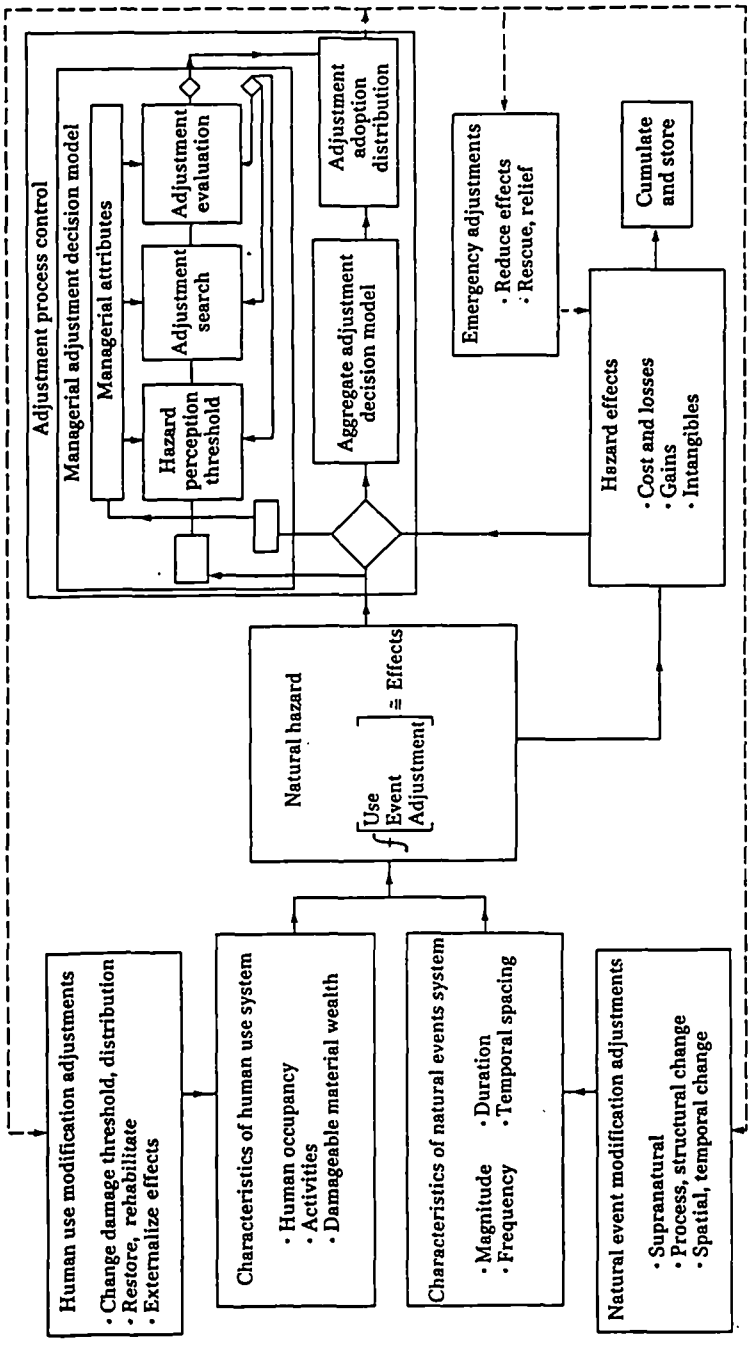
Anderson (1973) argues in favour of a systems approach, which he believes could be a primary tool of synthesis and integration. His belief, however, is predicated upon the existence of an "actual objective environment" and the possibility of freedom of ideological bias (1973:213), two theoretically related concepts, both of which have been challenged (Jackson and Smith, 1984; Pahl, 1970; Harvey, 1974). Harvey has said that the claim of science to be ideology free is itself an ideological claim (Harvey, 1974:23).

The basic model in hazards research of the mitigation adjustment process is that conceptualised by Kates (1971) and discussed in detail below. Later modifications to this basic model by Mileti (1980) are discussed below in Chapter 4.

2.3.1 Kates' general systems model of human adjustment to natural hazards

Kates' (1971) general systems model of human adjustment to natural hazards (see Figure 2.1) is the dominant conceptual model within hazards research. It is described in some detail because of its fundamental importance in the research field and because it was the initial model which directed the design of this study. Despite many justifiable criticisms (see below),

Figure 2.1: Kates' (1971) General systems model of human adjustment to natural hazards



the model simplified (or over-simplified as some would argue) the complexity of the problem area and was a bold, initial step which served at least to create a focus for a critical response.

The origination and initial development of the concept of human adjustment belongs to the work of Harlan H. Barrows (Barrows, 1923). In hazards research 'adjustments' are courses of action available to floodplain managers for coping with the hazard (Slovic et al, 1974) such as loss bearing, structural works, flood warnings, land use change or control etc. Adjustment is a short-term response, said to be purposefully or incidentally adopted (Kates, 1978). Various typologies of adjustments have been constructed (White, 1961b; Burton et al, 1968, 1978; Mileti et al, 1975; 1980).

Kates lists four critical features of natural hazards which influence choice of adjustment. The **frequency, magnitude** and **suddenness of onset** of the natural event and, fourthly, the **'ecological setting'** (see above). Although Kates refers to decision-maker differences, he presents them as essentially minor and finds no fundamental discrepancy between individual and collective choice (1971:440). While acknowledging that earlier individual or collective action may have constrained future choice, nevertheless, the emphasis throughout is on choice rather than constraint.

Hazard perception is defined as expectation of future occurrence and personal vulnerability and Kates claimed it to be independent of socio-economic indicators. The most significant characteristics of the hazard event were hypothesized to be magnitude, duration, frequency and temporal spacing; of personal experience: recency, frequency and intensity; of personality: fate control, differential views of nature and tolerance of dissonance-creating information. Risk-taking propensity was found to be inconsistent, arising perhaps from the difficulties found in measurement.

Awareness of adjustments is viewed in a passive manner and seen to be mainly a function of "casual access to communication networks" (1971:441) and differences in awareness "might be" due to factors controlling access to information. Motivation for increased knowledge is seen to be possibly related to personal experience encouraged by "positive views of fate control and the efficacy of action" (1971:441). Political power or effectiveness is absent from this exposition. Kates' floodplain actors appear passive individuals for whom freedom of choice is constrained merely by their own information and personality traits (which is commensurate, perhaps, with a geographer schooled in the behavioural science tradition working in a North American environment of 'free enterprise').

In Kates' model the interaction of a human use system ("locations, livelihoods, and social organization" (Burton et al, 1978:20)) and a natural events system ("the array of wind, water and earth processes" (Burton et al, 1978:20)) poses a natural hazard. Arguably, this should be, at most, a **quasi**-natural hazard. Such human use interactions seriously compromise the 'naturalness' of any event.

Human use is described in terms of "managerial units"; from the smallest, which comprises a household, through industrial and governmental units to an aggregate which is the nation-state. Although Kates admits that "one cannot simple aggregate the smaller units to arrive at the higher levels of hierarchy" (1971:444), there is an assumption in the work that this is indeed what happens in the absence of any differentiation of behaviour between the individual and the collective anywhere in the model.

The adjustment process control sub-model (Figure 2.1) describes a threshold of hazard perception below which adjustments are neither sought nor evaluated. The threshold is a function of the manager's perception of natural events, personal hazard experience, and specific personality characteristics. Crossing the hazard perception threshold triggers a search and evaluation of known adjustments and, based on the evaluation, a decision is made whether or not to adopt an adjustment. The major influence on adjustment adoption is hazard frequency with high variation of adoption in areas of intermediate frequency; the so-called certainty-uncertainty model (Kates, 1962).

Forms of adjustment are modifications of the natural events system, modifications of the human use system and post-event emergency adjustments. Although the model is of individual adjustment, few of the suggested available adjustments are open to individual action. Weather modification in the form of cloud seeding, water storage and retardation structures for example are beyond the financial and legal means of most individual managers and yet collective, institutional or governmental policy and behaviour and its role in constraint or availability of choice is not modelled.

Kates acknowledges the limitations of the model to deal with external determinants of behaviour, giving as examples the effects on policy of the economic depression of the 1930s and their likely impact on behaviour during droughts and floods at the time, and the influence of colonialism in East Africa through its 'encouragement' of cash cropping and controls on movement. But, again, these are not seen as structural, or systemic, constraints on availability of choice but as "events" (1971:450); neither do his examples reflect the omnipresence of "external" determinants of behaviour. The continuing process of fragmentation and reduction

inherent in the model obscures the wider, major issues by its focus on the particular and the minor.

The model presents a picture of free and (theoretically) unlimited individual choice. Rational economic man is only moderately bounded; and then bounded only by an inability, or an almost perverse refusal, to perceive the choices available. Contained within the model is the potential failure of the individual to adequately respond to the rational demands of the system, rather than in any sense the explication of a political system and its constraints. Individuals are said to "fail to perceive" environmental risks (Burton et al, 1978:88).

It has been suggested (Whyte, 1986:252) that, since it is acknowledged that only a subset of possible factors have been included in hazard perception models, discussion should focus not on whether models include all relevant factors but on whether they include the most important. The Kates model approximates to a closed system where problems are analyzed only with reference to its internal structure and not its external environment. The external environment is a 'given'; an essentially unchanging and unchangeable system of conditions within which the model operates towards a condition of homeostasis. While there may be academic justifications for this (that it is impossible to study the full complexity of reality, thus the model is an abstraction of one manageable component; that the study of the external environment exceeds the bounds of an academic discipline, for example) the effect of applying this model to the 'real world' is the maintenance of the status quo. Thus engineers can continue to operate solely within their engineering paradigm and fail to address the wider socio-political issues of, for example, land use planning because these are external to their modelled decision-making structure.

A major problem of past analyses has arisen from the virtually exclusive viewing of flood hazard adjustment through the single optic of flood hazard perception. However, flood hazard adjustment decisions are intimately bound up with other factors of land use, environmental concern, the power of the individual to choose, the degree to which the decisions of institutions are representative of given constituencies, the influence of underlying and competing value systems and ideologies reflecting political, economic and social structures, etc. Flood hazard perception is just one of many factors bearing on the decision.

2.4 Application of the dominant paradigm to the British situation

The non-applicability of the hazard school research methodology to other parts of the world and the call for an anthropological input to counteract its cultural specificity were frequent

criticisms of White's much reviewed and discussed 1974 volume (Lewis, 1976) although the critics most often referred to its inappropriateness for the less developed world rather than Britain. Nevertheless, despite the many political and cultural differences, the hazard school model was imported almost unchanged into the British geographical research discipline (Porter, 1970; Penning-Rowsell, 1972; Penning-Rowsell and Underwood, 1972; Parker and Penning-Rowsell, 1972; Harding and Parker, 1974; 1976; Parker, 1976).

The inappropriateness to Britain of the dominant hazard research paradigm has been related to differences in land use control, floodplain size (Parker and Penning-Rowsell, 1983), construction methods and materials (Smith and Tobin, 1979), and floodplain management institutions (Penning-Rowsell et al, 1986). Arguably, these criticisms were all satisfied by minor adaptations of the model.

Thus, the model evolved slightly by, for example, investigating the economic benefits of flood alleviation (Penning-Rowsell and Chatterton, 1977) and the intangible costs of flooding (Green et al, 1983; Green and Penning-Rowsell, 1985) and by adopting a planning focus (Penning-Rowsell and Parker, 1973; 1974; Neal and Parker, 1988). Perception studies similarly followed the North American model with closely approximate results (Harding and Parker, 1974; Parker, 1976; Penning-Rowsell, 1976; Smith and Tobin, 1979). Arguably, with the same research model it was inevitable that the findings would be closely related.

The difference between societies based on free enterprise (North America) and a welfare state (Britain) is another factor in the inappropriateness of the transfer between the two but this factor was not amenable to understanding by a minor transformation of the model and thus has remained under-researched.

In the British situation, crossing of the hazard perception threshold is frequently induced artificially by institutional forces which, likewise, influence the adjustment search. Although it is possible for individuals to make their own adjustments by floodproofing properties or various adaptive or coping strategies, most flood hazard adjustment is performed and governed at a higher level. The insurance situation in Britain is also different to that operating in north America. In Britain, the majority of insured households (there is variability in uptake of insurance irrespective of flood risk) have flood cover as standard in their insurance policies: thus, premiums are spread throughout the population with those in flood-prone areas being subsidised by those who are not. In areas subject to frequent and/or serious flooding, however, premiums or level of 'excess' may be raised considerably. Insurance has been seen as an effective response to flood hazard by spreading the cost through space and time (Arnell

et al, 1984).

An example of the application to Britain of the dominant model was the research done by Smith and Tobin (1979) in Cumbria. They followed closely the 'dominant paradigm', concluding, optimistically, that a predictive model of floodplain behaviour could be possible in the future based on hydrological data and social traits. This they based on findings such as, for example, that older residents had the most accurate perceptions of the flood hazard and were most likely to adjust 'effectively'. Thus, the degree of hazard adjustment on particular floodplains could be gauged from an assessment of census data and, following on from this, suitable educative action could be taken to improve the existing level of response (1979:117).

Their general model of individual hazard perception and response (1979:117) has as its goal the seeking of a peaceful coexistence with the floodplain environment, with degree of fear as the crucial catalyst for response. This models a small part of the total decision space by concentrating on the point of perception and ending with "a response". Perception of the flood hazard is associated with the physical characteristics of flooding, "structural factors" (which they list as proximity to hazard source, house type (cellar) and areal location) and social characteristics. Forms of response are limited to taking individual action or pressurising authorities to take action. Although it does acknowledge the decision choice of "accept some flooding".

Between perception of flood hazard and response is "degree of fear". Thus, if no degree of fear is experienced, presumably there will be no response. This again is an inappropriate focus on the individual: even if an individual does not perceive there to be any hazard, if the NRA perceives there to be (a sufficient) one then an adjustment will be made. The NRA has permissive powers that enable it to override objections and to develop a flood defence scheme **'in the wider public interest'** (although they would be unlikely to override significant numbers of objections).

Smith and Tobin's concluding list of five practical, "prospective advances" (1979:116-117) in flood loss reduction begins with the need for "general education", comprising a local authority leaflet outlining suitable action in a flood emergency and regular publicity for any existing warning schemes. The primacy of the educational role is perhaps over optimistic given that the causal connection between education and behaviour has very rarely been demonstrated to have occurred (Sims and Baumann, 1983; Mileti et al, 1975).

Third in the list, following the setting up of a flood warden scheme, is "development controls" which, arguably, should come first if the wider socio-political causes of flooding are acknowledged and if future escalation of damages through inappropriate floodplain development is to be halted. Smith and Tobin see this as a prospective advance in the long term, which is perhaps why they placed it lower down in their list of practical aids. However, while the necessary legislation to enforce development control may take some time, sensitivity to the importance of its role in floodplain management can begin much sooner, hence delay should be avoided. The major barrier to this kind of advance is an institutional one; floodplain management has never been integrated successfully within the wider land use planning structure and existing institutional structures are dominated by engineers, not planners.

White (1974) recognized that to cope effectively with environmental hazards modern societies cannot rely solely on technological solutions:

> "A crucial aspect of any long-term accommodation to the human environment is the skilful, sensitive use of a range of adjustments, including engineering devices, land management, and social regulation. To depend upon only one sort of public action is to court social disaster, environmental deterioration, and enlarged public obligations" (White, 1974:13).

This, in terms of White's (1974) typology, is a post-industrial response. Arguably, this long-term accommodation has yet to fully materialize in British floodplain management which still favours engineering devices - a 'technological fix' - over land management and social regulation (despite the fact that land use planning and social regulation procedures do exist), although economic and environmental pressures may now be forcing a shift in this direction.

A later, British, conception of decision making in community hazard reduction (Penning-Rowsell et al, 1986) focuses less on individuals and more on macroeconomic and institutional factors and the wider structural forces at work in society. This modelling of decision making at the "'community' or political level" (1986:15) attempts a more close approximation to the complexity actually found in (British) society by a generalised typology of decision making influences, not specifically anchored to flood hazards. However, the "structural influences" remain atomistically separate from other "inputs and influences" and from the "catalysts" to action. Thus, this model appears insufficiently grounded in fundamental socio-political forces. It is possible that it is the over-mechanistic, reductionist form of conceptualisation (in other words, the model itself) that is at fault. A good model simplifies to aid clarity of conceptualisation but over-simplification can itself be an obfuscation.

Hazards research, like any other, does not operate in an academic vacuum but within the wider social relations of production. As such, the orientation of research production is ultimately structured by the dictates of political economy: 'fashionable' areas of research that attract funding are closely related to current states of national economy and government policies (Silverman, 1989:5). Much research is initiated and financed by agencies involved in hazard management and with their own "mission" (White and Haas, 1975:6). Parker and Penning-Rowsell (1983) have noted that, in the 1960s and 1970s, interaction between geographers and engineers ensured close links between policy and practice and influenced research initiatives (1983:186) but this, essentially positive, reading of the situation disguises the fact that the very nature of the links ensured little alteration to the status quo[16]. The engineering profession, as too the research profession, operates in such a way as to secure its own future, thus small scale incremental change is the most likely form of advance to arise from the geographer/engineer relationship.

This section has examined the theoretical underpinnings of hazards research with particular reference to its North American origins. The next section examines more specifically the floodplain management environment of England and Wales.

[16] See Harvey, (1974) for a discussion of this area.

3. FLOODPLAIN MANAGEMENT - ENGLAND AND WALES

3.1 The institutional context of flood defence

Detailed description and analysis of floodplain management institutions can be found elsewhere (Penning-Rowsell et al, 1986; Parker and Sewell, 1988; Parker and Penning-Rowsell, 1980); this section serves to orientate and place in context the discussion of research findings below.

Land drainage is a cover term which includes both the drainage of agricultural land and urban flood defence. These are linked both hydrologically and institutionally although it is the agricultural drainage interests that have dominated policy setting and implementation (Penning-Rowsell et al, 1986). In England and Wales responsibility for the determination of national water-related objectives and ensuring the implementation of legislation lies with the Ministry for Agriculture, Fisheries and Food (MAFF), the Department of the Environment (DoE) and the Welsh Office.

However, the day-to-day policy-making and executive functions are devolved to the regional level in which lies the responsibility for meeting demands for water, sewerage, land drainage and recreation (Parker and Penning-Rowsell, 1983; Penning-Rowsell et al, 1986). At this level, Regional Flood Defence Committees (RFDCs) formally approve expenditure for new structural flood defence works (Penning-Rowsell et al, 1986). Regional and local land drainage committees performed this function prior to the 1989 Water Act and the change of name underlines the shift of emphasis from agricultural to urban, although the committee structure remains largely unchanged. This institutional anomaly reflects the lobbying power of landowning and agricultural interests who have maintained their control over local land drainage spending throughout several institutional restructurings (Penning-Rowsell, 1987).

It has been suggested (Parker and Penning-Rowsell, 1983) that the formation of the ten regional Water Authorities, which occurred as a result of legislation in 1973, was to the detriment of public accountability because policy and decision-making was then situated at neither the national, parliamentary level nor the local government level. This worked to the benefit of the (engineering) professionals for whom the political dimensions of decision-making were seen to be a poor substitute for technical judgements.

It has also been suggested (Patterson, 1987) that the transfer (as a result of local government legislation 1974) of water management from a local government level to regional level also

served to emphasise the role of water as a commodity and a resource for industry while devaluing it as a service concept; regional level organisations, by their scale of operation and relative lack of elected representatives, are more accessible to powerful capitalist interest groups (who also tend to be organised at a regional level) and less accessible to non-dominant, local consumer-based pressure groups (who tend to operate at the local level). This process, and the market economy ideology upon which it is based, is closely related to the later water industry privatization process (see below).

River management generally has undergone numerous institutional changes but has been organised largely within river catchment boundaries since the 1930 Land Drainage Act which invested 46 Catchment Boards with responsibility for land drainage. Subsequent legislation (i.e. the 1948 River Board Act, the 1963 Water Resources Act, the 1973 Water Act and the 1989 Water Act) reduced the numbers of authorities to ten, while still maintaining natural land drainage catchment boundaries (Gardiner, 1991:1/16).

Water management organised within a river catchment or basin structure can have technical and economic benefits by, for example, avoiding the export of costs ('externalities') beyond management boundaries, as can occur when upstream, river management operations cause downstream effects (Green, 1990a). It can be difficult however to maintain consistent inter-organizational liaison practices where hydrological and (local) political boundaries diverge.

Integrated river basin management (IRBM) - the management by one body of the whole water cycle from rainfall collection to water supply and treatment of waste water - created as a result of the 1973 legislation, has been widely regarded as a favoured operational structure (particularly in continental Europe where it is effectively precluded by the crossing of national boundaries by major rivers) but had an inherent weakness in that one organisation had both utility and regulatory functions.

This integrated system was broken by the water industry's latest (1989) institutional restructuring - privatization of the water supply and sewage treatment functions (see below) and the retention of the regulatory function in public hands (the NRA). Arguably, this latest development is not to be understood primarily as the attempt to increase institutional operational efficiency but rather as a result of the ideological position of the current and former conservative governments.

3.1.1 The flood defence function

It has been estimated that approximately a quarter of a million people (0.6 percent of the population) are at risk of flooding likely to occur on average, once in 100 years (Penning-Rowsell and Handmer, 1988; National Water Council, 1983). Just over half of these people are in areas covered by a flood warning system. Up to a further 200,000 people may be at risk of flooding from the sea (Handmer, 1987).

Flood defence in Britain is regarded as a social welfare product (Penning-Rowsell et al, 1986): flooding is generally perceived as 'an act of God' (albeit exacerbated by individual and/or collective human action) and it is both difficult and often economically inefficient to provide flood defence for individual utility, thus it has long been seen as a responsibility of the state. However, the maintenance of the rights and responsibilities of the individual riparian owner is a key aspect of land drainage law. Another key element is the permissive, rather than mandatory, nature of much land drainage law.

As a result of legislation in 1973, the then Water Authorities were required to carry out surveys of their areas in relation to their drainage - including flood protection - functions (Water Act 1973, Section 24(5)) to identify all the major land drainage and flooding problems in each area and to include a plan or programme for their solution. This, later reinforced by Circular 17/82 (DoE et al, 1982a), also entailed consultation with local authorities and a duty to "have regard to" their structure and local plans towards a co-ordinated planning response.

3.1.2 NRA Thames Region

The Thames Region of the NRA, with which this analysis is principally concerned, is the highest spending region of the ten regions (the following based on 1989/90 figures) and is responsible for approximately a fifth of the total NRA expenditure. Out of a total Thames Region expenditure of 56 million pounds, flood defence expenditure accounted for 42 million. The Region covers an area of 5,000 square miles, having a population of some 11 million. It contains a floodplain area of 211,000 hectares and 3,230 miles of main river (Gardiner, 1991).

3.1.3 Privatisation of Water Authorities/NRA

In February 1986 the Government published a White Paper containing proposals to privatize

the water industry[17]: in the following July it announced it was shelving such plans for the current term of office. This was largely as a result of widespread concerns about a private water supply company being able to police itself - although this had been the case with public ownership. Privatization plans reappeared in the Conservative Party manifesto the following May, in which the regulatory functions were to be invested in a National Rivers Authority.

The water authorities protested strongly at the disintegration of IRBM - the "holy cow of the water authorities" (Mitchison, 1987). Roy Watts - then Chairman of Thames Water Authority and regarded as the 'inventor' of the water privatization idea (Sunday Times, 1987) - soon became its most sternest critic when proposals for the splitting up of the industry were announced. The proposals for the remit of the NRA were subsequently revised and a slimmed-down organization was proposed. Within a year - between February 1986 and July 1987 - the proposals for a water industry watchdog were said to have come full circle "from in-house lap dog, to expensive fanged hound, and ... back to a litter of toothless puppies" (Mitchison, 1987:21).

It has been stated that the government and the Water Authorities "stumbled into" privatization without clearly understanding its implications (Kinnersley, 1988:127). Policies have been ideologically-driven with the intention of changing social structures in favour of a reduction in public expenditure and the role of the state and an increase in 'popular capitalism'.

Certainly, anomalies remain. The flood defence function entails a major development role: this reproduces the conflict of interest inherent in the dual poacher/gamekeeper role that, it was claimed, would be abolished through privatisation and the separation from the water supply functions. The regulating of the flood defence development role lies ostensibly with MAFF via economic appraisal techniques designed to identify the potential costs and benefits of a proposed (structural flood defence) development: this technique is cost-benefit analysis (discussed below). A major limitation of cost-benefit analysis is its inability to deal adequately with environmental factors and yet environmental protection has always been seen to be a major part of the NRA brief. Publicity material of the NRA presents the Authority as the "guardians of the water environment" and lays claim to being "the strongest environmental protection agency in Europe" (NRA Thames Region, 1989a). The following section outlines some of the environmental legislation that has influenced floodplain management in recent years.

[17] The early (1986) White Paper never proposed to privatize land drainage and flood protection, for these special arrangements were to have been made.

3.2 The (environmental) legislative context of floodplain management

The growth of environmental concern has been institutionalised in the legislature which has, in turn, affected institutions. Of particular relevance for this discussion are the Wildlife and Countryside Act (1981), the Water Acts of 1973 and 1989 and Statutory Instrument 1217, The Land Drainage Improvement Works (Assessment of Environmental Effects) Regulations.

The 1973 Water Act stated that Water Authorities should "**have regard to** the desirability of preserving natural beauty, flora and fauna". The 1981 Wildlife and Countryside Act charged Water Authorities with the duty to "**further** the conservation and enhancement of natural beauty and the conservation of flora, fauna and geological and physiographical features of special interest" in the carrying out of their functions (Newbold et al, 1983). The 1989 Water Act extended these aspects to the **promotion** of conservation and enhancement for its own sake (Gardiner, 1991).

Thus there has been a progressive broadening of the powers of environmental protection in the legislation although careful wording has created a number of opt-out possibilities. For example, the duties to preserve, conserve, enhance and promote are all followed by such caveats as: as far as is consistent with other duties; as far as the NRA considers desirable; to have regard to the desirability of carrying out this duty; as far as is reasonably practicable and consistent with other duties (HMSO, 1989).

The European Community has had a significant effect on this legislative development and of particular relevance for flood defence was the introduction of Statutory Instrument 1217 (MAFF and Welsh Office, 1988). SI 1217 implements, in respect of proposals for land drainage improvement works, the European Community Directive 85/337/EEC on the assessment of effects of certain public and private projects on the environment and provide a procedure for the provision of an environmental statement where the works are likely to have a significant effect on the environment.

The drainage body is required to give notice of proposed works in two local papers and state whether or not they propose to prepare an environmental statement. If the drainage body proposes not to prepare a statement, and subsequently representations are made concerning the likely environmental effects, then the proposals must be referred to MAFF (or, if in relation to Wales, the Secretary of State for Wales) which may direct that an environmental statement must be prepared.

When a statement is prepared, this must be announced in two local newspapers and copies must be supplied to interested parties. If no objections are forthcoming then the drainage body may proceed with the works; if an objection is made and not withdrawn then the decision must be referred to the appropriate Minister for a decision (MAFF and Welsh Office, 1988). It has been argued (Gardiner, 1991) that in order to judge whether an Environmental Statement is necessary, an Environmental Assessment is a necessary precursor and so some form of assessment procedure is assured whatever the outcome.

The 1981 Wildlife and Countryside Act was a factor in motivating land drainage engineers in the integration of environmental interests with operational activities (Archer, 1986). However, although Severn Trent Water Authority has long employed a landscape architect (later a team) - many of whom combine aesthetic with nature conservation requirements - it was not until some time after the formation (in 1989) of the NRA that all ten regions created at least one permanent staffing position to deal with environmental aspects of the Authority's work; generally this was a Conservation Officer(s) post (Gardiner, 1991).

In July 1991 the Government announced proposals for the setting up of an Environment Agency comprising all or parts of three existing organisations: the NRA, Her Majesty's Inspectorate of Pollution and the Drinking Water Inspectorate. This could once again divide and disrupt the NRA, coming only two years after the last major change resulting from privatisation, although the likely effects on the flood defence function are unknown.

Having outlined the institutional and legislative background to flood defence, the next section addresses issues in the availability of choice of possible adjustments.

3.3 Choice in the adoption of adjustments

The theoretical range of choice of adjustments to flood hazard outlined in the literature (White, 1945; Sewell, 1969; Burton et al, 1978; Penning-Rowsell et al, 1986) would appear to be quite large (see Table 3.1). However, while much of the hazards literature has concentrated on the individual's
perception of hazard and choice of adjustments, the possibilities for individual adjustment are limited and may, in certain circumstances, be counterproductive when viewed within the wider context.

For example, if an individual property owner decided to protect themselves by constructing a floodwall around their property, the NRA might formally object to the works because of

Table 3.1: Options for flood hazard mitigation

UNIVERSE OF OPTIONS

GOVERNMENT LEVEL	STRUCTURAL OPTIONS	NON-STRUCTURAL OPTIONS
		* land use planning * building design & construction codes * provision of disaster relief
		* emergency planning
INSTITUTIONAL LEVEL	* build control structures (dams, reservoirs, relief channels, banks, walls etc) * river management	* issue flood warnings * public education * property acquisition
	* adapt individual buildings	
INDIVIDUAL LEVEL	* prevent access of water (e.g. sandbagging)	* evacuate * change location * bear the loss * insurance

their potential to obstruct flood flows and increase the level of flooding elsewhere in the floodplain. In this hypothetical case, individual action in response to the flood hazard, although highly 'rational' at the individual level and conforming to the desired outcome in terms of the dominant paradigm model (perceive flood hazard - make adjustment), would be overruled at the institutional level as an unacceptable response. Thus, it is accepted that flood control is the responsibility of the wider community and occurs (generally) above the level of the individual.

Although White (White, 1961; 1964) early recognized that the full range of alternative adjustments are never available to the resource/hazard manager, little research effort has been expended on why this is so: it is possible that the concentration on examining flood hazard perception as the means to understanding mitigation choices, rather than concentrating on mitigation itself has been a contributory factor. The actual (as opposed to theoretical) range of choice of flood hazard mitigation options available to the individual member of the public is constrained by government level policies, institutional level preferences, individual social, economic and political factors, and perception of the flood hazard (which may itself be moderated at the institutional level through control of information dissemination).

At the level of the individual floodplain resident, choice of adjustment can be so severely limited that it becomes more appropriate to replace the term 'choice' with 'constraint'. Far from choosing between a range of structural and non-structural options, the resident rarely has a choice even between alternative structural options but is most likely to be presented with **a single preferred structural option**. The 'do nothing' option is rarely offered as a choice, as such, but can sometimes be present in the form of a veiled threat (i.e. 'you must accept this or nothing').

Choice of the 'do nothing' or 'bearing the loss' options (where they are options and not impositions) are related to coping strategies. 'Hazard' has been recognized as "the interaction between a 'natural' event and the character of human settlements and economics **beyond the point where adaptive capacity to cope can avoid serious damage or death**" [my emphasis] (O'Riordan, 1990:293; Burton et al, 1978). However, 'adaptive capacity to cope' is variable; it will be different at different levels of analysis and - at the individual level - for different individuals. The implication of scheme promotion (by an external body) is that floodplain residents cannot (or have not) adapt or cope and that some form of external intervention is necessary. While this may well be the case, there has been little opportunity made to test adaptive capability.

The process of adjustment choice at the institutional level begins with a range of feasibility studies which may include one or more of the following: legal-administrative-ownership constraints, physical-technological, political, financial, economic, social (Smith and Tobin, 1979; James and Lee, 1971; O'Riordan and More, 1969) and environmental (Penning-Rowsell et al, 1986; Gardiner, 1991:2/6) feasibility. MAFF provide grant aid for flood protection/land drainage schemes under the Land Drainage Act 1976 and formal application procedures are required. Following consultation and agreement on expenditure by the Regional Flood Defence Committee, an application is made for Approval in Principle. MAFF has produced guidelines (MAFF, 1985) to ensure standardisation of approach to the evaluation of costs and benefits.

The (five year) capital programme is the framework within which schemes are prioritised. It can be the case that near the end of the financial year project managers find they have underspent on the capital programme and have to search for suitable work on which to spend the money (because of severe limitations on the amounts which can be carried over to the following year). Once schemes have been slotted into the capital programme it then becomes problematic to cancel them; thus, public opposition to proposed schemes, which (because of the usual timing for consultation) tends to occur some time after detailed plans have been started, can be very disruptive to the capital programme. Hence, project managers have a particular incentive to take a scheme to completion.

Smith and Tobin (1979) argue that human adjustment has been ineffective because of a dependence on partial solutions dominated by a technical approach. A major factor in the failure to adopt an integrated floodplain management strategy is the "general lack of understanding of the practical importance of the social dimensions of the problem" (1979:31)[18]. Floodplain management is a multidimensional problem which is ill-served by a unidimensional, technical-engineering approach.

The concept of multiple adjustments to flooding is not new: in 1937 President Roosevelt concluded in a speech that a number of measures have to be pursued simultaneously because "they all tie in to a general picture" (quoted in Platt, 1986:43), and White (1945) discussed this concept in some detail in 1945.

O'Riordan (1971a) has argued that the significant factor in resources decision-making is the actor's perception of the degree of threat presented by the problem in relation to other

[18] However, their analysis of the social dimension remains severely limited and adds very little to the earlier models emanating chiefly from the dominant paradigm in hazards research.

stresses in the community (1971:115). However, when the major decision-makers are (NRA) flood defence engineers, the flood hazard problem can become elevated to a primacy that tends to override other stresses[19].

3.4 Structural and non-structural adjustments

It has been noted that floods can be both hazards and resources: similarly, structural[20] flood defence schemes can confer costs as well as benefits. Overtopping or failure of defences can result in catastrophic flood events, far greater than would have occurred in the absence of defences. Both quantity and velocity are increased when stored waters finally escape the bounds imposed by the defence.

Acknowledgement of this apparent paradox is perhaps more advanced in the U.S.A. where, in the last sixty years, vast amounts of federal funds have been spent on such engineering structures. The prestige attached to the development of major engineering structures makes them attractive to both engineers and vote-hunting politicians and ensures, at least, their initial consideration if not their ultimate acceptance. Something of the grandeur pertaining to such works is expressed by Platt:

> "This national commitment to the taming of rivers and coastal waters ranks among the foremost undertakings of mankind, equivalent to the pyramids of Egypt, the Great Wall of China, and the moon program. It is now in the process of joining them as past history" (Platt, 1986:29-31).

While Platt can claim for the U.S.A., in 1986, that "blind faith in structural protection is a thing of the past" (1986:62), this is perhaps not yet the case in England and Wales, although neither is there quite the same uncritical acceptance and scale of belief that the statement suggests, nor, perhaps, the same scale of works. Furthermore, it has been noted (Parker and Penning-Rowsell, 1983) that structural flood relief schemes have been relatively successful in Britain.

The grant aid system which has operated in Britain has been biased towards structural,

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[19] In the Thames Perception and Attitude Survey (see DWSC/89 Case Study) some respondents mentioned, as a greater personal concern, aircraft crashing, as they lived beneath a flight path into Heathrow; another respondent volunteered that a more serious personal concern was reservoir failure, as they lived in the vicinity of a major reservoir and at the time of interviewing there was some media coverage of this latter danger.

[20] 'Structural' in this discussion implies a physical structure; something constructed.

centrally organized, management options with - in the past - little or no aid being available for non-structural floodplain management options (Parker, 1988). While the establishment of flood forecasting and warning systems attract central government grant aid, they are not yet operative throughout England and Wales and riverine flood warning services, while being continually extended, have been found to have a variable performance level (Neal and Parker, 1988)[21].

It is possible that as the capital costs of structural schemes increase, benefit-cost ratios decline and difficulties arise from escalating concern about the potential for environmental impact, there might be a growing shift of emphasis from the structural to the non-structural.

When engineers promote their schemes to the public, they do not make available sufficient information to enable the public to make a truly informed decision: they do not tell them, for example, that a factor in the choice of the level of structural defence offered is the likely frequency and seriousness of overtopping. Engineers prefer a standard of protection that avoids such a risk occurring too often as this can have a detrimental effect on their professional reputation (see Chapter 13 for further discussion of this point).

The process of extending the standard of protection and not publicising the risks attached to differing levels of protection or the existence of post-scheme residual flooding, is a factor in the development in the public of the belief that engineering structures offer complete protection. Although engineers recognize this erroneous belief by the public, arguably, they do not attempt strenuously enough to re-educate them, because of the risk that this might jeopardise their projects. Thus, the inherent dangers of engineering solutions are not part of scheme promotion.

Structural flood alleviation schemes can 'invite' further development behind the protection they initially provide - the so-called 'levee effect' - but any subsequent development compromises their level of protection to the extent that further flood alleviation schemes are required to maintain the initial scheme's design standard. It has long been recognized (White, 1945) that a circular process of protection-development-protection is thus created (Smith and Tobin, 1979). It has been argued (Neal and Parker, 1988) that the major reason for the perpetuation of existing flood hazards and the creation of new ones may well lie with the increased use of floodplains for property development. The circular process of protection-development-protection is a self-perpetuating system with potentially severe environmental

[21] A coastal stormtide warning service, aimed at preventing loss of life, is available for most of the coastline (Parker and Sewell, 1988).

consequences if structural solutions are the chosen option.

3.5 The wider land use planning context

A general land use and development control system, designed primarily to control the spread of urban development into the countryside, has been in operation in England and Wales since 1947. While not enacted specifically for floodplain control, it is believed to have been largely successful in controlling extensive floodplain development in areas of high risk (Penning-Rowsell et al, 1986:3). However, while it offered some control over future development, this legislation did not remove the existing flood problem which arose from historic development adjacent to the natural lines of communication and other benefits that rivers provided. Neither, despite a planning liaison system between the NRA and local planning authorities, did it sufficiently control developments in areas with (relatively) remote (1:25 - 1:100) risks of flooding.

The problem does not lie simply with large scale development: small-scale, incremental change can ultimately have a profound effect on the hydrological regime and can lead to a substantially increased flood risk and flood damage potential. Such developments may increase surface water flows by transforming permeable into impermeable surfaces, increase discharges to storm sewers (Hollis, 1975), obstruct flood flows, and/or create additional flood damage potential.

The planning liaison system which exists between the NRA and local planning authorities aims to control development applications which could exacerbate the flood risk (DoE et al, 1982a). The NRA, however, have an advisory role only and acceptance of its recommendations is discretionary.

It has been suggested (Gardiner, 1991:12/4) that the predecessors of the NRA "felt obliged" to facilitate floodplain development and that this was encouraged to some degree by the available guidance notes, Circular 17/82 (DoE et al, 1982). However, as a result of its mandatory duty under Section 8 of the Water Act (1989) to conserve and enhance the environment in the implementation of its functions, the NRA could now object to development proposals on environmental as well as drainage grounds (Gardiner, 1991:12/5).

Estimates of the degree and impact of floodplain encroachment in Britain are variable (Smith and Tobin, 1979; Parker and Penning-Rowsell, 1983; Neal and Parker, 1988) but in southeast England (the Maidenhead area is a good example) past development and current development

pressures have been substantial and the planning liaison system has not protected many areas from inappropriate development. However an argument has been put forward (Penning-Rowsell et al, 1986; Neal and Parker, 1988) for the selective development of floodplains as a necessary resource in such a densely populated country as Britain.

The next section returns to structural flood defences and the technique for evaluating their (economic) viability.

3.6 Cost-benefit constraints

Cost-benefit analysis (CBA), also referred to as benefit-cost analysis (BCA), is a tool which aims to guide choices towards a social optimum (Mishan, 1972) via Paretian welfare theory (Dasgupta and Pearce, 1972). The rationale of benefit-cost criteria is ultimately that of a potential Pareto improvement: defined as a change in economic circumstance such that one or more members of society gain without others incurring a loss; while a **potential** Pareto improvement (essentially the simple Pareto rule modified by the Kaldor-Hicks compensation principle) is a change which **can** make everyone better off such that gainers **can** compensate losers and yet themselves remain better off; although the theory does not require that everyone is **actually** made better off or nobody made worse off (Mishan, 1972; Dasgupta and Pearce, 1972).

Maximisation of net social benefit, frequently defined in terms of **national** economic welfare, ignores many other legitimate political objectives such as regional economic welfare or income distribution. Even an ideally constructed CBA cannot guarantee a prescription for society: "a project that is adjudged feasible by reference to a cost-benefit analysis [...] is quite consistent with an economic arrangement that makes the rich richer and the poor poorer" (Mishan, 1972:13). While acknowledging its limitations, it has been suggested (Donaldson, 1978:212) that a virtue of CBA is that it forces decision-makers to make explicit, relative social values.

The advent of CBA can be traced to the United States of America, in the mid-Nineteenth Century - when the notion of measuring the net advantages of a capital project in terms of the net utility gains to society was first addressed - and subsequently in 1936, in the United States Flood Control Act; but it was not until the 1950s, and its use in water resource decision-making (again in the USA), that formal procedures for valuing costs and benefits were attempted (Dasgupta and Pearce, 1972). Its first application in Britain was to the first motorway, and transport has continued to be a major application.

Flood alleviation, often requiring considerable public expenditure, is a typical example of a social welfare product for which CBA has been used to gauge the economic returns to the nation over and above the costs incurred. Since 1977 a manual of techniques and a computer model have been available to systematize the procedures (Penning-Rowsell and Chatterton, 1977; Chatterton and Penning-Rowsell, 1978, 1981). An important aspect of benefit-cost accounting is that, under Treasury rules, analyses must be carried out at the national level; this is justified on the grounds that it is the nation - not the region or the local community - that bears the largest proportion of costs of flood defence (Parker et al, 1987).

As part of the economic evaluation of flood defence, benefits are discounted over the life of the scheme. The discount rate is set by the Treasury and its aim is to allow comparison of the investment in flood defence with other investments (Penning-Rowsell et al, 1986). The benefit-cost ratio can be considerably affected by only small changes in the discount rate (O'Riordan, 1983a) which can decide the viability of a scheme. Thus the measure of social utility to be gained from investment in flood defence is somewhat arbitrarily constructed, relative to this rate.

Cost-benefit analysis, like any other technique, is open to manipulation. The illusion of value-free objectivity masks the reality of its use to confer respectability and spurious rigour on preferred objectives. Benefits are not **found** but **sought** to increase the benefit-cost ratio and make it more robust in order to ensure scheme approval and grant-aid from MAFF. While the latter procedure is designed to protect the public purse at the national level, it ignores the investment by engineers of a great deal of individual/personal resources into the promotion of a scheme. If the benefits are not sufficient, they will go back and look for more[22]. The potential for abuse of the technique was remarked by White (1971):

> "One effect of benefit-cost analysis is to give any respectable engineer or economist a means for justifying almost any kind of project the national government wants to justify. (You tell me the project you want, and I'll give you a favourable benefit-cost analysis). It's thrown a cloud of respectability over sets of analysis which have ignored whole sectors of impacts and have misread other aspects, all in the most earnest, conscientious form. [...] Exclusive reliance on benefit-cost analysis has been one of the greatest threats to wise decisions in water development. I wouldn't eliminate it: but I would try to see it in proper perspective in terms of other sorts of guidelines."

[22] During the engineers' interviews (see Chapter 13) one engineer discussed the trade-off point at which it was no longer worth expending officer time on squeezing a few more benefits.

The limitations of CBA in relation to urban flood protection have been discussed in some detail elsewhere (Parker et al, 1987); some of these limitations include: its over-simplification of issues to either benefits or costs; that it is predicated upon a social consensus model and cannot overcome values-based conflicts; it can alienate the public and impede public participation in decision-making by its use of technical language which can obscure inherent assumptions; and its omission of impacts which cannot be quantified in economic efficiency terms (Parker et al, 1987:28) (the latter point is discussed in the next sub-section).

CBA itself can be a constraint on floodplain management, in that national economic efficiency can sometimes be an inappropriate measure for the relief of local flood problems. It can also lead to the promotion of schemes entailing considerable environmental impact, as the standard of protection is forced up to give a ratio greater than unity and the potential for environmental impact increased. Cost-benefit analysis is a poor tool for assessing environmental impact because, in cost-benefit terms, 'the environment' has no value: in its broadest sense, it cannot - at present - be measured but is set aside as an 'intangible'.

In the light of recent advances in economic modelling some (Pearce et al, 1989) might argue with the latter assertion and claim that increasingly sophisticated economic models can indeed place quantitative values on human desires and preferences, including those pertaining to the environment. However, these measures have yet to gain widespread validation and acceptance; most particularly from government agencies such as the Treasury and MAFF.

3.6.1 Intangible costs (of flooding/of scheme)

CBA is perhaps as well known for what it does not measure as much as for what it does. The intangible damages from flooding comprise those to which a monetary value cannot be assigned and include anxiety caused by flooding and the anxiety aroused by the prospect of future flooding, physical ill-health as a result of flooding, and inconvenience arising from the breaking of communication links and commercial disruption (Parker and Penning-Rowsell, 1980). When compiling a benefit-cost report it is common practice to include a summary of intangible damages, to draw their existence to the notice of the decision-maker.

While the intangible costs of flooding have been recognized to exist and attempts made to evaluate them (Green and Penning-Rowsell, 1985), the intangible costs of schemes have hardly been acknowledged in any technical way; rather they have been regarded (if at all) by many practising engineers as, perhaps unfortunate, but inevitable, costs accruing to a minority for the greater good.

The use of Environmental Impact Analyses (EIAs) or Environmental Assessments (EAs) in flood defence scheme appraisal is a first step in acknowledging the sometimes major environmental impact of flood defence schemes; but EAs suffer similar limitations as CBA: e.g. the problem of assigning meaningful and comparable values to non-market goods. It has been suggested (Sewell, 1981; Bowers, 1990) that EIA is perhaps better recognized as a framework for public participation rather than an analytical tool.

While there is a degree of optimism on the part of some economists (Pearce et al, 1989) and policy analysts (Green, 1990b) concerning the potential for (and the desirability of) 'extending' cost-benefit analysis to determine 'objective' values for environmental and aesthetic factors, the focus has tended to be at the 'high value' end of the scale. Thus, while the impact of a proposed scheme on a Site of Special Scientific Interest (SSSI) or an Area of Outstanding Natural Beauty (AONB) may be scalable to some extent (although, I would suggest, this is arguable methodologically, and the desirability of doing so must ultimately rest on a value judgement), less amenable to measurement is the (relatively minor) impact of a scheme on, for example, the view from residential property or on ease of access to a local recreation or amenity area.

The end result of this kind of valuation could tend towards the maintenance of a few, scattered sites of national or regional importance containing certain rarities known to experts, and the destruction of most locally important sites containing common species familiar to, and valued by, the majority of the ('ordinary') public. The importance of the commonplace (Mabey, 1980) is underestimated by many (expert) decision-makers.

However, the highly disputable measures of environmental value are tangential to and, to an extent, an obfuscation of, an understanding of a more fundamental failing of CBA, which lies in the operation of monopoly power relations. The latter is the dominant factor in institutional decision-making and it is this, rather than in a failure to appropriately value environmental factors per se, that will significantly affect the outcome of any decision. At a theoretical level CBA relies on the independence of the decision-maker (Bowers, 1988; 1990), and is thus a typical product of (supposedly) value-free, positive economics. However, this condition is invariably violated: decision-makers frequently have some considerable interest in the outcome of the decision-making process and are often in positions of sufficient power to enable them to manipulate the analysis to their own advantage (Bowers, 1990).

3.6.2 Equity and distributional issues

Flood hazard mitigation invariably presents decision-makers with problems of equity. Costs and benefits rarely exhibit equal spatial, temporal or social distribution. Even when the benefits (of a flood defence scheme for instance) outweigh the costs, there is an argument that the minority who bear the costs must not be disregarded (Platt, 1986:42). In attempting to deal with such externalities it is common to aggregate individuals into 'the public' (see Kates, 1971); but, by ignoring specific individuals or minority groups, it is possible to overlook the potentially severe distress and disruption caused to them (O'Riordan, 1983a).

There are conflicting arguments over whether, or to what extent, CBA should be, or is, a means of redistributing income (Parker et al, 1987). Some would argue that it is not appropriate to deal with society's distributional problems at the level of flood protection: others would suggest that redistribution already occurs to some extent when Treasury funds - gained from all taxpaying members of society - are used to benefit the minority at risk of flooding: whether this redistribution is itself equitable is yet another issue.

Identification of costs and benefits invariably implies a degree of public consultation, albeit at the level of representatives rather than at the general public level. Similarly, legislative requirements (in particular, SI 1217) demand public exposure of flood defence proposals. These factors combined have been instrumental in increasing the amount of public consultation that flood defence institutions have to conduct. The next section examines the issues surrounding public consultation and participation in flood defence.

3.7 Public consultation and participation

The terms 'participation' and 'consultation' are frequently used interchangeably but they are in fact discrete. Participation invariably implies consultation at some stage but the converse is not necessarily the case. Consultation can occur without any real participation in the decision-making process: views can be sought but disregarded. Involvement through consultation may not effectively influence the outcome. However, if participation (in some form) is held to be the ideal end point and, to some extent, the purpose of consultation then the occasional conflation of terms below can be accepted.

Public participation is widely held to be "a good thing" - the egalitarian result of an evolutionary process of social change; although a revolutionary and subversive potential is also acknowledged (Sewell and O'Riordan, 1976). That consultation procedures have

'evolved' over recent years is also the perception of NRA engineers; not only have consultation procedures evolved they have also expanded enormously.

However, it has been noted that resource managers (NRA engineers in this case) rarely have the communication or group problem solving skills necessary for effective participation (Sewell and O'Riordan, 1976:19-20). NRA engineers report (see Engineers section) a growth in consultative aspects of their work and a lack of any formal training at any point in their engineering career[23].

A classic, if radical, analysis of participation is presented in the form of Sherry Arnstein's 'Ladder of Citizen Participation' (Arnstein, 1969) (see Table 3.2). The eight rungs of the ladder represent varying levels of citizen control. According to this typology, consultation can be mere tokenism which simply reinforces the status quo and provides a means for informed consent rather than an expansion of democratic choice (Nelkin, 1984:36). Just how far up the ladder it is possible to go, and how far any decision-maker would want to go (given the largely voluntary nature of much consultation in the area of land drainage) is debatable.

The NRA are statutorily obliged to consult certain organizations when proposing flood defence schemes with a likely significant impact on the environment. However, statutory requirements for consultation in land drainage are minimal and voluntary consultation procedures are required if the public is to influence decisions (Penning-Rowsell et al, 1986:171). In practice, those involved in flood defence scheme promotion invariably go beyond the statutory consultees and consult with a wide range of interested individuals and groups such as individual landowners, local wildlife groups, parish councils and others: the list of consultees can be lengthy (Gardiner, 1991). Consultation with the general public is generally undertaken at a late stage of scheme development and it is at this stage that the differentiation between consultation and participation becomes important and the consultation process can be regarded both internally and by some members of the public as little more than a public relations exercise (see Lower Stour Case Study for accusations of this nature and Chapter 7).

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[23] During interviews, one engineer described the current situation and past evolution as follows: "[Consultation work accounts for] the vast bulk of the time spent on a scheme. It outweighs the amount of time spent on design by a great amount. Design is a relatively insignificant part of scheme promotion these days...it's [consultation] sort of evolved over the years. Most of the people here have been in the field for quite a long time now...and the consultation process itself has evolved over the years with the people involved."

Table 3.2: Arnstein's 'Ladder of Citizen Participation' (source: Arnstein, 1969).

RUNGS ON THE LADDER OF CITIZEN PARTICIPATION	NATURE OF INVOLVEMENT	DEGREE OF POWER SHARING
8. citizen control		}
7. delegated power	citizens are given management power for selected or all parts of programmes	} degrees of } citizen } power }
6. partnership	trade-offs are negotiated	}
5. placation	advice is received from citizens but not acted upon	} } degrees of
4. consultation	citizens are heard but not necessarily heeded	} tokenism }
3. informing	citizens' rights and options are identified	} }
2. therapy	powerholders educate or cure citizens	} } non-participatory
1. manipulation	rubber-stamp committees	}

It has been argued (Sewell and O'Riordan, 1976) that the ultimate aim of participation is "community participatory design", through an integration of the latent planning potential of the public and the expertise of the elite; this being most possible at the small scale, community level where interest is high. However, decision-making issues are rarely containable at the community scale and may have regional or national level inputs and the question of who should participate or be consulted becomes quite complex.

Wengert (1971) touches on this problem in relation to water supply issues (on the Susquehanna river). He points out that it should not be assumed that those most concerned with development decisions are necessarily only those that happen to live in the watershed. In the Susquehanna example, he also points to the needs and concerns of several cities regarding the recreational potential of the basin and the national interest in its economic development (1971:31).

Wengert has noted the complexity of concepts of public participation and the difficulty of their implementation in water resources planning (Wengert, 1971). He suggests that many of those who have written on the subject have not carried out empirical investigations or analyses to support their assertions; rather that "ideological concepts of public involvement" may be overruling more traditional values of representation and majority rule and participation is often a euphemism for pressure tactics and manipulation (1971:27).

Sewell and O'Riordan (1976) also note that participation may lead to greater alienation by exacerbating social divisions and favouring those who can exploit the political culture (1976:19). Within a community there will be a variety of, often competing, interests with differing opinions and value-sets (Long, 1975:126). Representativeness becomes important when groups are used as a proxy for public opinion - particularly in environmental matters.

Success or failure in an environmental dispute can have distributional consequences for the rest of the community with costs and benefits being unevenly distributed (Lowe and Goyder, 1983:98-105). However, particularly in the case of social risk assessment, even when benefits accrue to the majority, due attention must also be given to the minority who bear the costs (Krimsky 1984:54; Platt 1986:42).

The consequences of participation may be increased tension and polarization, making imperative the setting up of parallel agencies or departments for conflict resolution. Neither does greater public participation necessarily make planning easier or decisions more rational (Wengert 1971).

Wengert (1971) makes the point that water planning agencies invariably do not have legal authority or institutional structures for involving the wider general public in decision making (1971:30) and even if they did, it is unlikely that they would know which public they should be concerned with. He quotes Dorfman (1969) who says "information about the nature of beneficiaries, as distinct from the nature of benefits, is not emphasized" (1969:30). In issues of flood defence there can be a blanket identification of all floodplain occupants as beneficiaries of a flood defence project. This may obscure significant impacts arising from a flood defence scheme on groups and individuals in the floodplain[24].

Non-participation should not be construed as implying consent or lack of concern but may

[24] It may also obscure other, more oblique, beneficiaries such as property developers, whose formerly flood-prone developments have thus been protected out of the public purse and whose identification might be in the general public interest.

reflect any of the following: incomprehension; apathy; ignorance of what is happening; distrust of the intentions behind participation; powerlessness and feelings of impotence to influence the outcome (Lowe, 1976; Otway and Wynne, 1989). However, the very fact of non-participation generally makes it impossible to explain the reasons or the attitudes.

Evidence supports the view that participation should occur early on before major choices have been made and options foreclosed (Kasperson 1986:276; Bruton 1980:440). However, many arguments against early participation have also been advanced; such as that information collection (possibly of a technical or scientific nature) may not yet be complete and the opportunity exists therefore for confusion when further assessment is carried out at a later date; that there is likely to be a profusion of interested and possibly competing parties requiring information; and that early consultation can increase the opportunities for opposition (Kasperson 1986:277). However, once the problem area is defined, inertia on the part of decision-makers can make a fundamental re-examination of policy issues extremely difficult: technical and policy issues are rarely clearly delineated (Krimsky, 1984:50).

An aim of consultation and participation in floodplain decision-making is the achievement of consensus (NRA Thames Region, 1989b), however, in nonhomogeneous communities increased participation is likely to highlight differences and increase conflict. Thus it is important to examine whether a condition for consensus exists. If so, participation may further its realization: if not, (if a condition of diversity exists) then participation is likely to contribute little to conflict resolution and may increase conflict by creating conditions for confrontation and polarization (Wengert 1976:27).

A fundamental division exists between perceptions of society as either conflict- or consensus-based. Is society basically a cooperative and integrated collection of groups, most of whom subscribe to the same kinds of values or is society more accurately understood on the basis of conflict theory and characterised by social conflict and alienation: the struggle for the acquisition of scarce resources, political power and ideological conflict? (Simmie 1974:42).

It would appear that the corporate view within the NRA favours the former model, and on this basis maintains a self-image as a provider of services for the public good. Minority opposition to these services merely indicates an information/education gap that need only be filled to achieve a broad consensus.

The perceived need for consultation/participation can be different depending on whether one is communicating (NRA engineer) or receiving (floodplain resident) information. A

differentiation can be made between the public official's perception of the role of public participation - as a **means** to accomplish ends (characterised by such goals as: correcting misperception; educating the public; reducing conflict; easing implementation; and increasing legitimacy) and the public's approach to public participation which tends to concentrate on **ends** rather than means and is characterised by conflicts over fundamental ethical issues such as appropriate or tolerable levels of risk and who is to decide such levels and - in terms of scheme or project development - should it go ahead at all and for the benefit of whom? (Kasperson, 1986).

The potential for conflict is particularly great where structural flood defence schemes are perceived likely to have a detrimental environmental impact. As more of the countryside and open space has come under development pressure so environmental concern has grown and the construction of schemes has become problematic. The next section discusses the growth in environmental concern that has been an influential factor in the agricultural land drainage debate but has only recently become an issue in urban flood defence.

3.8 The growth of environmental awareness/concern

There can be many interpretations of the term 'environmentalism'; some include "a social movement, a set of ideas based upon ecology, a 'back-to-nature' philosophy, or just a greater interest in environmental affairs" (Sandbach, 1980:21), and a politicising and reformist movement (O'Riordan, 1983a:300). This variability in definition reflects the diverse nature of, what can broadly be called, environmental concern within which many competing ideologies are to be found. Despite a widespread tendency to ascribe homogeneity to environmentalists, ecocentrism is politically ambiguous (O'Riordan, 1983a; Pepper, 1989).

A marked increase in concern for environmental issues was apparent in Britain throughout the 1980s but particularly so at the latter end when Margaret Thatcher, then Prime Minister, made a speech to the Royal Society which appeared to give a new legitimacy to environmental matters (albeit of a markedly non-revolutionary kind which linked the health of the environment with the health of the economy). Although the speech was regarded by many as a cynical vote-catching strategy - the Government's environmental words were not commensurate with their environmental deeds - it nevertheless initiated a great deal of speculation and discussion in the communications media (Marsh, 1988; Financial Times, 30.9.88; The Guardian, 29.9.88; Phillips, 1988; Nature, 6.10.88; New Scientist, 8.10.88) which began to carry environmental stories, or gave stories an environmental slant, on most days thereafter.

Environmental issues have remained prominent in the media, fuelled by pressures from the European Community and the passing of the 1990 Environmental Protection Act, although, arguably, they have declined somewhat from their peak levels in 1989 and 1990. In September 1990 an opinion poll (Phillips, 1990) placed the environment as second only to the poll tax as a major cause of concern in Britain. Nevertheless, environmental issues have settled at a level higher than that existing before September 1988.

The apparent periodicity of environmental concern has been noted by many authors (Sandbach, 1980; O'Riordan, 1983a) and was conceptualised by Downs (1972) as conforming to an 'issue-attention cycle', related to a systemic cycle of heightened public interest, followed by increasing boredom.

The cycle comprises five stages: firstly, a **"pre-problem stage"**, when a social problem exists but has not been recognized as such in the public issue domain, although it may have generated concern in some interest groups or experts.

The second stage is one of **"alarmed discovery and euphoric enthusiasm"**, when, as the result of a dramatic series of events, the public become aware and alarmed and are enthusiastic about the possibility of finding a solution to the problem.

This is followed by **the realization of the costs of significant progress**. In this stage, certain sections of the public recognize the relationship between the benefits of problem solution and the costs - the former accruing to others while the latter accrue to themselves.

Fourthly, and closely related to the previous stage, there is a **gradual decline of intense public interest**, as the difficulties and necessary sacrifices of problem solution are more fully appreciated. One or more of three reactions can then develop: people become discouraged, or they feel threatened by thinking about the problem and so suppress the thoughts, or they become bored. At this stage another issue is likely to be entering stage two.

Finally there is the **post-problem stage** where an issue loses its central position and occupies a position of "prolonged limbo", punctuated by recurrent spasms of interest. However, the issue does not return to the pre-problem level of attention because during its progression through the five stages, new policies and institutions may have been initiated which will continue to make some degree of impact and thus a new equilibrium level of attention will have been created.

In response to Downs' conception, which largely ignores the role of the media and other social institutions in maintaining the existing social and economic order, Sandbach (1980) has put forward a 'conflict-accommodation model' as one more appropriate to a materialist understanding of the environmental movement (1980:35), in which conflicts of interest and the confinement of issues to areas safe for capital and the maintenance of vested interests are the key explanatory factors. This is a model of accommodation (see also O'Riordan, 1983a:376) which maintains the status quo.

There has been some divergence in research findings of the characteristics of the typical environmentally concerned individual although a majority opinion favours environmentalism as a largely middle class pursuit. Some earlier North American research (Tognacci et al, 1972) suggested that the environmental movement was unlikely to be a unifying social force because its members were predominantly the highly educated, of high socio-economic status, younger and with liberal political views; i.e. the same constituency as those traditionally active in civic and political institutions.

This research suggested that expressions of environmental concern might be a reflection of increasing commitment by this subgroup rather than by the public generally. However, a later American survey (Council on Environmental Quality, 1980) found support for the environmental movement was not limited to the affluent, the well educated or the young but was noticeable across the social categories. Research in Britain (Jowell et al, 1990) has shown increasing levels of concern generally through the late 1980s about pollution and threats to the countryside but the most concerned tend to be younger, better educated and from higher social classes.

What is unknown as yet is whether the apparent growth in environmental concern represents the beginning of a 'paradigm shift' (Kuhn, 1970) which will precipitate a reordering of the social framework of meaning within which experience is interpreted or whether it will result merely in a minor accommodation (see Chapter 4, Section 4.5 and O'Riordan's 'pattern of environmental ideologies' (1983a:376)) by the dominant paradigm to resource constraints.

A recent survey of industry and the environment (The Economist, 1990) suggests that the latter is certainly possible and even probable if capitalist economies are to survive in the medium (if not the long) term. This survey exemplifies the incorporation of environmental 'concerns' within the dominant social paradigm. The adoption of green technologies and green strategies are seen as leading to a potentially positive economic advantage. It reflects the values of 'technogreen' determinism, using language such as: "officious

environmentalists"(p.22); "ingenious technology" (p.6); "smart entrepreneurs" (p.22); "good green companies" (p.30); and "the paradox of technology: the industrial economy causes environmental damage, but also offers the main way to repair that damage" (p.29).

It must be acknowledged that such 'opinion polls' have been criticised on the grounds that they are a poor guide to understanding the strength of commitment to policy objectives (Sandbach, 1980) and that they "rarely solicit deeply-held views" but reflect socially acceptable opinions, of matters rarely considered before, that are influenced by media coverage and social communication (O'Riordan, 1983a:216-7)[25].

With hindsight, minority opinion can be seen to have been in the vanguard of more widespread environmental attitude change in relation to flood defence as follows: demands by articulate minority groups (local nature conservation groups, etc.) for consultation and participation were met initially by counter claims that the groups were unrepresentative of the general public and therefore, in the light of wider public interest, their demands were unreasonable. In a process which perhaps can be likened to Kuhn's (1970) theory of scientific progress, as more evidence built up to support their validity, attitudes towards these same minority group demands eventually underwent a 'gestalt switch' and became institutionalised and (to varying degrees) accommodated. The growth in institutional acceptance of the importance of nature conservation issues in flood defence can be seen as an example of this accommodation process. It is possible that the increasing importance of the (even more) subjective aesthetic issues may be at the beginning of a similar path.

These issues are central to the focus of this study. The next chapter discusses these focal issues, including reasons for locating in floodplains and differences between lay and professional attitudes. It looks in more detail at the hypotheses conceptualised as underlying the central theoretical proposition that floodplain managers (residents and engineers) make a risk-environment trade-off.

[25] Criticisms of opinion polling are not always confined to the limitations of commercial market research techniques but are sometimes part of a more fundamental criticism of (academic) behavioural research.

4. FOCAL THEORY

4.1 "Why do they live there?" (Kates, 1962)

At a superficial level this question can be answered with the very simple statement that for most people who specifically chose to live there, and for most of the time, the floodplain environment is a very pleasant place to be. It is unlikely that the outsider - whether they are merely travelling through or with a professional interest in the area such as engineers or geographers perhaps - will be able to appreciate fully the benefits of a given location. Natives and non-natives acquire and assimilate information about a place differently (Lowenthal, 1961:260).

Kates (1962) put forward 5 reasons for the persistence of people in areas subject to flood hazard:

1. They do not know about the flood hazard and are therefore not unduly concerned.
2. They know about the flood hazard, but personally do not expect a future flood, and therefore are not unduly concerned.
3. They expect a future flood, but do not expect to bear a loss, and are therefore not unduly concerned.
4. They expect to bear a loss, but not a serious one, and are therefore not unduly concerned.
5. They expect to bear a serious loss and they are concerned. Therefore, they have undertaken or are planning to undertake some action to reduce the losses (Kates, 1962:135).

While individually these reasons may be valid (most research projects have identified one or more of these reasons), together they do not encompass the range of possible determinants of persistent floodplain occupance. The assumption behind this list is that only reason 5 is the correct analysis and response: (flooding is a serious hazard; this hazard has been perceived; ergo mitigation will be undertaken). It assumes that the other four reasons are deficient in some manner. However, at least two more reasons could be added to this list:

6. They expect to bear a loss but accept this outcome as an acceptable cost of enjoying the locational (environmental) benefits.
7. They had **little or no choice** in location and/or have little or no choice but to stay.

Reason 6 was recognized by James et al (1971) who acknowledged that Kates' explanation

of floodplain occupance on the basis of faulty information was "not the whole story" (1971:footnote 44). James questioned the correctness of a policy that sought to prohibit floodplain residence by those who had willingly chosen to "endure floods every few years" in order to enjoy the benefits of the location. This was particularly the case in areas subject to shallow flooding where he believed there would be only a minor threat to properly constructed properties, or to life and health (1971:vii). However, James' analysis is limited by its strong focus at the individual level; individual goals and choices are aggregated to determine floodplain policy or effect environmental change. Government is assigned a reactive, policing role - "regulating individual excesses" - rather than any essentially pro-active, ideologically-based, structural or values- and attitude-forming function as this thesis would suggest[26].

In response to reason number 4 above, it is likely that, in Britain generally and in the areas of flood risk to which this thesis directs itself, most people's experience of floods will be of the less serious kind, i.e. they will experience indirect disruption from flooded roads or railways or perhaps their gardens only will be flooded. Fewer, and a (relative) minority, will suffer household flooding of a serious nature.

It is of some interest, therefore, to ask what is a flood? (Gately, 1973); clearly it is not an absolute term. Related to this, it is unrealistic to extract those who say the event was/will be very serious and assign to them the exhibition of the rational response against which other responses will be measured: **some** people will find the event very stressful and very serious but possibly the majority will not. Within the often somewhat large 'flood envelopes' denoting the spatial extent of a given level of risk/protection (such as a 1:50 to 1:100 level common to many flood defence schemes) it is unlikely that the majority will experience a serious level of flooding.

Reason 7 (they had little or no choice in location and/or have little or no choice but to stay) is a necessary counterbalance to the dominant model's emphasis on voluntary, individual choice. Hazards have been classified as 'voluntary' and 'involuntary' (Starr, 1972). Examples of the former, it has been suggested (White and Haas, 1975), are smoking or riding motorcycles and are consciously assumed; examples of the latter are the uses of electricity and motor vehicles which are said to be borne without conscious choice. Within this

[26] The pre-eminent role of the individual in the free enterprise, North American society is recognized, nevertheless it must be acknowledged that major flood defence projects have been and continue to be constructed by a government agency (the U.S. Army Corps of Engineers) and thus organizational and societal level analyses are appropriate.

classification, White and Haas claim natural hazards "have a strong component of the voluntary" (1975:88) resulting from interactions between human activity and destructive events.

Further, that aggregated individual preferences towards risk set the threshold acceptable to the nation (White and Haas, 1975:89). The foregoing strongly suggests a consensus in the nation and overlooks the extreme variation in choice availability and (sub-)cultural imperatives among different social groups. The implication is that the individual need only act to change both his/her - and ultimately, through aggregation, the nation's - level of risk. Issues related to the conceptual appropriateness of choice or constraint have been discussed in greater detail above.

The following subsection returns to the sixth reason and describes more fully the concept of a risk-environment trade-off and its role in answering the question "why do they live there?".

4.2 The risk-environment trade-off

The term 'risk-environment trade-off' encompasses a range of conceptual dimensions and so could be said to contravene Shively's (1980) rule for social scientists to use unidimensional language. His prescription is supported by the following three reasons:

1. The meaning of a theory is not unambiguously clear if it is couched in multidimensional words
2. Variables cannot be measured unambiguously if they have been defined in a multidimensional way
3. Inclusion of multidimensional words in a theory confuses that theory with additional theories which are implied by the existence of the multidimensional words themselves (Shively, 1980:36).

However, while insisting on the necessity of thinking and working with unidimensional concepts, he acknowledges the validity of joining separate dimensions together in **explicit** multidimensional combinations (1980:37). These can add clarity when juxtaposing several concepts and can be useful for describing general processes. There can be some value also in retaining a looseness of definition in the early stages of investigation to avoid a too limited perspective (Goodey, 1973:2).

Initially, in this study, 'environment' was defined narrowly to focus on its ecological or nature conservation aspects. However, it soon transpired, as research continued, that this focus was too narrow and too technical and would result in limited and mostly negative

responses from the general public who, while concerned to varying degrees about such issues, tend to focus more on the more visual landscape and aesthetic issues. Thus, while a structural flood defence scheme might be recognized as possibly leading to disruption of wildlife[27], this would be a somewhat broadly defined concern to most members of the general public and probably secondary to the way the scheme would impact on the view from a house, or change the appearance of a familiar area for example.

The research programme aimed to examine to what extent, when structural solutions are suggested to flood hazard, people make trade-offs between flood risk and environmental values. Why do some make the trade-off in one direction - i.e. in favour of protection of environmental value or integrity, with an attendant increased risk from the flood hazard - and others make it in the other direction - i.e. in favour of protection from the flood hazard, with an attendant sacrifice of environmental value or integrity.

In the risk-environment trade-off, 'environment' comprises all those environmental concerns including inter alia pollution, nature conservation and landscape issues, but is focused specifically on the impact on visual amenity and ecology that may arise from a proposed or actual flood defence structure. More fundamentally it is related to an underlying value system, of which environmental factors form a part.

The following subsection outlines the hypotheses from which a model of flood hazard mitigating adjustment was constructed.

4.3 Hypotheses

The research design was based on a familiar model (Kates, 1971; White, 1974; Mileti, 1980) but with the express aim of including an environmental dimension. The main hypothesis to be tested in the research was that there exists some relationship between hazard perception and environmental perception that influences the decisions of floodplain residents/managers - whether individuals, groups or institutions (such as the NRA). The hypothesis suggests that 'trade-offs' are made between tolerable levels of risk and the willingness to accept environmental change resulting from structural flood defence schemes.

Thus, the research project aimed to extend Kates' hypothesis to examine whether, or to what extent, the threshold of response (adjustment search, evaluation and adoption/rejection) is

[27] Flood defence schemes can also enhance wildlife value to varying degrees but this aspect is invariably compensatory for a similar or greater degree of disruption elsewhere.

influenced, not only by flood experience, as he and others had found, but by environmental factors, to avoid or prevent the initiation of structural adjustments which are perceived as environmentally damaging.

Kates (1971), building on work by White (1961b), has hypothesized that there exists a threshold of hazard perception below which the floodplain manager does not seek or evaluate adjustments. When the threshold is reached the adjustment search begins and adjustments are evaluated. It was hypothesized here that the perception threshold, and nature of the search and evaluation processes, were likely to be different in individual and institutional floodplain managers. Thus, it was intended to investigate possible differences in perception and attitude between experts and laypeople (focusing on NRA engineers and the general public respectively); the factors affecting those attitudes and the way in which the attitudes (and subsequent behaviours) of the 'experts' influence public choice and its availability. This is discussed in greater detail below.

An additional strand in the research, which assumed greater importance as the work progressed, was that of public participation and the consultation process as it relates to river management and flood defence in particular. In a model of society as one of competing interest groups, decisions have distributional consequences that can be controlled to varying degrees by those in positions of power: control of information is an important tool of power groups. It was hypothesized that access to information is a key factor in influencing attitudes to flooding and flood defence and that social 'gatekeepers' (NRA officers, estate agents, solicitors, etc.) might be controlling this access.

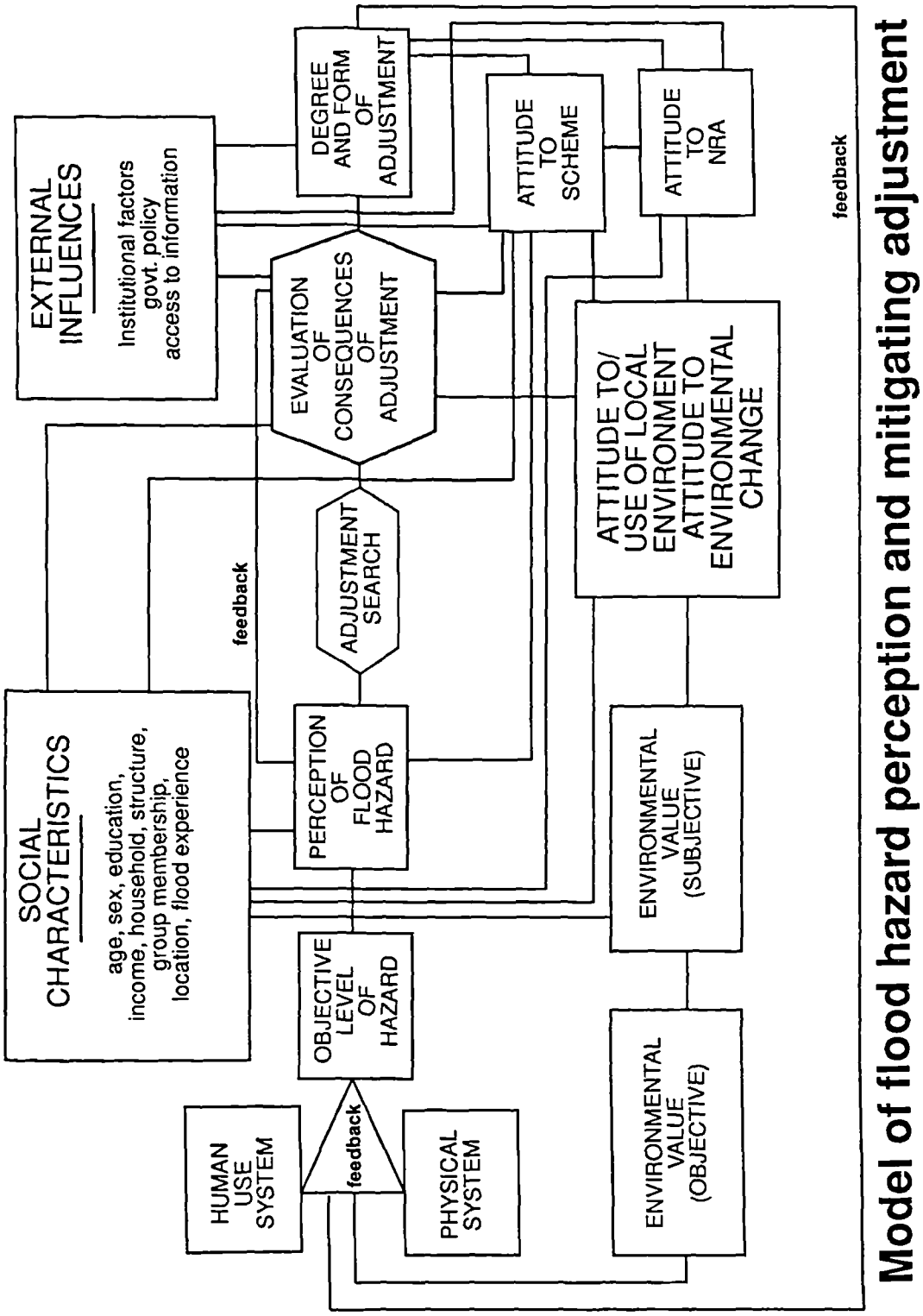
These hypotheses underlie the conceptual model described in the next sub-section. The conceptual propositions, constructed from the hypotheses underlying the model are listed in Appendix A-4.1.

4.4 Initial thesis model of flood hazard mitigating adjustment

Flooding is an inevitably recurring event wherever people have developed communities in floodplains. Choice - when choice is available - of mitigating adjustments to manage the flood hazard will be determined not only by both geophysical and socio-economic factors but also by attitudinal factors as conceptualised below.

The conceptual model (see Figure 4.1.) described here is a development of a basic model of flood hazard perception and flood mitigating adjustment taken from Kates (1971) and later

Figure 4.1: Initial model of flood hazard perception and mitigating adjustment



extended by Mileti (1980) and was the theoretical model which guided the research design for the studies discussed below. The description that follows is based on this early conception and does not incorporate the findings of the subsequent research. Thus, it may appear to conflict with some of the foregoing and concluding discussions.

In this model the human community and its use system, linked to a physical system (e.g. a floodplain environment) define a level of flood hazard that can be seen as, essentially, objective. This level of hazard is dependent upon the chosen land use practices of the community and the geophysical characteristics of the particular environment. The model describes a dynamic system in which the level of (objective) hazard can be altered by changes in both the human use system and the physical system. There is, therefore, a circulating feedback mechanism between these first three elements.

However, it is the (subjective) perception of flood hazard which is hypothesized to determine the degree and form of hazard mitigating adjustment. It is hypothesized that the perception of hazard is dependent upon the social characteristics of the social unit, included in which is previous flood experience, both personal and secondary experience through relatives and acquaintances. Whatever the actual level of hazard (a truly objective determination of hazard being problematical) if it is not perceived to exist then, to all intents and purposes, it does not exist and hazard mitigating adjustment will not be considered.

Once the hazard perception threshold is reached, an adjustment search is initiated and the consequences of the possible adjustments are evaluated. This evaluation procedure is influenced by the social characteristics of the social unit and by various external influences such as macro Government policy issues, institutional factors such as the nature of the flood defence authority (e.g. NRA) and its policies, access to information and (possibly conflicting) interest group goals. These factors will influence the degree and form of hazard mitigating adjustment chosen.

The degree and form of hazard mitigating adjustment can change both the physical system and the human use system. Thus creating a further feedback mechanism which, in turn, alters the level of hazard - both objective and subjective.

These are the elements of the basic model to which this research adds certain environmental factors. In this parallel, but closely related, environmental system, the human use system and the physical system define a level of environmental value which can be seen as objective (in the sense of recognized designations such as Areas of Outstanding Natural Beauty (AONB)

or Sites of Special Scientific Interest (SSSI)). This objective level of environmental value is similarly linked into a feedback mechanism whereby the value can be altered (enhanced or degraded) by changes in the human use system and the physical system.

It is hypothesized that perception of environmental value is influenced by the social characteristics of the social unit and both are an influence upon attitudes to the local environment, to use of the local environment and to attitudes to environmental change (e.g. arising from structural flood defences). It is further hypothesized that evaluation of the consequences of possible hazard mitigating adjustments will be dependent upon these environmental attitudes. Attitudes to proposed flood relief schemes will be determined not only by perception of the flood hazard but also by the environmental attitudes of the social unit and by attitudes to the NRA, in terms of confidence in its technical abilities and its environmental sensitivity.

The perceived levels of hazard and environmental value are dependent upon the characteristics of the social unit. The perceptions are likely to be different at the individual and at the institutional level. Likewise, the probability is that perceptions of the consequences of selected adjustments also differ between the individual and the institution. This is discussed further in the following sub-section.

4.5 Perceptual and attitudinal differences of flood defence engineers and floodplain residents

Differences in perception between professionals in various fields and the public have been noted (White, 1966a, 1966b; Craik, 1970; Sewell, 1971, 1974; Sewell and Little, 1973; Coppock, 1974; Cotgrove, 1982). In the following discussion, flood defence engineers are typically associated with a professional or expert response while floodplain residents are associated with the 'layperson' or public response. The differences between the two groups in relation to risk perception have already been discussed (see Section 2.1.4) this section discusses decision-making and environmental attitudes.

Sewell (1974) provides an introductory framework of some of the key issues. He notes the reliance on expert opinion (notably engineers among others) in decisions relating to environmental quality which, he suggests, results from the complexity of the problems involved, from the uncertainty of individual decision-makers in the adequacy of their judgements and also partly from the promotional abilities of the professionals themselves.

A consequence of this has been the development of a technical elite which has assumed responsibility for the identification of problems and their solutions and whose advisory role has been institutionalised within administrative structures. A further consequence (noted by Sewell with reference to North America but now perhaps equally applicable in the UK) has been "the alienation of the public in the policy-making process" (1974:111). Engineers, for example, not only define the problem to be solved, they also determine the options for a solution and frequently select the strategy to be adopted. This process inevitably gives expression to their views of what society wants (1974:112) or needs.

Sewell found the perceptions and attitudes of the engineers he studied to have the characteristics of a closed system. The views of the engineers appeared to be highly conditioned by training, they adhered to the standards and practices of their profession and showed allegiance to the goals or mission of their agency or firm. They believed themselves to be highly qualified to do their job and to be acting in the public interest (1974:120). Sewell found scepticism on the part of professionals (particularly in the sciences) about the involvement of the public in policy making because the latter were perceived as not sufficiently well informed and liable to produce a profusion of opinions which would make policy making impossible. However, while the presenting to the public of a few discrete alternatives has the advantage of simplifying the process of choice, unless the values of the public - rather than those of the professionals - are reflected in the alternatives, they may all be rejected (1974:129).

Sewell concluded that "experts are not in favour of institutional change, especially if it means that their own role will be altered" (1974:129). This is characteristic of social systems generally and can be conceptualised as a state of 'dynamic conservatism' or a tendency to fight to remain the same (Schon, 1971). In the case of institutional structures for flood defence, environmental factors have already forced a degree of institutional change to accommodate them (i.e. in the provision of conservation and landscape officer posts and the imperatives of environmental legislation).

Environmentalism, and environmental attitudes generally, cannot be examined in isolation from other social and political values of which they are merely a part. Of central importance is whether, and if so to what extent, the values of environmentalism are in opposition to dominant social values and thus to what extent it will be necessary to overcome the inertia of the status quo. Cotgrove (1982) found[28] in a series of social surveys, a high level of

[28] Cotgrove's research was carried out between 1977 and 1980.

environmental awareness and concern in the public with a majority supporting, for example, higher taxation to control pollution although the balance of opinion favoured the protection of jobs over the protection of the environment (1982:17).

However, Cotgrove argues that surveys tend to aggregate the opinions of quite different social groups and if they are disaggregated then a marked polarization of perceptions of the environment emerges. Cotgrove (1982) made a useful early distinction between different kinds of environmentalist: traditional and radical. The traditionalists are exemplified by values relating to small scale, decentralized communities and the restoration of order; the radicals are attracted to possibilities for escape from hierarchical and bureaucratic structures; they are anti-power and anti-authority. It is argued here that it is in the former section that many 'environmentally sensitive' engineers could be placed; the radicals - by definition - are bound to comprise a minority group in society.

I have used Cotgrove's (1982:27) model of the dominant social paradigm as appropriate for the socio-political framework as applied to Britain (see Chapter 2, Table 2.1). This is the paradigm held by the most powerful social groups - and to which, arguably, the majority aspire - and which provides legitimation for the institutions and processes of a market economy. His model contrasts industrialists (the dominant paradigm) with environmentalists. For this analysis the hypothesis is that there is a congruity between the attitudes of engineers and the dominant paradigm and that this is contrasted with the alternative environmental paradigm; particularly - in the light of the specific focus of this analysis - in terms of values concerning nature and knowledge.

In this simplified, dichotomous structure, engineers are hypothesized to value the contributions of science and technology in the production of knowledge, and the separation of fact and value, while the environmentalists recognize limits to the power of science and technology and tend to integrate fact and value. The engineers are also hypothesized to regard nature as hostile (inherent in the terminology of flood hazard) or neutral and to perceive the control of the environment as both possible - within technological limits - and desirable, while the environmentalists recognize a balance in nature that can be upset by, and should not be subject to, human control.

The above conceptual differentiation suggests how it is that engineers can claim to be environmentalists and yet find themselves in conflict with environmentalists (see Chapter 7 for further discussion). O'Riordan's formulation (1983a; see also Sylvan, 1985 and Redclift, 1988) extends this dichotomous structure to include four "stopping points" ('cornucopians',

'accommodators', 'self-reliance soft technologists' and 'deep environmentalists') on a continuum of environmental ideologies (1983:376). In this conceptualisation, it could be argued that an environmentally concerned engineer might be characterised as an 'accommodator'; closer to Cotgrove's 'cornucopians' but still some way from the 'deep environmentalists'.

The above discussion has outlined the specific foci of this study. Before discussing the case studies in which these issues were examined, it is necessary to address certain general methodological issues which are central to our understanding of the information that has been collected and to assumptions concerning its validity.

5. METHODS

5.1 General introduction to theory and literature

While hazards research has traditionally used predominantly quantitative methods of inquiry, this study has had as one of its aims the extension of the methodological field to include other, qualitative approaches. Social science has been concerned, for at least the last few decades, with the debate between what are seen as, not only, opposing methodologies but also opposing epistemologies and even ideologies.

The importance of this debate is not merely theoretical but has practical implications for the choice of research method. If differing theoretical perspectives are representative of differing ways of seeing and acting upon society, this presupposes that methodologies (which must be theoretically based) cannot be neutral but must define the way in which the researcher acts on and represents their environment (Denzin, 1970).

Lofland (1971) provides a simple framework within which to view the fundamental differences between qualitative and quantitative methods of analysis. At its simplest level, social inquiry or analysis can be seen as an attempt to answer one or more of three questions:

1. What are the characteristics of a social phenomenon, the forms it assumes, the variations it displays?
2. What are the causes of a social phenomenon, the forms it assumes, the variations it displays?
3. What are the consequences of a social phenomenon, the forms it assumes, the variations it displays? (Lofland, 1971:13).

Within this simple framework, qualitative analysis is generally seen as the attempt to answer, primarily, the first question and quantitative analysis as the attempt to answer, primarily, the second and third questions. Thus qualitative research would appear to be ideally suited to providing rich descriptions of social settings, and quantitative research appropriate to the search for causes and consequences.

This is, necessarily, a simplification and cases will arise where all questions come under examination. However, Lofland's argument is that while conjecture, hypothesis and theory may be addressed to varying degrees in qualitative research, they are rarely tested to the same extent as they are in quantitative research and the research reports that come out of the research do not "stand or fall" on these causal accounts but rather on the variations and patterns of the findings (Lofland, 1971:62-3). Other researchers do not ascribe this somewhat

narrow theoretical role to qualitative research and make a case for a stronger theory generation and testing function (Glaser and Strauss, 1967; Mitchell, 1983; Strauss, 1987).

The discussion below is structured to examine separately each of these two methods of research analysis and then to examine the potential for combining both.

5.2 Quantitative methods

Quantitative research is predicated upon a natural science model. Research set within the scientific paradigm proceeds along a well defined path: problem, hypothesis, research design, measurement, data collection, data analysis and generalization (Nachmias and Nachmias, 1989). Much of the more positivistic (see Chapter 2), quantitative survey research has adopted this paradigm although it is widely recognised that the actual research process is somewhat different to this idealised type (Silverman, 1985; Cornwell, 1986) and that a strict adherence to the initial hypotheses defined within this scientific paradigm will almost inevitably require a degree of post hoc rationalisation. Further, that this model of research can distort meanings (Silverman, 1985; Barrett, 1976).

Certain preoccupations are prominent in quantitative research. One of these is the establishment of causality: in which the causal process is deemed to be unidirectional - the action of the cause comes first in time (Hage and Meeker, 1988) - and is operationalized in terms of dependent and independent variables. Survey researchers have been concerned with establishing cause and effect relationships despite there being a general belief that survey research is appropriate at the level of simple associations and correlations and that 'correlation does not imply cause' (Bryman, 1988).

Another preoccupation is with the generalization of findings to a wider population and this is manifested in issues of sampling design and the representativeness of samples. The use of computers and probability theory have extended the scientific respectability of this aspect of the research process. Related to this is the issue of replication. The replication of findings is a test of their 'generalizability' to other contexts. The difficulty of replication is a key criticism of qualitative research in which the idiosyncrasies of the researcher may be a significant component of the research and thus impossible to replicate.

Quantitative research has been dominated by a focus on the individual unit of analysis[29]. This is related to the dominant technique of enquiry, the survey questionnaire, which is administered to individuals and the results aggregated. This necessarily results in a view of society as an 'aggregation of disparate individuals' (Blumer, 1948:546 quoted in Bryman, 1988:39). There has been extensive debate concerning the appropriate level of analysis: whether social processes can be explained by reference to individuals and the meanings of situations or by reference to social structures. After some years of polarised positions on this question (still not entirely resolved), researchers began to bridge the two (micro and macro) levels or chose (irrespective of personal ideological position) the level most appropriate for answering a particular research question while making reference, during analysis and interpretation, to the influence of the other level (Silverman, 1985): this eclectic approach has been criticised however (Eyles and Lee, 1982).

The main techniques adopted by quantitative research are surveys and, in psychology, the experimental method: others also used include the analysis of previously collected data, content analysis and structured observation (Bryman, 1988). Of pre-eminence, however, is the social survey.

Surveys themselves do not have to be synonymous with particular techniques (Marsh 1982) although they are most commonly associated with structured questionnaires and are normally characterised structurally by a variable by case matrix (de Vaus, 1986) which is fundamental to their method of analysis. Neither, it has been argued (Marsh, 1988:102), do they have to be inherently positivistic. However, the most frequently used survey instrument - the structured questionnaire - is based largely on the possibility of asking unbiased questions and the measurement of atheoretical and value-free perceptions which makes this latter claim problematic. Detailed discussion of the survey method can be found elsewhere (Marsh, 1982).

5.3 Qualitative methods

Hammersley (1990) notes that ethnography is something of a blanket term which can be synonymous with 'qualitative method', 'participant observation', 'case study' and a number of other, primarily non-quantitative, methodologies. In this thesis no distinction is made between ethnography and other qualitative methods: the distinction that is used is a broad one between quantitative and non-quantitative approaches.

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[29] But not, paradoxically, the individual her- or himself; it is **qualitative** research that more appropriately studies the individual person while quantitative methods are concerned with **aggregations** of individuals.

A particular strength of qualitative methodology lies in its potential to uncover the interviewees' own language and issue selection (within the bounds of the interviewer's ability to uncover issues of importance without overly directing and leading the interviewee); a method of seeing through the subject's own eyes (Bryman, 1988:70). Spradley makes a useful distinction (in the context of the ethnographic interview) between the respondent in the social survey and the informant in the ethnographic interview (Spradley, 1979:25-39). In the social survey, the respondent **responds** to questions formulated previously in the survey researcher's own language; in the ethnographic interview, the informant **informs** the researcher of the questions s/he should ask. The former searches for answers while the latter searches for questions. (Arguably, the choice of use of these two terms also represents a shift from a confirmatory to an exploratory mode respectively.)

Spradley claims that ethnography "always implies a theory of culture" (Spradley, 1979:5). However, 'culture' is probably one of the most complicated words in the English language (Williams, 1983:87). Spradley uses the term to mean "the acquired knowledge that people use to interpret experience and generate social behavior" (Spradley, 1979:5).

The core of ethnography is a concern with the meanings of actions and events **to the people the ethnographer is seeking to understand** (in contrast to a concern with the meanings **to the ethnographer** of the people s/he is trying to understand). It represents a radically different approach to the proposed study group. The ethnographer sets out in relative ignorance (but see the discussion of case study research below) to learn from the study group what is meaningful to the study group. In contrast, the survey researcher sets out with greater knowledge (or assumptions) to test pre-formed hypotheses about restricted areas of interest to the researcher.

This concept is reflected in the language used: the ethnographic interview can be distinguished from social survey research by the use of the terms **informant** and **respondent** respectively (Spradley 1979). At a simple level, in social surveys, the respondent **responds** to questions that have been formulated in the social scientist's language, out of the social science culture. In the ethnographic interview, the informant **informs** the ethnographer of the questions s/he should ask. Thus, the flow is reversed: social surveys **begin** with questions rather than with **the search** for questions (Spradley, 1979:31).

The method contains flexibility and often an initial lack of structure. This should not suggest that the method is unsystematic but rather that there is a rejection of (detailed) concept and theory formulation in advance of fieldwork (Bryman, 1988) and the categories used for

interpreting what people say and do are not pre-given or fixed (Hammersley, 1990).

Data may be gathered from a range of sources, but observation and/or relatively informal conversations/interviews are the most frequent forms (Hammersley, 1990). Data analysis focuses on description and the interpretation of meanings and functions of social behaviour and relies very little on quantification and statistical methods which may be singularly inappropriate because of the small numbers often involved. In some cases the focus may be on a single individual but more usually it is a particular setting or group. The questionable general utility of findings taken from a very small, non-random sample is regarded by some as a potential weakness of the method.

However, although the qualitative approach concentrates on the (un-aggregated) individual to a greater degree than quantitative methods, ultimately the focus of analysis is on the patterns and themes that emerge from interviews (Hakim, 1987:26) and these may be found to have a wider relevance. Hakim notes further in defence of the qualitative method that its dismissal in favour of surveys is based on the overlooking of the latter's own validity problems (Hakim, 1987:27-8). In a structured, quantitative interview, unique or deviant responses are handled statistically and might be eliminated from the later stages of analysis. In unstandardized, qualitative research, such deviant responses can have a significant effect on interpretation and lead to a revision of earlier hypotheses (Whyte, 1977:38).

Hammersley (1990) underlines the importance of context, and the motivation for the message built into the context, to understand meaning. He also observes, with perhaps a hint of caution, that context is "almost endlessly extendable" and at its extreme can extend to the wider society in which the communication occurs and even to the history of that society (1990:ix). Nevertheless, qualitative research conveys a strong message that the situating of events in their wider social and historical context is imperative for understanding (Bryman, 1988:65).

Qualitative research shows a concern with process: social life is viewed in processual rather than static terms. In policy research this manifests itself in a concern with the process of implementation rather than a focus on outputs: emphasis is placed on the responses of both those who implement and those who are affected, how each responds to the other's views, how policies are interpreted, and how perspectives change (Bryman, 1988; Finch, 1986).

The place of theory in research is often a distinguishing element of the research method. The simple quantitative research model tends to start with theories and hypotheses to be tested and

verified by the investigation while the simple qualitative research model rejects an initial statement of theory as likely to be unrepresentative of the subjects' own views and develops hypotheses through the investigation: theory emerging at the end. There has now developed some blurring of these distinctions. 'Grounded theory' (Strauss, 1987; Glaser and Strauss, 1967), associated strongly but not exclusively with qualitative methods, emphasises the early and continuing development of theory throughout the investigation while quantitative investigations can have exploratory or unpredictable elements (see Bryman (1988) for further discussion and examples). The place of theory is discussed further in the case study section below.

5.4 Quantitative and qualitative methods in combination

The notion of combining qualitative and quantitative research methods is not new but has tended to occur in a specific sequence: qualitative methods have traditionally been used as explorative precursors to the main research stage which is quantitative. Thus qualitative methods are frequently viewed as 'second rate' (Bryman, 1988:94) generators of hypotheses which can be tested more vigorously by quantitative means. Proponents of qualitative research, and those more open to the possibilities of combination, tend to see the relationship more as one of equals.

In a discussion of how far positivist, humanistic and structuralist approaches (to geography) conflict with or complement each other, Johnston has noted (1980) that a strong case can be made for combining positivist/behavioural and structural approaches. However, against this, Eyles and Lee (1982) argue that:

> "There appears to be an assumption...that these 'approaches' are in some way alternatives; that we can select this concept from one approach, that method from another, and the perspective from yet another. Unfortunately, this desire for eclecticism rests on the false assumption that these approaches are above all techniques for analysis rather than epistemologies" (1982:117).

Harvey (1990) argues against this and says that methodologies are not inherently positivist, phenomenological, etc. Bryman (1988) believes the tendency to view quantitative and qualitative research as arising from different epistemological positions, and the resultant depiction of them as mutually exclusive models of research, has exaggerated the differences between them (Bryman, 1988:105).

Quantitative research methods began to decline in popularity in the sociological field after the

mid 1960s, although they were (and are) still held to be valuable in other disciplines (Silverman, 1985). After a period of conflict, sometimes characterised by intolerance and bigotry (Bulmer, 1984) between the proponents of the two opposing methodologies, there has developed a blurring of the distinctions and a move towards research designs calling for the use of whichever method is most appropriate or combining elements of both (Fielding and Fielding, 1986; Bryman, 1989, 1988). There has been a reaction against the dogmatic approach and a call for a sense of balance in qualitative research that allows for a degree of quantification where necessary to maintain intellectual breadth and rigour (Silverman, 1985:17).

Johnston (1980) suggests that empirical results can be used in a number of ways (1980:155) and not necessarily employing a positivist approach. His discussion of work by Cox and McCarthy (1982) is apposite. They carried out a questionnaire survey and analyzed the data using multivariate statistical analysis. However, their **goal** was not to establish that the same empirical results hold elsewhere but to examine **underlying forces**. They "used the empirical material both to suggest structural interpretations of observed relationships and to illustrate the empirical outcome of structural mechanisms - in given circumstances" (Johnston, 1980:154).

5.4.1 Triangulation

The combination of techniques and strategies known as triangulation (Campbell and Fiske, 1959; Webb et al, 1966 referenced in Bulmer, 1984) is recommended in the research literature (Denzin, 1970; Smith, 1975; Marshall and Rossman, 1989:146; Patton, 1980:108-9; Bryman, 1988:131-4) to strengthen the validity of empirical inquiry. A number of different types of triangulation are possible: triangulation of theory (by using multiple theoretical perspectives in relation to the same object or set of objects); of data (in time, space, level of analysis); of investigator (by using multiple observers of the same object or set of objects); and of method (either between methods or within methods) (Denzin, 1970:301).

Triangulation has been used throughout this research project by the use of different research methods - quantitative and qualitative; using different data sources (including written documents, personal interviews and newspaper articles); and incorporating questions from other quantitative studies in order to make comparisons. While triangulation can increase confidence in the validity of separate research studies through comparisons of core themes and questions, the importance of **context** in any research 'event' must not be underestimated: each must be evaluated in its own terms. This can make the final integration of triangulated

data problematic (Silverman, 1985:21). It is also possible that the use of a multi-method technique may result in an increase in error if the relevant bias-checking procedures have not been adopted (Fielding and Fielding, 1986:31).

In Kuhnian terms (Kuhn, 1970), paradigms are "incommensurable" and thus, if quantitative and qualitative research comprise individual research paradigms then, it is not possible to integrate different research methodologies if they are founded on conflicting epistemologies. There appears to be no simple answer to the epistemological debate that avoids dogmatic or fetishistic adoption of a single world view and accompanying methodology. Clearly, research methods are not neutral or atheoretical representations of the 'real' world; rather they act as filters through which the world is selectively experienced (Smith, 1975:273). However, while each method may result in a degree of bias or distortion, a combination of methods, based on suitability to the problem or problem element under investigation, incorporating adequate recognition of their inherent biases, should more accurately represent the research environment. This is the position adopted by this research.

5.4.2 Case study research

A simple dichotomous characterisation of the differences between quantitative and qualitative research is that the former is nomothetic and the latter ideographic; that is, the former seeks to establish general laws, applicable irrespective of time and place, while the latter is located in a specific time and milieu (Bryman, 1988). The case study, which may be a single person, group or event, is typically ideographic.

A criticism levelled at qualitative research generally and case studies in particular, is the limited degree to which findings can be generalized to other or larger populations. This criticism is based on a false notion of the form of inference undertaken. Sampling theory in survey research has gained a pre-eminence which can obscure the possibilities of other analytical routes to understanding meaning. The apparent problem of generalizability is one of a confusion between statistical inference and logical (Mitchell, 1983) or analytical (Yin, 1984) inference; the former relies on a representative sample having been drawn initially, from which the analyst can extrapolate to a larger population. There is a misconception that views case study research as if it were a sample of one drawn from a universe of similar cases (Bryman, 1988:90). Logical inference is based on the unassailability of the subsequent analysis (Mitchell, 1983:200); it is not theory-less but arises from an a priori familiarity with underlying theory. Thus case studies can be selected, not for their 'typicality' but for their explanatory power:

> "For general purposes any set of events will serve the purpose of the analyst if the theoretical base is sufficiently well developed to enable the analyst to identify within these events the operation of the general principles incorporated in the theory. [...] So in the social sciences an illuminating case may make theoretical connections apparent which were formerly obscure" (Mitchell, 1983:204).

This method acknowledges the uniqueness of any event and the possibility of examining the exceptions to generalization which can deepen understanding of social processes. It calls for a generalization, not to other case studies, but to theoretical propositions (Yin, 1984:44).

It should be noted that quantitative research does not always adhere to its own rules for representativeness: surveys do not always use random samples (Bryman, 1988) and often refer to spatially or temporally restricted populations. Thus the simple nomothetic/ideographic dichotomy is rarely applicable.

While this thesis adopts the term 'case study' it may not conform to strict definitions of the term (Yin, 1984) but rather uses it as a unifying link between quantitative surveys and sets of qualitative interviews (which might more usually be termed case studies) based on certain underlying theoretical propositions. The individual research designs for each case study and for the interviews with NRA engineers are under the appropriate individual Case Studies below.

PART TWO

6. INTRODUCTION TO CASE STUDIES OF FLOODPLAIN RESIDENTS

The research findings are based on three quantitative data sets and two qualitative studies:

The Quantitative Studies:

1. The Thames Attitude and Perception Survey, 1989 (DWSC/89) (part of The Datchet, Wraysbury, Staines and Chertsey Baseline Study);
2. 'The River Environment and You' Postal Survey, 1990 (DWSC/90) (also part of The Datchet, Wraysbury, Staines and Chertsey Baseline Study);
3. The River Thames Maidenhead Flooding Survey, 1990 (Maidenhead 1990) (part of The Maidenhead, Windsor and Eton Flood Study).

The Qualitative Studies:

4. The Lower Stour Flood Alleviation Scheme: Christchurch, 1990;
5. The Bridport Flood Alleviation Scheme: West Bay, 1990.

Detailed examination is focused on two quantitative studies (DWSC/89 and Maidenhead) and one of the qualitative studies (The Lower Stour). Anecdotal information collected over the three year study period from all ten NRA regions also informed the research as did attendance at both public and internal NRA meetings, seminars and conferences, following which notes were made.

Table 6.1 shows the status of the case studies: whether or not there has been recent flooding, the stage of flood defence scheme development and an estimate of the proximity of those interviewed to any possible scheme impact (there is an assumption that all schemes will have some impact on the local environment but no value judgement is made concerning the nature of the impact).

During the research period between 1988 and 1991 the author was involved, to varying degrees, in a number of individual research modules. With so much empirical data it was necessary to strike a balance between breadth and depth. The choice of case studies to be

Table 6.1: Stages on a scheme-development continuum

CASE STUDY	RECENT FLOODING	SCHEME DEVELOPMENT SITUATION	PROXIMITY OF SCHEME IMPACT ON MAJORITY INTERVIEWED
DWSC/89	NO	NOT PROPOSED*	LIKELY TO VARY
DWSC/90	NO**	NOT PROPOSED*	LIKELY TO VARY
MAIDENHEAD	YES	PROPOSED	DISTANT
LOWER STOUR	NO	COMPLETED	NEAR
WEST BAY	YES	REJECTED***	NEAR

* i.e not **publicly** proposed although certain options have been examined.
** very little flooding in the immediate area although flooding occurred nearby in Maidenhead (1990).
*** N.B. rejected by the interviewees.

discussed here was justified on the grounds that they covered a range on the scheme-development continuum from the baseline situation, before a flood event or scheme proposals (DWSC/89), to the post-scheme development stage (Lower Stour).

Two other studies which could have been included and on which analysis was undertaken (the Eton Wick survey of residents' perceptions of flood risk and flood alleviation schemes and the River Severn Flooding Survey) were excluded from the case study section for three reasons: firstly because little or no direct input was made to their design; secondly because they contained insufficient comparable data; and thirdly to limit the size of the total study. However, because Eton Wick lies within the main study area for this research, occasional references are made to the community and to some of the research findings which are reported in full elsewhere (Tunstall et al, 1989).

The major quantitative analysis exercise involved the Thames Perception and Attitude Survey (DWSC/89) but cross referencing to the other data sets (including those not discussed in detail here) was undertaken for selected analytical variables. The findings from each of the

surveys have been reported in separate research reports (see under separate Case Studies) but the following discussion is based on a re-analysis of the data sets.

Where there was missing data for a variable, a decision was made generally to exclude these cases from the analysis; thus, for any table or chart, the number of valid cases may differ from the total sample number but is generally noted.

Key tables and figures appear in the main text but a number of supplementary tables and figures have been placed in appendices.

6.1 The Thames floodplain studies: general introduction

Discussion of the Datchet, Wraysbury, Staines and Chertsey Flood Study which comprised the Thames Perception and Attitude Survey (DWSC/89) and follow-up postal survey 'The River Environment and You' (DWSC/90) must be preceded by an outline of the Maidenhead Windsor and Eton (MWE) Flood Study, out of which it grew. The MWE Flood Study had been initiated partly as a result of Thames Water Authority's Section 24 (5) surveys to identify the major land drainage and flooding problems in the region. A study carried out by Middlesex Polytechnic Flood Hazard Research Centre (Thames Water, 1987) identified a number of towns along the River Thames as being at risk of flooding. Maidenhead was selected initially for further examination partly because of the existence of extensive flood records for the area. The early stages of the design process for this major scheme were notable for the number of disciplines involved in detailed discussion regarding the optimum design and route, taking into account a range of environmental factors (Gardiner, 1988).

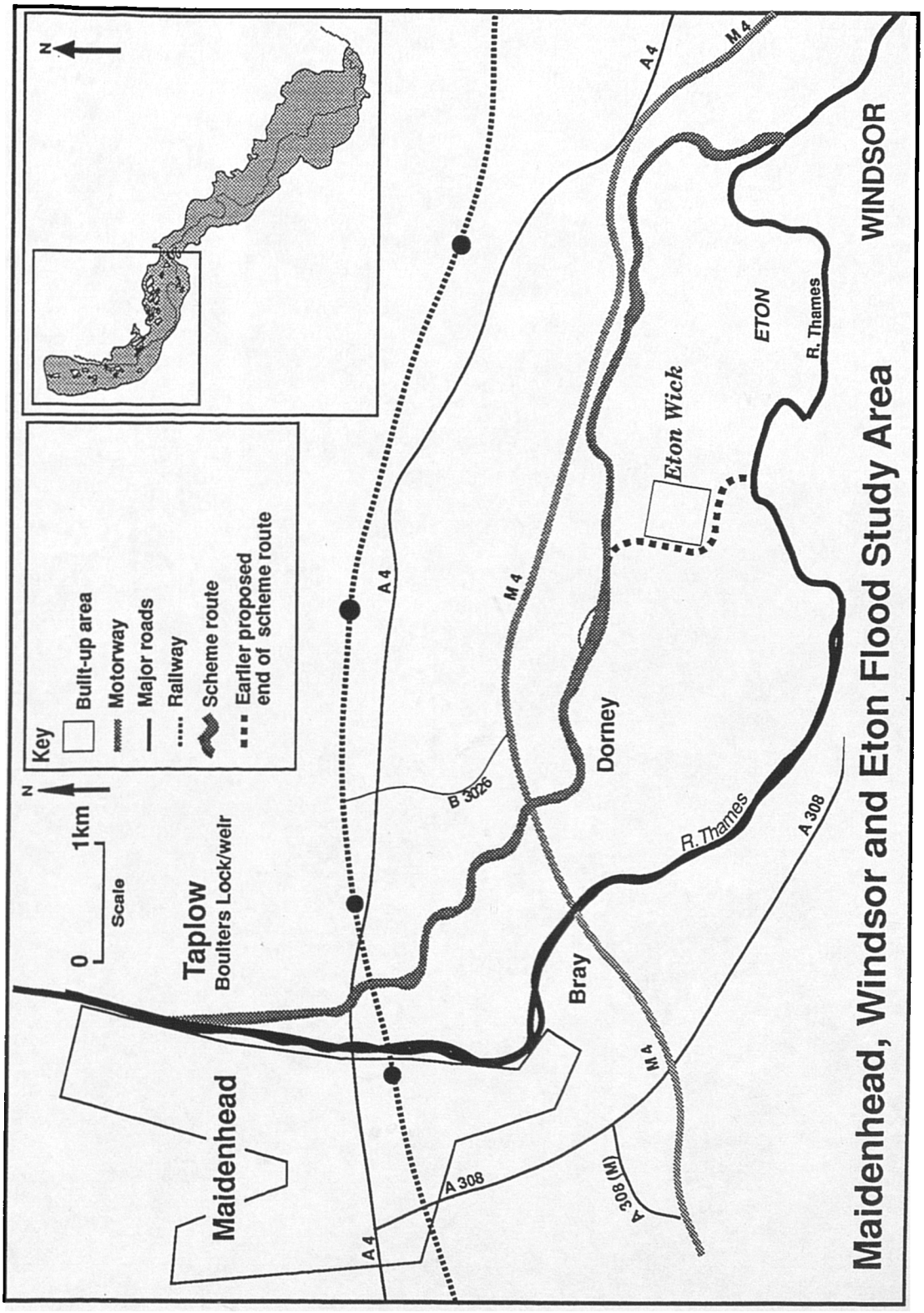
Subsequently, ten options for flood defence in the Maidenhead area (later extended to include Windsor and Eton) were identified and, from these, one preferred option was chosen: an east bank flood relief channel - of approximately the same width as the Thames - combined with improvement works to the Thames and embankments in certain areas. A programme of public consultation was initiated (see below) as a part of which, Middlesex Polytechnic Flood Hazard Research Centre undertook a survey of residents' attitudes (Tunstall et al, 1989) to the proposed scheme in Eton Wick, a small village to the southeast of Maidenhead and close to which the proposed route lay.

As a result of continued (technical) studies and public consultation, the final proposed design

and route was modified and subsequently extended to provide flood relief to Windsor and Eton also (see Figure 6.1). This resulted in a proposal for an 11 kilometre long channel and associated works which would protect against flooding with a return period of approximately 1 in 60 years. The outcome of planning applications for this scheme is as yet unknown.

The extension of studies to the 27 kilometres downstream to Walton Bridge was part of the River Thames Flood Defence Strategic Initiative (Thames Water 1988). Although a particular scheme had not been specified, studies were initiated to test the engineering, environmental and public feasibility of a continuation of the MWE scheme channel. The 1989 Thames Perception and Attitude Survey (Tunstall et al, 1989) formed part of these early studies of public attitudes and was seen by the NRA Thames Region to be part of an early public consultation initiative.

Figure 6.1: Map of Maidenhead, Windsor and Eton Flood Alleviation Scheme route (as at January 1991)



7. THE THAMES PERCEPTION AND ATTITUDE SURVEY (DWSC/89): BASELINE STUDY

STUDY STATUS	NO RECENT MAJOR FLOODING NO SCHEME YET PROPOSED PUBLICLY SCHEME IMPACT - VARIABLE

7.1 Introduction

This study area (Figure 7.1) extends from Datchet downstream to Walton Bridge (Thames Water 1988) and is an extension of the Maidenhead, Windsor and Eton Flood Study area discussed above. Proximity to London and the many attractive and historically important features in the landscape make it a favoured residential environment. It is predominantly contained within the Metropolitan Green Belt and contains a number of Sites of Special Scientific Interest and other ecologically valuable areas. The area has been affected by mineral workings and associated land restoration works; however, certain areas remain relatively unchanged and are valued for that reason.

7.1.1 Consultation and participation: procedures followed

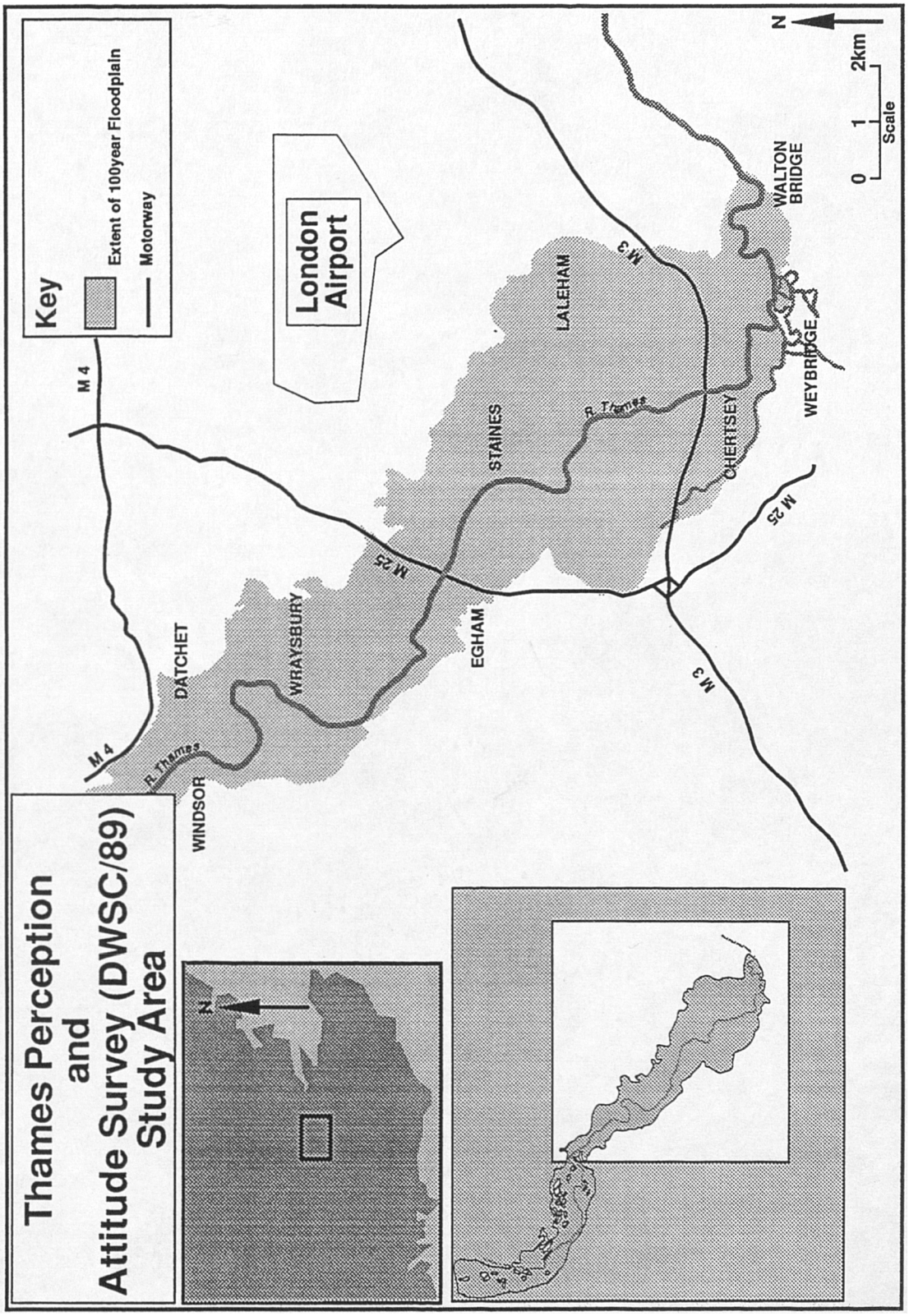
The NRA Thames Region proposed a baseline public perception survey (DWSC/89) to investigate attitudes to the flood risk and possible future schemes prior to any firm scheme proposals or designs having been made. In this way they hoped to identify problem areas or issues ahead of the design stage so that costly amendments could be avoided. There was some hesitation, however, on the part of NRA personnel to alert floodplain residents to both the flood risk, in case this alarmed them, and the possibility of a future scheme, in case this created 'nimby-type' opposition groups. Thus, the NRA set the most unfavourable conditions for an information-gathering exercise in an area without recent flooding and little or no experience of flood defence.

7.2 Research design

The survey population was defined as householders living within the 100 year floodplain[30] between Datchet and Walton Bridge. All the streets within the flood envelope were listed and

[30] The floodplain definition was based on the latest maps supplied by the consulting engineers on the flood study (Halcrow Water) but has been redefined subsequently.

Figure 7.1: Map of the Thames Perception and Attitude Survey (DWSC/89) study area



electoral registers used to estimate the number of addresses. Seven separate samples were drawn with varying sampling intervals in order to produce samples of sufficient size for separate analyses if required.

The interview period extended through the summer and autumn of 1989, providing 494 questionnaires (see Appendix B-1) for analysis. The interviews were lengthy (the average interview took just over an hour) and prospective interviewees were warned beforehand of the probable amount of time they would have to commit. This may have been a contributory factor in the high refusal and non-contact rate of over 50 percent[31]. However a major cause of the low response rate appears to be the considerable apathy of the floodplain residents with regard to the flood risk. Interviewers reported many instances of residents expressing the belief that there was no flood risk and thus the survey was irrelevant to them.

It is possible that the high non-response has led to an element of bias and that the results are not representative of the population as a whole. It is possible that those who responded were more than usually interested or concerned with environmental or flooding issues. However, for the purposes of the NRA, it is often precisely these people who are of most interest as they are the ones most likely to become actively involved in any public debates about proposed schemes and thus the NRA should be aware of their attitudes and concerns.

The sampling error at a 95% confidence level for a random sample[32] of this size is 4.5% (de Vaus, 1987:63). The selection of analytical sub-groups will, of course, affect this level of error.

7.3 Flood history and present level of risk

The last major flood in the area, estimated at the time of the survey to have a return period of 56 years, was in 1947 although high water levels, which would have caused localised flooding of gardens and possibly a few riverside properties, occurred in 1968, 1974, 1979 and 1988. Records of flooding in the study area are scarce (Griffiths, 1979).

Since 1947 there has been considerable development in the floodplain, including major infrastructure developments such as motorway and reservoir construction, which have

[31] Because of the failure of certain interviewers to complete interview response forms it is not possible to give a completely accurate response rate.

[32] This was not strictly a random sample but rather a stratified random sample.

influenced the pattern of flooding (Thames Water, 1988). Estimates, derived by NRA consultants from mathematical models and other specialised software, of the number of properties to be at risk of flooding suggest that up to ten thousand properties throughout the study area are at risk from a flood of similar magnitude to that which occurred in 1947.

7.4 Social characteristics

A breakdown of social characteristics across all three quantitative data sets (DWSC/89, DWSC/90, Maidenhead) is given in Table 7.1.

The majority of the study sample is in the middle or older age group, and is relatively affluent and well educated. The mean length of residence is 19 years but almost a quarter have been resident for less than 5 years. Only 11 percent of respondents have been resident long enough to have witnessed the 1947 flood but over a third long enough for the 1968 floods.

Forty-three percent of the sample live within 250 metres of a river, with 11 percent of these in riverside properties. Just over a quarter of the sample live over 500 metres from the river. The latter is an indication of the geographical extent of the floodplain and a probable factor in the general lack of concern of the respondents about the flood risk (many respondents expressed a belief that they live too far from the river to be at any risk).

Membership or regular support of various organizations (Question 41) were hypothesized to be indicative of the strength of respondents' environmental and community concern, their access to alternative channels of information, and an increased disposition to act on issues of concern. Of the organizations listed in the questionnaire, those with the largest support were sports clubs (28 percent), the National Trust (23 percent) and the World Wide Fund for Nature (20 percent). These were closely followed by the Royal Society for the Protection for Birds and civic or community associations (both with 19 percent) and other environmental groups such as Friends of the Earth and Greenpeace (16 percent).

A scale was constructed, based on the number of community actions taken (see Appendix C-7.1). The categories were suggested by the British Social Attitudes Survey Research (Jowell et al, 1987) but the corresponding question wording (Question 9) was altered from a specifically environmental activism to general activism because of a concern that too few numbers would be achieved for analysis from such a relatively narrow interest area and that the propensity to act on any issue would be sufficiently informative.

Table 7.1: Social characteristics across 3 datasets

Thames Attitude Survey (1989) (DWSC/89)
'The River Environment and You', Postal Survey (1990) (DWSC/90)
Maidenhead Flooding Survey (1990) (M'head)

		DWSC/89	DWSC/90	M'HEAD
SEX	% male	50	59	46
	% female	50	41	54
cases		(489)	(589)	(197)
AGE	% 18-34	21	20	10
	35-49	N/A	31	35
	50-64	N/A	25	79
	65+	N/A	24	21
*DWSC/89				
	35-54	39	40	N/A
	55+	40	42	N/A
EDUCATION (age when completed)				
%	<15 years	31	33	15
	16-17 "	40	47	32
	>17 "	29	20	53
cases		(478)	(559)	(189)
HOME OWNERSHIP				
%	yes	86	85	95
cases		(483)	(585)	(198)
INSURANCE COVER FOR FLOODS				
%	yes	63	63	83
	no	6	7	6
	don't know	29	27	9
	don't have*	2	3	3
cases		(491)	(583)	(198)
LENGTH OF RESIDENCE				
	mean years	19.3	20.0	12.2
	median "	14	14.5	8
cases		(492)	(602)	(198)

* Maidenhead wording: 'No: others/landlord responsible'.

Table 7.1 continued

		DWSC/89	DWSC/90	M'HEAD
DISTANCE FROM RIVER*				
%	riverside	11	16	28
	250m	32	19	54
	250-500m	31	19	17
	>500m	26	40	2
cases		(463)	(603)	(198)

* DWSC/89 distances were measured by researchers; in other surveys, distances were assessed by respondent.

FLOOD EXPERIENCE				
%	yes	24	24	91
cases		(493)	(604)	(199)
GROUP SUPPORT/MEMBERSHIP				
	National Trust			
%		23	29	N/A
cases		(491)	(405)	
	WWF			
%		20	22	N/A
cases		(491)	(405)	
	Political Party			
%		11	17	N/A
cases		(490)	(405)	
	Naturalists' Trust			
%		4	3	N/A
cases		(490)	(405)	
	RSPB			
%		19	16	N/A
cases		(489)	(405)	
	Sports Club			
%		28	39	N/A
cases		(489)	(404)	
	Civic Assoc.			
%		19	18	N/A
cases		(481)	(405)	
	Other env. group			
%		16	22	N/A
cases		(478)	(406)	

The high scorers (defined as those who have taken 6 to 8 actions) on this scale were more likely to be middle-aged (35-54) males with higher levels of education, home ownership and income. Thus, while activism may appear to have become more widespread in recent years, the data support the traditional view that it is largely the middle classes[33] who engage in such community activity.

Responses to scheme statements (Question 24) were examined to discover whether or not those most in opposition to scheme proposals were also likely to be more active in the community, as this would be problematic for the NRA. The responses were variable and inconclusive: out of 15 scheme statements, 7 attracted more positive responses and 8 attracted more negative responses towards hypothetical schemes although the differences between high and low scorers were marginal. Attitudes to the NRA (Question 31) were examined in a similar way and were generally more positive although, once again, differences between high and low scorers were marginal.

7.5 Environmental perception and attitudes

How people perceive the environment was hypothesized to affect their attitudes to proposed structural flood defence schemes in their area. An important indicator of such attitudes is likely to be the relative importance of environmental values within a respondent's total value system; this survey, however, concentrated on the environmental component.

7.5.1 General environmental orientation

A pilot survey (April 1989) tested two sets of attitude statements (compiled by several FHRC researchers) related to nature conservation, and environment and society, comprising 23 and 22 statements respectively. There was considerable agreement with the majority of the statements suggesting widespread environmental awareness and concern. After, inter alia, factor and reliability analyses, the two sets were amalgamated into one section of general environmental orientation. This was necessary to reduce the overall interview time.

For the main survey (Autumn 1989) a set of 25 statements were used, some of which were based on, or influenced by previous published work (Cotgrove, 1982; McKechnie, 1977; Jowell et al, 1988).

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[33] Class was not examined specifically but an assumption is made here on the basis of higher levels of education, income and home ownership.

Analysis again showed positive environmental awareness and concern, although certain statements showed a more divergent response when respondents had to choose between industrial growth and environmental preservation. Factor analysis (Kim and Mueller, 1982, 1983) showed that a number of dimensions were contained within the overall concept of environmental values; eight factors were found which were difficult to interpret. However, cluster analysis (Norusis 1988, 1990) revealed a basic two cluster pattern of 15 and 10 statements each. From these two clusters two separate but related scales were formed, termed 'environmental values' and 'optimistic utilitarianism'[34], comprising 13 and 7 items respectively (see Appendix C-7.2 and C-7.3).

The two scales broadly conform to the values represented by the dominant and alternative social paradigms (Cotgrove, 1982) discussed above (see Table 2.1: in particular, the core values and those concerning nature and knowledge). Higher scores on the optimistic utilitarianism scale are related to the values of the dominant paradigm (materialism, the natural environment as a resource, confidence in science and technology, controllability of the environment etc.) and high scores on the environmental values scale are related to the alternative paradigm (intrinsic value of the natural environment, balance of nature).

While neither scale showed substantial differences in response, the optimistic utilitarianism scale was more discriminating than the environmental values scale. This suggested that, in the sample studied, while environmental concern is widespread at a superficial level, the discriminating factors appear to be related to the primacy of economic and individualistic versus other - particularly environmental - values. The role of science and technology in society and willingness to accept a degree of personal sacrifice in order to protect the environment were important underlying factors.

Those people giving the lowest scores on the optimistic utilitarianism scale (and by implication the most environmentally committed) are most likely to be young to middle-aged females, with higher levels of education beyond the statutory minimum and to be home owners with higher incomes (see Appendix C-7.4).

The majority of the sample rate highly the area in which they live (Question 3). Those scoring highly on the optimistic utilitarianism scale (and thus the least environmentally

[34] Parallel research and analysis on a larger set of attitude statements was undertaken by another researcher (Green and Tunstall, 1990) and these two terms coined although the identification of the concepts and dimensions had been arrived at jointly with the author.

committed) rate it very slightly higher, which suggests that although the environmental factors are significant, other factors (possibly related to attitudes to property and other, non-environmental, values) not measured by the questionnaire are also important.

Membership or support for various organizations and mean scores on the scales were not always easily interpretable (see Figure 7.2). Members of 'other environmental groups' (such as Friends of the Earth and Greenpeace) were the highest scorers on the environmental values scale and the lowest scorers on the optimistic utilitarianism scale, which was broadly as expected; as was the lowest score on the environmental values scale for the sports club members. Members/supporters of County Naturalists Trusts were the highest scorers on the Optimistic Utilitarianism scale which was surprising although somewhat in line with Cotgrove's (1982) findings (see Chapter 4, section 4.5) which contrasted 'environmentalists' and 'nature conservationists': the former allied to a more radical social paradigm; the latter more allied to the traditional, hierarchical values which underlie the optimistic utilitarianism scale. Unusually the responses of the National Trust and Sports Clubs members and supporters seemed to be related and they proved to be low scorers on both scales. However, the low frequencies of organization membership throw some doubt on the reliability of these findings.

Table 7.2 shows the mean scores on environmental values, optimistic utilitarianism and community activism scales according to the number of environmental groups supported. Although the differences between the categories are small, they conform to the expected pattern, i.e. the members/supporters of the greater number of groups have the lowest optimistic utilitarianism scale scores and the highest environmental values and community activism scale scores.

7.5.2 Attitudes to the local environment

Respondents were asked (Question 2) to rate a number of items as advantages and disadvantages of their local area as a place to live (see Figure 7.3). This showed that the nearby countryside and nearness of the river were rated as considerable advantages while the risk of river flooding was a marginal disadvantage only (for some, the risk of flooding is so far from being a disadvantage that they rated it positively). Other advantages of the area included housing, access to work and leisure and recreational facilities. Being near the river was rated an advantage by 79 percent of respondents while the risk of river flooding was rated a disadvantage by only 34 percent. Thus the many advantages of the local area outweigh the perceived risk of flooding (similar findings emerged in all the surveys discussed).

Figure 7.2: Mean scale scores for different organization members/supporters (DWSC/89).

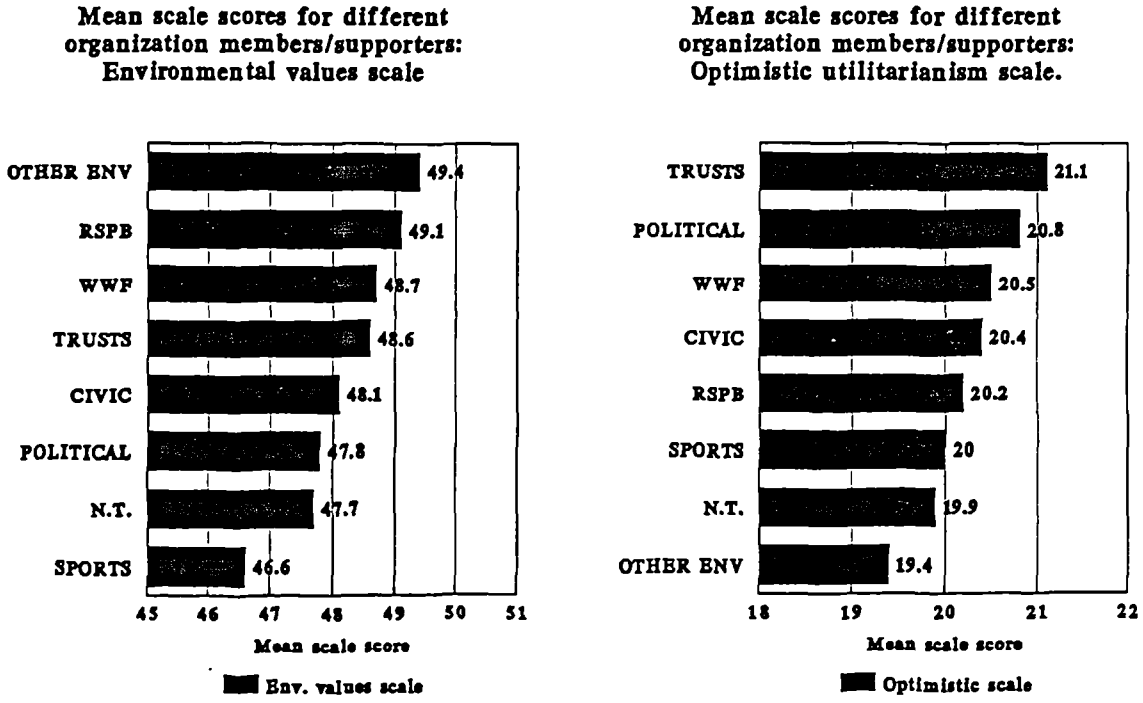


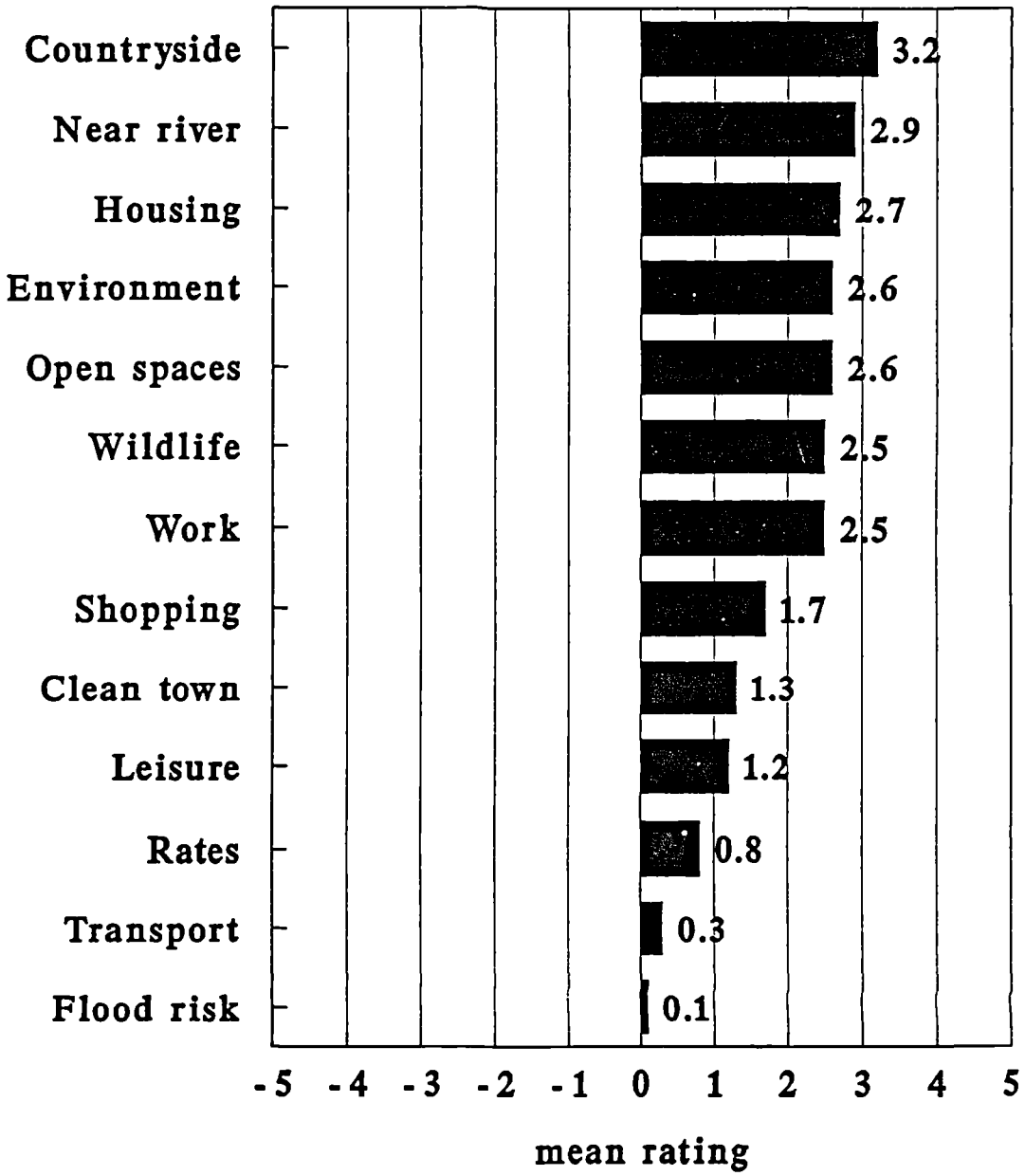
Table 7.2: Mean scores on environmental values, optimistic utilitarianism and community activism scales according to membership/support of environmental groups (DWSC/89)

	ENV'MENTAL VALUES SCALE	OPTIMISTIC UTILITARIANISM SCALE	COMMUNITY ACTIVISM SCALE
Member/supporter no environmental group	46.6	21.0	3.1
Member/supporter 1 environmental group	47.4	20.6	4.4
Member/supporter 2 or more environmental groups	49.1	19.8	5.0
All cases	47.4	20.7	3.8

Environmental groups = National Trust, World Wide Fund for Nature, County/Local Naturalists' Trust, RSPB, Other environmental group (e.g. Friends of the Earth/Greenpeace)

Attitudes to the local environment were also examined in three questions (Questions 7, 7a and 8) based on questions in the British Social Attitudes Surveys (BSAS) of 1985, 1986 and 1987 (Jowell and Witherspoon, 1985; Jowell et al, 1986; 1987). The wording was changed slightly to make them more appropriate to the needs of the survey and the study area. For example, while the BSAS survey questions were widely focused on the countryside generally, the DWSC 1989 survey aimed to examine attitudes to the particular local area. It was thought possible that not all respondents would regard their local open spaces as 'countryside', and so the wording was changed from "do you think the countryside generally is much the same as it was twenty years ago, or do you think it has changed?" to "I would like to ask you whether you think the local countryside and open spaces have changed in the last 20 years". Thus, while the results are not directly comparable, they serve to place the local Thames survey results against a wider, national, background. The Thames survey data suggest (see Appendix C-7.5) that in 1989 more change is perceived to have occurred locally compared to nationally in earlier years and that just under two fifths of respondents regard the changes as being for the worse. However, just over two fifths regard the changes as having both

Figure 7.3: Advantages and disadvantages of living locally (DWSC 1989).



Scale: -5 major disadvantage
to 5 major advantage

positive and negative aspects. A question (Question 8) was included to measure levels of concern for the local environment. The categories were expanded and the wording changed slightly for the DWSC/89 survey which generally shows (see Appendix C-7.6) a higher level of concern for the local environment than is apparent in the more widely focused, national sample. Only 4 percent of respondents admitted to being "not particularly concerned".

Another measure of environmental concern at the time of the Survey was the European Election results in June 1989 when the Thames Valley (Berkshire East, Reading East, Reading West, Slough, Spelthorne, Windsor and Maidenhead, Wokingham) gave the Green Party 21.5 percent of the vote (nationally the Green Party took 14.9 percent of the vote; other results were: Conservative 52.7 percent; Labour 27.2 percent; Social and Liberal Democrats 8.5 percent).

Thus, the respondents in the Thames Valley study area show a high level of concern for their local environment which they feel has undergone considerable change, much of it for the worse.

7.6 Flood experience

A quarter of respondents have experienced flooding in their house or garden. Of these, almost half have experienced flooding at their present address and the majority of the remainder of those with flood experience were flooded in some other part of the study area. A third of those with flood experience had floodwater inside their homes while the remainder had floodwater in the garden only. The majority of those with flood experience have been flooded on one occasion only, although some have experienced more frequent flooding.

Respondents were asked (Question 10g) the date of the most serious flood they had experienced. Only 13 percent (3 percent of the total sample) had experienced their most serious flood within the last ten years. Thirty-one percent (6 percent of the total sample) gave 1947 as the date of the most serious flood experienced.

7.7 Perception of, and attitudes to, flood hazard

Awareness of past flooding in the area was high (80 percent aware) with over 40 percent aware of the 1947 flood specifically. Awareness of flooding at other times was not common; the next largest percentage recalled 1968 as a year of flooding.

Just over half of the respondents were aware of the flood risk when they moved to the area. In response to the question: "could you tell me your reasons for moving here even though you knew about the possibility of flooding?" (Question 19d.), they gave answers such as they liked the area, it was convenient, the flood risk was low or non-existent, it was a better property or that they wanted to live by the river (see Appendix C-7.7). Other research (James, 1971 et al,; James, 1974) has also shown high levels of awareness of flood risk when moving to an area.

A number of attitude statements were used with the intention of constructing Likert scales of flood hazard perception to indicate levels of awareness of the causation and likelihood of flooding, and the nature of flooding and living in flood-prone areas. The expected pattern was that those with high flood hazard perception would agree with the more negative aspects of flooding suggested by the statements and would be more likely to expect flooding to recur. It was hypothesized that those with flood experience would be likely to show higher flood hazard perception, and thus a higher score, than those without.

In practice, the experience of these floodplain residents appeared to conflict with the expected pattern in certain aspects, giving negative correlations where positive correlations were expected (although the correlations were weak, most being less than 0.3). Appendix C-7.8 and Appendix C-7.9 show the means, medians and standard deviations for the statements according to flood experience. The validity and reliability of the scales were deemed unacceptable and the statements were used as individual indicators only.

The majority of respondents asserted that there are no problems getting insurance in the area perhaps because there was also a majority belief - irrespective of flood experience - that there are no "real floods" in the area. In general, respondents disagreed that in areas liable to flooding you could not get insurance but about a quarter were uncertain (neither agreeing nor disagreeing) - irrespective of flood experience. In fact 63 percent of respondents said they had insurance that provides flood cover; 6 percent said their insurance did not provide flood cover; 2 percent do not have any insurance and 29 percent did not know whether their insurance policy provided flood cover. The last suggests an apparent lack of concern about the flood risk.

The vast majority agreed that it takes a long time to get back to normal after a flood but they were split over whether you can get fun out of the flooding situation: more of those with flood experience agreed that you can. Agreement with the latter item was hypothesized to point towards trivialisation and underestimation of the serious nature of flooding and was

expected to be supported by those without flood experience, thus it was surprising to find those with flood experience agreeing with it.

While the majority agreed that nobody wants to buy a flooded house, about a quarter disagreed, irrespective of flood experience. Respondents were split over whether "If you live in flood prone areas, flooding is at the back of your mind all the time", however, those with flood experience showed greater disagreement; which is the reverse of what was expected.

Although the majority agreed with the statement "the worst thing about floods is not the monetary costs but the loss of personal possessions like letters and photographs", the responses of those with flood experience were more dispersed across the attitude range. It seems probable that for a minority who do lose such possessions of importance, it can be the worst part of a flood event but for those who do not, other factors predominate.

Those without flood experience were uncertain whether "flooding brings out the best in people" but those with flood experience expressed stronger agreement. Those without flood experience believed more strongly that "a flood affects people's mental and physical health long after the event" than did those who have experienced flooding. This, again, was the reverse of what was expected.

There was considerable uncertainty about flooding, its effects and likelihood in this sample of whom only a quarter have experienced flooding. The responses to the statements suggested that frequently it was the non-flooded who responded as would be expected from a hypothesized model of those with high flood hazard perception, i.e. with a negative image of flooding as distressing and disruptive. In this sample, those with flood experience revealed more positive aspects of flooding, and were frequently in opposition to this hypothesized model. The expected pattern was confounded in 6 out of 10 statements. It is possible that the seriousness of the experienced flood would have an influence on these responses. However, no objective assessment of event seriousness is available, only the respondents' subjective rating of seriousness.

Eight statements were used to examine the causation and likelihood of flooding (Appendix C-7.9). It was hypothesized that flood experience would be likely to increase knowledge and awareness of flooding. More of those with flood experience disagreed that the Thames Barrier had removed the risk of flooding in the area but a quarter believed it had.

Poor operation and maintenance of locks and weirs was believed to be the cause of flooding

in the area by both those with and those without flood experience although more of those with flood experience believed building roads and houses in the area makes flooding worse. Those with flood experience were more likely to believe that "past flooding was a freak event, unlikely to happen again".

There was more disagreement from those with flood experience with the statement that "the likelihood of flooding in the area is increasing all the time because of changes in climate and other things" but there was little difference in responses between those with and those without flood experience to the statement that "a flood could happen again any year".

Although a majority disagreed that "a flood won't happen again because the Water Authority (NRA) can now control flooding through river management", the responses from those with flood experience were more dispersed. There was considerable uncertainty regarding the statement "we are now due for another flood" with similar responses irrespective of flood experience.

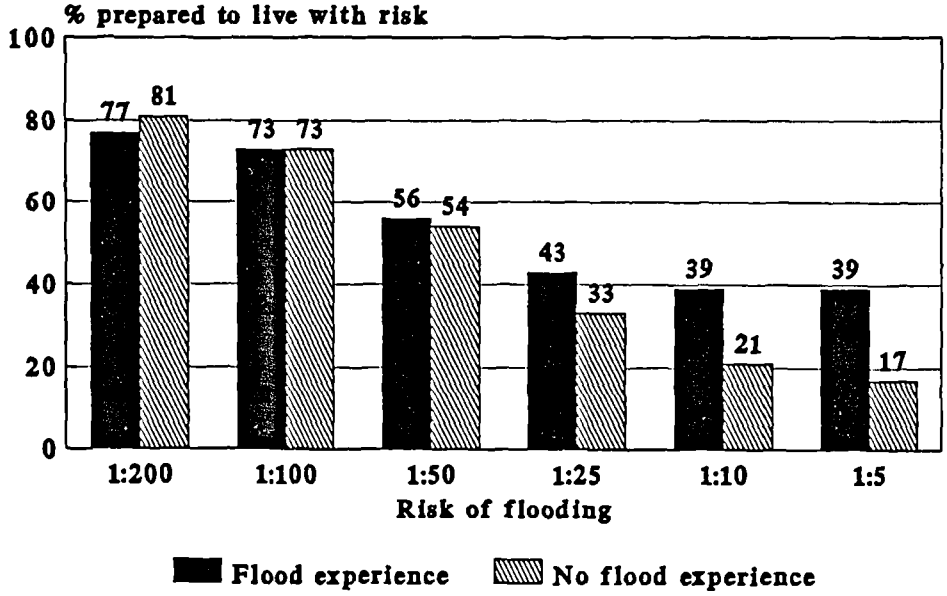
7.8 Perception of, and attitudes to, future flood risk

Awareness of the possibility of future flooding was also high (75 percent aware) although this suggests that a quarter of respondents had not considered this risk before the interview. Of those who were aware of the flood risk, the majority became aware through personal observation of the river. Other major sources of information were neighbours and solicitors and estate agents when buying their property.

Respondents were asked whether they would be prepared to live in the same area if there were varying levels of risk (Question 18). A majority would be prepared to live with risks between 1 in 200 and 1 in 50 but only a minority were prepared to live with risks between 1 in 25 and 1 in 5. However, more than a fifth of respondents were prepared to live with the most frequent flood risk. Those with flood experience (see Figure 7.4) were more prepared (or as prepared) than those without to live with all but the most remote level of risk. Preparedness to live with varying risks followed a decay function with distance from the river; those living nearest being more prepared to live with all levels of risk (see Figure 7.5).

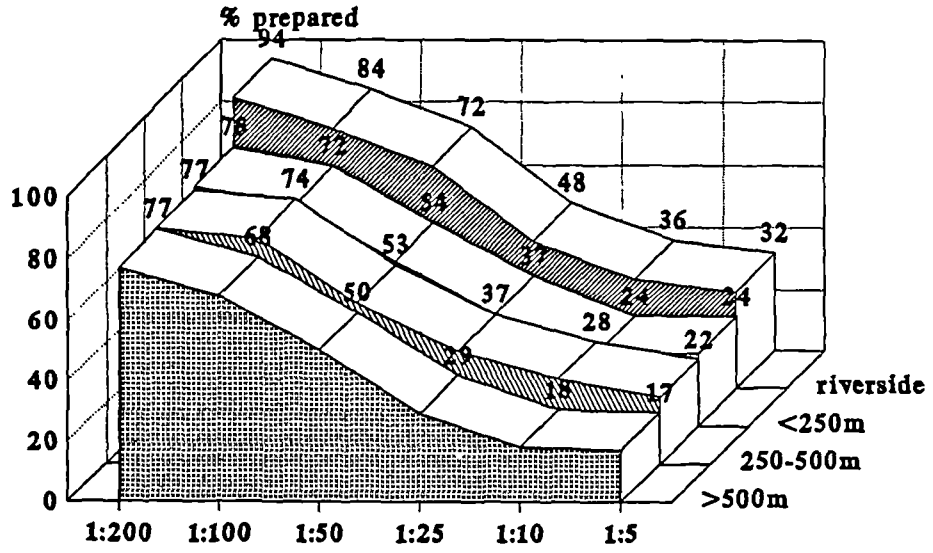
Appendix C-7.10 shows the ratings for perceived seriousness of an experienced flood and worry about future flooding across the 3 data sets. This shows little difference in the seriousness ratings but a rise in the level of worry about future flooding from the recently flooded samples from Maidenhead compared to the DWSC/89 survey. Generally, the latter

Figure 7.4: Preparedness to live with varying flood risks (DWSC/89).



A 1:200 to a 1:5 risk that your house would be flooded each and every year

Figure 7.5: Preparedness to live with varying flood risks by distance from the river (DWSC/89).



A 1:200 to a 1:5 risk

respondents suffered less recent and less serious flooding than the former survey sample which supports the 'classic' survey findings of Kates and others that recency and magnitude are important and influential factors in flood hazard perception although the above discussion suggests that this is not a simple relationship.

7.9 Attitudes to adjustment (proposed/implemented)

At the time of the survey there were no specific plans for flood defence in the study area and so responses were to hypothetical works only. Interviewees were asked to respond to a set of general and area-specific scheme attitude statements (Question 24; see Appendix C-7.11). Generally respondents had a positive attitude towards flood relief schemes although responses were qualified and large numbers showed uncertainty by giving a "neither agree nor disagree" response. A third believed that there is no need for a scheme because the risk is too low and over a quarter were uncertain.

Distance from the river proved to be a useful explanatory variable with regard to attitudes to proposed schemes. Those living **closest** to the river and those **with** flood experience were generally **more** prepared to live with the flood risk and were often **less** in agreement with scheme development proposals. As those who live nearest to the river also have the greatest flood experience it was necessary to examine preparedness to live with risks and attitudes to flood scheme proposals and to control for flood experience. Many of the examples of those with flood experience are based on low frequencies (the numbers are below 50 in many cases) and may be less reliable in statistical terms.

Appendix C-7.12 shows responses to selected scheme statements according to flood experience and distance from the river.

Distance from the river was not a consistent explanatory variable which suggests this is not a simple bivariate relationship but other factors, perhaps related to underlying value systems, are also in operation. In order to examine this hypothesis a comparison was made of responses to 6 scheme statements (Questions 24 a, d, e, g, k and o) according to flood experience, distance from the river, environmental values scale score and optimistic utilitarianism scale score (see Appendix C-7.13a to C-7.13f).

The statement "Anything designed to reduce flooding is desirable" (Appendix C-7.13a) attracted general agreement, as had been found elsewhere (see discussion of this statement in the Lower Stour case study Chapter 10, Section 10.9), with little difference between the

responses according to distance from the river, flood experience or environmental values scale score. However, there was much stronger agreement from the high scorers on the optimistic utilitarianism scale. This finding accords well with what would be expected from those espousing the values of the dominant social paradigm, particularly control of nature and materialism.

Conversely, the statement "I would rather put up with flooding than spoil the open spaces here with flood relief channels" (Appendix C-7.13b) attracted general disagreement - possibly because respondents found an image of damage easier to construct for flooding than for flood relief channels. Neither of the environmental scales discriminated between responses but distance from the river and flood experience did, which suggests that the interviewees were responding to the first part of the statement - related to flooding - rather than the second - related to environmental damage from mitigation works. Those living closest to the river and those with flood experience (two strongly related categories) showed greater agreement with the statement.

There was general disagreement with the statement "It is a waste of money to spend it on flood relief channels: nature will always win in the end" (Appendix C-7.13c), with none of the explanatory categories discriminating well. This statement also contained two parts and it is uncertain whether responses were directed to one or other or both parts. The more strongly worded and area-specific statement "A flood relief scheme should be carried out in this area regardless of cost" (Appendix C-7.13d) attracted a slightly more dispersed response with a higher frequency of 'neither agree nor disagree' responses. Interestingly the high scorers on both environmental scales showed greater agreement with the statement, perhaps because there were no obvious environmental triggers in the wording and responses were directed at the cost aspect. The fact that the high scorers on the environmental values scale tended towards greater support for this statement indicates the complexity within a broadly environmental values system, aspects of which can straddle both the dominant and the alternative social paradigms.

Respondents were uncertain about the statement "There is no need for a flood relief scheme in this area because the flood risk is too low" (Appendix C-7.13e), with large numbers opting for the 'neither agree nor disagree' category. Perhaps surprisingly, there was little difference in response according to flood experience. The two scales, although showing only moderate variation, appeared to accord with expectations (see 'economy' category in Table 2.1): the high scorers on the environmental values scale opting for safety and the high scorers on the optimistic utilitarianism scale leaning towards risk. Most of the variation was found in the

distance from the river variable, with those living closest to the river showing greater agreement with the statement.

Although there was general agreement with the statement "I would rather have any scheme than be flooded" (Appendix C-7.13f), there were marked differences in responses depending on distance from the river and score on the optimistic utilitarianism scale. Those living closest to the river showed stronger disagreement with acceptance of **any** scheme and, conversely, those with the higher score on the optimistic utilitarianism scale showed (as hypothesized) greater support.

7.10 Consultation and participation

The DWSC/89 Survey was considered by the NRA Thames Region to be part of its consultation process and the questionnaire included a number of questions specifically concerning attitudes to consultation and participation in relation to flood defence.

7.10.1 Residents' attitudes

While the Thames Perception and Attitude Survey may have been regarded internally as an early public consultation exercise (see discussion above), in terms of the public's power to influence decision-making it was more closely allied - in Arnstein's (1969) conceptualisation (see Table 3.2) - to non-participatory 'tokenism' than to 'citizen power'. There was some scepticism and much uncertainty among the respondents regarding the completeness and fairness of the NRA's consultation procedures (see Appendix C-7.14). Almost two thirds of respondents believed "some people affected by a flood relief scheme have more influence on the decisions of the Water Authority/NRA than others" and two-fifths believed "The Water Authority/NRA doesn't take the public's views into account when deciding on a flood relief scheme". However, over half agreed that "The Water Authority/NRA consults the people affected fully when developing plans for a flood relief scheme".

Respondents were asked their preferences regarding the timing, the target groups and the nature of consultation on any possible flood relief schemes for the area (Questions 32, 33 and 34). The majority preferred to be consulted at the stage when a number of possible options had been selected for them to choose between or even earlier (see Table 7.3. This lends support to the recommendations arising from the Eton Wick Survey (Tunstall et al, 1989:37) where dissatisfaction with the late (preferred option) stage of consultation was reported.

Table 7.3: Preferences for consultation: when, who and how? (DWSC/89)

Preferences for consultation: when

Question 32: "If the National Rivers Authority Unit of Thames Water were to propose a flood relief scheme for this area, how soon do you think it should consult the public?"

	%	Number
a) Before it selects any options for the design or route	29	(144)
b) When it has selected a number of possible options for the design and route so that the public can choose between them?	59	(290)
c) When it has chosen a preferred option for the design and route for people to comment upon?	8	(41)
d) Or do you think it shouldn't consult at all but should go ahead with whatever it thinks best?	2	(10)

Cases: 489

Preferences for consultation (DWSC/89): who?

Question 33: "In your view, should the NRA Unit of Thames Water..."

	%	Number
a) Only consult the general public directly?	13	(62)
b) Only consult through representatives such as parish councils, residents' committees, wildlife and amenity groups etc?	16	(76)
c) Consult both the public directly and through representatives?	70	(342)

Cases: 491

Preferences for consultation (DWSC/89): how?

Question 34: "How would you prefer to be consulted about any flood risk or flood relief proposals for this area?"

	YES		NO	
	%	Number	%	Number
a) Public meetings	59	(282)	41	(195)
b) Walk-round exhibitions	66	(313)	34	(159)
c) Video presentations	46	(212)	54	(253)
d) Regular newsletters	82	(393)	18	(86)
e) Other	29	(63)	N/A	N/A

(e.g.: local free press, use of local shopping centres, "Water Authority personnel should come and visit people in their homes and talk about it.")

Cases: 465-479

Respondents expressed a preference for consultation with both the public and representatives (such as parish councils, residents' committees, wildlife and amenity groups etc.). Arguably, this, combined with an early start to the consultation process, could mitigate against a repetition of the situation which arose in Eton Wick, where a late discovery of sites of importance to the public conflicted with the sites chosen for the preferred flood defence option (Fordham et al, 1991): this was the rationale behind the decision to survey the Datchet to Walton Bridge area prior to the development of detailed plans.

Respondents were asked whether or not they would prefer to be consulted by public meetings, walk-round exhibitions, video presentations or regular newsletters or to specify other means. There was a majority in favour of all but video presentations, with newsletters gaining the strongest support. It is possible that more respondents expressed a preference for this means because it entails the least effort on their part but another factor may be that the regularity suggests continuity of consultation rather than the 'one-off' nature suggested by the other means. Whether or not respondents had experienced flooding did not affect their attitudes towards consultation but greater numbers of those living closest to the river preferred to be consulted at the earliest stages of the process. This lends support to the notion (discussed below) of differentiation between consultees. Those most impacted by both flooding and proposed schemes should perhaps receive higher levels of contact and opportunities for participation (as opposed to mere consultation) than those less impacted (usually those further away from the river).

7.11 The risk-environment trade-off

In the determination of a negative flood hazard mitigation attitude (as partly indicative of a risk-environment trade-off), distance from the river was the most useful explanatory variable (in terms of the number of statements where it showed a variance in response), followed by the optimistic utilitarianism scale score, flood experience and then the environmental values scale score.

To examine this further, those with a negative attitude towards scheme proposals were selected from the responses to a set of scheme response statements (Question 24, statements: a, b, d, g, j, k, l and o). These statements were selected as showing a strongly negative attitude to a flood relief scheme in their area and to be indicative of those making a risk-environment trade-off (see Table 7.4). Each statement was examined in turn and the findings amalgamated to give an average response across the set.

Table 7.4: A risk-environment trade-off: percentage giving responses to selected scheme statements indicative of a negative scheme attitude (DWSC/89)

(Question 24)	Percentage - frequency showing negative scheme response	
Anything designed to reduce flooding is [not] desirable	23%	(113)
A flood relief scheme should [not] be carried out in this area regardless of cost	43%	(215)
I would rather put up with flooding than spoil the open space here with a flood relief channel	16%	(81)
I would [not] rather have any scheme than be flooded	32%	(157)
I would rather rely on flood warnings and risk being flooded than have any flood relief scheme in this area	20%	(97)
There is no need for a flood relief scheme in this area because the flood risk is too low	36%	(171)

More of these respondents lived closer to the river and had generally been in residence longer. The majority rated the attractive environment and being near the river as a greater advantage and the risk of flooding as less of a disadvantage. They were more aware of past flooding and had more personal flood experience but they rated the seriousness of the experience lower than the average. They believed the likelihood and seriousness of future flooding to be less than average and were less worried and more prepared to live with the complete range of risks. They were more often males with higher levels of education and income and higher levels of community activism.

The fact that they rated their flood experiences as lower than average might be construed as typical of those prepared to tolerate flooding: the argument (most particularly from flood defence engineers discussed below) being that were they to experience serious flooding they would change their attitudes and accept virtually any flood defence scheme. However, the other case studies discussed here do not always support this view and the engineers themselves provided evidence to contradict this position (see Chapter 13). Furthermore, the flood experience seriousness rating (Question 10e) is a subjective one: it

does not indicate the objective level or duration of any flood event but rather how it was perceived by the respondent. It is possible that an 'objectively' serious flood may be given a low 'subjective' seriousness rating although an approximate relationship must be assumed (the Maidenhead data (below) broadly support the relationship between depth of flooding and event seriousness rating).

7.12 Summary and conclusions

This survey showed a general level of support for flood defence in principle but not at the expense of the environment: thus floodplain residents were indeed making the hypothesized risk-environment trade-off. The survey found widespread environmental awareness and concern although this could be said often to be at a superficial level. The discriminating factors appeared to be related to the primacy of economic and individualistic versus other, particularly environmental, values.

The majority rated highly the area in which they live. The nearness of the river and countryside were rated as considerable advantages while the risk of river flooding was a marginal disadvantage only.

Over two thirds of respondents were aware of the flood risk when they moved to the area but there was considerable uncertainty about flooding (its effects and likelihood) in this sample, of whom only a quarter had had flood experience. Those with flood experience tended to respond differently, revealing more positive aspects of flooding and opposite to the expected response pattern.

A majority would be prepared to "live with" risks between 1 in 200 and 1 in 50 (which covers the 56-year return period for the last major flood in 1947) but only a minority were prepared to live with a more frequent risk. However, more than a fifth of respondents were prepared to live with the latter, most frequent, risk.

Greater numbers than expected of those living closest to the river and those with flood experience were prepared to live with the flood risk and were often less in agreement with scheme development proposals.

The majority of respondents preferred to be consulted about flood defence at least at the stage when a number of possible options had been selected for them to choose between or at an earlier stage. This was particularly the case for those living nearest to the river.

While this survey itself represented a form of public consultation at an early stage, it nevertheless remained passive in form and provided little opportunity for direct public participation in decision-making.

In terms of the relationships hypothesized in the model which guided the basic research design, the findings have supported the importance of environmental factors in flood hazard mitigation but they have also suggested an underlying complexity that the model does not convey. Appendix C-7.15 contains a more detailed discussion of some of the significant relationships found when testing the model.

This survey has examined a sample of floodplain residents, the majority of whom have yet to experience either a flood or a flood defence scheme thus their decision-making environment is one of great uncertainty and their responses must be regarded as tentative indications only of their responses to an actual scheme. The following case study discusses a follow-up study in the same area, which was carried out after flooding occurred nationally and in areas nearby.

8. DATCHET, WRAYSBURY, STAINES AND CHERTSEY STUDY: POSTAL SURVEY: 'THE RIVER ENVIRONMENT AND YOU' (1990)

STUDY STATUS	RECENT, MOSTLY DISTANT FLOODING NO SCHEME YET PROPOSED PUBLICLY SCHEME IMPACT - VARIABLE

8.1 Introduction

Localised flooding in February 1990 of parts of the Thames Valley provided the opportunity to examine the same study area as in 1989 before and after flood events were addressed by the media and perhaps experienced by respondents. This Case Study provides a brief discussion of the survey findings, which have been reported at greater length elsewhere (Tapsell et al, 1991).

8.1.1 Consultation and participation: procedures followed

No formal consultation programme had been initiated at the time of the 1990 survey (no scheme having yet been decided) although, as with the DWSC/89 survey, the postal survey itself was considered to be part of an early information-gathering, consultation process. An unknown number of respondents would have been contacted by letter and by interviewer during the first survey and this may have raised awareness levels (while it is known how many households took part in both surveys, the number of households which were contacted and refused or were unattainable has not been computed).

8.2 Research design

The same sample and the same or similar questions were used for both the 1989 and 1990 surveys but the second survey used a self-completion postal questionnaire (see Appendix B-2). This was chosen as a means of examining different survey instruments and perhaps overcome the poor response rate in 1989. Attention was paid to the presentation of the questionnaire and a glossy cover was used to encourage people not to throw it away. Some of the feedback from the respondents suggested that most of them liked the presentation but some were concerned that the materials should have been less extravagant and recycled ones used instead.

The response rate for the 1990 postal survey, allowing for the removal of incomplete returned

questionnaires, was 54 percent which was better than the previous survey but still low. It is likely that, despite recent flooding in nearby communities and the country nationally, there was still a high level of unconcern about the possibility of future flooding. It is possible (even probable) that those who did return the questionnaires showed a more than average level of concern for either or both the local environment or the risk of flooding. Twenty-three percent (261) of the 1990 questionnaire returns were from households that had been interviewed for the 1989 survey.

The two surveys are not directly comparable because differences may be attributable purely to the difference in survey instrument rather than a change in respondent attitude to the measured item. However, it must be accepted that any survey is a unique record of attitudes at the time of survey and dependent upon many extraneous (unmeasured) factors that can be hypothesized to influence attitude change or stability. Furthermore, the survey questionnaire can itself change attitudes, by raising awareness for example, and thus the administration of the same survey instrument may result in changed attitudes (Lowenthal, 1966).

A further argument against their direct comparability is that the same individual may not have answered both sets of questions. The 1990 postal survey used the same list of households as in 1989 but no indication was given about which individual in the household could fill in the questionnaire and no specific question was addressed to this.

Bearing in mind the above, it is felt, nevertheless, that the two surveys under discussion are sufficiently similar in both content and in the sample from which they were drawn, to be broadly comparable.

The sampling error at a 95 percent confidence level for a random sample[35] of this size (614) is between 4 and 4.5. The selection of analytical sub-groups will, of course, affect this level of error.

8.3 Flood history and present level of risk

Flooding occurred in February 1990 in many parts of England and Wales. There was little flooding in the study area although a red alert (flood warning) had been issued (and featured in the national news media) and the River Thames flowed out of bank on some stretches. The nearest major flooding occurred upstream in Maidenhead and was covered extensively in both

[35] As with the preceding survey, this was not a simple random sample but a stratified random sample.

local and national news media; this was hypothesized to be a possible influence on attitudes.

8.4 Social characteristics

The social characteristics of the postal sample closely resembled those of the first (see Chapter 7, Table 7.1) except that a higher number of males responded to the Postal survey than in the 1989 survey (59 percent compared to 50 percent previously) and there were differences in the distance from the river at which they lived.

In the DWSC/89 survey the distance was measured by researchers while in the DWSC/90 survey the respondents were asked to estimate the distance themselves. The 1989 survey used 'riverside' as the nearest zone of property, meaning those roads/properties closest to the river without intervening properties or developments. The 1990 survey asked respondents if their property 'overlooked' the river which could include properties at some distance and even with intervening properties/developments that still allowed a river view. This may have increased the numbers in the 1990 survey giving the nearest zone, and decreased the numbers in the next (up to 250 metres from the river).

There was a considerable increase in the numbers of respondents giving 'over 500 metres from the river' as the distance they lived from the river. This suggests that those living over 250 metres from the river may perceive themselves to be further away than they are. This factor may influence attitudes to both the river's environmental benefits and its risks.

Membership and support for various organizations were broadly similar to the 1989 survey.

8.5 Environmental perception

8.5.1 General environmental orientation

A set of environmental attitude statements was used in both surveys. The main differences between the 1989 and 1990 responses (see Appendix D-8.1) were that less respondents believed that "people are more important than the environment"; more people agreed that "the most important problems today are the threats to the environment"; less people agreed that "it's right to use animals for medical research"; and less people agreed with the statement that "these days, morality and trying to do what's right don't seem to matter". The findings suggest a slight enhancement of environmental concern between the two surveys. However, this could be accounted for by the fact that those who were more environmentally concerned

would be more likely to return the questionnaire.

8.5.2 Attitudes to the local environment

Although a similar question was asked in both surveys regarding the advantages and disadvantages of living in the area, a different rating scale was used (the use of a '-5 to +5' scale was considered to be too complicated for some possible respondents in a postal survey without the aid of an interviewer). It showed (see Figure 8.1) that the mean response to the risk of flooding placed it as marginally more disadvantageous than "new building developments" and marginally less disadvantageous than "aircraft noise" (the latter was site specific however). The "attractive countryside" and "being near the river" were rated highly as advantages, as was "access to work". The mean general rating of the area was similarly high (after recalculation) in both surveys.

The responses of those with flood experience (see Figure 8.2) closely resembled those without. The largest difference was for the item: "being near the river", which showed those with experience giving it a higher rating. As with the 1989 survey, the advantages of the location appear to outweigh any apparent disadvantages related to the flood risk.

8.6 Flood experience

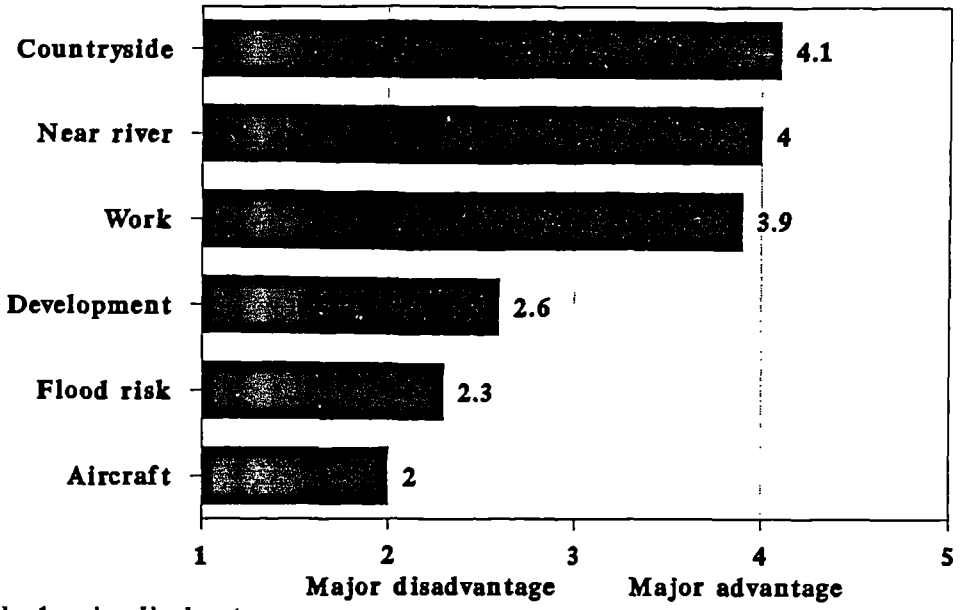
It had been hoped, for comparative purposes, that the postal survey would show higher levels of flood experience than had been found in the 1989 survey; however, levels of flood experience were similar, with three quarters having no experience of flooding. Of the quarter who had experienced flooding the majority had experienced garden flooding only and at their present address.

Only four respondents reported flooding in the house in 1990 and 35 (6 percent) reported flooding in the garden.

8.7 Perception of, and attitudes to, flood hazard

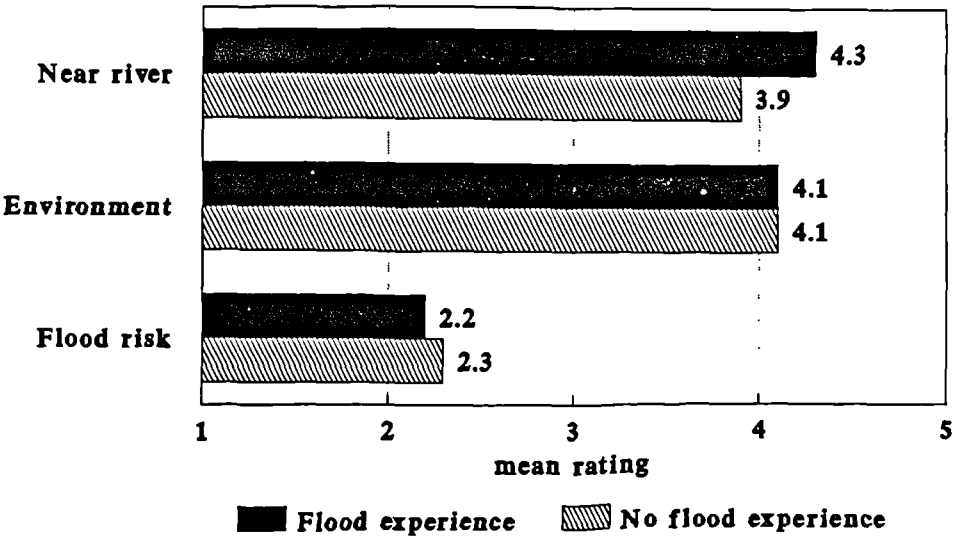
Compared to the 1989 survey, slightly higher percentages of the 1990 survey respondents were aware of the possibility of future flooding (Question 13) and were aware when they moved to the area (Question 13a) (see Table 8.1). Over 80 percent of respondents were aware that there was a risk of flooding in the area and three quarters of these (over half of the total sample) were aware of the risk when they moved. Of those who were unaware of the flood

Figure 8.1: Advantages and disadvantages of living locally (DWSC/90).



Scale: 1 major disadvantage to 5 major advantage

Figure 8.2: Advantages and disadvantages of living locally, according to flood experience (DWSC/90).



Scale: 1 major disadvantage to 5 major advantage

Table 8.1: Perception of flood hazard: past and future flood risks (DWSC/90)

'The River Environment and You' (DWSC/90: Questions 7, 13 and 13a) and 'Thames Attitude Survey' (DWSC/89: Questions 13, 19 and 19b).

	DWSC/90	DWSC/89
Aware of past flooding in area*	62%	80%
Aware of possibility of future flooding	81%	75%
Aware of flood risk when moved	58%	52%

* DWSC/90 Survey question wording: "Are you aware of the flooding that occurred in February 1990...in this area?"
DWSC/89 Survey question wording: "Are you aware of [this local area] having been flooded in the last 50 years?"

Cases: DWSC/90: 479 - 616
DWSC/89: 383 - 494

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risk, three quarters (almost half of the total sample) stated they would still have moved there had they known (Question 13d).

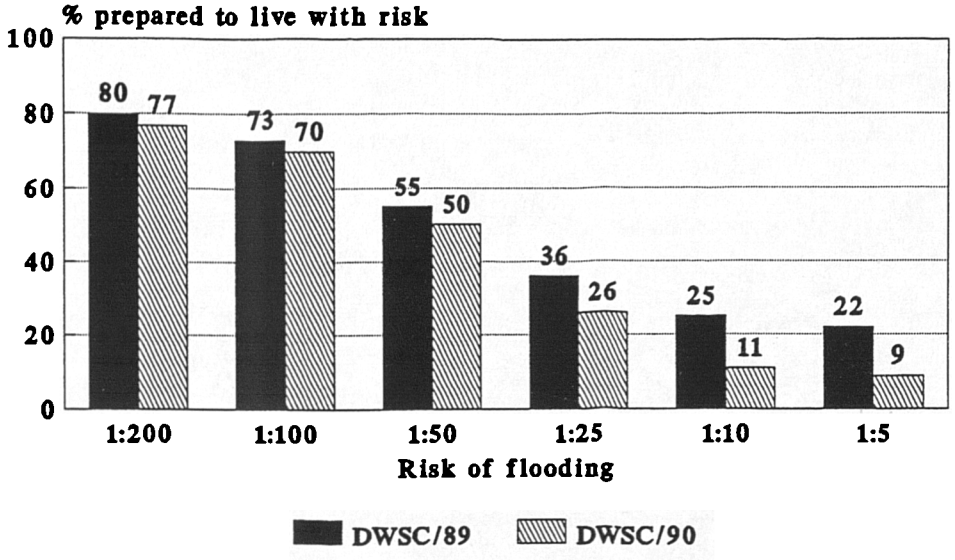
Responses to a set of statements used in the 1989 survey indicated a general increase in the perception of flood hazard (see Appendix D-8.2) with fewer respondents agreeing that "past flooding was a freak event" and that "we don't have real floods here". There was also less agreement with the (erroneous) statement that "the Thames Barrier [...] has removed the risk of flooding in this area", although it is not possible to point to the cause of the latter finding.

Respondents were asked whether the Thames floods of February 1990 had changed their attitude to the flood risk in the area. The majority said it had not. Thirty percent said it had not and they were still unconcerned; 30 percent said it had not and they were still concerned. Of the 26 percent who said the flooding had changed their attitude, 23 percent were more concerned. Fifteen percent said they did not know about the flooding.

8.8 Perception of, and attitudes to, future flood risk

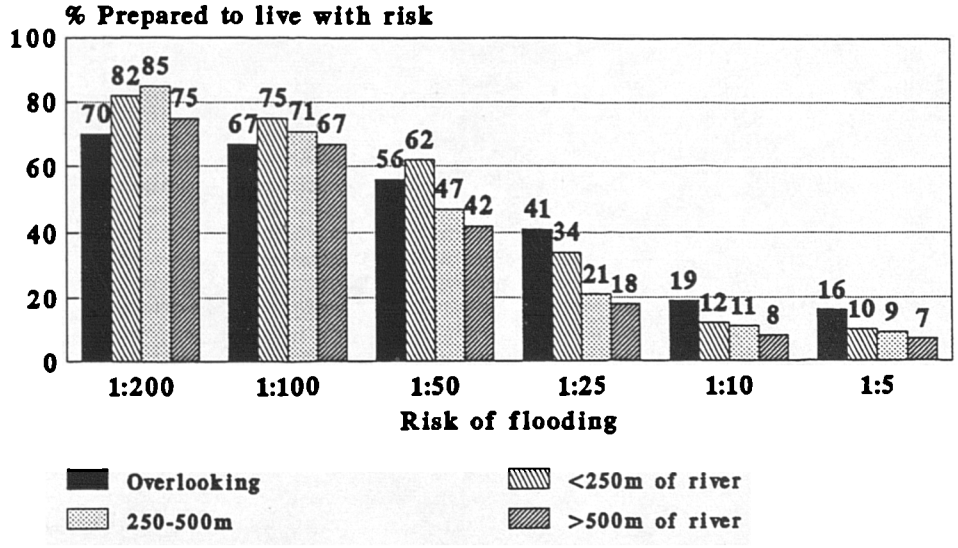
Like the 1989 respondents, fifty percent or more of the 1990 respondents were prepared to live with risk levels of 1:50 to 1:200 (see Figure 8.3). Unlike the 1989 respondents,

Figure 8.3: Preparedness to live with varying flood risks (DWSC/89 and DWSC/90).



A 1:200 to a 1:5 risk, each and every year, that your house would be flooded

Figure 8.4: Preparedness to live with varying flood risks according to distance from the river (DWSC 1990).



"A 1:200 to 1:5 risk, each and every year, that your house would be flooded."

however, those living nearest to the river (see Figure 8.4) were not more prepared than those living further away to live with all levels of risk. They were less prepared to live with the low probability/high impact flood risks of 1:50 to 1:200 but they were more prepared to live with risks between 1:5 to 1:25. It is not possible to interpret this reliably: assuming a sophisticated understanding of flood risk (which it is not always possible to do) then it could be that those living closest to the river were more prepared to live with more frequent/low impact floods than rare floods of a more serious nature. The variability may be related to the fact that respondents themselves had gauged distance from the river and some of their estimates may not be reliable.

The 1990 respondents were less prepared to live with the complete range of flood risks (see Figure 8.3) perhaps because they believed flooding to be more likely (see Figure 8.5 and Figure 8.6) and were more worried than the 1989 respondents (see Appendix D-8.3). Interestingly, the 1989 respondents gave a slightly higher seriousness rating to their worst flood and yet were less worried about the possibility of future flooding; this confounds the expected pattern which suggests past, serious, flood experience would heighten future concern. Both sets of respondents rate similarly highly the effects of a future Thames flood.

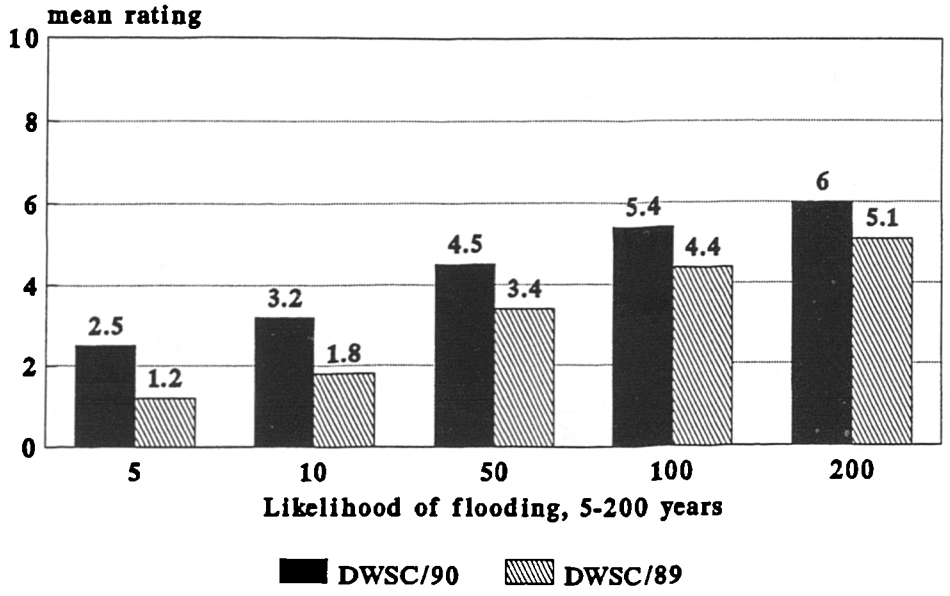
8.9 Attitudes to adjustment (proposed/implemented)

At the time of the survey there were still no publicised plans for a flood relief scheme in the study area; thus, responses were to a hypothetical scheme.

Several of the 1989 survey scheme response statements were included in the 1990 survey and many of the responses were similar (see Table 8.2). The second survey differed however in showing less agreement with the statement "there is no need for a flood relief scheme in this area because the flood risk is too low", suggesting that their perception of the flood risk had increased. Nevertheless, this did not ensure unconditional support for a scheme, as respondents in the second survey were also less in agreement with the statements: "I would rather have any scheme than be flooded" and "anything designed to reduce flooding is desirable". Despite this slightly cautious attitude, they were not prepared to risk flooding and showed a similar, negative, response to the 1989 respondents to the more strongly worded statement: "I would rather put up with flooding than spoil the open space with flood relief channels".

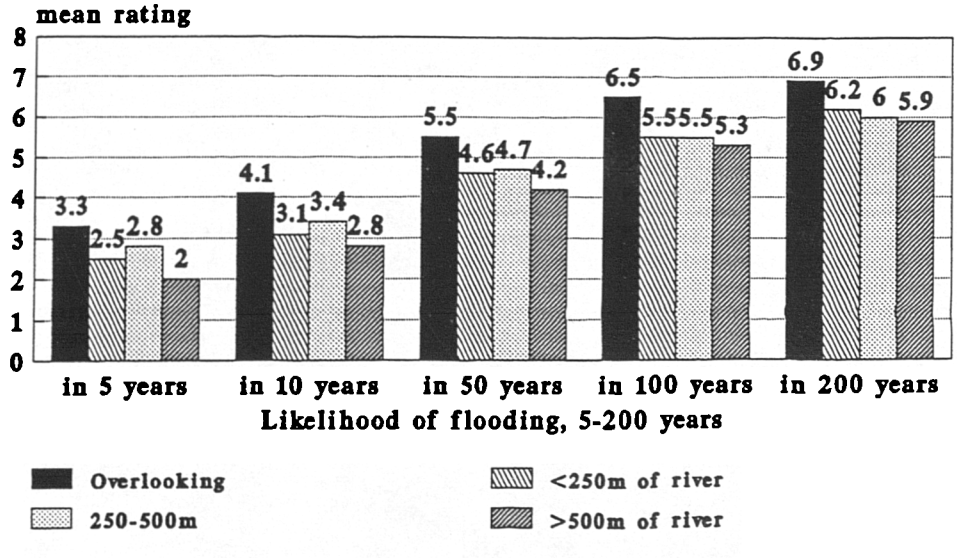
The reduced support for the statement "anything designed to reduce flooding is desirable" may stem from the different position it occupied in the list of statements (Schwarz, 1991 and

Figure 8.5: Perceived likelihood of flooding (DWSC/90 and DWSC/89)



Scale: 0 no chance to
10 almost certain

Figure 8.6: Perceived likelihood of flooding according to distance from the river (DWSC/90).



Mean ratings. Scale: 0 no chance
to 10 almost certain.

Table 8.2. Agreement with scheme statements (DWSC/90 and DWSC/89)

DWSC/90: Question 15 and DWSC/89: Question 24.

	% AGREE	MEAN	SURVEY
A flood relief scheme should be carried out in this area regardless of cost	37 33	2.9 3.1	DWSC/90 DWSC/89
I would rather put up with flooding than spoil the open space here with flood relief channels	18 16	3.4 3.6	DWSC/90 DWSC/89
I would rather have any scheme than be flooded	40 53	2.9 2.7	DWSC/90 DWSC/89
There is no need for a flood relief scheme in this area because the flood risk is too low	27 36	3.1 3.0	DWSC/90 DWSC/89
I would rather rely on flood warnings and risk being flooded than have any flood relief scheme in this area	20 20	3.4 3.5	DWSC/90 DWSC/89
Anything designed to reduce flooding is desirable	48 67	2.8 2.5	DWSC/90 DWSC/89
Flood relief schemes will only bring more development into the area	32 34	2.9 3.0	DWSC/90 DWSC/89
Cases: DWSC/90: 569 - 580 DWSC/89: 479 - 493			

see discussion of this point in the Lower Stour Case Study (Chapter 10, Section 6.5). Respondents were asked whether they were aware of the scheme proposed for Maidenhead, Windsor and Eton (discussed in Chapters 6 and 9) and whether they thought a similar flood defence channel would be the best option in their area. Only 16 percent were aware of the scheme and three quarters said they did not have enough information to decide whether this would be the best option.

8.10 Consultation and participation

8.10.1 Residents' attitudes

A similar set of questions was asked in both surveys to ascertain preferences for public consultation. The majority of respondents preferred to be consulted at the stage where there were a number of possible options to choose between or even sooner (see Table 8.3). It has already been remarked (see Chapter 8, Section 8.10), and will be remarked upon further, that these early stages are the most preferred by the public and yet the least used and preferred by the NRA (see Chapter 13). As with the 1989 survey, few preferred to be consulted at the preferred option stage.

8.11 The risk-environment trade-off

In a similar process to that used in the 1989 survey, those with a negative attitude to flood defence schemes were selected from a set of scheme response statements (Question 15) to partly indicate a risk-environment trade-off (see Table 8.4).

This group were more aware of past floods and had more flood experience but rated it as less serious. They were less worried about the possibility of flooding and more prepared to live with all flood risks. This was perhaps because, as with the 1989 survey group, they thought it less likely.

More lived nearer to the river and rated its advantages, and the general area rating, slightly higher. The flood risk was also rated slightly higher. The group comprised more males who had a slightly longer period in education, slightly higher home ownership and more group membership. Slightly more had taken precautions against flooding including having insurance.

Thus, awareness and experience of flooding is not sufficient to assure acquiescence to scheme proposals and environmental factors are of importance to those with a negative attitude to (hypothetical) flood defence schemes.

8.12 Summary and conclusions

The 1990 survey generally confirmed the findings of the 1989 survey but suggested that levels of flood hazard perception had increased. It has not been possible, however, to separate the influences of the recent flooding in the area and the repeated contact and information from

Table 8.3: Preferences for public consultation: when? ((DWSC/90 and DWSC/89)

DWSC/90: Question 19; DWSC/89: Question 32.

"If the National Rivers Authority Thames Region were to propose a flood defence scheme for this area, how soon do you think it should consult the public?"		
	DWSC/89	DWSC/90
Before it starts any studies of a flood problem?*	20%	N/A
Before it selects any options for the design or route?	15%	29%
When it has selected a number of possible options for the design or route so that people can choose between them?	52%	59%
When it has chosen a preferred option for the design or route for people to comment upon?	10%	8%
Or do you think it shouldn't consult at all but should go ahead with whatever it thinks best?	2%	2%
* Not asked in 1989		
Cases: DWSC/90: 589 DWSC/89: 489		

Table 8.4: A risk-environment trade-off: percentage giving responses to selected scheme statements indicative of a negative scheme attitude (DWSC/90)

(Question 15)	Percentage - frequency showing negative scheme response	
Anything designed to reduce flooding is [not] desirable	28%	(164)
A flood relief scheme should [not] be carried out in this area regardless of cost	34%	(196)
I would rather put up with flooding than spoil the open space here with a flood relief channel	19%	(106)
I would [not] rather have any scheme than be flooded	34%	(200)
I would rather rely on flood warnings and risk being flooded than have any flood relief scheme in this area	20%	(114)
There is no need for a flood relief scheme in this area because the flood risk is too low	27%	(157)

the surveys themselves.

As with the earlier survey, the perceived advantages of the location outweighed the possible disadvantages of flooding to a sample of whom only a quarter had experienced flooding.

Awareness of the flood risk was high; three quarters were aware when they moved and although the 1990 respondents were less prepared to live with flood risks than were the 1989 respondents, half or more were still prepared to live with risks of 1:50 to 1:200 (i.e. the level of risk which a scheme would be likely to protect against).

Attitudes to hypothetical flood defence scheme proposals were generally positive in the totalsample although environmental factors presented an important possible constraint: particularly so for those with a negative response to schemes. However, these responses might change were an actual proposal to be promoted.

James (1974), in a comparison of interview and postal questionnaire surveys (with identical questions), found a bias in the latter towards those especially concerned about flood problems. He concluded that the postal questionnaire was a good instrument for obtaining information from those with flood problems but one that would tend to overestimate the magnitude of the problem (1974:66), because it would be the most concerned who were more likely to respond voluntarily in a postal survey but an interview survey can persuade the more reluctant to participate.

The Thames floodplain surveys support this finding: the DWSC/90 postal survey showed a higher level of concern with and expectation of flooding than did the DWSC/89 interview survey. It is likely that the DWSC/89 survey is more representative of floodplain attitudes generally (and the situation most commonly faced by NRA engineers during scheme promotion) and the DWSC/90 postal survey is representative of the more 'sensitized' floodplain resident, after the occurrence of a flood event or the intervention of some other sensitizing factor (such as a repeated questionnaire survey, for example).

In contrast to the two case studies discussed above, the next case study examines a predominantly flooded sample and a proposed flood defence scheme.

9. THE MAIDENHEAD FLOODING SURVEY (1990)

STUDY STATUS	FLOODING - 1990 SCHEME PROPOSED SCHEME IMPACT - MOSTLY DISTANT

9.1 Introduction

Maidenhead (see Figure 9.1) is located in the Thames Valley, approximately 55 kilometres west of London and is upstream of, and contiguous with, the DWSC study area. Several lengths of the river are of outstanding beauty, notably Cliveden Reach, and the river is spanned by two bridges which are listed structures, the Maidenhead Bridge and the Brunel Railway Bridge (Thames Water, 1986).

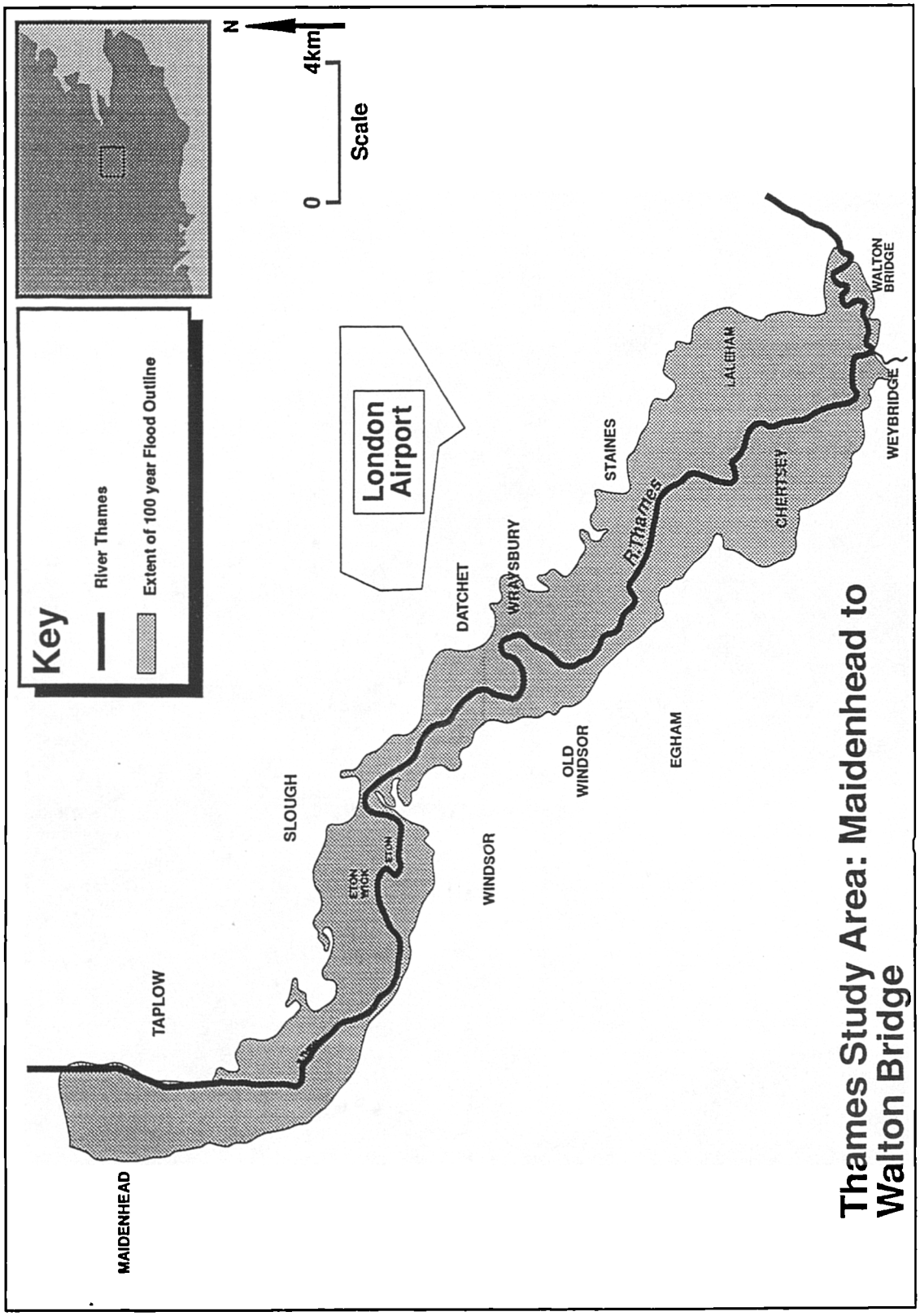
Proximity to London, allied to considerable environmental attractions, has made the area important in both recreational and residential terms. The housing stock is generally of high quality and property values are correspondingly high, with riverside properties at a premium.

The original town of Maidenhead was located on high ground, some 1.5 kilometres west of the Thames. However, continued expansion has occurred leading to development of land between the original town centre and the river and elsewhere in the floodplain (Neal and Parker, 1988).

Major floods have occurred in November 1894, January 1915, December 1929 and March 1947. The last flood, used most often for comparative purposes, was caused by heavy rainfall on a frozen catchment which was then accompanied by snow melt, leading to very high run-off rates: it has an estimated return period of 1 in 56 years. Other less serious floods have occurred in December 1954, January 1959, December 1960 and November 1974. Prior to the February 1990 flooding, which initiated the survey discussed here, the last major flood to cause damage to property in Maidenhead was in March/April 1979 which, although a relatively minor flood, was exacerbated by the setting loose of a barge by vandals and which collided with, and then sank in front of, Boulters Weir in Maidenhead.

The December 1954 flooding of Maidenhead came from overland flow from Cookham Beach which swelled the Maidenhead Ditch. Following this event the Thames Conservancy (which had responsibility for flood defence at that time) undertook a scheme to restrict the water entering the town from the north and comprised enlarging and streamlining of existing

Figure 9.1: Map showing Maidenhead and Datchet, Wraysbury, Staines and Chertsey (DWSC) study areas



watercourses. These works were designed to prevent a recurrence of the 1954 flood but did not provide a solution to the overall flood problem in the area: this was to be addressed by the Maidenhead, Windsor and Eton Flood Study outlined above. The areas affected by flooding in February 1990 extended from Bourne End and Cookham, north of Maidenhead, to Eton and Windsor in the south east. This flood event initiated the survey discussed below.

9.1.1 Consultation and participation: procedures followed

In 1988 the NRA Thames Region (then Thames Water) undertook a public consultation programme on the basis of the preferred option at that time (an east bank flood relief channel combined with improvement works to the Thames and embankments in certain areas) which had become a contentious local issue (Tunstall et al, 1989). The Flood Hazard Research Centre was asked by the NRA Thames Region to undertake a survey of residents' attitudes to the proposed flood defence scheme and Eton Wick was chosen as the focus of study as it was the largest residential development to be directly affected by the proposed flood relief channel. At that time the possible extension of the proposed channel to provide flood defence for Eton and Windsor was being addressed. However, the study was still known as the Maidenhead Flood Study and did not become known as the Maidenhead, Windsor and Eton Flood Study until some time later. This fact caused annoyance to some residents outside Maidenhead who were being asked to accept a flood defence scheme which appeared to be solely for Maidenhead's benefit and to be necessary, many believed, solely because of Maidenhead's mismanagement of floodplain development control (Tunstall et al, 1989).

Public consultation proceeded through the normal route of statutory consultees followed by many public meetings (incorporating slideshows and exhibitions) in local areas to be affected by the scheme. The size of the scheme justified to the NRA the opening of a separate office in Maidenhead to deal with this major engineering project. From this office invitations were sent to flooded residents after the February 1990 flood, inviting them to one of two receptions where details of the scheme were exhibited. The residents were shown a promotional video and a number of NRA personnel gave talks on various aspects of the flood; the meetings were then opened to discussion.

These receptions had a dual purpose. Firstly they were to project the best possible image of the NRA to the public, by showing the lengths to which they had gone to design an environmentally sensitive scheme, ahead of the major flood for which it was designed. Allied to this, the meetings were aimed at defending the NRA should they incur any blame for the February flood. Secondly it was a promotional exercise to gain support for the scheme from

those who, the NRA believed, would be most likely to lend support.

9.2 Research design

The 1990 survey (Sangster et al, 1990) concentrated on those properties flooded in the house, garden, outbuildings or in the road immediately outside. Information leading to the identification of this population was obtained from consulting engineers to the NRA Thames Region who identified 40 properties thought to have been flooded within the house out of a total flooded population of 520 households. A sample of 200 was drawn from this population and included all 40 households thought to have been flooded within the property. The remainder were selected by random sample from each identified location. A 75 percent response rate was recorded.

The research brief from the NRA Thames Region was quite extensive and aimed to gather data on the following:

1. Details of the flood event: areas affected, depth, duration;
2. Description of direct flood damages;
3. Description of indirect damages and intangible effects;
4. Performance of the flood warning system;
5. Perception of flood risk and the local environment and knowledge of and attitudes to the flood defence proposals.

Only the last, which comprised the same and related questions as those for the other case study surveys, will be discussed below (see Appendix B-3 for relevant sections of the questionnaire).

A major analytical variable was flood experience. As the majority of the Maidenhead respondents had experienced flooding to some extent, the responses were broken down into those whose houses were flooded inside ('flooded') and those who experienced either garden flooding or no property flooding ('not flooded'). In certain specified circumstances the flood experience variable was divided into three (flooded in house; flooded in garden; not flooded). Thus the definition of 'flooded' and 'not flooded' differs between the Maidenhead survey and other surveys. The amount of flood experience in the Datchet, Wraysbury, Staines and Chertsey surveys was too small to allow such a breakdown of the data.

The survey of the flooded area was undertaken, in part, to further the promotion of the

scheme by gathering information on support in the community and also to gain more accurate information on the damages likely to ensue from any major flood in the future. As discussed elsewhere, the benefit-cost ratio must be greater than unity for MAFF to grant-aid and support a scheme. In a scheme of this size considerable benefits must be found to offset scheme costs and any data likely to increase the benefits would be of value to the NRA. Due to the high property values in the area it was believed that a 'Maidenhead factor' was in operation which would raise the probable benefits and therefore make the benefit-cost ratio for the scheme more robust.

The sampling error at the 95 percent confidence level for a random sample[36] of this size (199) is between 7 and 7.5 percent (de Vaus, 1987:63). The selection of analytical sub-groups will, of course, affect this level of error.

9.3 Flood history and present level of risk

(See above, Section 9.1). The flooding which occurred in February 1990 was estimated to have a return period of approximately 1 in 6 years. Thus it was considerably less serious than the level of flooding against which the proposed flood defence scheme is designed to protect (approximately 1 in 60 years). Nevertheless, flooding occurred over a period of approximately 12 days (this varied with location) and there was considerable disruption to certain groups and individuals.

9.4 Social characteristics

(See Table 7.1. *for comparative data across all the quantitative surveys). Compared to the* total population of Windsor and Maidenhead (Berkshire County Council: 1989) the sample comprised fewer respondents in the youngest age bracket and more in the older age brackets, particularly the 50 to 64 years age range.

The Maidenhead respondents had higher levels of education and home ownership than any of the other survey respondents but the average length of residence was much lower. Levels of affluence were high but a quarter of respondents refused to answer this question. When the total percentage was recalculated, omitting those who refused to answer, two fifths of the

[36] This was not strictly a random sample but rather a stratified random sample. The households flooded within the house represented almost a population: it had been intended to survey all those who had been flooded within the house but during the interview process other properties were identified but not interviewed.

respondents had an annual income greater than £40,000 and a quarter of these had an income greater than £60,000.

More than a quarter of Maidenhead respondents overlooked the river compared to 11 percent in the DWSC/89 survey. A further 50 percent lived within 250 metres of the river. Only 2 percent of respondents lived over 500 metres from the river, compared to a quarter of the DWSC/89 respondents. In comparing these data sets it must be emphasised that distance from the river in the DWSC/89 survey was measured from maps by researchers while in the other surveys, including Maidenhead, it was by respondents' own estimation. It is possible that some under- or over-estimation may have occurred through these different measurement techniques.

9.5 Environmental perception and attitudes

9.5.1 General environmental orientation

A scale was constructed from seven environmental attitude statements (see Appendix E-9.1.) used previously in the DWSC/89 survey[37] and the social and other characteristics of the lowest and highest scorers were examined.

High scorers on this environmental values scale were more likely to be males, whereas in the DWSC/89 survey they were females. The lowest scorers had the highest levels of education and qualifications except for professional qualifications, more of which had been obtained by the high scorers. This suggests that length of education is not necessarily associated with positive environmental attitudes but possibly of more significance is the type of education and later career path (these being related to underlying value systems). The lowest scale scorers also had the highest income levels (approximately a third were in the greater than sixty thousand pounds per annum bracket). As might be expected, the high scorers gave higher ratings to certain environmental advantages of the area, such as being near the river and the attractive environment and rating the area generally: more of these lived overlooking the river.

Those with the highest environmental values scale score were least aware of the flood risk when they moved to the area but more would have moved there anyway had they known (although the latter group had too few cases to be reliable). More of those with the lowest

[37] This survey used only a selection of the attitude statements used in the DWSC/89 survey and in this instance a single scale was constructed.

score were flooded in the house and more of those with the highest score were flooded in the basement during the 1990 flood but flooding in other locations did not present any clear pattern. Those with the lowest scale score rated the seriousness of the event higher and those with the lowest scale score were least worried.

The highest scale scorers were least likely to think the proposed scheme is the best option and more likely to think there is a better alternative, while the lowest scorers were most likely to say they did not have enough information (almost a third).

Responses to many of the individual environmental attitude statements did not vary greatly between the Maidenhead and DWSC/89 Surveys. Of those that did, more of the Maidenhead respondents agreed with the statement "people are more important than the environment", and disagreed with the statement "the most important problems today are the threats to the environment".

9.5.2 Attitudes to the local environment

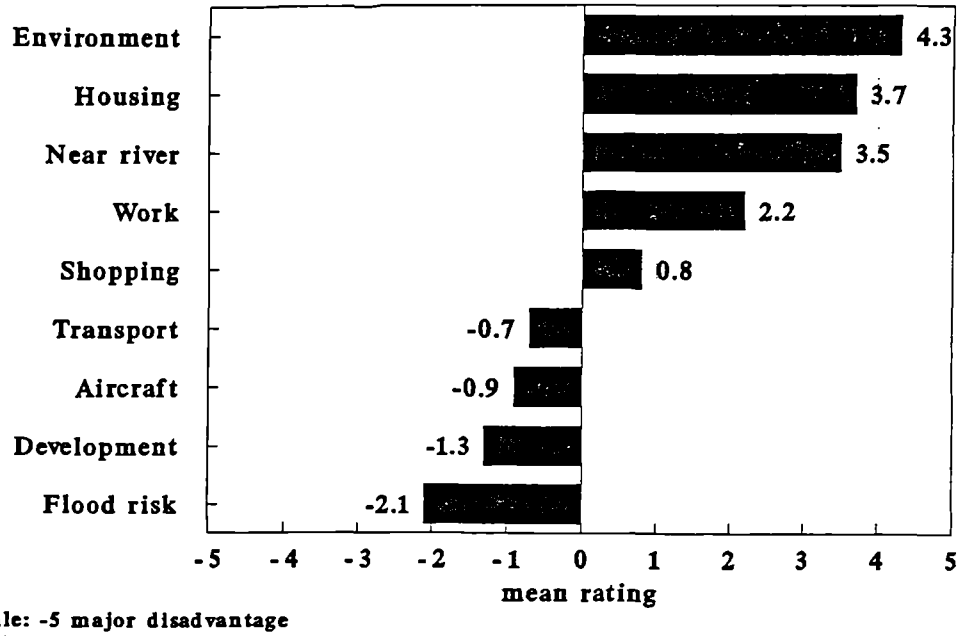
The general rating of the local area was very high and the attractive environment, quality of the housing and being near the river were regarded as considerable advantages. The risk of flooding was regarded as a disadvantage but not a major one (see Figure 9.3). Compared to the DWSC/89 Survey, being near the river, the attractive environment and the general rating of the area were all given higher ratings, while the risk of river flooding was regarded as more of a disadvantage (Figure 9.4).

Those living overlooking the river regarded being near the river and the attractive environment as more of an advantage and gave the area generally a higher rating. The risk of flooding was regarded similarly whatever the distance from the river although there was a slight tendency for those living furthest from the river to regard it as more of a disadvantage than those overlooking (reliability is doubtful because of the low numbers living at a distance from the river).

9.6 Flood experience

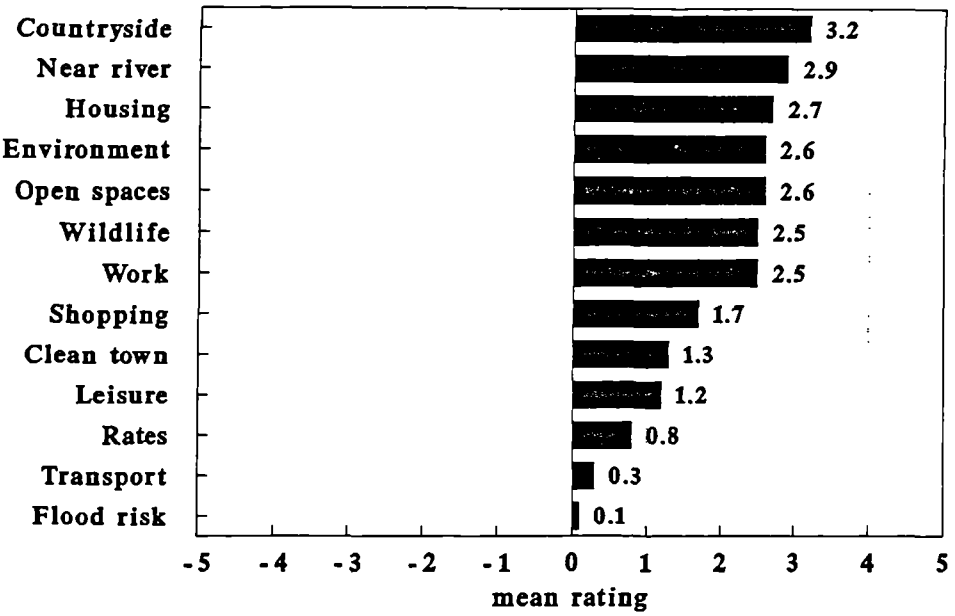
Respondents were asked how often in the last 5 years or, if resident less than five years, since living in their present property, they had been flooded. Seventeen percent reported that they had not been flooded before. Almost half had been flooded once and over a third had been flooded more than once. Almost a half had had their gardens or outbuildings flooded

Figure 9.3: Advantages and disadvantages of living locally (Maidenhead 1990).



Scale: -5 major disadvantage to 5 major advantage

Figure 9.4: Advantages and disadvantages of living locally (DWSC 1989).



Scale: -5 major disadvantage to 5 major advantage

once and almost a quarter had been flooded within their property once.

For the February 1990 flood, the mean depth and duration of flooding within properties (i.e. ground floor/under floor/basement) was 40 centimetres and 8 days. The mean depth and duration of flooding outside properties was 59 centimetres and 11 days. Thirty-one percent of the respondents had their ground floor, under floor or basement flooded; 60 percent were flooded in their gardens or outbuildings; and 9 percent were not flooded at all.

9.7 Perception of, and attitudes to, flood hazard

As with the other surveys, the majority (77 percent) of the respondents were aware of the flood risk when they moved to the area. Of those that were unaware, over half would still have moved to the area had they known. Two thirds of respondents became aware of the flood risk through their own personal observation and experience of the river. A third heard from their solicitor and almost another third heard from neighbours.

The Maidenhead responses were compared with the DWSC/89 and DWSC/90 responses for the same attitude statements dealing with the flood risk (Appendix E-9.2 and see also Figure 9.5). It can be seen that there is a substantial difference between the DWSC/89 responses and those of the other two surveys. Generally the DWSC/90 responses fall between the two but nearer to the Maidenhead respondents.

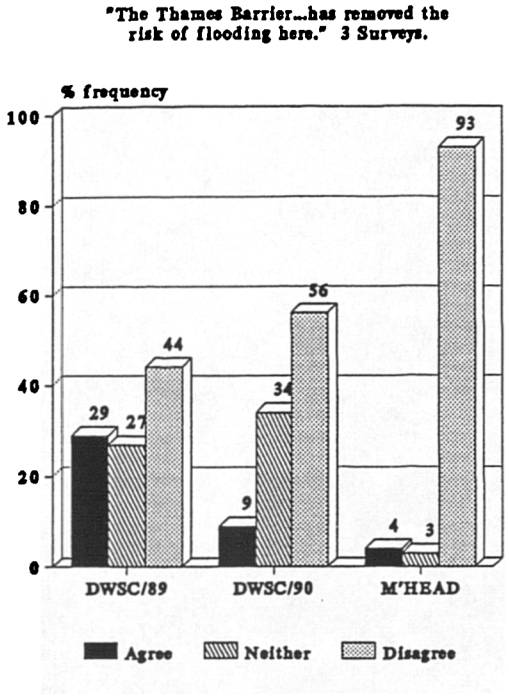
Only 4 percent of Maidenhead respondents (compared to 29 percent in the DWSC/89 survey and 9 percent in 1990) agreed that the Thames Barrier has removed the risk of flooding in their area. Only 12 percent, compared to 61 percent in the 1989 survey and 31 percent in the 1990 survey, agreed with the statement "we don't have real floods here".

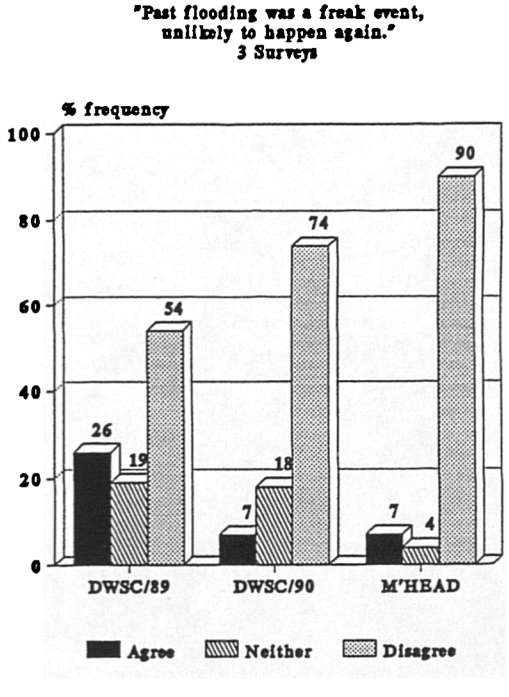
Thus, compared to the lower levels of flood experience further downstream between Datchet to Walton Bridge, the recently flooded sample in Maidenhead showed a higher level of flood hazard perception as measured by this set of attitude statements. It is hard to avoid the interpretation that the increase in perception of flood hazard is related to the degree to which the samples were exposed to recent flood events (this interpretation holds when just the flooded samples of DWSC/89 and DWSC/90 are compared to the Maidenhead sample).

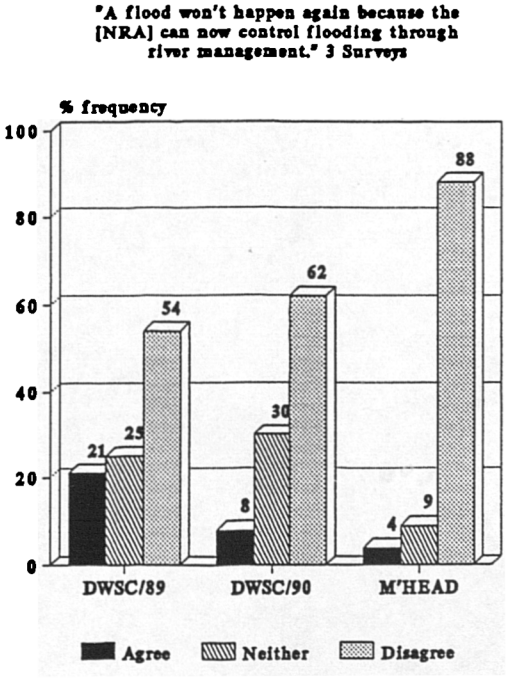
9.8 Perception of, and attitudes to, future flood risk

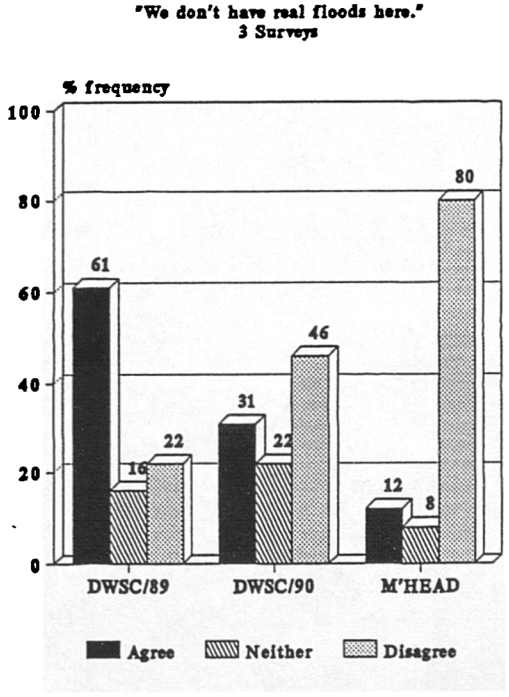
The perception of the likelihood of future flooding was higher here than that found further

Figure 9.5: Agreement with selected flooding statements (DWSC/89, DWSC/90 and Maidenhead 1990)









downstream in the DWSC/89 and DWSC/90 surveys but was still not perceived to be great in the short term (see Figure 9.6). A decay function was apparent according also to the degree of flooding experienced (whether in the house, the garden or not flooded at all) with those experiencing the most serious flooding perceiving future flooding to be more likely (see Figure 9.7). Thus, earlier research findings relating flood experience to heightened perception of flood risk were substantiated.

No easily interpretable pattern of response was apparent with varying distance from the river (see Appendix E-9.3). Those living closer to the river believed flooding to be more likely in the 5 to 50 year period but for periods of 100 and 200 years hence, it was those living further away, between 250-500 metres and over 500 metres from the river (the median values were better indicators for the highly skewed responses to this question).

A majority of respondents were prepared to live with flood risks between 1 in 50 to 1 in 200 but only just over a third were prepared to live with a 1 in 25 risk. This was close to the result for the DWSC/89 and DWSC/90 surveys although the DWSC/90 respondents were the least prepared to live with any level of risk (see Figure 9.8). However, those in Maidenhead with the most serious (house) flood experience were generally more prepared than those without to live with all risks except the most frequent, 1:5 risk (see Figure 9.9).

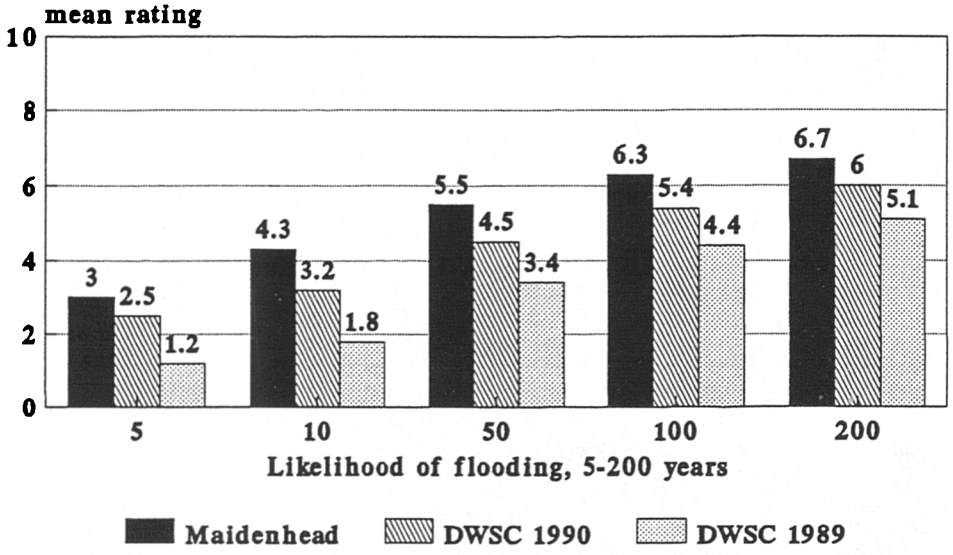
Distance from the river showed no simple trend. Those living closer to the river appeared more prepared to live with the less serious and more frequent risks between 1:25 and 1:5, than did those living further away (despite believing flooding to be marginally more likely in that period). However, they were less prepared to live with the less frequent and more serious risks between 1:200 and 1:50 than those further away (despite believing flooding to be marginally less likely in that period). Thus, the first example suggests that greater expectation of risk does not necessarily lead to greater avoidance of risk.

9.9 Attitudes to adjustment (proposed/implemented)

Respondents were asked a series of questions about the proposed scheme (see Table 9.1). A substantial majority were aware of the proposed MWE flood relief scheme, just over half of whom had heard of it through newspaper reports and approximately two fifths had heard about it from an NRA leaflet.

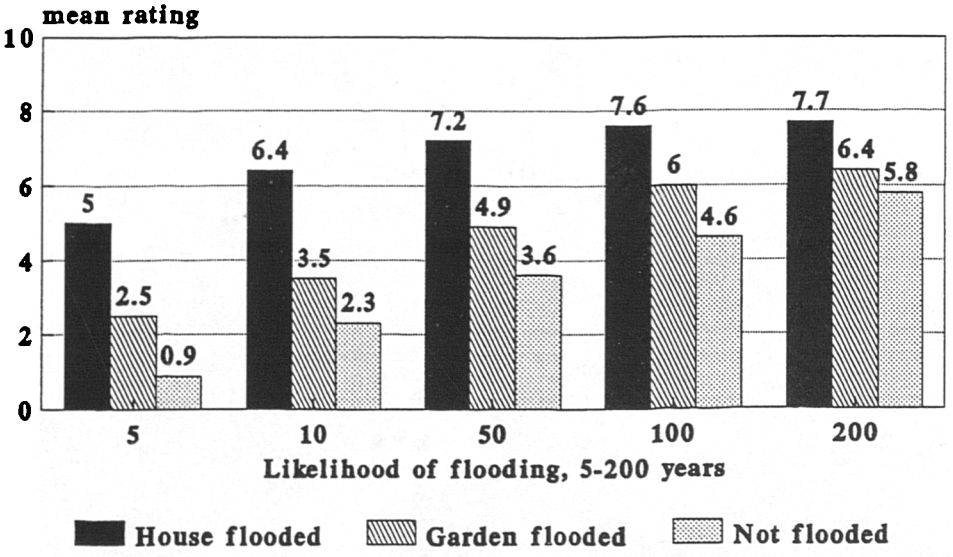
The majority were aware of the location of the proposed channel but there was considerable uncertainty as to its size and nature. Approximately two fifths (flooded and non-flooded) were

Figure 9.6: Perceived likelihood of flooding (Maidenhead 1990, DWSC/90 and DWSC/89).



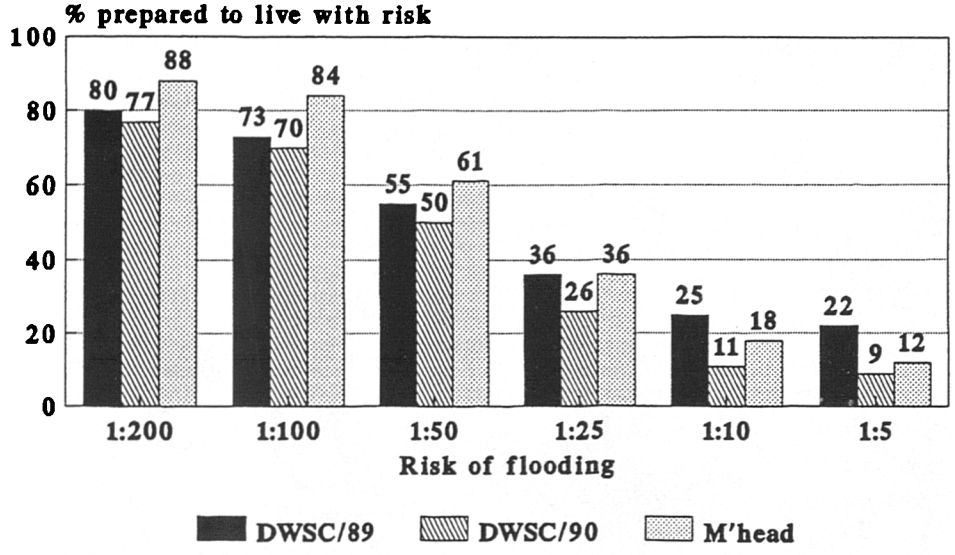
Scale: 0 no chance to
10 almost certain

Figure 9.7: Perceived likelihood of flooding according to flood experience (Maidenhead 1990).



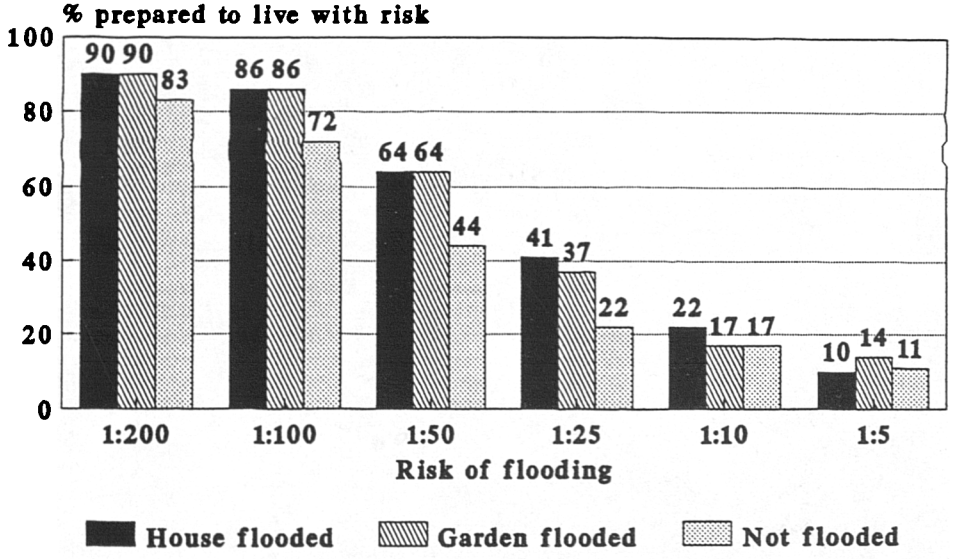
Scale: 0 no chance to
10 almost certain

Figure 9.8: Preparedness to live with varying flood risks (DWSC/89, DWSC/90 and Maidenhead 1990).



A 1:200 to a 1:5 risk, each and every year, that your house would be flooded

Figure 9.9: Preparedness to live with varying flood risks according to flood experience (Maidenhead 1990).



A 1:200 to a 1:5 risk that your house would be flooded each and every year

Table 9.1: Awareness of proposed Maidenhead, Windsor and Eton Flood Alleviation Scheme (Maidenhead 1990)

Question 75: "Are you aware of the flood alleviation scheme (which includes a major flood relief channel) that has been proposed by the NRA for the Maidenhead, Windsor and Eton area?"

	%	Frequency
Yes	82%	(159)
No	19%	(36)
Cases: 195		

Question 75a: "If yes, where did you hear this?"	%	Frequency
Newspaper	55%	(108)
Television	3%	(5)
Public meeting	25%	(50)
NRA leaflet	39%	(77)
NRA video	7%	(14)
Neighbours	15%	(29)
Cases: 198		

Question 76d: "Do you think that the proposed scheme is the best option for alleviating flooding in this area?"	%	Frequency
Yes, this is the best option	54%	(90)
No, there is a better alternative	5%	(8)
No, for other reasons	2%	(3)
Don't have enough information to decide	27%	(44)
Don't know	13%	(21)
Cases: 166		

Questions 76a to 76c:	%	Frequency
Aware of the location of the proposed channel	72%	(142)
Aware of design elements of the proposed channel	40%	(77)
Aware of the width of the proposed channel	41%	(41)
Cases: 86 - 166		

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correct in their belief that the channel would have mainly natural banks but a further two fifths did not know.

A third (a quarter of those flooded in the house) did not know, when presented with three options, how wide the channel would be. Almost a half of those who had been flooded within the property and who had received extra information, believed the width to be half that which

was proposed. Thus, in the group which had received more information, more of them thought they knew the correct answer but more of them were wrong.

It is possible that even the slender majority (see below) of this flooded sample in favour of the channel might be further eroded by the knowledge that the channel will be twice the size they had thought. It was not possible to differentiate between those who had, and those who had not, attended NRA receptions and thus had received more detailed information.

Surprisingly, considering the efforts the NRA had made in contacting and informing many of the respondents, there was not a clear majority in support of the scheme. Forty-six percent of the total sample and a bare majority of 54 percent of those who had experienced flooding within the property, agreed that the proposed scheme was the best option. Approximately a third (of both the total sample and the flooded sample) felt they did not know or did not have enough information to decide.

Perhaps not surprisingly, a comparison of those that believed the proposed scheme to be the best option with those who felt they did not have enough information to decide, found that the former regarded the effects of both the past flood and a future flood to be more serious; were more worried about future flooding; believed it to be more likely and were less prepared to live with all levels of risk.

Few respondents (10 percent) agreed with the statement that they would rather put up with flooding than spoil their open space with channels - even those (16 percent) with the highest scores on the environmental values scale. Those with the highest levels of education were least likely to agree.

As might be expected, those rating the risk of flooding as more disadvantageous were more likely to express positive attitudes to scheme proposals and have a higher score on the scheme scale. They were more likely to agree that "anything to reduce flooding is desirable" and less likely to prefer flood warnings to a scheme or putting up with flooding rather than spoil the open space with channels.

However, those living nearest the river, and thus, at greatest risk from flooding, were more likely to **disagree** that anything to reduce flooding is desirable or that they would rather have any scheme than be flooded.

The responses from the DWSC/89 and Maidenhead surveys were compared for the same

scheme attitude statements (Appendix E-9.4. The responses were similar for the statement "anything to reduce flooding is desirable", with both sets of respondents showing majority agreement (but see later discussion of this statement in the Lower Stour Case Study). However, the later statement "I would rather have any scheme than be flooded" gained stronger agreement from the DWSC/89 respondents, who did not have an image of a scheme on which to base their response, than from the Maidenhead respondents who did - despite the greater flood experience of the latter. However, the Maidenhead respondents did not agree that "there is no need for a flood relief scheme in this area because the flood risk is too low". This suggests that opposition was not to a flood defence scheme per se but to a particular design or route of scheme. This kind of attitude is discussed in greater depth in the Lower Stour Case Study.

9.10 Consultation and participation

9.10.1 Residents' attitudes

Respondents were asked several questions about their preferences for consultation that were the same or similar to those asked in the DWSC/89 and DWSC/90 surveys. When asked how soon should the NRA consult the public about flood relief schemes (see Table 9.2), the majority of respondents chose consultation when a number of options for the design and route were available to choose between or earlier, as the NRA starts studying the problem. Few respondents preferred to be consulted at the stage when a preferred option has been chosen. Thus there was little support for the procedure actually adopted by the NRA.

As with the DWSC/89 survey, the majority preferred consultation to be carried out with both representatives and directly with the public. Newsletters and public meetings were preferred methods of consultation. Those who were flooded in the house (many of whom attended the NRA receptions) showed a higher preference for those methods which were used at the receptions: public meetings, exhibitions and video presentations. However the majority of respondents (both those flooded within their property and those not) heard about the proposed scheme via the newspaper and regarded this as the best source of information.

9.11 The risk-environment trade-off

As with the two previous surveys, those respondents with a negative attitude to scheme proposals were selected from the responses to several scheme statements (Questions 70 (1), (2), (4), (6), (7) and (8)) and their characteristics examined as indicators of those making a

Table 9.2: Preferences for consultation: when, who and how? (Maidenhead 1990)

Preferences for consultation: when?

Question 72: "When proposing flood relief schemes, how soon do you think the NRA should consult the public? Should it consult them..."

	%	Number
a) As it starts studying the flood problem	31	(61)
b) Before it selects any options for the design or route	11	(22)
c) When it has selected a number of possible options for the design and route so that the public can choose between them?	45	(89)
d) When it has chosen a preferred option for the design and route for people to comment upon?	10	(19)
e) Or do you think it shouldn't consult at all but should go ahead with whatever it thinks best?	4	(7)

Cases: 198

Preferences for consultation: who?

Question 73: "In your view, should the NRA..."

	%	Number
a) Only consult the general public directly?	17	(34)
b) Only consult through representatives such as parish councils, residents' committees, wildlife and amenity groups etc?	18	(35)
c) Consult both the public directly and through representatives?	65	(128)

Cases: 198

Preferences for consultation: how?

Question 74: "How would you prefer to be consulted about any flood risk or flood relief proposals for this area?"

	YES		NO	
	%	Number	%	Number
a) Public meetings	47	(92)	3	(5)
b) Walk-round exhibitions	38	(75)	2	(4)
c) Video presentations	24	(47)	4	(7)
d) Regular newsletters	75	(148)	3	(6)

Cases: 54 - 154

risk-environment trade-off (see Table 9.3). While the numbers prepared to make the trade-off were generally somewhat less than the DWSC/89 survey, the characteristics of this group were broadly comparable. Compared to the total Maidenhead sample, very slightly less lived overlooking the river (an average difference of only 1 percent, however, and so well within the margin of error for this sample size) and more lived in the sector up to 250 metres away. They had been resident longer; regarded being near the river as a greater advantage and the risk of flooding as less of a disadvantage; and rated the area generally as slightly higher. Fewer of them had experienced flooding inside the house, more had experienced flooding in the garden and they rated the seriousness of the event as lower than the average. More of them were aware of the flood risk when they moved to the area but they were less worried and regarded the likelihood of flooding as less likely. They were more prepared to live with all levels of risk from 1:5 to 1:200. They had similar levels of education to the average but more of them owned their property.

As stated above, those with the highest environmental values scale score were least likely to think the proposed scheme is the best option and more likely to think there is a better alternative. This strongly suggests, in this predominantly flooded sample, that flood experience can be less important than environmental factors in influencing attitudes to structural flood defence schemes.

9.12 Summary and conclusions

This recently flooded sample showed a higher level of flood hazard perception, as measured by a set of attitude statements, and a higher perception of the likelihood of future flooding than those further downstream in the DWSC/89 survey, although the risk of future flooding was still not perceived to be great in the short term.

This would seem to support the model's hypothesized relationship between flood experience and greater flood hazard perception; however, those with house flood experience believed flooding to be more likely and yet were more prepared than those without to live with all levels of flood risk except the most frequent (1:5). Thus, greater expectation of risk does not **necessarily** lead to greater avoidance of risk. This undermines the assumption (as hypothesized) that greater hazard perception will necessarily lead to hazard mitigation (or acceptance of hazard mitigation).

The majority of respondents were aware of the location of the proposed channel but showed considerable uncertainty as to its size and nature, despite many of them having been exposed

Table 9.3: A risk-environment trade-off: percentage giving responses indicative of a negative scheme attitude (Maidenhead 1990)

(Question 70)	Percentage - frequency showing negative scheme response	
Anything designed to reduce flooding is [not] desirable	27%	(52)
A flood relief scheme should [not] be carried out in this area regardless of cost	32%	(63)
I would rather put up with flooding than spoil the open space here with a flood relief channel	10%	(20)
I would [not] rather have any scheme than be flooded	11%	(22)
I would rather rely on flood warnings and risk being flooded than have any flood relief scheme in this area	11%	(22)
There is no need for a flood relief scheme in this area because the flood risk is too low	6%	(10)

to greater information levels.

Despite recent flooding there was not majority support for the proposed scheme but a third felt they had insufficient information to decide. Higher numbers of those living nearest the river disagreed that anything to reduce flooding is desirable, and that they would rather have any scheme than be flooded. Few respondents preferred to be consulted at the stage chosen by the NRA (when a preferred option has been chosen); most preferred to be consulted earlier.

This third case study represented a progression from the DWSC/89 survey situation by examining attitudes to a proposed scheme after a recent flood. It did however, examine attitudes to proposals only: the fourth case study (Lower Stour) examined attitudes to a scheme which had recently been constructed.

10. THE LOWER STOUR FLOOD ALLEVIATION SCHEME: CHRISTCHURCH, DORSET (1990)

STUDY STATUS	FLOODING - 1979 SCHEME CONSTRUCTED SCHEME IMPACT - NEAR

10.1 Introduction

In 1985, as part of its programme of consultation, the National Rivers Authority Wessex Region invited residents in Christchurch (see Figure 10.1) to respond to proposals for a major flood defence scheme to be constructed in an area of significant ecological and amenity value.

The proposed scheme works included dredging of the river, excavating tipped land and the construction of flood banks and walls up to three metres high. The comments that were made in the comments book provided (see Appendix F-10.1) reflected a range of attitudes, from the most positive to the most negative (see Appendix F-10.2 for an extended list and examples of themes taken from those reported in the comments book). This case study is based on interviews which were undertaken with thirteen of those residents to investigate whether their attitudes have changed since the section of the scheme nearest to their properties has been largely completed.

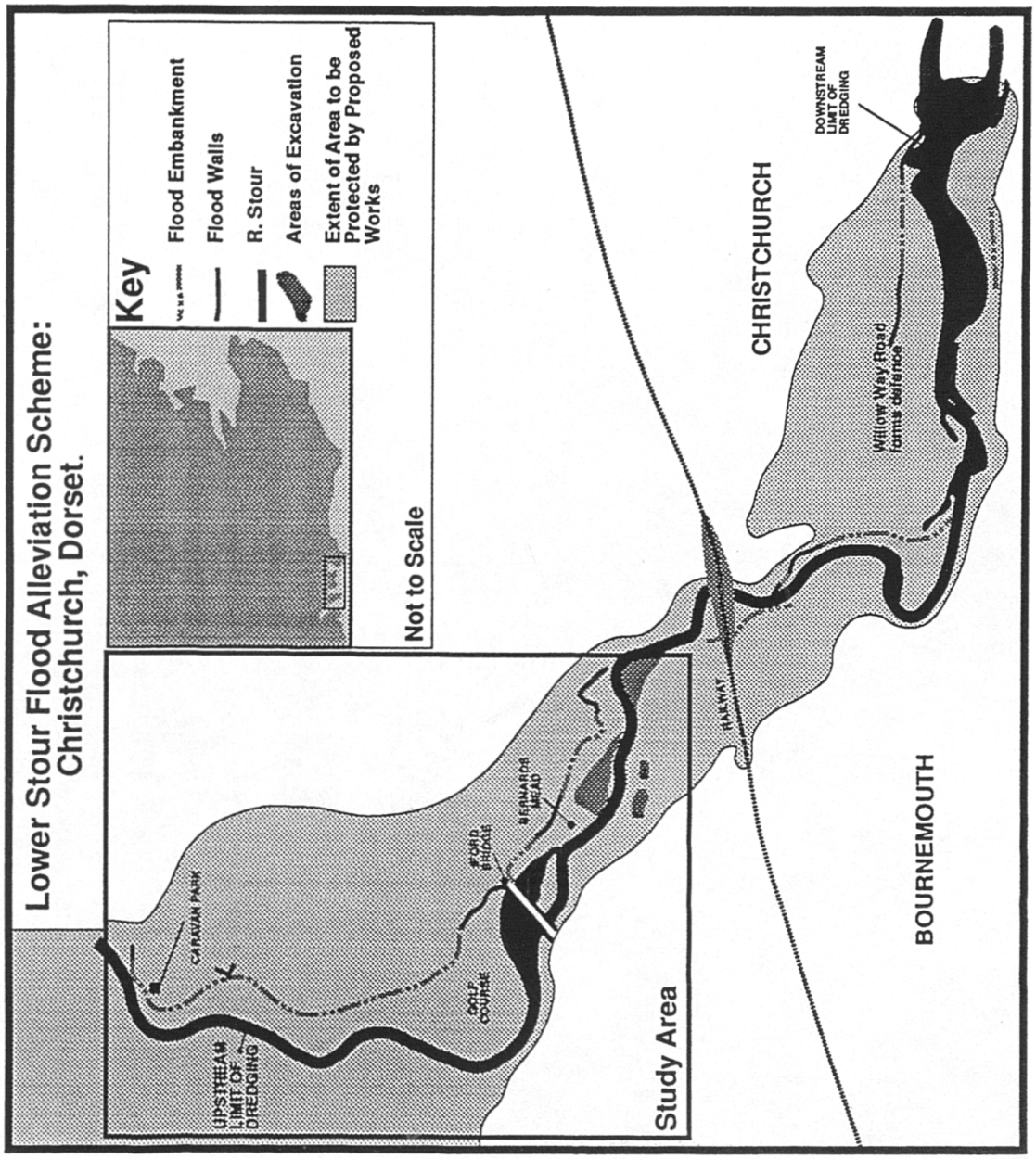
The case study area, Christchurch in Dorset, is between five and six kilometres from the sea and comprises mainly residential properties and recreational land and relies for its main source of income on the holiday trade. The area contains a number of caravan parks and a holiday camp. A large proportion of the population is retired. Much of the floodplain land is Council-owned and managed as public open space for formal and informal recreation.

The following discussion is a revised version of an earlier research report (Fordham, 1991a).

10.1.1 Consultation and participation: procedures followed

In addition to contacting the statutory consultees, the NRA Wessex Region arranged several public meetings and exhibitions, one of which provided the Comments Book reported on here. The NRA felt that the exhibition and comments book had been inconclusive and so all those householders likely to be affected by a 1 in 100 year flood were balloted to ascertain their preference for one of three options: the full scheme, a modified scheme to a lower

Figure 10.1: Map of the Lower Stour study area



standard, or no scheme (see discussion below.

10.2 Research design

A qualitative approach was adopted for the Lower Stour Flood Alleviation Scheme Case Study to complement the largely quantitative work carried out elsewhere in the research. The chief method employed was a long (taped) interview technique that most closely resembles the 'nonschedule-structured interview' as categorised by Nachmias and Nachmias (1989:189-192).

An outline interview schedule was prepared prior to the interviews (see Appendix F-10.3). This listed a number of topics under six headings - flooding, local environment, flood defence scheme, consultation, NRA and insurance - which it was hoped each interview would cover. It also contained, for comparative purposes, certain specific questions that have been used in the other surveys discussed here.

An open and relatively unstructured research strategy was adopted and it was proposed that the interviews should be as free from interviewer direction as possible in order that those matters of importance to the interviewee could be revealed. However, the interview schedule provided a checklist of topics identified as important to the interviewer for comparison with the other surveys undertaken.

Prior to the interviews, some content analysis (Weber, 1990; Nachmias and Nachmias, 1989) was undertaken in the examination of the copy of the comments book that had prompted the case study. This provided insight into the broad areas of concern aroused by the scheme and represented the baseline of attitudes against which the interview material would be compared. It also provided the address list from which the sample was drawn.

The study was designed as an initial exploratory examination[38] of both the study area and the use of a qualitative method. Hence the number of interviews was small and the sample was particularly closely focused. The population comprised all those who made comments in the comments book provided during the flood alleviation scheme consultation programme in 1985. There was a total of 181 contributions in the comments book.

The sample was what Hakim terms a 'focused' sample (Hakim, 1987:141-143), that is, one

[38] The study formed part of the assessment for the Postgraduate Diploma in Research Methods in the Social Sciences.

that selects particular persons, groups, processes or relationships etc. to offer particularly illuminating examples or tests of propositions. The available sample was broken down according to overall positive or negative attitude to the proposed flood alleviation scheme. Comments were categorised, somewhat crudely, as follows:

(+)	Positive and for the scheme;
(-)	Negative and against the scheme;
(+/-)	Critical but generally for rather than against;
(-/+)	Critical but generally against rather than for;
(N/C)	Not committed either way or uncategorizable from the available comments.

As an important focus of interest was the risk-environment trade-off, the sample was concentrated primarily on those whose comments appeared to express this trade-off most forcefully. As a first step in identifying these respondents the focus was placed on those addresses partly or wholly within the 1979 flood outline. The rationale for this was that such addresses, being nearest to the river, were most likely to have experienced flooding, were most likely to be at risk of future flooding and most likely to have significant environmental benefits associated with their location and, thus, any trade-offs made would be meaningful. The area of search was narrowed down further to all addresses partly or wholly within the 1979 flood outline (flood maps were supplied by the NRA).

The area of search was again narrowed to concentrate mainly on 'front line' properties. It was felt that people in these properties would have both the most to gain and the most to lose from the flood defence scheme and also would have been closely associated with, and affected by, its construction.

Introductions and requests for interview were undertaken by telephone. Only one person refused to be interviewed but she agreed to talk over the telephone. She was generally satisfied with the scheme. Another would not be available at the time the interviews were undertaken but also agreed to speak on the telephone. She had some criticisms of the scheme. One interviewee refused to have the interview taped.

Some interviews were with one informant but others were with couples (see Appendix F-10.4). While interviews with couples might be thought to result in ambiguous findings, they can reveal elements of the decision-making process that are normally hidden. Individual attitudes/behavioural intentions measured by (quantitative) questionnaires will be constrained in actuality; people do not act as isolated individuals in society - all actions are subject to the

physical or moral constraints of the social group. Individual choice is constrained through the assumption of different roles - as partner, family member, group member, etc. - which influence their final decision. Decisions affecting common assets (such as the possible impact on jointly owned property of flooding or a flood defence scheme) are likely to be subject to a degree of debate and subsequent refinement. Thus, preparedness to live with a range of flood risks (discussed below) may vary between partners and the subsequent decision will reflect this.

Excerpts from the interview transcripts are prefixed by the interview number in square brackets and, if both partners of a couple contribute in the extract, the gender is denoted by 'MR' for the male and 'MRS' for the female. Gender is not specified elsewhere.

10.3 Flood history and present level of risk

A severe flood in December 1979 which flooded over 250 properties and disrupted traffic for a number of hours on the main 'A' road through the area was the impetus for the design and provision of a flood alleviation scheme. The 1979 flood has been assessed as having a likely return period of 60 years (Wessex Water Authority, 1986:3). Wessex Water Authority (the body responsible for flood defence prior to privatisation in 1989), also reported flooding to have occurred prior to this in 1954, 1960 and 1966.

The flood risk in the area has been exacerbated by a lack of development control that has allowed urban development of the floodplain (Wessex Water Authority, 1986:3). In addition, domestic refuse tips in several floodplain locations have raised ground levels thereby lowering the capacity of the floodplain to store flood waters. A number of obstructions in the floodplain have also increased the flood risk.

10.4 Social characteristics

The social characteristics of those interviewed were varied. Although this is an area with moderately high property values, a number of the residents are retired with low disposable income. Those interviewed comprised a number of retired persons but also professionals in the middle age range (40 to 60). Both sexes were represented. Levels of education varied from manual workers through to professionals. Income was not assessed. The majority of those interviewed lived overlooking the river and/or the flood relief scheme but three of the ten interviews were undertaken with informants living further away.

10.5 Environmental perception and attitudes

10.5.1 General environmental orientation

A general environmental awareness and concern underlay much of the interview content although most focused on particular local environmental concerns and issues. A love of the landscape, and pain at the damage perceived to have been caused to it, were expressed during interviews. One informant spoke of herself and her husband as "great conservationists" (INT5), to the extent that they did not kill garden pests in case of inadvertently killing bees and other beneficial insects. Other interviewees spoke of concern for wildlife but related to the specific local area. Appendix F-10.5 contains a selection of themes, with examples, taken from the interview transcripts.

10.5.2 Attitudes to the local environment

Informants showed considerable concern for the local environment and gained much pleasure from it. The site of the flood defence scheme was well used for walking and informal recreation and remained so by most of the informants although one claimed he does not visit the area any more because he felt the NRA had spoilt it. Informants expressed awareness of and concern for wildlife and for the impact of the scheme on the landscape. It is likely that the group of residents who were selected for interview had a particularly strong concern for scheme-related environmental issues because they were personally so strongly impacted.

Why people moved to the area was an important factor in their attitude to the scheme. This was a finding of the quantitative surveys also but was explored in more depth in the qualitative studies. In five interviews the view across the meadow, or golf course, and the river was mentioned specifically as a major factor in location choice. Many of those who were antagonistic to the scheme, moved to that location specifically for the environmental benefits it had to offer and because of that, to varying degrees, accepted the flood risk.

> [INT5] "We've retired here, dear...we know about the flood. We retired here knowing about it. We bought the house here, we could have had one round the corner, actually the surveyor said to me "you can get a better house, you know, less money, what do you want that one for?" I said to him "that's why I want it [points to garden and view] I don't want to look in somebody's kitchen". You see, I said, "it's so private here, look, I mean, it's so private! and beautiful"."

> [INT7] "We bought this house because of the view...it was a beautiful view; it's a beautiful view now from upstairs but not from here."

In these and similar cases, the view seemed to be regarded as integral to the property and so the construction of floodbanks and walls represented a direct assault on what was probably perceived as their most valuable asset.

10.6 Flood experience

A factor of expected importance in attitudes to flood defence schemes was flood experience. Only two out of the nine taped interviews were with residents who had been present and personally experienced the 1979 flood. Coincidentally, the four untaped interviews were all with residents who had been present during the flood; three had personally experienced flooding, two of whom had floodwater in the house. The record of their experiences, however, was minimal compared to the tape transcripts. Thus, the flood experience variable cannot be examined as thoroughly as it might have been had transcripts been available for all those with flood experience.

The interviews served to elucidate the complexity which underlies decisions about flood hazard mitigation. No simple relationship was found between flood experience and scheme attitude. Negative scheme attitudes were found in both those with and those without flood experience and vice versa.

10.7 Perception of, and attitudes to, flood hazard

The perceived cause of flooding can be expected to have an influence on attitudes to solutions to the flood risk. Those who believe, for example, the cause of flooding to be lack of maintenance of existing drainage channels are unlikely to accept the need for major structural works in addition to dredging and clearing of obstructions. In all the surveys discussed, an element of this reasoning was found. In the DWSC/89 survey, 59 percent of respondents believed that "flooding is only likely in the area if rivers, streams, locks and weirs are not properly maintained or operated". A similar finding obtained in Maidenhead where flooded residents complained about obstructions in local drainage channels during the flood event. NRA engineers have argued that these factors had little or no effect on flood levels in Maidenhead or Christchurch but many residents remained unconvinced. Residents adopted a 'commonsense' approach to the problem: commonsense told them that if drainage channels had not been dredged or sufficiently managed then this would exacerbate flood levels:

> [INT5] "We told them that a lot of the trouble was that the river wanted cleaning out."

> [INT5] "But, you see, all the channels were blocked so the water couldn't get away...if you look over that bridge you'll find all the archways underneath...they were totally blocked."

A major problem lies in the level of protection preferred by the NRA engineers which, in most cases, is considerably greater than any flood experienced by the residents and thus seems excessive to them.

A connection was made by many interviewees between development in the floodplain and increased flood risk:

> [INT4] "...with all these huge housing estates they've built...as well as hospitals, supermarkets, all the rain comes off very, very rapidly into the river. And all the way up the Stour."

Some of those interviewed in Christchurch had a fairly sophisticated understanding of the nature of the flood risk:

> [INT4] "A lot of the flooding down here has increased over the years possibly because of the drainage and the government grant scheme for farmers...in order to drain the land all the way round the Stour here...so its a political problem, its not an engineering one really."

Several of those interviewed mentioned a rumour that the 1979 flood was caused, or at least exacerbated by, a failure on the part of NRA operatives to either open or close (nobody was sure which) a valve or a floodgate upstream. As the flood occurred over the Christmas period, the rumour claimed that the operatives were the worse for drink and had not performed their duties correctly. Others suggested that earlier straightening of the river channel by the NRA had worsened the flood risk by speeding the flow.

Much engineering effort now goes into trying to avoid or reduce to a minimum the exacerbation of flood risk downstream from upstream river engineering[39]. The Maidenhead, Windsor and Eton scheme is estimated to increase downstream flood levels by approximately 100 millimetres, a level which the engineers regard as minimal but which causes concern to certain of the downstream residents. A Lower Stour interviewee also felt that the works would make the flooding worse downstream ([INT3] "...but I don't think there's any doubt that what they've done here is going to push the flooding further down"); and this factor was

[39] Some engineers who were interviewed refuted this accusation: some had carried out tests in response to this claim and found no downstream changes from river works.

an element in her critical, but ultimately not oppositional, stance to the scheme.

The social characteristics of the informants were varied and no pattern was apparent in linking particular characteristics with type of response. Age was identified by the informants at the ninth interview (INT9) as being a contributory factor in their response to the flood risk and the scheme. The female informant believed that now, at the age of 60, she would not tolerate a flood again but if she were 20, 30 or 40 she might (this informant was 50 when the previous flood occurred). She also identified health factors (both mental and physical) as being influential in determining tolerance levels. She regarded herself as a 'nervous' person who worried too much to tolerate the risk. Her husband has heart problems which now would not allow him to cope as he had done previously. She believed that younger people were more prepared to cope with and tolerate a flood.

> [INT9] "I suppose really at our time of life...youngsters don't care do they? I mean, lets face it, you can take it better when you're younger. Well, I don't know, when you're 30/40 you take...I mean what were we? I was what 50? about 52 when we were flooded."

However, other informants of the same age or older were against the scheme and prepared to tolerate the risk. This was so for both those with and without direct personal experience of the 1979 flood.

Two interviews in adjacent properties, with neighbours of approximately the same age, both with floodwater inside their house in 1979, with previously similar views across the golf course to the river and now with similar views of the scheme, had opposing attitudes to the scheme. It is not possible to say why this is so; the informants who had a positive attitude (INT9) regarded themselves as "an easy pair", that is, they were not the type of people to make a fuss. They believed, however, that those who did complain "get thought better of".

The neighbour who had a negative attitude (INT1UT) had lived in the area all his life and felt, because of that, that he knew the area and its flood risk better than the NRA. He had objected strongly to "the form and height" of the proposed defences and remained strongly opposed. He had been particularly concerned at the time of the consultation with the impact of the proposed scheme on privacy and the likely "desecration of the beauty of the area". He felt that the comments he had made had been ignored. Thus, even though this informant's house was flooded (he had had between 4 and 5 inches of water in the house and had lost certain, irreplaceable items) he remained a staunch opposer. It is possible that a belief that the flood will not return is one of the determinants of this informant's present attitude but the

interview was too short to build sufficient rapport and to fully examine underlying meanings[40].

10.8 Perception of, and attitudes to, future flood risk

It was apparent from the interviews that expectation of future flooding was generally low. For most of those interviewed the flood risk was remote and many felt a flood of similar magnitude to that which occurred in 1979 would not happen again. A common recurring theme was that the flooding was a 'freak event':

> [INT5] " I always think floods are freak things. I do honestly."
>
> [INT1] "I'd still have that attitude that it couldn't happen really."
>
> [INT2] "I don't ever think its going to happen again personally, that's my view. Yeah, I think it's [the scheme] all done for nothing [said bitterly]."

Just what constitutes a 'freak' flood is not easy to define. Arguably, a flood with an estimated recurrence of 1:50 or 1:100 years comprises a relatively 'freak' occurrence. This case study has confirmed earlier findings (Burton et al,1978) that different time horizons seem to exist between the average floodplain resident (short-term time horizon) and, for example, the professional engineer (long-term time horizon). Burton et al have noted that a given hazard event does not constitute the same hazard to everyone (1978:97). For those who expect to occupy the floodplain for a short time period only, a flood risk of 1 in 50 appears remote and improbable. The flood defence engineer, however, with a professional time horizon of 50 or 100 years regards the probability of such an event with a greater degree of certainty. Older persons are particularly prone to the former view because they tend not to project beyond their (limited) life expectancy.

Clearly there are differences in perception between those (such as engineers) for whom the concept (the risk of a rare flood) is an abstraction and those (such as many residents) for whom it has personal meaning. Understanding of the statistical estimation of flood risk and the justification for a scheme's design standard was not widespread among the informants:

---

[40] This informant had been suggested by his neighbour: contact was made by personal visit and the interview was conducted at that time. Thus, the informant had not had time, as others had, to evaluate the researcher and research purpose beforehand. He remained somewhat suspicious and refused to have the interview recorded.

[INT5] "You get these freak floods. It doesn't mean they're going to come every...unless you build 12 foot walls. It's a lot of nonsense..."

[INT2] "We were told by the engineers of Wessex Rivers that it would never be flooded for another hundred years."

[INT7] "We'd have been insured anyway, and the word was, once in a hundred years. In a hundred years we shan't be here anyway."

Although some had a better understanding:

[INT4] "Yes well they say it only happens once in a hundred years but I...suspect those statistics like that because catastrophes can happen at any time really."

Interviewees' attitudes to the flood risk seemed to have been influenced by their insurance companies and their solicitors when they bought the property. It is possible that such professionals are acting as 'gatekeepers' (Pahl, 1975) and should be included specifically in any flood hazard information dissemination that the NRA might carry out in the future.

[INT3] "I mean before we bought the place, we went to the insurance company and said well, were they prepared to insure the property and, 'b', would they ask for an additional premium, and this was what, 5 years after the event and they were quite happy, they regard it as a freak incident"

[INT2] "Even when it was flooded you see none of the insurance policies went up at all."

[INT9] "But we never had anything said about flooding on our...papers...all they done on our...the solicitors brought our attention to was the Route 10...but there was nothing else that they drew our attention to."

These extracts indicate some of the other sources of information which were used by residents to balance that provided by the NRA.

People responded differently to the high river levels of the winter of 1989/90. For some who had a negative attitude to the scheme, the fact that even after a lengthy wet period there was little water to be seen outside of the river banks, was confirmation that the scheme that had been constructed was unnecessarily extreme:

[INT5] "Now the other thing was, about...oh just before Christmas, or some little time before Christmas, we had the most terrible weather here when it rained for days and days and days. The golf course got flooded; but for all that the river overflowed and the golf course flooded, it was no higher than that [indicates 2 foot above the ground]. So what do we want a 12 foot wall in front of our property for?"

For others with a positive attitude to the scheme, the sight of high river levels reminded them of the flood threat and caused them to be grateful for the presence of the scheme:

> [INT9] "Yes well mind you, last winter [1989] when the weather was a wee bit atrocious at times...and we did have a lot of wet around Christchurch...I suppose we felt happy."

Thus, people seemed to interpret the event in accordance with prior attitudes. Although the event referred to was slight, this example does indicate how experience is not always a sufficient causal factor in attitude change.

It was planned to ask interviewees several questions from other surveys undertaken for the main research project so that a comparison could be made. However, it was found that the loosely structured interview situation did not always lend itself to asking questions in the same formal manner that obtained during earlier questionnaire surveys. It was decided, therefore, after four or five interviews, to drop most of these. However, the following question was asked at nine of the interviews (see below for a discussion of the use of selected scheme attitude statements):

Would you be prepared to live in the same area if the risk of flooding were as follows:

> a 1 in 200 risk each and every year that your house would be flooded;
> a 1 in 100 risk each and every year that your house would be flooded;
> a 1 in 50 risk each and every year that your house would be flooded;
> a 1 in 25 risk each and every year that your house would be flooded;
> a 1 in 10 risk each and every year that your house would be flooded;
> a 1 in 5 risk each and every year that your house would be flooded?

The same, or a closely related, question formulation was used with nine out of the thirteen interviewees[41] who showed a range of competence in dealing with risk estimation in this form. The use of this question was one of the means of estimating a risk-environment trade-off. It served here to reveal the interviewees' perception of flooding as a cyclical process and proved useful in identifying the ways in which interviewees interpreted this question; providing some confirmation of previous hypotheses about how survey respondents handled

[41] Exactly the same wording was not used because it did not seem appropriate in some of the interview situations so the findings here cannot be said to be strictly comparable to findings using a different survey methodology.

the issue of risk. That is, that they tend to think concretely about risk in terms of the likelihood of an event over time (e.g. the 100 year flood) and not in terms of abstract statistical measures of risk (e.g. a 1 in 100 risk). Also, while willing to respond to the range of risk statements, underlying this is the belief by many that it won't happen to them or that, in any case, they have no choice in the matter.

On first moving to the house, the first interviewee (INT1) and her invalid husband had arranged flood plans for his evacuation to neighbours across the road. Thus they had to some extent prepared for a flood and since making these plans she had stopped thinking about the flood risk. When asked the standard question on preparedness to live with the flood risk, she answered that she was prepared to tolerate all levels of risk and gave various reasons.

Firstly, she stated that she would adopt the specific tactic of getting sandbags to manage the flood. Secondly, that she would "still have that attitude that it couldn't happen really", which can be regarded as another tactic: denying the risk. Thirdly, and somewhat differently, she felt she couldn't very well move anywhere else now, she wouldn't want to uproot her home and so she would have to tolerate the flood risk, she did not perceive that she had any choice, she was constrained to stay; which is somewhat different to a completely voluntary tolerance.

Based on new information about a general change in flood risk (global warming and sea level rise) and by a process of 'getting used to' change arising from the scheme development, this informant now felt able to accept the scheme even though her perception of the specific flood risk with which she was faced had not undergone radical change, i.e. she still felt, based on past experience, that it would not happen to her. This casts in a new light the common finding: 'it won't happen to me'. This argument is more often allied with arguments against acceptance of mitigation but here it is allied with acceptance of mitigation. It is included here to indicate that seemingly irrational and illogical reasoning can be used by both opponents and supporters of flood hazard mitigation.

The majority of those interviewed, irrespective of their attitude to the scheme, were prepared to live with risks of between 1 in 200 and 1 in 25, and a third were willing to live with all risk frequencies (see Table 10.1) for the responses of the Christchurch interviewees to this question). Thus, the Lower Stour informants were more prepared to live with frequent levels of risk than those in the other case studies.

An expected pattern might be that whose house was flooded would have had a positive attitude to the scheme and vice versa. This simple pattern was not found in all cases. For

Table 10.1: Preparedness to live in the same area with varying flood risks (Lower Stour)

Interview number and scheme attitude	- flood risks -					
	1:200	**1:100**	**1:50**	**1:25**	**1:10**	**1:5**
INT1+	YES	YES	YES	YES	YES	YES
INT1UT-	YES	YES	YES	YES	YES	YES
INT5-	YES	YES	YES	YES	YES	YES
INT4-/+	YES	YES	YES	YES	NO	NO
INT6-	YES	YES	YES	YES	NO	NO
INT2-	YES	YES	HE: YES SHE: NO	depends** no	no no	no no
INT7-	YES	YES	YES	possibly	no	no
INT9+	HE: YES SHE: NO	YES no	NO no	no no	no no	no no
INT3+/-	YES	NO	NO	no	no	no

Signs (+ -) following the interview number indicate positive (+) or negative (-) attitudes to the scheme
** 'depends on insurance'
UT = untaped (interview)
Uppercase NO = recorded response
Lower scae no = response assumed from previous responses

example, Interviewee 1 **was not** flooded and yet had a positive attitude to the scheme while Untaped Interviewee 1 **was** flooded and yet had a negative attitude to the scheme. The inclusion of whether the interviewee overlooked the scheme (and thus was more obviously impacted by the scheme) again did not conform to the pattern as expected in the ideal type (see Table 10.2). Interviewee 4 did experience flooding, did not overlook the scheme (and so was not immediately impacted by it), and yet had a fairly strongly negative attitude to the scheme. This is discussed further in the following section.

Table 10.2: Flood experience, whether scheme overlooked and scheme attitude (Lower Stour)

INT. No. ORIGINAL ATTITUDE	HOUSE FLOODED	GARDEN ONLY FLOODED	INT'VIEWEE PRESENT DURING FLOOD	OVERLOOK SCHEME?	ATTITUDE NOW
INT 1-	NO	YES	NO	YES	+
INT 2-	YES		NO	YES	-
INT 3-	YES		NO	NO	+/-
INT 4-	YES		YES	NO	-/+
INT 5-	?YES		NO	YES	-
INT 6-	YES		NO	YES	-
INT 7-/+	YES		NO	YES	-
INT 8-	NO	YES	NO	YES	+/-
INT 9-	YES		YES	YES	+
INT 1UT*-	YES		YES	YES	-
INT 2UT-	YES		YES	NO	-/+
INT 3UT+	NO	YES	YES	YES	+
INT 4UT+	NO	?YES	YES	YES	+

* UT = Untaped interview
\+ = positive attitude to scheme
\- = negative attitude to scheme
+/- = critical attitude but mostly positive
-/+ = critical attitude but mostly negative

10.9 Attitudes to adjustment (proposed/implemented)

The scheme that was proposed aimed to give "protection against all floods with a return period of less than 100 years" (Wessex Authority, 1986:2). The scheme works were to be phased over a period of six years and the estimated capital cost (in 1986) was £2.3 million.

The main components of the scheme were the construction of floodbanks and walls (up to three metres high), the dredging of the river bed, clearance of blocked flood arches and excavation of tipped land (see Figure 10.1 for location of works).

The most controversial part of the scheme was, and remains, the flood embankment (up to three metres high in places) which was of a new design that had not been used before for floodbanks (it had been used by the Ministry of Defence for blast banks on weapons ranges). The side of the embankment that faced residential property had a steep (1:2) gradient, the purpose of which was to reduce landtake. The opposite, golf course, side of the embankment had a gradient of about 1:3. The turf was an integral part of the bank construction and not a post-construction landscaping element (see Appendix F-10.6 for photographs of the scheme).

The main objections in 1985 to the scheme proposals were focused on the embankments and walls which many felt were too high and feared would result in a loss of view, reduction in property value and loss of privacy caused by children playing and people walking along the tops and looking into windows. Other objections were based on the infrequency of flooding which, it was felt, did not warrant such a large scale and expensive scheme. Many people agreed with certain scheme elements, such as dredging the river and unblocking flood arches, but disagreed with the full scheme (for an extended list of themes arising from the comments book see Appendix F-10.2).

Loss of privacy, caused by people walking along the bank and wall, was mentioned by most interviewees as a problem to some degree; this was the case whether or not they were generally happy about the scheme.

> [INT2] "You get cars come up here at night time, police have had to patrol it...there's people walking along the bank and look over into people's gardens, there's a hell of a high risk for burglars."
>
> [INT5] "Now, this wall, is being used for children on bicycles and they're up and down..."
>
> [INT7] "A lot of people along the wall, adults mainly, using extremely bad language when they've been asked to move."
>
> [INT8] "We frequently get people walking up and down, having a look in to see what's happening because they've got a good view."

More positively, some interviewees had 'adopted' the bank as part of their garden:

> [INT1] "I planted all the flowers up there [on floodbank] and they came up and they're quite nice."

Others had watered the bank during drought periods when the turf was having difficulty getting established.

The embankment had proved more of a problem than the wall. The new technique tried in its construction has not been wholly successful due in large part it is thought to lengthy periods of drought during its construction and early stages of turf growth. Damage caused by the contractor while mowing, further reduced its aesthetic appeal by requiring remedial measures that relied on patching in of black plastic netting, fixed with bright blue plastic twine. Many interviewees contrasted the promises of green, grassy, landscaped banks to the dry, brown, mound patched with black polythene and blue twine that they could see from their windows (see Appendix F-10.6c).

> [INT6] "Now listen...listen to this [reads from NRA document], "by careful landscaping, selection of materials and planting of suitable trees, shrubs and flowers, we hope to make the works as pleasant as possible". Now have a look at that! Take a look at that! Do you know what was on the side there, its all been burnt off now, polythene! Black polythene!"

For many of those who bought their property for the view it afforded, the scheme was a major disappointment. The (excessive) height of the embankments and walls was a continuing theme:

> [INT7] "But to go to this extent, to build a Berlin Wall to keep the river water back..."
>
> [INT2] "Get a machine here and we'll knock a metre of it off [laughs], quite easy to do, mind [laughs]."
>
> [INT5] "You see...everybody along here, we're all in agreeance ...let's have a little flood barrier but not 12 foot high."

This last comment reveals an important component in scheme attitudes: those who opposed the scheme, opposed the height of the defences and therefore the standard of protection offered. They were not totally opposed to flood defence in principle. It suggests that, if the NRA believe high levels of protection to be justified, more resources should be expended on explaining the justification for this standard and the implications of choosing a different level. However, floodplain residents do not necessarily act as passive and positive recipients of information from the NRA; they receive information from elsewhere in the community and

it is possible that this latter source may reinforce their initial beliefs and outweigh information from the relatively unknown NRA.

Another theme that was raised in the comments book and resurfaced during interviews was the perceived impact of the scheme on property value:

> [INT7] "There's no talk of compensation or anything like that for loss of view...Devaluation of the house because of the wall, I suppose they would say the house would be of more value because it would never get flooded again [laughs] but the once in a hundred [flood] won't make up for the other 99 times you can look out over the meadow, an unrestricted view."

It was felt by many who opposed the scheme that there had indeed been an impact on property values from the scheme. This was expressed most often as the loss of a 'selling point'; that is, the scheme had obstructed the view, which formerly had been a selling point.

> [INT7] "Who wants to live behind a wall? Not a selling point. Before we had a view; that was a selling point. It's not now."

It could be argued that the protection from flooding offered by the scheme would improve property values, however, the presence of a flood risk does not seem to have influenced property values here in the past although one informant remarked that they had tried without success to sell their property after the 1979 flood. Thus, property values may suffer in the immediate aftermath of a flood but recover again after a flood-free period. Similar findings have been reported by Montz (1992) whose study of the impact of hazard disclosure on property values in three New Zealand communities found that disclosure of hazard had little effect and that hazardousness did not appear to be an important consideration in house buying decisions; any impact of an actual event on property prices was temporary (see also above comments relating to insurance company and solicitors' attitudes to the flood risk in the area).

For some of those who feel strongly against the scheme, it was impossible to find anything positive to say about it. Others were pleased with the sense of security it offered. Some remarked that the scheme afforded them more privacy than they had enjoyed previously. A number of residents gained extra land between their former garden boundary and the bank or wall; this was not always regarded as a benefit by the older residents who had difficulty managing their gardens.

Negative aspects were necessarily more numerous, given the sample that was chosen, and were mostly concerned with the perceived visual blight and threat to privacy mentioned

elsewhere. The ramps and pathways constructed for access across the defences were also felt to be a negative aspect; not only because of the impact on privacy but also because the stark white of the original paths was thought to be out of character with the area.

Three key variables in scheme attitude were: height of the defence, perception of scheme impact on view, and flood experience. However, the variables did not co-vary in a simple way and, clearly, the relationships were complex. Those whose attitude to the scheme was generally positive, would not be so satisfied if the floodbank or wall were nearer or higher:

> [INT9] Q: "How would you feel if [the floodbank] was higher than that?
> MRS: Oh gosh!
> MR: Very upset! Very upset."

The first interviewee (INT1) was originally "dead against [the scheme]...absolutely dead against it." She elaborated on the reasons for her present, more positive attitude. Firstly, she associated her change of attitude with "being human beings and human nature", a result of which was adaptation: "you get used to it". 'Getting used to it', and more particularly, '**having** to get used to it' and a somewhat fatalistic attitude, were mentioned by several informants as having influenced their present attitude. To some extent the NRA engineers who promote schemes depend on this process occurring (this will be discussed further in the section dealing with the engineers' interviews) to overcome opposition in the long term.

Secondly, this informant was influenced as a result of interactions with others in the community; by neighbours and other residents discussing the possibility of future flooding and, probably more importantly, by hearing a talk by "one of the people from the Council" on the 'greenhouse effect' and the threat this posed through rising water levels. The latter (allied to wider media coverage) was an important component in attitude change for this and for other informants. Thus, for this informant, scheme attitude was not dependent on information from the NRA but from other social or cultural contacts; in this instance it served to turn a negative scheme attitude to a positive one and thus worked in the NRA's favour.

Two conditions of her acceptance of the scheme were her belief that "when they've landscaped it, it will be quite nice" and that "it hasn't spoilt my view". The latter is a very important condition of acceptance of the scheme for this informant and for others. The floodbank at her location was sufficiently low for her to have retained a distant view down to the river and also the condition of the turf on this section was better than in other sections where it had suffered drought and other damage. If these two factors were reversed then it is probable that her attitude to the scheme would have been more critical.

10.10 Consultation and participation

10.10.1 Residents' attitudes

There was a relatively clear division of attitudes to the NRA consultation programme. Generally, those in favour of the scheme were satisfied; those against the scheme, were not. For those with serious criticisms of the scheme, the consultation programme did not seem to answer their needs. Many could not accept the need for such high defences to protect against flooding that 'wouldn't happen for 100 years'. The use of the term '100 year flood' by NRA officers, had merely acted as a reinforcement to the public perception of flooding as a freak event with a likely recurrence 100 years hence.

A number of those interviewed felt that the drawings and plans did not adequately convey the information they required; one believed this to be a deliberate tactic of the NRA to get support for the scheme. Others felt that the consultation process did not go far enough in allowing them an input into decision-making:

> [INT2] "I think that we should have been asked in different ways how it would be designed and we were only asked about the height."

Some informants expressed the attitude that the NRA weren't really interested in peoples' opinions and that the consultation was more of a public relations exercise.

> [INT2] "Alright, they had us up there and you write in a book but they didn't really...they weren't really interested in it at all."

> [INT3] "...I mean consultation is as much or as less as you want to put into it really...I think its a very good public relations exercise, consultation, but whether or not, from the public's side, you get what you want, I really don't know."

More positive attitudes were also expressed by some who felt the NRA had taken trouble to organise the displays and exhibitions and had kept people informed by a form of newsletter. The use of newsletters was a preferred method of consultation in the Thames Valley surveys discussed above. More regular use of this means of communication might have avoided some of the negative attitudes to the NRA which developed particularly when elements of scheme design were changed after the exhibitions, leading some residents to suspect that there was an element of 'trickery' involved.

The NRA survey of residents' preferences (see Table 10.3) was criticised by a number of

Table 10.3: "Results of the [NRA] Public Consultation in the Iford Area, January 1986" (Lower Stour)

Number of questionnaires delivered		860		
Total returns by 11 February		503	58%	
1st choice:	Option 1 - Full scheme	276	55% }	
	Option 2 - Reduced scheme	163	33% }	100%
	Option 3 - No scheme	62	12% }	
	Unidentified papers	2		
		503		
Area upstream of Barrack Road				
Total returns		383	60%	
1st choice:	Option 1	220	58%	
	Option 2	120	33%	
	Option 3	41	11%	
Area downstream of Barrack Road				
Total returns		120	54%	
1st choice:	Option 1	56	47%	
	Option 2	43	36%	
	Option 3	21	17%	
Front row of properties	Total	68		
Total returns		56	82%	
1st choice:	Option 1	19	34%	
	Option 2	27	48%	
	Option 3	10	18%	
Properties where occupier voted for Option 3 - no scheme		62		
Number of these in new ownership since 1979		19	31%	

Source: NRA Wessex Region

interviewees who felt that the area covered by the ballot had extended too far and had included those who would not be impacted by the scheme:

> [INT2] "They went a bit too far with their leaflets to get a lot of votes...those people weren't concerned, see...they weren't concerned about it were they, they weren't worried, "oh yes, let's go for the higher scheme"."

> [INT9] "If we lived back there, we would have done that naturally, in fairness to yourself, if its 8 foot its going to be dead certain and 4 foot...if you're back there and you don't even see it, you're naturally going to opt for the [higher scheme] I mean, we would have done the same."

Informants did not appreciate that the ballot was of those likely to be affected by a 100 year event; they thought it was only of those affected by the 1979 flood and perceived, therefore, that the NRA had spread the net too wide - and, it was suggested by some, manipulated the result - by including many who were not flooded in 1979. This created a considerable level of distrust which could perhaps have been avoided by a more thorough explanation of the criteria for inclusion in the survey.

It was felt by some interviewees that certain of the concerns expressed by them in the 1985 consultation and reported in the Comments Book, were not dealt with by the NRA during final design and construction of the scheme. For example, the probable loss of privacy caused by people walking along floodbanks and walls. Although this concern was expressed in 1985, it did not seem to have been dealt with in the design. It had caused considerable annoyance and distress since construction and appears to have necessitated the erection by the NRA of chestnut paling fences as an ad hoc preventative measure:

> [INT7] "One of the meetings I asked, if there was going to be a wall could it be made pointed so people couldn't walk on it. I didn't get a satisfactory answer. The answer is, it's 2 feet wide and it's like a footpath."

> [INT5] "Oh and then on top of that they put that hideous fence, can you see it? You know why that's there? To stop the kids cycling!...they're up there all the time."

The interviewee who requested a pointed top to the floodwall remarked that this suggestion was now being considered but he was uncertain of how this would be achieved when the wall was ostensibly complete.

Some informants felt that none of the tactics[42] they had used to convey their feelings about the scheme had worked and in the fifth interview the informants were left with a feeling of powerlessness which seemed to have a long-term consequence in that the experience had persuaded them it was not worth objecting to anything in the future.

> [INT5] "I would never object to anything in future because it's a lot of wasted energy at our age, when we don't need to waste our energy, you know, we objected and we went to the meetings, we did this, that and the other...it's all to no avail. Oh absolutely not."

A number of informants - both those who opposed the scheme and those that did not - believed that those in opposition were a 'minority' and as such had no chance of their preferences prevailing against the majority. This was particularly evident in the widescale ballot of opinion carried out by the NRA.

> [INT5] "It doesn't matter about going to meetings 'cos one man, Residents' Association, said "sit down"...Because he wasn't interested, he was in favour of the wall because he lives...miles away from the wall, you see, so they weren't interested in your opinion anyway. And asked the opinions of people who don't live anywhere near the wall."

These informants claimed to be 'staunch Conservatives' and had found themselves in the unusual and, to them, distressing position of being regarded as rebels and in opposition to the consensus view of the public meetings:

> [INT5] "MR: ...after attending all these meetings and that...you were pushed aside because...they ask you for your opinion and when you gave your opinion, you were looked at as if you were...were rebels you know ...you don't know what you're talking about."

When asked whether the differences of opinion about the need for the flood defence scheme had caused conflict in the community these informants said it had not, although their reasoning was that this was because there were too few in the minority group to create a significant level of conflict.

The minority/majority theme is conveyed here by the comparison of the informants' (minority) side of the road with the other (majority) side. They suggest that it was "natural"

---

[42] This term was not an informant's term but its use here relates to analysis based on 'grounded theory' techniques (Strauss, 1987), the results of which are presented in Appendix F-10.7)

for those living on the 'front line' to opt for the lower scheme and those living further back to opt for the higher scheme:

> [INT2] "MRS: Well obviously they're all for it the other side and we're all against it this side which is only natural isn't it. MR: That's right. MRS: 'cos it only affects us; doesn't affect the other side...MR:...They weren't bothered over the other side of the road. MRS: Naturally. We wouldn't have been. MR: We wouldn't have been, no, that's right."

Other interviews, however, suggested that this was not always the case; some living further back also opposed the scheme. The NRA's questionnaire survey showed only 14 percent of respondents were from the 'front line' and yet 45 percent of the total respondents chose the lower or no scheme.

Another informant believed, unusually, that the majority comprised those who were flooded in 1979 (he was aware that his property had been flooded to a depth of three feet but he was not resident at the time) and the minority, those that overlooked the scheme but were not flooded:

> [INT7] "I mean, people such as us living alongside it, a nice view, were in a minority I suppose. 'Cos all the people that got flooded in the past were living behind...so they were the majority and the minority people such as myself, I suppose if you followed up round the back of the golf course, they all felt the same as I did, that they didn't want it..You've only to walk around the back streets...and all those roads that were flooded, to know that the few people that were bordering on to the golf course and on to the meadow here are definitely in a minority. The people across the road, they don't care a damn about the view here would they? The back streets that were flooded opted for the wall and the higher wall because they wanted to be covered against the flood. We're just outnumbered that's all which I don't think will be considered in any way at all."

Equity issues arise frequently in floodplain management and have yet to be addressed adequately by decision-makers. Decisions are made on the basis of majority opinion which can result in considerable distress to individuals and minorities. This will be dealt with further in Chapter 13, Interviews with NRA Engineers.

10.11 The risk-environment trade-off

In this case study the risk-environment trade-off was more overt than in the previous case studies as it formed the central research problem, the saliency of which had been determined by the floodplain residents themselves in the comments they made during consultation, before

the present research study began.

In the following discussion the risk-environment trade-off is illustrated by a simultaneous examination of flood risk and mitigation through the use of two scheme attitude statements taken from the earlier quantitative surveys. These statements were used in several of the Lower Stour interviews and the responses included here illustrate the complexity involved in the response process as well as the risk-environment trade-off itself. The two statements were "I would rather have any scheme than be flooded" and "anything designed to reduce flooding is desirable". The rating scale used was: 1 strongly agree, 2 agree, 3 neither agree nor disagree, 4 disagree and 5 strongly disagree.

It will be seen that informants qualified their responses to the statements to some degree before or after they answered; this process is not (usually) conveyed in quantitative surveys. In the extract below the first informant (INT1) agreed with the first statement, explaining further with the qualifying word "now". That is, she would not have agreed with the statement before the scheme was built and before her attitude to the general flood risk had changed (as discussed above). However when the first statement was followed by the second, and an emphasis placed on the word "anything", a different response was given:

Q: "...If I said to you "I would rather have any scheme than be flooded", how would you respond to that statement, strongly agree to strongly disagree?
MRS: I would agree now. '2', agree.
Q: And what about "anything designed to reduce flooding is desirable"?
MRS: Yes, provided its a good design [laughs].
Q: But if I said "**anything** [emphasised] designed to reduce flooding is desirable"?
MRS: No, it's got to be done in consultation with the people that are living here so I wouldn't say anything...I'd say disagree."

This shows the qualifying process which would be hidden by the simple, unprompted numerical results of 2 or 4 (agree and disagree). It also points to the importance of the position of the statements in a series (Schwarz, 1991). It is possible that different responses might be gained by altering the relative positions of statements as seemed to be the case with the DWSC/90 survey where the statement ("anything designed to reduce flooding is desirable") was placed later in the order, giving respondents more chance to think about negative aspects of schemes before responding. The self-completion process in the postal survey also allowed respondents to read and respond to statements in any order rather than being directed by an interviewer.

In the second interview (INT2) the informants' initial response to the statement: "I would

rather have any scheme than be flooded" was to strongly agree but when the words 'any scheme' were emphasised the male informant interjected a qualification: "as long as it...it **suits** [said emphatically] the environment". Similarly with the second statement ("anything designed to reduce flooding is desirable"), the initial response was strong agreement but when it was suggested that the informants had in fact got 'anything' they showed considerable discomfort. They recognised the contradiction in their previous position and tried to rationalise their response by explaining that they were never against a scheme per se but only against the design with which they had been presented: it was too high and inadequately landscaped.

The informant in the seventh interview (INT7) responded similarly to the same statement, first agreeing and then, on reflection, disagreeing when he realised the implications of agreeing to 'anything' and qualifying his answer thus: "...not anything, not anything no. It depends in which way they go about it."

This probing of responses indicates how simple reliance on the response frequencies in a quantitative survey can be misleading. The frequency of agreement with the above statements might conceal considerable dissatisfaction with and opposition to an actual scheme, were one to be developed.

The juxtaposition of risk and environment inherent in the statements and responses strongly supports the notion of a trade-off occurring.

10.12 Summary and conclusions

In this study area, which last experienced major flooding in 1979 and is now protected to a 100 year standard, experience of, and attitudes to, the environment and flooding were closely intertwined. Although age, health, flood experience and distance from the river/scheme were important variables for some informants, no consistent pattern was observable in this small sample relating social characteristics with either flooding or scheme attitudes.

Expectation of future flooding was generally low and many regarded past flooding as a 'freak event'. The majority of those interviewed, irrespective of their attitude to the scheme, were prepared to live with risks of between 1 in 200 and 1 in 25 and a third were willing to live with all risk frequencies (1 in 200 to 1 in 5) but underlying this was the belief for some that the flood would not occur or that they had no choice but to tolerate the risk: moving home not being a viable option.

No simple relationship was found between flood experience and scheme attitude. Negative scheme attitudes were found in both those with and those without flood experience and vice versa.

Many of those who were antagonistic to the scheme, had moved to that location specifically for the environmental benefits it had to offer and because of that, to varying degrees, had accepted the flood risk as they perceived it. They comprised a subgroup (of the population at risk) who had been differentially impacted by the scheme.

The level of protection chosen for the community by NRA engineers was greater than any flood experienced by the residents and thus seemed excessive to them. Generally, informants were not opposed to flood defence in principle.

For those with serious criticisms of the scheme, the consultation programme did not answer their needs. It was argued that it did not go far enough in allowing them an input into decision-making and was regarded by some merely as a public relations exercise.

Floodplain residents are not necessarily passive and positive recipients of information from the NRA; they receive information from elsewhere in the community and it is possible that this latter source may reinforce their initial beliefs and outweigh information from the relatively unknown NRA.

Those that opposed the scheme regarded themselves as an aggrieved, powerless and beaten minority. Majority decisions can result in considerable distress to individuals and minorities and this suggests the need for an examination of the feasibility of differential levels of consultation and participation.

The qualitative method has brought out the variability in response rather than, as with the quantitative method, focusing on homogeneity. The long, loosely structured, interview technique was successful in highlighting some of the complexity behind expressed attitudes, although it would have been preferable to have carried out one or more follow-up interviews to deepen the analysis. The informants' evaluation of the flood risk and possible (and actual) adjustments to it were conditional upon a range of beliefs and circumstances and upon interactions with others in the community. Some of these are summarised in Appendix F-10.7, which presents the results of analysis based on grounded theory techniques (Strauss, 1987) and lists a range of conditions, consequences, interactions and strategies/tactics applied to selected dimensions of the scheme and flood risk.

This case study has examined the attitudes of a small sample of residents to a scheme that was constructed despite considerable levels of opposition. It showed dissatisfaction to have outlasted the construction phase albeit in the absence of any recent, serious flooding. The following case study (West Bay) examined the attitudes of scheme opponents who 'won' their argument and the proposed scheme was not constructed but who subsequently suffered serious flooding.

11. WEST BAY, COASTAL FLOODING (1990) (BRIDPORT FLOOD ALLEVIATION SCHEME: STAGE 1c)

STUDY STATUS	RECENT FLOODING SCHEME PROPOSED & REJECTED SCHEME IMPACT - NEAR

11.1 Introduction

This very small case study differs from the others in that it concerned coastal rather than riverine flooding. It examined the rejection of flood defence proposals by the residents of four properties on Chesil Beach in Dorset (see Figure 11.1). Because the survey population was so small, the maintenance of confidentiality was problematic and, while the informants did not feel they had said anything during the interview that they would not wish a third party to hear, nevertheless, assurances were requested and given that they would not be identified individually by name. In this section and the report (Fordham, 1991b) on which much of the following is based, the sex of the informant is also disguised by the use of the term 'they' in place of 'he' or 'she' for example.

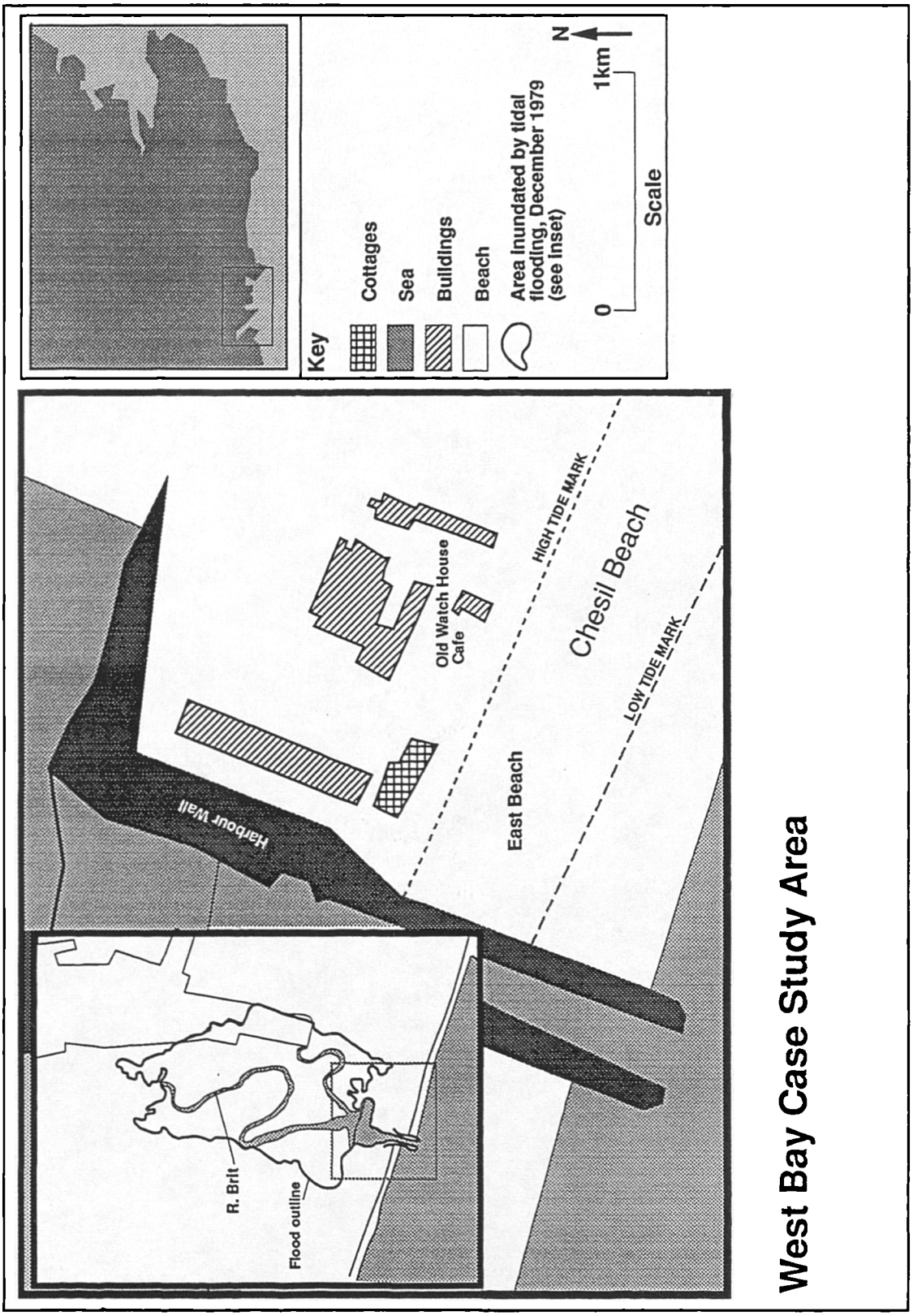
All four cottages were flooded on the weekend of December 16/17th 1989. Interviews were conducted in April 1990 with three of those present during the flood.

West Bay is a small holiday resort on the Dorset coast. It lies downstream of Bridport at the point where the River Brit enters the sea at West Bay Harbour. Development of the town has been low-key and was felt to be responsible for a large part of its charm.

The focus of the study concerned a group of cottages which lie at the western end of the 29km long Chesil Beach (see Figure 11.1). Chesil Beach stretches from Portland Bill in the southeast to West Bay Harbour in the northwest and is a Site of Special Scientific Interest (SSSI).

The cottages are Grade 2 Listed dwellings. Originally, it was thought, they were built as coal bunkers for a much larger four storey terrace lying at a right angle to the coastline. The Grade 2 listing is a constraint on the type of individual floodproofing measures that could be undertaken.

Figure 11.1: Map of the West Bay area



11.1.1 Consultation and participation: procedures followed

NRA engineers who have commented on this research and the accompanying report (Fordham, 1991b) now acknowledge that the original consultation procedures were perhaps less than adequate and report that "things are done differently now". At the time, the process was of fairly standard form including consulting the statutory consultees, one of whom was the NCC which objected to the original proposals which included concrete piling and would have required importing material on to the beach. There is a divergence of opinion as to whether or not individual residents were consulted prior to the commencement of works: the NRA believe residents were contacted but the residents claim they were not.

11.2 Research design

Flooding of the properties occurred during December 16th and 17th 1989 and it was proposed to interview the owners to ascertain whether their attitudes to flood defence had changed since the flood event.

The names and addresses of the cottage owners concerned were obtained from the NRA Wessex Region and contact made by letter and telephone in March 1990. Interviews were carried out in April 1990 with a single owner from all the cottages and also one tenant. All who were asked agreed to be interviewed although one interviewee was somewhat reluctant and the ensuing interview was too short (approximately twenty minutes) to generate very much information.

Four loosely structured interviews ranging between two hours and twenty minutes in length were completed. One owner owns two of the cottages which are rented out while they live elsewhere; one owner occupies their cottage permanently; and one owner uses theirs as a holiday cottage but their father (the tenant and fourth interviewee) occupies it permanently. Interviews were also conducted with two engineers involved with the scheme.

The loose structure of the interviews was designed to cover certain basic areas but to allow the interviewees to express their own concerns freely. Several set questions taken from other surveys were asked for comparative purposes. The interviews were not tape recorded but notes were taken during the interview and expanded notes were included immediately afterwards.

11.3 Flood history and present level of risk

The particular flood problem to which this study relates is one of overtopping of the East Beach (see Figure 11.1) by tidal influences. High wave action can cause overtopping of the East Beach shingle bank at approximately two- or three-yearly intervals although property is not normally flooded. If, however, this coincides with high spring tides, significant flooding can occur in the village of West Bay and can include property flooding and road closure. The last event of such severity occurred in December 1979 and was the impetus for the original flood defence proposals which date from 1981.

The flood adjustment situation existing before the 1989 flood was that all three owners of the cottages had refused to accept the proposals put forward by the NRA, which comprised the raising and regrading of the existing beach profile to 7.5m AODN (Above Ordinance Datum Newlyn) from the existing level of between 5.7m and 6.7m AODN to provide a 1 in 100 year standard of protection. The proposals entailed a potential impact on visual amenity for the owners of the cottages who have always enjoyed an uninterrupted view of the sea. The subsequent refusal of the proposed works meant that the cottages themselves became the defence.

Some adaptation to the flood risk was apparent: the ground floor circuitry in one cottage at least was isolated from the rest of the house so that, in the event of a flood, heat and light would be available in the rooms upstairs. One interviewee believed the cottage was built to be flooded but not to have shingle in it. The basement had a 'plughole' in the floor to drain floodwaters.

11.4 Social characteristics

No information was sought systematically on the social characteristics of those interviewed. Interviews were undertaken with both males and females whose ages ranged from the mid-forties to one interviewee who was 85. Educational level was not examined specifically but varied across the informants. One interviewee referred to their university education; another referred to previous hotel ownership and management; another to working "in the building trade".

The ownership and occupancy of the cottages was as outlined above. Length of ownership and residence varied: one non-resident owner bought their property in 1955; the other in 1971. The resident owner-occupier bought their property in 1981 and the tenant had been in

residence since 1982.

11.5 Environmental perception and attitudes

11.5.1 General environmental orientation

Little information is available on the general environmental orientation of the informants although two mentioned the wider, more philosophical aspects of environmental concern which underlay their attitudes to the locality and their opposition to the proposed scheme; these are discussed in relation to scheme attitudes below.

11.5.2 Attitudes to the local environment

West Bay was regarded by one of the informants as "a bit of a slum; bit of a grotty joint" (said in a way which suggested this was part of its charm). The town had been largely bypassed by development. What little had occurred was "of an amateur, shabby kind", which was regarded as part of its value: it had not been professionally developed. It was also said that the town had "a sense of history".

Asked what was the particular attraction of the property or location, two informants responded that it was the rarity of the position - the last house on Chesil Beach - and that it was difficult to find a house that close to the sea.

One of the informants was an active member of the local preservation society and thus had greater concern for, and involvement with, local planning decisions. The attitudes of another informant to the locality were dependent upon the time of the year:

> "it's nice in summer but in the winter it's different with the wind coming in through the windows. Beautiful in summertime."

11.6 Flood experience

The cottages had experienced little or no flooding prior to 1989. Some percolation of water occurs through the shingle and up into the basements which can get "quite damp". This had occurred in one of the end cottages on one previous occasion when two inches of water "seeped up through the gravel and then went away again". In 1958 there was minor flooding in the other end cottage causing damage to one carpet. The owner of one of the middle cottages reported that there appeared to be no record of flooding "by local memory for the

last 100 years".

The 1989 flood brought approximately four feet of water and fifteen tons of gravel (by one estimate) into the cottages on the evening tide. By eleven p.m. on the Saturday evening the sea had broken through the windows - smashing the glass and frames - and flooded the basements. By two or three a.m. the Fire Brigade had managed to pump out the water down to a level of approximately one foot but the next day the water and gravel came back again.

Three of those interviewed were present during the flood that occurred over the weekend of the 16th and 17th December 1989.

11.7 Perception of, and attitudes to, flood hazard and future flood risk

Those who experienced the flood were asked how they felt about it. None underestimated the severity of the event but feelings were varied:

> "it was a very frightening experience. The sea often comes up to the edge of the bank [of shingle]; too close for me. Frightening"
>
> "the worst thing was feeling so helpless. I never thought it [the flood] would happen. I used to say, 'I don't mind if it does, if it is caused by the elements', but I minded more than I expected"
>
> "feeling numb, helpless. Not really frightened"
>
> "I didn't think 'Oh, I must get out and sell the place'"

At one stage members of the Fire Brigade, roped together, attempted to negotiate the seaward side of the cottages but were prevented by the strength of the waves ("they were afraid").

The interviewees mentioned a number of contributory causes of flooding. It was suggested by one interviewee that the original course of the river Brit had been further to the east (nearer to the East Cliffs) and that works carried out in the past by the NRA (the construction of a shingle bank) had blocked off this flood route which would have funnelled the flood waters up the original course of the river to the east and round the back of the cottages. A similar flood causation factor emerged in the Lower Stour Case Study.

Another contributory cause of flooding that was mentioned was the over-extraction of gravel from the beach. This, it was felt, had changed the beach profile and made it much steeper. This was perceived to contribute to the cause of flooding by bringing the sea nearer. The

"natural defence", the Chesil Beach, had "disappeared". It was said that it always used to disappear but had always come back again; "but it hasn't come back".

When the flood defence proposals were rejected by the residents the NRA had raised the shingle bank slightly and built a small wall next to one of the cottages as a compromise. This wall was held by some interviewees to be a contributory factor in the flooding. Another interviewee reported that the shingle bank was breached during the flood and floodwaters washed down the Watch House Cafe on the beach.

Insurance factors were some influence on attitude to the flood risk. One informant reported having insurance that covered all risks. This flood caused approximately £10,000-£20,000 damage and the informant was concerned about the response of the insurance company, i.e. that they would raise the premium considerably or even refuse to insure. Another informant had to pay the first £500 building excess and the first £500 contents excess. Asked if they could put a ceiling on the cost of premium which would force them to leave, they said it was impossible.

One of the non-resident owners, not in residence at the time of the flood, had offered alternative accommodation to those who were but they had refused; preferring to stay despite the disruption of the flooding[43].

Some interviewees mentioned the fact that the cottages had withstood the elements for over a hundred years and felt secure in the belief that they would continue to do so. The cottages were felt to be structurally sound with walls two feet thick and, to a certain extent, designed to be flooded.

11.8 Attitudes to adjustment (proposed/implemented)

In the immediate aftermath of the December 1989 flooding, the NRA raised the shingle bank levels to approximately the levels first proposed. While gratitude was expressed for the help provided and the raising of the shingle bank was acknowledged as being well meant, at the time of interviewing, one at least of the interviewees was less than happy with the result and referred to it as: "a gruesome little bank...this ghastly bank".

Two interviewees did not think the original flood defence scheme would have made any

[43] These temporary tenants could not be contacted for interview.

difference in the December 1989 flood event if it had been constructed.

Since the flooding of December 1989 the owners suggested a modified proposal for a new wall between the properties and the shingle bank. This, it was felt, would deflect most of the seawater and break the force of the waves. The height of the proposed wall had not been decided but it was felt that it must retain the view, fit in with the surroundings and not rob people (visitors) of access to, and the recreational value of, the beach. If it were unsightly then one interviewee at least would prefer nothing. An NRA engineer who was asked about this proposal expressed some reluctance to address the issue with any speed.

One interviewee felt that steel shutters on the windows would have prevented much of the damage caused by the gravel which was washed into the basements with such force as to break not only the window glass but the frames also. However, because these are listed buildings, the owners are not allowed to erect such shutters.

Three of the four interviewees were asked to respond to the following attitude statements from the other surveys in the research project: "I would rather have any scheme than be flooded" and "Anything designed to reduce flooding is desirable". They were asked to rate their response in the same way as those who had been interviewed with a structured questionnaire, on a scale of 1, strongly agree to 5, strongly disagree. Two of the three strongly disagreed with both statements, giving them both a rating of 5. Both these interviewees chose the location specifically for the environmental benefits it had to offer and were not prepared to tolerate **any** scheme, if it represented a significant detriment to the environment. They acknowledged a difference in perception between the engineers and non-engineers:

> "You must be careful about engineers, they don't care about the look of the thing."

The third interviewee was given just one statement, "anything designed to reduce flooding is desirable" and responded positively:

> "would settle for anything. Would have to...at the moment there are no defences at all; you're just open to the sea."

This interviewee, however, was the elderly tenant with limited abilities to cope with a flood and who did not specifically choose the location for its environmental benefits.

11.9 Consultation and participation

11.9.1 Residents' attitudes

A lack of consultation was mentioned by two interviewees as a matter of some annoyance. It was said that they first became aware of the flood defence proposals when work began on the beach and that no prior contact had been made: "the whole place was up in arms".

A further cause of annoyance was that they were not offered any alternatives to "a twelve foot high" shingle bank. Thus, there were no possible areas for discussion or bargaining and the residents had to 'take it or leave it'. They chose to leave it.

One informant believed that individual engineers with whom they had had dealings were "very good" and:

> "...possibly took [our] opinions seriously...didn't think [we] were lunatics... but maybe they just sent down the charmers to keep [us] quiet."

However, this contact had come too late for the residents to affect the design of the proposed flood defence.

11.10 The risk-environment trade-off

Three of the interviewees were asked the standard question from other surveys in the research project on preparedness to live with varying levels of risk (see Question 18, Thames Perception and Attitude Survey Questionnaire {Appendix B-1} and other case studies). Two interviewees were prepared to live with up to a 1 in 25 risk but not a 1 in 10 or more frequent risk. Their reasons for tolerating the risk lay in the uniqueness of the situation - the last cottages on Chesil Beach - and the nearness of the sea. One of these interviewees thought this attraction to the sea was "a primeval thing": that they "couldn't see a threat to life and limb at the moment" and that they "enjoy a gale - exciting experience".

Another felt that living there was their choice and that they must put up with flooding to some extent:

> "if you choose to live near water you have to put up with something...you cannot damage the environment just for the sake of property...'seriousness' means deaths, not amount of damage."

The third interviewee was prepared to live with a 1 in 100 risk but not a 1 in 50. This elderly (over 80 years old) interviewee was very ill, and subsequently hospitalised just as the flooding occurred. Unlike the others, this interviewee was a tenant, not an owner, and had not specifically chosen the location.

Table 11.1 gives a simplified breakdown of whether or not the 1989 flood was experienced by the interviewee, their present attitude to the flood defence scheme, and whether or not the location was chosen specifically for its environmental benefits. From this table it can be seen that the only interviewee to accept the need for a flood defence scheme as proposed by the NRA, did not choose the location for its environmental benefits (this does not, of course, preclude the importance of other factors in arriving at this decision).

Those that chose the location for its environmental value, in particular its proximity to the sea, were prepared to make a trade-off (up to a 1 in 25 year risk) between the risk of flooding and the maintenance of the existing environmental quality. This was so, despite recent and serious flood experience.

One informant expressed the belief that one must expect danger from the elements, although the wind was perceived to be more dangerous than the sea. And that "it comes back to the sea. You cannot damage the natural environment just for the sake of property". Those residents who wanted the shingle bank just so they could have their carpets saved were dismissed in a partly scornful, partly despairing tone.

These expressions of the hypothesized risk-environment trade-off were the strongest that have been found. They were made in the immediate aftermath of serious flooding and were strong, personal expressions of the context in which preparedness to live with flood risks occurred for them. They suggest that environmental assets are of greater value to them than property assets. The first example above, which speaks of the primeval attraction of the sea, also hints at a much deeper relationship between people and nature that has yet to be explored sufficiently.

11.11 Summary and conclusions

Individual reasons for locating in the area seemed of more importance in this study than flood experience in partly explaining attitudes to the flood defence scheme proposals.

Those that chose the location for its environmental value, particularly its proximity to the sea,

Table 11.1: Personal flood experience, attitude to the flood defence scheme, and whether or not the location was chosen specifically for its environmental benefits (West Bay)

	Flood experience (1989)	Accept proposed flood scheme?	Chose location for environment?
1 non-resident owner	NO*	NO	YES
1 occasionally resident owner	YES	NO	YES
1 permanently resident owner	YES	NO	YES
1 permanently resident non-owner	YES	YES	NO

* This interviewee, though not personally present during the 1989 flood, sufferred a financial penalty and a degree of disruption.

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were prepared to make a trade-off between the risk (1 in 200 to 1 in 25) of flooding and the maintenance of the existing environmental quality. That was so despite recent and serious flood experience.

The owners (but not the resident non-owner) of this group of cottages were prepared to tolerate a degree of flood risk in order to maintain their view of the sea. The problem for the NRA lies in its perceived obligation to protect other residents who may be at risk of flooding and who may not be prepared to tolerate similar or greater levels of risk. This may be because these residents do not enjoy similar environmental benefits which they perceive would be damaged by the proposed protection.

The interviews suggested that greater consultation in the earlier stages and with a range of options rather than one preferred scheme might have resulted in an acceptable compromise.

Although this final case study dealt with coastal rather than riverine flooding, many of the same issues were apparent. This was surprising in view of the greater danger inherent in close proximity to the sea compared to rivers. However, the interviews with engineers (see Chapter 13) also identified risk-environment trade-offs in relation to coastal flooding; this would appear to be a fruitful area for further study.

12. CASE STUDY CONCLUSIONS

Early hazards research had not found socio-economic status to be associated with flood hazard perception but these findings were contradicted subsequently (James, 1974; Burton et al 1978:95). James (1974) concluded that "people of certain characteristics are more likely to move onto the flood plain than are people of other characteristics, and those who live on flood plains have their perceptions and attitudes changed by flood experience" (1974:72). His research showed that "flood plains are disproportionately settled by people who overlook flood problems as not relating to any residential choice considerations that they deem important" (1974:73).

Although James acknowledges the considerable variation between locations in the perceptions and attitudes of residents to flood problems and notes that the optimum solution for one location may be inadequate for another (and thus "project-specific" information is required), nevertheless his discussion assumes a degree of social homogeneity in floodplain residents that is not supported by the Thames Valley and southern England case studies, although there is evidence that many of those that live on or overlooking the river are a self-selected group displaying a greater level of environmental concern than do those living further away.

The most important locational choice factors found by James were "convenience" factors (size and floor plan of home, well-kept yard, good sewerage and drainage facilities), followed by seclusion and attractiveness: least important was the "price and access" factor (low price, proximity to school, work and shopping). His interpretation of this finding was that price and access were viewed as a constraint in choice **between** areas in which to look for a home and that the higher rated factors were more important for selecting a home **within** a certain area (1974:70). The case studies suggest some support for this interpretation although the attractiveness of the area, in particular the river location, proved to be a more important choice factor for the Thames Valley and southern England case studies discussed above.

The quantitative analysis of the DWSC/89 data set showed social characteristics (as defined by the model) to be related to perception of flood hazard but in a complex manner; many characteristics are interrelated. Increasing age and decreasing levels of income and education were related to a degree of acquiescence with statements and low flood hazard perception (as measured by the statements). Those living closest to the river frequently exhibited a different response pattern to those living further away and tended to have a lower perception of flood hazard, as measured by the statements, despite having greater flood experience.

The qualitative research aided interpretation of sometimes conflicting findings. For example, two of the qualitative interviews showed age to be related to a reduced preparedness to live with the flood risk and a more positive attitude to scheme proposals, primarily because of feelings of inability to cope with the event. However, this relationship was not found with other older informants nor with cases of tolerance of flooding by some older residents that were reported by engineers. Thus, age cannot be regarded, on its own, as a reliable indicator of flood hazard perception **as presently defined**. The definitions of flood hazard are largely based on catastrophic events whereas most flood experience, following a decay function away from the source, falls short of this degree of severity (see Chapter 3) and thus the criteria for definition of the hazard and its perception are inadequate.

Analysis of the distance from the river variable warrants further, more detailed, research (see also Montz, 1982 for a discussion of this variable). It was found, of course, to be closely linked to flood experience (including recency, frequency and seriousness of event) and while the data broadly support previous research which related recent, frequent and serious flooding with higher levels of flood hazard perception, the qualitative research illustrated the complexity behind the responses. It suggested that the threshold of perception of flooding **as a hazard requiring action** (adjustment) is raised by environmental factors, particularly where the informant/respondent overlooks the river. The perception of hazard is strongly interconnected with the nature of available or proposed adjustments and the two cannot be adequately examined or understood separately.

In view of the specific role of flood experience in this model it would be preferable to separate this from other social characteristics. Secondary flood experience was not found to be a useful factor in the quantitative studies although the Lower Stour interviews suggested that contact with friends and neighbours with flood experience (in the same area) had had a marginal effect in raising the perceived seriousness of flooding but did not seem to be sufficient to shift attitudes to proposed or existing schemes from negative to positive.

None of the case studies addressed socio-economic status and political leanings in any detail: this was partly because of the difficulty in gaining valid measurements without using a large number of questions and partly because the main research sponsor (the NRA Thames Region) believed asking 'political' questions of NRA 'customers' to be too sensitive. The subsequent analysis of the data sets suggested that the measures used in the quantitative surveys, although strongly suggestive of an explanatory role (particularly the environmental values and optimistic utilitarianism scales), were not sufficiently wide-ranging or sensitive to cover the factors which appeared to be important (i.e. those outlined in the dominant social paradigm

and) and that a more detailed examination of underlying value systems is justified.

All the case studies (and the engineers' interviews) lent support to the view that attitudes to local environmental factors were an important influence (though not necessarily or always an overriding one) on attitudes to flooding and flood defence schemes. As might be expected, attitudes to the local environment were related to more fundamental environmental values but, as stated above, the measures for underlying values lack sufficient sensitivity as yet. The Maidenhead data illustrated this problem: they (in addition to background information on the area and its residents collected during an observer role) suggested that concern for the local environment leaned more towards property values (associated with the dominant social paradigm) rather than what might be termed 'bioethics' (associated with the alternative social paradigm): more sensitive measures of underlying values should facilitate further understanding of these relationships.

Those living nearest to the river tended generally to show less support for flood relief schemes and those furthest from the river to show most support. The distance from the river at which an individual lives is, of course, related to a range of other factors, including inter alia the specific local characteristics which might or might not add a premium to riverside property value, income level, preferences in leisure pursuits (e.g. angling, boating, etc.), and personal environmental values. Thus, caution should be exercised in generalising from these studies to elsewhere in England and Wales.

However, this research suggests that many riverside dwellers are likely to comprise a distinct sub-group with greater river experience (of both floods and river management options), and with more both to win and lose in any flood defence debate. In choosing (for those who have chosen) to live by the river this group may have paid a premium on their property value, a premium on their insurance rates and a premium on their exposure to risk. These factors - depending on other socio-economic variables - could make them either vociferous opponents or supporters of any flood defence proposal. However, riverside dwellers - as with floodplain residents generally - are not a homogeneous social group and thus it is inappropriate to expect a unified response.

For many floodplain residents (and other members of the community) the NRA remains a shadowy organization which has yet to project an image. Very large numbers of respondents gave 'don't know' or 'neither agree nor disagree' responses in the quantitative surveys, and the qualitative interviews suggested that those residents who had had contact with the NRA's predecessor organization were expecting the NRA to develop similarly - poorly or adequately

as past experience dictated. Overall, attitudes varied between positive and negative and no very clear picture emerged from the social data to suggest that particular groups had either a positive or a negative attitude to the NRA.

It was hypothesized that attitudes to the NRA would influence attitudes to schemes but when respondents have little experience of the NRA it is possible that the relationship can be reversed, as appeared to be the case in some of the Lower Stour interviews. It seems likely that the two variables are closely interlinked and subject to continual revision following the accumulation of further experience or information.

The model of flood hazard perception and adjustment suggests that the public actively search for, and freely choose between, an unspecified range of adjustments. This represents, however, a static model which does not take account of the dynamic nature of flood hazard adjustment. It is only realistic at a specific point on the scheme development continuum; that is, at the post-flood (and, often, pre-adjustment) stage. This stage is not always present. It is more often the case that possible adjustments are **presented to** the floodplain resident by a flood defence agency (most usually the NRA) with specialist foreknowledge of flood risk, and not, as the model suggests, actively searched for by the resident.

In the DWSC/89 survey only 15 percent of respondents had "taken any precautions against flooding". Of this 15 percent of properties, the most common precautionary measure was for the house to be built above the 1947 flood level (a common recommendation from the NRA in response to planning proposal referrals from local authorities). Other precautions actively taken ranged from raising the floor level of the house by raising the structure on piles or putting in another, concrete, floor; placing electrical wiring above flood levels; carrying out minor management works to the river and its banks; buying sandbags; and taking out insurance. Many householders had inherited these adjustments when they bought their property and had not personally carried out such an adjustment. Thus despite a large majority of respondents in the case studies discussed being aware of a flood risk, only a minority had made a form of individual adjustment search and carried out an adjustment.

Generally, in the face of difficult decisions and with no strong personal interest or apparent cost to bear[44], there is an underlying tendency to accept the experts' views and proposals. For any decision, however, there is invariably a minority that perceives it will have to bear a cost and its attitudes are influenced accordingly. The perceived costs are a measurement of

[44] Cost, as it is used here, does not necessarily imply a financial cost. It is an aggregate of all the disbenefits perceived to accrue from either a flood or a flood defence scheme.

the perceived impact of a decision on the perceived existing benefits.

In the absence of any detailed proposals for the design or route of a flood defence scheme, the general attitude is likely to be acquiescence. Arguably, this is because the respondents have no 'image of damage' (Mileti, 1980; Hutton and Mileti, 1979; Marks, 1990) - either of flooding or of a flood defence scheme - upon which to base their attitude response. This was perhaps the case in the DWSC/89 Case Study where the prevailing attitude was one of general acceptance (although not entirely uncritical) of the professional estimation of the flood risk and a relatively neutral position regarding any hypothetical scheme. This did not preclude a negative disposition to flood defence proposals by a minority.

When the proposals are more detailed, the image of damage becomes more focused. At this stage opposition to scheme development can be more pronounced. The relative costs and benefits of any proposed scheme are then likely to be influenced also by personal perception of the flood risk. In the absence of recent flooding, perception of flood risk is likely to be limited and the present costs of the scheme proposal can be seen as greater than the future benefits. In this situation the risk-environment trade-off will be more strongly weighted against the proposal (and for the environment). To balance this, however, there remains an underlying attitude amongst the majority of the public of acceptance of, and acquiescence to, the expert/public body promoting the scheme.

This was the situation reflected in Eton Wick (Tunstall et al, 1989). In Eton Wick, the flood risk was seen to be relatively remote and the perceived impact of the proposed scheme was more immediate. In addition, there was a conviction in the community that while the major costs of the proposed scheme would fall on Eton Wick, the benefits would accrue to Maidenhead - the area likely to bear the major costs of flooding but, for the majority, a lesser impact from the scheme.

Equity and distributional issues such as these are typical of flood defence decision-making and resource management generally. Such issues must be borne in mind when evaluating choices in hazard mitigating adjustment. For example, while many of those in Maidenhead who experienced flooding made what would seem to be an appropriate choice in accepting (or perhaps just not opposing) the proposed scheme, the majority of them do not have to bear the scheme costs; these must be born by others in closer proximity to the scheme who may or may not have experienced, or be at risk from, flooding. This study also underlined that it is important for decision makers not to be complacent about getting a positive response to scheme proposals in the event of a flood. Even when, as in Maidenhead, recent flooding has

occurred, this does not provide automatic support for flood defence proposals.

In the Lower Stour and West Bay Case Studies flood impact and scheme impact were not so widely separated. In these two studies it could be said that the true cost of a scheme would have been borne by those who also bore the major cost of flooding. Both case studies showed that the experience (and thus bearing the cost) of flooding is not always sufficient to outweigh the perceived costs of a scheme.

The comment from the West Bay study that "...you cannot damage the environment just for the sake of property...'seriousness' means deaths, not amount of damage" reflects an extreme of environmental concern and is thus a minority view. It is possible, however, that over time it may come to reflect the views of a greater number and is at present in the vanguard of environmental attitude change. The precedent for this interpretation is the increase that has occurred in the level of environmental concern of the general public: a level of concern that was, until comparatively recently, representative of only a minority.

This would appear to be a different sort of risk-environment trade-off to that made by some of the Maidenhead respondents for whom the protection of their (valuable) property was possibly a more significant element in their scheme attitude than a generalised concern to avoid detrimental environmental impact. The environmental sensitivity of the Maidenhead, Windsor and Eton scheme was also promoted vigorously whereas this part of the Bridport scheme was not, which made it easier to support a scheme in Maidenhead and easier to reject one in West Bay (on environmental grounds).

The case studies, focusing at the individual level, have suggested that the initial model of flood hazard perception and mitigation is too simplistic although support was found for the importance of environmental factors and the existence of a risk-environment trade-off. All the case studies have shown, to some degree, a mismatch between the perceptions of the floodplain residents and those of the NRA engineers whose role it is to provide flood defence. The following section examines the input from the institutional level through a series of interviews with NRA engineers.

13. INTERVIEWS WITH (NRA) ENGINEERS

This chapter discusses the findings of a separate research module designed to examine the role of institutional-level influences on the decision environment of the individual floodplain resident. Although aimed at the institutional/organizational level, the research was conducted through a study of the attitudes of individual engineers whose views, it is suggested, are broadly typical of the (river) engineering culture (evidence for this assumption comes from interaction with the engineering culture over the three year study period).

13.1 Data collection techniques: engineers

13.1.1 Introduction

Observation of NRA engineers has been on-going since the inception of the research project, albeit mostly on an informal and unstructured basis. Attendance at internal and external NRA meetings and at conferences and seminars has presented numerous opportunities to observe engineers in both their professional and private capacities. Notes were taken after some of these meetings and some lengthy telephone conversations. From these opportunities, it became clear that there existed, in the culture of the engineer, a fruitful area for more in-depth study[45].

An acknowledged problem in qualitative research is gaining entry to the field of study (Hammersley and Atkinson, 1989; Bryman, 1989); past work undertaken by FHRC (much of it for the NRA and its precursor organizations) is known to many engineers in river management and its reputation provided ease of entry into the engineering culture. Cooperation was generally forthcoming from the participants, largely because sponsorship for the study came from their own organization and was thus legitimated from within.

13.1.2 Pilot quantitative survey

As part of the examination of engineering culture and attitudes, a structured pilot questionnaire was given to 17 engineers and 11 research and administration staff in February 1990 to examine the hypothesis that the two groups would have different attitudes towards a range of environmental and public participation issues with the

[45] This was pursued only in so far as the engineers' attitudes and actions intervened in the initial model of flood hazard perception and mitigating adjustment.

engineers placing less value on the importance of environmental and public participation issues and more value on technical expertise and the role of science.

The research and administration staff were hypothesized to be more representative of the general public. The majority of the questionnaire was designed to test the usefulness of a number of attitude statements, many of which had been used successfully before. Although the sample was too small for any reliable statistical analysis and any results must therefore be treated with caution, it was found that a number of statements discriminated between the two groups and generally supported the initial hypotheses. However, this form of structured questionnaire was deemed to be of limited value because of the number of uncommitted responses it elicited from the engineers in particular. Generally they appeared unwilling to accept the breadth of the concepts covered by the statements and frequently rated their responses at the midpoint of the available range: neither agreeing nor disagreeing.

The engineers who took part in the pilot questionnaire survey resisted the 'straightjacket' of the categories and appeared unwilling to submit what was perceived to be an inexact response. As a result, it was decided to adopt a qualitative approach which would allow the engineers themselves more control over issue selection, terminology and expression.

13.1.3 Pilot qualitative interview (a 'brief ethnography')

A pilot qualitative interview was undertaken based on Spradley's 'brief ethnography' approach (Spradley, 1979). This was deemed to be the appropriate method with which to make an exploratory examination of engineering culture as a background to the more specific areas of inquiry which had been somewhat unsuccessfully examined using the more highly structured questionnaire.

In terms of achieving the original aim of the ethnography - to make an initial exploration of the culture of the (NRA) engineer - the pilot interview was largely successful. It showed that there are sub-cultures in engineering and brought out a useful distinction between site-based, 'Resident Engineers' and office-based, 'Project Design Engineers'. It suggested that site experience (over and above the minimum required for professional qualification) might alter an engineer's attitudes and approach so as to make the "human factors" (as the engineering informant termed them) of scheme development (that is, landscape impact, loss of view, loss of privacy, effect on house values, general concern about impacts on, and disturbance of, local environments etc.) a more major factor in

scheme design. In the informant's own words these "human factors" were described as "peripheral" and "subsidiary" to the engineering function. The distinction between the two types of engineer was a new dimension and had not been expected.

An important finding for the research project that arose from the interview, was the parallel identified by the informant when he compared and contrasted the conflict that arises between flood defence and 'human factors', with the earlier conflict that had arisen between land drainage and conservation. Nature conservation and ecology were once seen to be peripheral to land drainage schemes. Arguably, they represented a threat to the expert status of the engineer by compromising the primacy of the engineering design.

Although the conflicting value systems of the engineer and the nature conservationist still cause some conflict, the engineering culture has adapted to some extent. By organising into groups, conservation and ecology gained a more powerful voice with which to bargain. This, allied with a general change in public attitudes to the environment, led to environmental protection legislation, and such issues are now treated with a degree of respect - although still regarded as subsidiary to the main problem focus. Formal mechanisms and institutional structures have been developed to deal (to some extent) with this conflict.

It may be that the less easily categorisable and measurable 'human factors' - which are now still regarded as peripheral - may soon pass through a process of maturation and emerge as significant factors to be accounted for in scheme design. The recognition of this similarity provided a valuable insight into the research problem and a useful frame of reference in which to examine further this highly subjective focus of public opposition to flood defence schemes.

It is problematic in a single interview to explore meanings in any depth, nevertheless, a substantial body of information was collected in the pilot interview. However, it was decided that the classic ethnographic approach and Spradley's highly structured question technique (Spradley, 1979) were potential barriers to the progression of the research which did have specific questions to answer in a limited time and across a large geographical range (see below). Thus, a looser style of interview was chosen for the remainder of the research into engineers' attitudes.

13.1.4 Qualitative interviews with engineers

Sampling design

It was decided to interview a minimum of ten engineers from across the NRA regions. This was felt to be an adequate number to ascertain the validity and reliability of the interviews and to achieve a national coverage. There was a concern to establish a degree of 'generalisability' of the findings of the quantitative surveys which, because they had been concentrated within the Thames area, might be held to be a regional artifice and solely a reflection of the affluent south east. This created an opportunity to expand (and possibly make more acceptable) the original aim of a qualitative survey of engineers, which was to examine, in a broadly philosophical and discursive mode, attitudes to a range of environmental and decision-making issues. The administration of the pilot questionnaire and subsequent discussions with engineers suggested that many NRA engineers were likely to be too busy to agree to such a proposal but would agree to something more concrete and more obviously connected with their work and the NRA organization.

A revised plan was formulated to discuss specific schemes where there had been significant opposition on environmental impact grounds (this was a part of the proposed research plan for the Public Perception of Rivers and Flood Defence Research Project for the following year). It was hoped that, while speaking of the details of individual schemes, attitudes would be revealed towards the issues of research interest and that a more discursive mode would be adopted when a degree of rapport had been established between interviewer and interviewee.

An initial list of contacts for nine NRA Regions was obtained from an officer of Thames Region. A letter was sent requesting information and creating an opportunity for further follow-up. It was acknowledged in the letter that the addressee might not be the person most suitable to respond and asking that the letter should then be forwarded. There then followed some delay while some regions replied, others passed the letter on and others failed to respond. Telephone follow-ups were made and after some months appointments were made within eight NRA Regions. No interviews were arranged in the Thames Region, where continuing contact was established and thus the circular letter was inappropriate, or Wessex Region, where the original pilot interview had been undertaken. Both of these regions are in the south/southeast of England where several research projects had already been carried out, thus the need to pursue the question of

generalisability here did not apply.

A total of eleven interviews was carried out with engineers at a senior level (see Table 13.1). This level was chosen to give a range of experience, including project design, public consultation and substantive decision-making. One of those interviewed (Interview 10) was an engineer in a new NRA post that was significantly different to that of the other ten interviewees. This interview produced mostly factual rather than attitudinal responses and so is of less value than the other ten.

The interviews

It is preferable, in qualitative research, for a series of interviews to be undertaken in order that rapport can be built up over a period of time. In this way more complex or personal questions can be asked and an opportunity is given for the interviewer to return to query and clarify earlier responses. In this series of interviews each engineer was seen once only, which meant that rapport had to be developed very quickly and remained fragile.

An outline list of questions (see Appendix G-13.1) was prepared but this was substantially modified during the progress of the interviews. It was found that rapport could easily be broken by introducing a question from a question sheet in what otherwise tended towards an informal discussion. (This was found also during interviews with floodplain residents in the Lower Stour Case Study). The outline interview structure was used flexibly and the interviewee given a large measure of control over the choice and depth of topics covered. This resulted in a smaller number of questions being covered in some detail while others were not asked at all[46] (Cornwell, 1986). Many question topics were covered by the interviewee spontaneously without the question being asked. Other questions were found to be inappropriate in their formulation or content and were either reformulated or dropped entirely. Others were of a largely factual nature which only needed to be raised in one interview.

It was clear, in some interviews, that engineers were responding as they felt the NRA would wish them to respond: that is, they were giving an institutional, rather than a personal, response. This was particularly the case for Interview 2. Some engineers were initially quite suspicious of the motives for the interviews, suspecting that they were

[46] This approach is similar to that used by Cornwell (1986) in her 'non-sanitised' account of a research project.

Table 13.1: Status of engineering interviewees and details of interviews

INTERVIEW PERIOD:

Pilot interview:	25th June 1990
First interview:	28th November 1990
Last interview:	7th February 1991

INTERVIEW NUMBER	JOB TITLES OF ENGINEERS INTERVIEWED	YEARS IN PROFESSION
1	Principal Engineer	30+
2	Chief Engineer (above Principal)	30+
3	Principal	23
4	Area Flood Defence Manager	15+
5	Regional Planning Engineer	17
6	Area Manager	19
7	Engineering Manager (above Principal)	37
8	Principal Engineer	23
9	Area Manager	30
10	Senior Engineer	11
11	Principal Engineer	27

Mean number of years in profession = 24

LENGTH OF INTERVIEW

INTERVIEW NUMBER	PAGES OF TRANSCRIPT	HOURS/MINS.
1	24	3 hours
2	14	1 hour
3	13	1 hour
4	19	1 hour 30 mins
5	30	2 hours 50 mins
6	16	1 hour 50 mins
7	22	1 hour 45 mins
8	18	1 hour 15 mins
9	16	1 hour 15 mins
10	10	1 hour
11	19	1 hour 45 mins
	201 pages	18 hours 10 mins

Average length of interview = just over 1 hour 30 mins.

perhaps a method of professional evaluation.

A minority of those interviewed expressed concern initially over confidentiality and what was to happen to the transcripts. They were given assurances that no comments would be attributable to individuals and that after making an initial complete transcript for the interviewer's eyes only, a second transcript would be produced with the informants' names and, where necessary, place and region names, changed to initials or symbols. They were told that non-sensitive details of schemes were to be forwarded to NRA Thames Region as part of the research project requirements.

All interviews were tape recorded and transcripts were made by the interviewer (as recommended by Whyte, 1977). Most engineers accepted the need for the tape recorder and for the majority of the interview period it did not **appear** to be unnecessarily intrusive. However, some interviewees were considerably more free in their comments once the interview was completed and the tape recorder was switched off. Others punctuated the interview with expressions such as "perhaps you'd better not quote this" or "perhaps I shouldn't be saying this but...".

Some of the longer interviews included a break for lunch during which time the engineers were again more free with their responses. This was particularly the case where another engineer was present when they would talk to each other as if an outsider were not present. On one such occasion the tape recorder was switched on again briefly but had a strongly inhibiting effect.

The untaped responses did not reveal any themes or topics which were not recorded elsewhere on tape, however, they were expressed much more bluntly. These points were noted subsequent to the interviews and served to reinforce the later interpretation of the transcripts but no verbatim comments are available.

The interviews took place in regional NRA offices, many of which had only been occupied since the formation of the NRA in 1989 (or just prior, when formation was more or less certain). Thus NRA engineers (amongst other staff) had had to undergo considerable physical disruption as well as disruption to their working practices, since the decision to split from the water and sewerage supply functions and these factors contributed to the feelings of some that they were under pressure.

Nine of the eleven engineers interviewed made references to how busy they were. Most

made explicit reference by saying they were very busy and would spare a stated amount of time for the interview, others made more covert references by taking occasional glances at their watch or getting physically restless after fifty or sixty minutes and fidgeting in their seats or showing slight signs of relief when it was indicated that the interview was coming to an end. Two of the eleven interviewees however, made no overt reference to being busy or to time but were anxious that the long journey undertaken should not be wasted and therefore gave freely of their time.

Two of the interviews were with two engineers simultaneously for part of the time. In the first of these the second informant is identified in the transcripts by a lower case letter as well as the interview number (1b). In the second joint interview, the contributions divided fairly evenly between the two, with one engineer speaking for the majority of the first half and the other for the majority of the second half. This was transcribed as two separate interviews[47].

13.2 What was expected prior to the interviews

As a result of the above-mentioned long-term interaction with engineers and the surveys of, and interviews with, floodplain residents, it was expected that the interviews would reveal a range of attitudes, relating to environmental and public participation issues, to indicate where NRA engineers influenced, constrained or controlled the choices of floodplain residents. Further, that engineers, in their role as experts, would show some degree of ambivalence to the need or preference of the public for an input from them to floodplain decision-making.

It was expected also that there would be some sensitivity about the role of engineers in the guardianship of the water environment[48]. When a former water authority landscape architect made a very public denunciation, on television and in print, of the destruction of watercourses by engineers (Purseglove, 1988) he was criticised by many engineers as having 'bitten the hand that fed him' (personal observation at a FHRC Seminar on Environmental Assessment, 1988). The destruction of wetlands by engineering projects has received a considerable degree of attention in recent years and continued contact with engineers has revealed that they are not immune to this criticism. It was expected

[47] Brief details of the interviewees and the interview lengths are outlined in Table 13.

[48] Soon after the NRA was formed its publicity material began to describe it as the 'guardian of the water environment'.

therefore that the interviewees might adopt a defensive position to protect both their profession and their organization.

It was also expected, after many informal discussions with engineers, that they would express the belief that opposition to flood defence schemes that was based primarily on environmental factors, came from people with no flood experience and would disappear in the wake of a flood.

13.2.1 Hypotheses

Following from the above discussion and based on readings of the literature (White, 1966a, 1966b; Craik, 1970; Sewell, 1971; Sewell and Little, 1973; Cotgrove, 1982; Penning-Rowsell et al, 1986; Wengert, 1971; Otway and Wynne, 1989; Simmie, 1974) several hypotheses were developed that underpinned the interviews. These were as follows:

Engineers would be likely to:

(i) prioritize technical above environmental factors in scheme design and implementation;

(ii) place greater emphasis on nature conservation impacts rather than aesthetics in scheme design;

(iii) believe that public consultation is something of an obstruction to the smooth implementation of a scheme;

(iv) prefer to control the dissemination of information to the public;

(v) have a simplified conceptual model of the floodplain resident's decision-making process.

These hypotheses provided the base for the 'Outline Interview Structure' (see Appendix G-13.1) but were not adhered to rigidly during the interview process.

13.3 Discussion of interview findings

The interviews broadly confirmed the above hypotheses but also served to illustrate the complexity of these issues. It soon became apparent that the 'Outline Interview Structure' had been formulated with a simplified conceptual model of the engineer's decision-making process. It was found that engineers, like environmentalists and floodplain residents, were

not a homogeneous group although most did share a common core of values related to the role of the expert and the importance of objectivity rather than subjectivity.

A range of themes was identified from the interview transcripts. Some of these themes were articulated spontaneously by one or more interviewees; others arose from the questions and topics in the 'Outline Interview Structure' (a list and examples of themes that were examined in the analysis can be found in Appendix G-13.2 and G-13.3). It is proposed to use the above hypotheses as headings under which the interview findings will be discussed. These will be preceded by a discussion of the environmental attitudes of NRA engineers and will conclude with a discussion of the risk-environment trade-off from the perspective of the NRA engineer, standards of flood protection, and flood causation. Verbatim quotes are identified by the number of the interview in square brackets.

13.3.1 Environmental attitudes of NRA engineers

It was stated above that the term 'environment' encompassed a number of dimensions and this was apparent in the interviews. The simplest division comes between nature conservation and aesthetic considerations. Most engineers tended to focus initially on the former dimension although on occasion they merged the two, while the comments of the floodplain residents most frequently related to the latter. Nature conservation has a scientific, and therefore objective, base that engineers could respect while visual aspects were seen to be purely subjective and less easily legitimated.

Certain areas of land or communities are deemed by engineers to be 'sensitive' because they are particularly valued environments and this determines both the initial and the subsequent treatment they receive in the design and promotion of flood defence schemes:

> [6] "In a place like the centre of 'X', which is a nationally renowned sort of tourist area, the thought of us building walls and floodbanks and the like would have just been out of the question."
>
> [8] "...a very...extremely environmentally sensitive area and we recognised this right at the beginning of the design stage and we embarked upon trying to design engineering works with environmental sensitivity."
>
> [6] "There are sites that we identify fairly quickly...a scheme near 'X' Abbey and right from stage one we're saying we've got to be very careful here in the way we approach this scheme, its a tourist area, its high quality fishing in the river, all these things are picked out in stage one."

The need to avoid damage to such 'objectively' assessed sites of ecological, landscape or cultural value is now accepted. This does have, however, a knock-on effect in that any areas not so designated are inevitably regarded as of lesser value and perhaps deserving less concern. Thus, the purely local (subjective) value conferred on an area by those who live there may not be deemed sufficient to justify costly damage-avoidance works. This attitude can be shared by both engineers and nature conservationists, who adopt, on technical grounds, specific criteria of value for the purposes of 'objective' site evaluation and, in the process, devalue some sites of purely local interest.

Although an area may have no **designated** ecological, historical or other value, it may nevertheless have significant value to the local inhabitants (Fordham, 1991a; Fordham et al, 1991). An assessment of environmental value in purely technical terms (by professional ecologists and conservationists) can overlook the more commonplace value of local environments to the general public.

Some engineers attempted to appropriate the term 'environment' for themselves (as, for example, commercial organizations dealing with waste management have done also); the following extract gives an indication of one way in which this was done:

> [5] "Now, environmentally, there's two ways of looking at it. Obviously...a flood relief scheme that stops or very much reduces the frequency with which people...get flooded, is in itself an enormous environmental enhancement."

Thus, because engineers work in and with 'the environment' they can claim a professional (and therefore more legitimate) understanding of both the environment itself and the term; the suggestion is almost that NRA engineers are the true environmentalists, certainly more so than the average floodplain resident. Related to this, many engineers regard themselves as longstanding environmentalists and refer to their membership of the professional organization the Institute of Water and Environmental Management (IWEM) as evidence of this. Good engineering practice, in terms of design and use of resources, was seen by one engineer to be equated with good conservation:

> [3] "My own personal view of conservation matters is that the best engineered solution will frequently be the best conservation perspective. If you look at conservation from an overall perspective."

Several engineers expressed a familiarity with nature conservation and ecological principles and stated that there was little mystique involved ([4]"there isn't that much

mystique about nature conservation. We tend to know what is wanted and what is unacceptable ourselves."). However, in the majority of cases, this familiarity is based on the use of several manuals and guidelines that have been produced in recent years (Water Space Amenity Commission, 1980, 1983; NCC and Countryside Commission, 1983; Newbold, Purseglove and Holmes, 1983; Lewis and Williams, 1984; Dearsley, 1984; Ash and Woodcock, 1988; Purseglove, 1988). The familiarity is also based on attendance at conferences and seminars, and interaction with NRA conservation staff, consultants and consultees. These instructional sources cover certain practical matters but little basic theory and can lead to misunderstanding and mistrust of conservationists' motives for their decisions.

The following extract illustrates the complexity of the environmental dimension in river works. Although the engineer claimed an awareness of the consequences to the environment of land drainage works, what preceded it showed how nature conservation and amenity or leisure values have been treated as interchangeable: the suggestion was that saltmarsh and "natural wading birds" can be replaced by the "leisure value" of "linear park works":

> [8] "The Rivers Authority at that time, had close liaison with the NCC to develop...well they couldn't avoid losing the saltmarsh but they did some linear park works and this sort of thing to try and reduce the impact on the local people to provide them with some other sort of leisure value, if you like, as a replacement for that which they'd be losing by the loss of natural wading birds etc. Yes, I think we certainly have learned to recognize the value of the environment and to perhaps be more aware of the consequences of what we're doing in land drainage..."

Nature conservation was seen here in terms of its leisure (use) value to people, rather than having its own intrinsic value and rights of protection. The breadth of the term 'environment', which encompasses a range of environmental concepts, can lead to confusion in the prioritisation of impacts and decisions. A range of, possibly competing, interest groups are likely to be involved in any environmental decision: the competing interests of nature conservation and more generalised leisure pursuits can lead to conflict when both are subsumed under the umbrella term 'environment'.

Interviewees (and other engineers met during the research period) expressed a degree of sensitivity to the idea that engineers have been forced to incorporate environmental factors in their work, and often claimed to have done so willingly. Some interviewees characterised NRA engineers as being particularly interested in the countryside and the

environment and denied that there was much conflict between themselves and conservationists:

> [4] "Most of us tend to be drawn towards countryside and nature and that sort of thing. So I don't really think there is a great conflict. Nowadays I think people tend to want conservation, things that look nice, and that is what they're given but I think that the general attitude of engineers is that that is what we should be providing anyway or certainly the general attitude of engineers within the NRA and the river type environment because this is why most of us tend to come towards this sort of job."

> [9] "Where we can do things to enhance, we do. You know, we're not forced into it, we do it quite happily."

While the importance of environmental issues has been acknowledged for some time by engineers, the interviews suggested that their acceptance of the need to change work practices has been forced to some degree by legislation and NRA mission statements. The values expressed by the engineers pointed to the placing of environmental factors behind technical and cost issues whereas, generally, the reverse is the case for floodplain residents (see above case studies).

Antipathy to 'environmentalists' or 'conservationists' and their viewpoints was implicit in parts of some interviews but could also be explicit. One engineer was prepared to put forward a personal view that reflected related values that other engineers only hinted at:

> [1b] "Well I don't know what the NRA thinks but I think people are much more important than any other species personally."

This view was noticeable in other interviews when the NRA and NCC could not achieve a satisfactory compromise on the nature or timing of works. When this situation arose the NCC was suspected of going beyond the bounds of purely scientific justification for its decision:

> [5] "It's a partly scientific argument [from NCC] but I think that politics and influence come into it as well."

While the engineers who were interviewed displayed a degree of environmental awareness and concern it was apparent that environmental factors had been imposed on traditional engineering 'custom and practice' and have yet to be fully integrated and accepted within professional thinking. It is possible, however, that the engineers' value system (which,

arguably, encompasses a utilitarian view of nature and values its control) will remain antipathetic to the values underlying a deeper sense of environmental concern.

13.3.2 Prioritization of technical above environmental factors in scheme design and implementation

The interviews supported the hypothesis that engineers prioritized technical aspects of scheme design although, it could be argued that this is as it should be because engineers are primarily technicians. However, as public servants, with an expressed commitment to 'giving the public what it wants', the consistent devaluation of (broad) environmental factors is notable. The interviews suggested that engineers still regard modifications of scheme design to take account of aesthetic (and nature conservation) factors as 'bolt-on extras' and therefore of a subsidiary nature to the primary technical function. The following two excerpts illustrate the way engineers viewed the non-technical or aesthetic aspects as compromises to technical or economic viability:

> [4] "I don't think we should compromise engineering principles for other reasons. If you're going to design something, the first element of design - it's got to work."

> [1] "We're not in the business of providing totally uneconomic schemes just because people don't like the look of it."

An interesting adjunct to this discussion is the engineers' own aesthetic sense which derives pleasure from the clean lines and simplicity of certain uncompromisingly engineered structures:

> [5] "An engineer in the past might have derived satisfaction from seeing a well designed, neatly constructed, well constructed concrete channel, doing a good flood relief job and not realize that, to the people whose gardens it backs onto, it's an eyesore."

This point was taken up by several engineers and suggested a comparison between engineers and farmers, many of whom have a similar attitude to a vast, ploughed field or field of wheat, uncluttered by hedges, trees and wild flowers ('weeds'). In this comparison a parallel relationship can be seen between farmers and conservationists and engineers and conservationists:

> [5] "I think there's been almost a parallel change of heart and mind on the part of farmers...we have a close relationship with farmers in many aspects of our land drainage responsibilities and I detect that they too are tending...I mean they're being pushed in that direction anyway. But its a combination of being pushed and becoming aware, I think, on the part of both sections of the population. Who would have thought that farmers and engineers had anything in common..."

This seems partly to acknowledge the 'push' that was necessary for the development of a degree of environmental sensitivity by these two professions which have significant effects on the environment.

13.3.3 Placing of greater emphasis on nature conservation impacts rather than aesthetics in scheme design

The technical bias discussed above extended to nature conservation issues which were generally held to have greater validity than the purely aesthetic although this was often implicit rather than explicit in the transcripts. A number of reasons could account for this. Firstly, that it is the result of the exigencies of legislation (1976 Land Drainage Act, 1981 Wildlife and Countryside Act, 1989 Water Act; EC Directive No. EEC/85/337, 1988 Statutory Instrument No. 1217) which have made the conservation of flora and fauna a statutory obligation (albeit, in the 1989 Water Act, only as far as is consistent with other NRA duties). Similar obligations apply to the conservation and enhancement of 'natural beauty' but this acknowledgement of subjective values tends to be confined to areas with obvious and widely recognized value, such as designated Areas of Outstanding Natural Beauty etc., rather than, for instance, the more parochial value of local views from houses.

Secondly, as discussed above, nature conservation has a strong technical component and thus can be seen to be open to objective evaluation. This 'fellowship of technical expertise' (Lowe, 1983) can provide a bridge between engineers and conservationists (see below (13.3.5 (iv)) for further discussion of this point).

Thirdly, nature conservationists have become organised and powerful and many of their arguments have now become widely accepted. This is not the case in many, seemingly minor, instances of conflict over aesthetics where no organized body may exist or be accepted. Local authority planning departments can, and on occasion do, perform this role although their record on aesthetic aspects of design is notoriously poor (evidence for this assertion an be found in numerous town shopping areas, for example). The single

resident or small group of residents who wish to preserve some aspect of their immediate environment, or state a preference for an alternative design feature or finish, have little or no negotiating power and are often over-ruled primarily on cost grounds. However, on large schemes with substantial budgets, it was recognized by some interviewees that it can be cost effective to agree to some of these more minor alterations in design in order to smooth the implementation of a scheme and avoid costly delays with contractors.

Several engineers expressed opposition to the idea of decorative detailing of structures if the details were not functional: function should dictate form. This was taken further by one engineer who believed it to be wasteful of natural resources and therefore ultimately damaging to the environment:

> [3] "If you have a concrete structure, why not let it be concrete? Its just...purely subjective. To go quarrying out stone...spoiling the countryside to quarrying stone to make your engineering structure apparently more conservation...more sympathetic to the conservation viewpoint. I find it utterly ludicrous really."

This provides a further example of the appropriation of the conservation ethic.

13.3.4 Belief that public consultation is something of an obstruction to the smooth implementation of a scheme

Although the engineers publicly professed a commitment to the appropriateness of consulting the public as part of scheme promotion, certain of their comments (particularly some of those expressed outside the formal, taped interview) betrayed the frustration that they felt ("...if we didn't have to consult anybody it would be much easier to...promote schemes." [2]).

The general position implicitly adopted by engineers was that they were expertly qualified to manage problems of flood defence and that early and wide inclusion of the public into the decision-making arena served only to complicate and extend the design and implementation periods of schemes.

Engineers' descriptions of consultation included the following adjectives:

> 'stormy'; 'rowdy'; 'delicate'; 'hairy'; 'tortuous'; 'hard'; 'foot-slogging'; 'extensive'.

These are indicative of the perceived difficulty of many consultation initiatives. Frequently engineers appeared to adopt, or were placed in, a combative/adversarial position in relation to the public. The nature of existing forms of public consultation tends to perpetuate this relationship by placing the engineer in the role of expert 'promoter' with a scheme to defend against an opposing group. This relationship was acknowledged by some engineers and it can be seen in the following extract how the process has become, to some degree, institutionalised:

> [7] "...project manager, he looks after it, its his own project, he's done the investigation, he's decided or recommended the preferred solution, he's got the necessary approvals, he's intent on carrying that scheme right through to completion...And its that commitment to a scheme really which enables the project manager to take on all sorts of...sort of, hairy situations and...dealing with difficult people, its something you've got to do to overcome the problems to...get the work carried out. I suppose we're salesmen...we are salesman in some ways because we've probably spent a lot of time in looking at the various alternatives but we have to persuade other people that the proposals which we have are the best ones and if you believe in what you've done, as a project manager will..."

The above shows how, in that region at least, the adversarial position had been incorporated into the design and implementation process, influencing the project staffing structure. For the project manager the scheme then becomes very much a personal enterprise and while 'difficult people' can obstruct its progress, it was acknowledged nevertheless that this was an accepted part of the process.

13.3.5 Preference for control of the dissemination of information to the public

Engineers expressed similar views concerning the need to control the nature and the release of information to the public. Information release in the promotion of a proposed scheme is controlled by the NRA with the intention of ensuring the most favourable response. The public does not have free access to available information, much of which is regarded as highly confidential. The timing of the release of information concerning proposed schemes is carefully controlled to avoid jeopardising the development with too much public opposition.

At a meeting of Taplow Parish Council, where members of the NRA Thames Region were giving a promotional talk and video screening for the Maidenhead, Windsor and Eton Flood Alleviation Scheme, a request from the audience to see the evidence on which option selection had been based (a preferred option had been selected from ten possible

options (Thames Water, 1986)) was met with some dissembling and agreement was not immediate[49]: the meeting was told that the request would have to be referred to a higher level in the NRA management hierarchy. Thus, although the NRA is a public body and its flood defence engineers believe themselves to be performing a public duty, nevertheless in scheme promotion an adversarial relationship can develop and project engineers are unwilling to divulge details of project decision-making to members of the public who may oppose them at a public inquiry.

Accepted protocol within the NRA provides the following sequence for flood defence scheme consultation: from Regional Flood Defence Committee approval to formal consultation with local authorities, then Parish Councils, local societies and finally the general public (Gardiner, 1991). There are many internal justifications for this sequence. The need to gain and maintain local authority support for a proposal necessitates the release of information to elected members, ahead of the general public, for them to acquaint themselves with the details of a proposal to 'safeguard their credibility with their constituents'; similarly with community group leaders (Gardiner, 1991).

Individual landowners who would be impacted directly by a scheme are felt likely to be the most sensitive to proposals and so project engineers prefer to contact them personally before any information is released to the wider public. As Regional Flood Defence Committee Meetings are open to the public and any matters discussed are likely to be reported in the local press, it was said to be necessary on occasion to fix the timing of the release of information to these committees to prevent directly affected landowners hearing about proposals via the impersonal medium of the press.

The NRA maps the occurrence of flooding and produces flood envelopes for floods of different magnitudes. Within any flood envelope there will be some properties that do not flood because they are on higher ground or are otherwise protected or simply because the flood envelope is inaccurate at that point. When the NRA releases flood maps as public information and publicity material it runs the risk therefore of alarming some residents unnecessarily and possibly leaving itself open to legal liability problems. Thus, there can be a hesitancy to release such maps and related information to the general public often on the grounds of their possible effect on property values. There is a concern that proposed flood defence developments should not create a form of 'planning blight'

[49] The Project Manager, who was an outside consultant, was in favour of releasing the information but an NRA officer at a higher level in the institutional hierarchy was not.

(Gardiner, 1991) and thus the timing of the release of information to the general public is seen by some as sensitive: as a result, information regarding a local flood risk may not be disseminated (engineers are unlikely to widely publicise a flood risk without simultaneously having some form of flood defence proposals to offer the public). Further discussion of the control of information will be dealt with under separate headings below.

(i) Consultation: general issues

Engineers are not trained in methods of public consultation or conflict resolution techniques and yet they now find that they spend an increasing amount of time dealing with the public under the broad heading of 'consultation'. Engineers stated that between 20 and 75 percent of their time was spent on consultation (see Table 13.2). Generally, engineers learned the techniques of public consultation through engaging in the process itself and by building on the accumulated skills of colleagues within their department. Procedures for consultation were seen by some engineers to be progressing in an evolutionary rather than a revolutionary manner; a method of progression recognized (and supported by some) in the literature (Fagence, 1977; Banovetz, 1972; O'Riordan, 1983a).

Many engineers felt that dealing with the public was integral to their work in the NRA and because of this the job attracted a certain kind of engineer:

> [4] "[Consultation]'s a fundamental part of the job...if you don't get adept at doing it you fall by the wayside. I think its something we've got to do and if you can't, particularly in this job, if you can't deal with the public then all sorts of problems arise...Were I not able to deal with the public then I wouldn't be in this job because I wouldn't really be able to do it...people that naturally take to that sort of side of things come into jobs a bit like mine. Whereas if I didn't like the public at all or wasn't able to deal with the public, I'd go to a consultants or something like that where I was dealing with the pure engineering aspect rather than some public consultation."

Engineers perceived an increasing pressure on them to consult. Changing social values now mean that people no longer accepted unquestioningly the authority of public servants. Engineers identified pressures coming particularly from the middle/professional classes who were more active and better resourced in their campaigning.

> [5] "I think the people are much more conscious nowadays of their power to get things changed than in the past...There's obviously much more awareness of the environment...and the realization that you don't have to put up with what is done in their name."

Table 13.2: Responses to the question: "how much time do you spend on public consultation?" (Engineers)

INTERVIEW NUMBER	
1	75 percent;
2	'Its the vast bulk of the time spent on the scheme. It outweighs the amount of time spent on design by a great amount. Design is a relatively insignificant part of scheme promotion nowadays'
3	'A fifth';
4	'Getting on for a half';
5	Not asked;
6	'A third';
7	Not asked;
8	Not asked;
9	Not asked;
10	Not asked;
11	'About a quarter'.

Approximate average percentage of time spent on consultation = 40%

The wider socio-political environment exerts an influence in terms of a social consensus: "what everyone wants". According to several engineers interviewed, in the 1960s "what everyone wanted" was cost-effectiveness, and the environment "had no value". Now however, the environment is "fashionable" and extensive public consultation is demanded and so engineers have adapted their designs and work practices to meet these new requirements. This suggests there has been **some** shifting in the values of the dominant social paradigm.

A factor that emerged from the interviews was that NRA engineers perceived much of their work to be 'in the public interest'. They tended not to recognize or admit that any personal/institutional need drives scheme development. Schemes were believed to be developed in a spirit of altruism based on the following scenario: because engineers do not live in floodplains, they have nothing to gain from scheme development and thus, a

flood defence scheme is purely for the benefit of floodplain residents. This partly explains why engineers can be genuinely surprised when floodplain residents oppose and refuse the schemes which have been developed "purely for their benefit". The engineers also made a distinction between the role and behaviour of NRA engineers and private consulting engineers. The latter were believed to care less about public preferences and sensibilities and to concentrate more on 'getting the job done': the former were believed to perform a public service and to be more concerned to accommodate or placate the public.

Engineers expressed a preference for retaining control of consultation processes including the methods, the timing and the choice of those to be consulted. Clearly there are organizational/operational justifications for the engineers' position but these may conflict with broader notions of the public interest. These will be discussed below.

(ii) Consultation: how?

A range of methods for consultation (see Table 13.3) are adopted by NRA engineers depending on the perceived sensitivity of the proposed scheme. A public meeting was the preferred method for consultation with the general public . This allows the NRA to set the agenda and retain a degree of control of the proceedings. Sometimes the NRA attend public meetings which are nominally called by Parish Councils. These meetings are chaired by the Parish Council and NRA officers attend as guests although they have largely initiated the meeting. The basic structure of the meetings remains the same: NRA officers outline the flood history of the area, make a presentation of the scheme proposals using slides, videos and other display materials, and answer questions from the floor. As discussed above public meetings invariably disadvantage the inarticulate and advantage organised interest groups and individuals. Thus, they are not a representative reflection of public opinion.

The interviews brought to light a secondary use of public meetings, as a means of placing the (often minority) scheme opposers in close proximity to those in favour of scheme proposals. The rationale given for this is that the former are likely to have no flood experience but are likely to be personally disadvantaged by a scheme and they will have to face, and justify their position to, flood victims who will be pressing for a solution. Because flood defence is seen to be 'in the public interest' scheme opposers are placed in the position of acting against the public interest and merely in their own self interest.

Table 13.3: A range of methods for consultation adopted by engineers

Main methods:

- public meetings
- public exhibitions (drawings, plans, photographs etc.)
  - put contact names/numbers on public displays
  - produce an artist's impression of scheme
  - slide presentation
- via Statutory Instrument 1217
  - advertise in local press (SI 1217)
- break scheme into a number of small parts and apply for planning permission for each part
- press handouts

With representatives:

- meetings with local councillors/local authority officers
- meetings with Parish Councils
- meetings with environmental and amenity groups
- meetings with prospective floodplain developers

With the general public:

- write to everyone in local community
  - giving details
  - with questionnaire
- personal letters of invitation (to public meetings) to residents
- take residents to see physical models
- personally visit individual affected landowners
- put notices up in local community
- site meetings with affected individuals
- use the National Farmers' Union to convene a meeting of local landowners
- consult with ratepayers
- put up profiles on site to indicate height of proposed defences
- set up a 'hotline' between residents and Resident Engineer

[7] "when there are problems like that I always feel that the best way of dealing with them is to meet them head on and to have a public meeting...you can't really beat a good public meeting where everyone...or as many people as possible, turn up and get their feelings about the scheme off their chest and their neighbours get a chance of hearing them and hearing the answers which we provide and often that results in some sort of agreement being reached."

[4] "...In fact this is one of the reasons we hold these public consultations, in as much as if someone doesn't want a scheme, the neighbours can discuss it and get onto them and say, you know, 'don't be so silly' and they tend to work it out amongst themselves."

The interviews in Christchurch (see Lower Stour Case Study) supported this interpretation of the secondary use of public meetings. Some interviewees who were opposed to the (at the time) proposed scheme because of the major impact they perceived it would have on their amenity and property value claimed they had been shouted down by others at meetings. Other documentation (NRA file of correspondence) related to this scheme showed that the scheme opposers were characterised by certain other local people as selfish, even though some of those in opposition had personally experienced flooding, or whose houses were at risk of flooding, and were thus putting themselves at risk from future flooding.

However, it was also pointed out in the engineers' interviews, in situations where there is considerable opposition to a scheme this secondary use of the public meeting can work against the scheme promoters because a minority voice, in support of a scheme, will also be inhibited from speaking out against the majority view.

As outlined above (see Chapter 3, section 3.2) the NRA is now obliged, when developing a flood defence scheme (or carrying out other land drainage/river works) likely to have significant effects on the environment, to carry out an Environmental Assessment (EA) or prepare a written justification for not doing so. Statutory Instrument 1217 not only acknowledges that flood defence schemes can have significant environmental effects but also that the public has a right to be consulted, and make representations, about them. The regulations came into force in July 1988 and seem not to have caused the problems that many engineers at first envisaged. Few EAs have attracted written comment from the general public but where they have they have caused considerable delay. This, it was suggested by some engineers, was particularly the case when the regulations were first introduced and MAFF was obliged to make a decision on a scheme:

> [6] "We produced an environmental statement...and we satisfied everybody apart from one person.....He wouldn't withdraw his objection...It then went through to MAFF and had to go to the Minister for a decision. And I think this really put MAFF on the spot and it took a long time for MAFF to actually bite on the bullet and come down on our side. They were very reluctant."

Individual members of the public who raised objections had been a problem for more than one region. The suggestion behind some of the comments made by the engineers was that because no insurmountable objections had been raised by conservation bodies, this pointed to there being no **legitimate** environmental objections:

> [3] "You're obliged to advertise, even when you've reached agreement with all the conservation bodies about what the scheme should be, you're then obliged to advertise the fact in two local papers and anybody can send in some spurious objection. Not based on any proper understanding of the environment, it can be a totally subjective objection. And if that is brought to the Minister's attention then there are difficulties promoting the scheme."

The problem of the single objector has led some regions to opt for the planning permission route for scheme development even though many flood defence schemes are deemed to be permitted development and do not require this permission. This route was regarded as 'more secure' because it resulted in the approval of the local planning authority for the scheme and placed the onus for dealing with objections with the local authority rather than MAFF:

> [3] "If we'd followed that route and got planning permission for it, then the gentleman [objector] concerned would have had to object to the planning authority, they would have realised from the local knowledge that his objection was not to be taken seriously and the scheme would have had planning permission and we would have been building it by now if we'd taken the planning permission route rather than the SI1217 route."

(iii) Consultation: when?

Most engineers accepted that the public had a right to know what was being done by a public authority although they adhered somewhat rigidly to the belief that there was a right time for this knowledge to be imparted.

> [2] "You obviously can't do it at a very early stage because, until you've got some clear idea of what you're going to do, there's nothing to consult on."

The engineers' position on the timing of consultation was that the public prefer the NRA

to consult when they have a reasonably clear idea of what the preferred option, and sometimes options, would be and that if engineers went to consultation before that stage, the public were likely to send them away until they had more firm proposals to present:

> [1] "If you start talking to people about 'well now, what are we going to do about the flood defences around here?'. They're quite likely to turn around and say 'well that's your business, for goodness sake, go away and get some ideas together and we'll have another chat when you know'."
>
> [4] "If we go too early we find we've got airy-fairy ideas and we can't give them anything definite. And they more or less say 'well come back when you've got something a little bit more definite'."
>
> [11] "I can imagine them coming back and saying 'well, when you've got some...better ideas, talk to us then; when you've got something we can see, talk to us then and then we'll maybe be able to make some comments to that'."

This position conflicts with the findings of the surveys of floodplain residents' attitudes discussed above which showed that only a small minority preferred to be consulted at the stage of a preferred option; most preferred to be consulted at the stage where there were several options to choose between or at an even earlier stage. However, as no cases of consultation by the NRA at a very early stage have been discovered the engineers' assertion remains untested.

The following quote is representative of how most engineers felt about the timing of public consultation and the point at which it is actually carried out:

> [6] "Stage 1 is problem identification, we sort of say 'well we've got a flooding problem here, it could cost something like two hundred thousand to solve this problem and there looks like being round about three hundred thousand pounds worth of benefits and its worth going farther with it'. Stage 2 is you actually look at the various options and try and evaluate...I suppose it isn't until we've got Stage 2 established and we've got a preferred scheme that we tend to...or going into Stage 3, the detailed design stage...Stage 2, the evaluation of alternatives, while we may talk to the environmental groups, the fisheries and the like, we don't normally talk to the public. [Q: Why is that?] I think it's more convenience more than anything else, you know, to get yourself in a position...at the end of Stage 2, then you know you've got a scheme which is acceptable from an engineering point of view, you can cost it...it'll work, it'll cost about the right amount of money, the conservation, recreation side of things is all agreeable, you can actually go and say 'well this is a scheme which we could build', rather than perhaps...offering alternatives which for other reasons we couldn't build either because they're too expensive or there're problems from the conservation point of view."

While from the engineers' perspective this seems a rational way to proceed, it does not allow for a 'no scheme option'. By this stage money has been spent, individual engineers have a strong sense of ownership of the scheme and to have the basic premise challenged by the public would entail considerable professional loss of face. It is an example of a common situation that has been identified in the literature (HMSO, 1969; Krimsky, 1984; Kasperson, 1986), that is, once decisions have been made, the decision-making body tends to exhibit considerable inertia in addressing more fundamental issues such as whether a scheme should go ahead at all.

One engineer acknowledged this dilemma but did not speculate further:

> [11] "People have said to me...that really it's too late once you've started the design, you've got to get in earlier than that. Because things have...decisions have been taken by that stage; you're already pointing in one direction and its too late..."

(iv) Consultation: who?

Statutory requirements for consultation are limited and voluntary procedures are necessary if the public is to make an input to decision-making (Penning-Rowsell et al, 1986:171). For many reasons it is more convenient for NRA engineers to deal with representatives of the public (whether local authority members and officers, officers of environmental organizations, parish council members etc.) than with the public themselves. However, the surveys discussed above found that the public preferred consultation to be with both representatives and the general public.

Nature conservation supporters have become organised into groups with a recognized authority and identifiable personnel with whom engineers can consult. Such groups represent "relatively fixed, identifiable points, with some permanence and continuity, in a shifting sea of attitudes, values and interests" (Lowe, 1983:94). Many organizations have permanent staff whom engineers are prepared to respect as fellow professionals. Nevertheless, one engineer stated (outside the formal interview situation) that their region had co-opted a representative of a conservation body onto one of their committees and thus he was seen to be, to some extent, within the NRA's control.

One aspect of the engineers' attitude to the general public and who should and should not be consulted is reflected in the following extract. It refers to officers from a borough council rather than the NRA. However, the remarks and tone of the engineer who related

the anecdote revealed his agreement with the underlying message:

> [1B] "Down in 'X' they've got all sorts of societies and the Borough Engineer's department they had a sort of list of all these and they were all capable of producing you an impressive letter on impressive headed notepaper but the Borough Engineer's Department had got notes on all of them, you know, 'big society, lots of influential people, we'll listen to them' and...'this is a load of cranks, you don't need to take any notice of them'; they'd got them all graded."

It is not surprising that engineers generally give members of the public a low priority in the sequence of consultation when their attitudes to the abilities or knowledge of the public is known. When asked how useful members of the public were as sources of information or suggestions most engineers considered them to have a very limited value:

> [4] "Well they're extremely useful on historic flood levels. What has happened, we find that they are very, very good; they will know that a flood in 1947 came up to the fourth brick below their window or something...Quite often their views on the causes of these things and the answer to how to solve these things isn't very good. Basically they haven't got the training."

Some engineers gave examples where members of the public had offered useful pieces of historic evidence of past floods but others hesitated to accept even this role for the public input of information. Information offered by the public was often seen as partial and, when compared to the level of technical information available to engineers, very imprecise.

(v) Consensus and conflict

Where, as a part of the consultation process, a scheme is presented to a relatively homogeneous community, it can result in little or no opposition; this situation tends to be regarded as the norm by many NRA engineers. However, in conditions of diversity, scheme proposals can heighten existing situations of conflict and the consultation process itself can increase confrontation and polarization (Wengert, 1976; O'Riordan, 1983a:230).

The NRA is not set up to deal with conflict situations but relies largely on achieving consensus. Implicit in many of the beliefs and working practices of NRA engineers is a consensus, rather than conflict, model of society: beliefs that there is very little conflict over flood defence scheme promotion and that the consultation process, with its emphasis on public education, will achieve consensus. Sometimes it is acknowledged that conflicts do not get resolved:

[1] "The conflict was never actually resolved...there were still a lot of objections left over at the end but the Parish Councils eventually decided that something needed to be done about it and the preference which most people had chosen, the scheme which most people preferred on our consultation...they said 'Oh we'd better do that'."

[10] "It's this cooperation that we're trying to establish always; cooperation not confrontation."

During interviews some engineers claimed that scheme opposers were merely representatives of a specific interest group and not representative of the general public. Thus (possibly legitimate) claims by minorities were regarded as unacceptable if they were in serious conflict with the goal of scheme adoption[50].

13.3.6 Simplified conceptual model of the floodplain resident's decision-making process

This hypothesis relates to the standard picture presented by engineers of the floodplain resident and his/her attitudes to flood risk and flood defence schemes which tends towards over-simplification. A common position was discernible. Firstly, those who opposed flood defence schemes were not themselves at risk of flooding. They were characterised as people who walk their dogs in the area; visitors from outside who like the view; newcomers to the area; and those being 'whipped up' by a minority:

[4] "You'll often find that people who complain about views of the river and aesthetics I suppose are probably people that don't get flooded, they live somewhere else and they go down there during the day or walk past it to do the shopping."

[9] "I think there was some very, very, active stirring by some people who weren't necessarily involved in the flooding."

[11] "There are a handful...less than a handful of people, who are really doing the driving. But they know their way around the system and they claim to be speaking on the behalf of about 150 other people; they've got a petition to prove it."

The latter extract also refers to the type of people who "know their way around the system". These people, and also those who are "well-resourced" and able to back their

[50] Interest groups were not examined in any detail during the research and analysis proved to be inconclusive (see Figure 7.2) but it seems probable that the differing value systems of interest groups would be likely to result in variations in scheme response.

opposition with lawyers, were singled out by several engineers as problematical. They were often described as newcomers and professionals and were contrasted with those (non-professionals) who had been resident longer and were generally more acquiescent.

Secondly, that the 'silent majority' in the community was in support of a scheme and only the opposing minority was vocal:

> [4] "The opposition to the scheme, was quite vocal. People that were in opposition would write to the press and they'd write to us and they'd write to the Chairman, they'd write to MPs, they'd say they didn't want a scheme. Whereas the people who did want it were far more sort of happy and sort of thankful the scheme was going ahead and they didn't make a lot of noise. Its easier to sort of say no to something and get yourself heard than sort of to say yes."

It has been noted in the literature that silence on, or lack of involvement in, an issue is often construed as consent when in fact it may just reflect a sense of powerlessness (Otway and Wynne, 1989) or may not have reached the threshold of action (Kasperson, 1986).

A third common characterisation was that when flooding occurred, people were happy to have any scheme, and that a flood was almost a pre-requisite for scheme acceptance:

> [8] "You can usually promote flood alleviation works on the back of past flood events."

> [6] "I think the only thing that would have got the scheme off the ground would have been a flood during the course of the preparations."

The surveys of floodplain residents' attitudes discussed above showed that while flood events did heighten expectations of future flooding and generally predisposed communities towards acceptance of a scheme, they were not sufficient to ensure acceptance of a flood defence scheme that was perceived to have an unacceptable environmental impact. Further examples of such tolerance of flooding were advanced by the engineers from all regions during interviews.

> [4] "an interesting point that we find, generally when we're doing these schemes, is that the people who've experienced...lived in a place for a long time and have experienced flooding for a long time, tend to accept it. They, well they just accept it...they're people that have always known it floods and it doesn't come as any shock to them or any surprise to them."

It can be difficult for engineers to accept this accommodation of the flood risk as it undermines their professional raison d'etre. While engineers, when pressed, could recognise this to be the case, it appeared to require them to step outside their professional role and empathise (not merely sympathise) with floodplain residents regarding matters which were not primarily flood-related. This requirement is outside their professional (technical/design) brief and thus tends to remain dormant.

13.3.7 The risk-environment trade-off from the perspective of the NRA engineer

Many of the engineers interviewed rejected initially the idea of a risk-environment trade-off. However, as the individual interviews progressed, that position appeared increasingly untenable. Table 13.4 juxtaposes illustrative extracts and shows how, within the same interview, some engineers made contradictory statements regarding this concept.

Tolerance of the flood risk (and flooding) by the public was often either denied or regarded as 'peculiar':

> [1] "So I don't know...my own experience of talking to people, what sort of floods they'll tolerate. I reckon after they've been flooded they won't tolerate any sort of flooding even if it was quite a small flood."

> [4] "The people who've...lived in a place for a long time and have experienced flooding for a long time, tend to accept it. They, well they just accept it. Their buildings have always smelt musty and they tend to think that is the norm. It's quite peculiar."

Nevertheless, many engineers had experienced personally situations where residents had refused flood defence on environmental grounds although more often the engineers information was indirect, through hearsay:

> [3] "There are a couple of residents at 'X' who are not that bothered about being protected from flooding and I've heard of another location, Upton-on-Severn, has been a fairly famous example of a village that floods regularly where the people positively don't want to be protected from flooding because of what would be entailed."

> [2] "But there are the odd schemes where, for particular reasons, the only solutions that are available to us may have adverse effects. And people then have to choose between having the scheme done and not having a scheme done. And there have been situations where we've suggested a scheme to a local community and they've said 'no thanks, we'd rather carry on and put up with the flooding'. And we haven't then done anything."

> [5] "Now, the people who lived there suffered quite badly last winter, got very badly flooded, they've had a very strong interest in something being done. But once they learned that access to the beach was going to be cut off by these ["huge lumps of rock" to be used as breakwaters] they threw up their arms in horror and said "we're not having that any way"."

The interviews showed that engineers themselves made a risk-environment trade-off. They recognized that there was a point in scheme design beyond which they could not go because of the unacceptability of the environmental impact:

> [2] "I wouldn't attempt to even produce details of the sort of schemes [1960s-type concrete channels] nowadays to a public meeting because you wouldn't get out alive [laughs]."

> [4] "There are certain things we don't consider now because they will be environmentally unacceptable."

They also made a risk-environment trade-off when they balanced the standard of protection against the environmental impact of a scheme (independent of cost factors):

> [1] "There was a great debate at the time...how high it should be and it was actually put lower than we would have intended, because of objections."

> [3] "Obviously the height of the seawall is more or less a compromise between effectiveness and visual impact."

Such schemes are no longer considered even though their benefit-cost ratio would have allowed a higher standard of protection. This might have meant reducing the standard of protection from a 1 in 100 year level to a 1 in 50 for example, which could require the lowering of the height of a wall or bank so that a view was maintained or a section of scheme removed altogether for species or habitat protection.

The environmental impact from land drainage schemes has been recognized for longer than that for urban flood defence and many of the former schemes are no longer viable in environmental terms even though they might (marginally) satisfy benefit-cost criteria:

> [1b] "The arable farmers were pressing for a channel improvement to reduce the incidence of flooding and...you could only realise enough benefits to justify the scheme by completely devastating the whole valley and turning it over to intensive arable...So there was a scheme that certainly would have had some benefits...but it had this big environmental minus that killed it."

Table 13.4: Risk-environment trade-offs: illustrative extracts showing how, within the same interview, some engineers made contradictory statements regarding this concept

TRADE-OFF DENIED	TRADE-OFF SHOWN
[1] "My own experience of talking to people, what sort of floods they'll tolerate. I reckon after they've been flooded they won't tolerate any sort of flooding, even if it was quite a small flood."	[1] "On practically every scheme we've done recently...not only recently...some that go back a long time, we've had quite significant objections...on the grounds that it was going to spoil the view or obstruct access"
[2] "We've never been in a situation where we've promoted a scheme in opposition to public opinion."	[2] "There have been situations where we've suggested a scheme to a local community and they've said 'no thanks, we'd rather carry on and put up with the flooding'."
[3] "Problems are more about...the basically conservative thing about not wanting change. At least, those people not affected by flooding, not wanting change."	[3] "The seawall would have had to be six feet high along the edge of the existing promenade. That was obviously totally unacceptable I would have thought."
[4] "I don't think [people who buy flood-prone properties] realize [what flooding is like]...they wouldn't trade-off that against the environment in the middle of summer on a nice day."	[4] "The people who've lived in a place for a long time and have experienced flooding for a long time, tend to accept it."
[5] "People who suffer the environmental detriment as a result of your scheme...are unfortunately not usually the same people who derive benefit from flood relief."	[5] "Now the people who lived there suffered quite badly last winter, got very badly flooded, they've had a very strong interest in something being done...but once they learned that access to the beach was going to be cut off...they threw up their arms in horror and said 'we're not having that any way!"
[7] "I can't recall that [trade-off] happening quite honestly. Generally, you know, people...we've always managed to persuade them at the end of the day."	[7] "Even people who've maybe been affected by flooding don't necessarily want to welcome you onto their land if you want to construct works."

Table 13.4 continued

TRADE-OFF DENIED	TRADE-OFF SHOWN
[8] "I've not...never found a lot of interest or requests from people asking us to leave out works, they're usually quite happy to hear that flood defence works are being carried out and usually are quite prepared to accept the type of works that we're proposing."	[8] "When things are *calm and quiet* the production of scheme works can prove somewhat difficult but if you can carry them forward on the backs of recent events, people's acceptance and understanding of what we're doing is a lot higher."
[9] "And the ones who were affected, they knew darn well they had flooded badly and they were very pleased to see the scheme thank you!"	[9] "The older property had been lived in by people who accepted the flooding and their property flooded and they didn't expect anyone to do anything about it."
[11] "People who object to flood defence schemes...have never been flooded."	

The trade-off engineers make, however, is a professional one and not the personal one made by floodplain residents (Fordham and Tunstall, 1990). Engineers invariably do not live in floodplains and thus are not themselves at risk of flooding. The trade-off they make could be regarded as 'easier' than that made by the residents. However, if a scheme is overtopped then the professional repercussions can be considerable:

> [4] "If you undertake a scheme, say a 30 year scheme, and it's overtopped, the consequences are far worse than they would have been had there been no scheme at all. And the political fallout from doing a scheme, and then it *actually* overtopping, is quite horrendous."

This is the reasoning behind the engineering practice of 'overdesigning' schemes to allow for the (inevitable) greater than design standard flood. The choice of standard of protection is an important factor that will be discussed next under its own heading.

13.3.8 Standards of protection

The Case Studies discussed above pointed to differences in the attitudes of engineers and floodplain residents to standards of flood protection. In many cases, residents did not

object to flood defence in principle but to the scale of the scheme (i.e. the level of protection) chosen by the engineers. The choice of standard relates to the different kinds of risk-environment trade-off made by the two groups but, more importantly, to traditional engineering practice which, as discussed above, errs on the side of caution. Despite public expressions of relative certainty regarding the justification for chosen standards, privately some engineers are prepared to acknowledge that 'overdesign' takes place:

> [1B] "I mean as far as I can see there are a lot of uncertainties in all engineering projects, you know, and maybe there are some economic inefficiencies as a result. I mean, most structures are over designed because no structural designer wants to be the fellow who took it too far and had his whatever it was fall down [laughs]...so basically a lot of civil engineering is over designed to a greater or lesser extent. So the works are going to be over designed and there's no doubt if they were under designed someone somewhere is in serious trouble [laughs]."

> [4] "I'd say in the general case, I would go for a high standard of protection rather than look for a lower standard simply because its more cost-beneficial or for other reasons, people can't see the river or that sort of thing."

The high capital cost of structural flood defence measures has led, perhaps inevitably in the political and financial climate of recent years, to a rethinking of old methods. The dogmatic adherence ("custom and practice") to fixed 100-year standards of protection in urban areas is being challenged to some extent and specific flood problems are beginning to be assessed on an individual basis. However, there is not yet universal acceptance of this view:

> [4] "We've had a policy of designing schemes to a hundred year standard with adequate freeboard. Now I think that it has been quite often voiced that what you should actually do is look at the most viable financial...financially so if you get a better cost-benefit on a say a thirty year scheme or a fifty year scheme then you should go for that. And I think that is a view holding a lot of...you know, is taking root. I don't agree with that myself."

Many engineers still believe they must provide, in the public interest, protection "for the foreseeable future". However, that there is room for flexibility in scheme design was touched upon by some engineers. One engineer contrasted river and sea flood protection; the former being more of an exact science than the latter which involved too many variables interacting independently in various ways:

> [3] "The design of seawalls is not very precise...I think the compromise element comes there; that it's misleading of an engineer to say "it has to be precisely 3 feet nine high, because I worked that out to be 3 feet nine high", because I think that would be really dishonest. You can say that the wall can be, you know, 2 feet high or 4 feet high...if its only 2 feet high you'll get a bit more seawater coming over when there's a bad storm than if we make it 4 feet high."

This quote suggests that there could have been some discussion and negotiation of standards of protection and height of defences in the West Bay Case Study and conflicts with the reported experiences of the residents who were faced with an 'all or nothing' situation.

13.3.9 Flood causation

Beliefs about the causes of flooding are important influences on attitudes to mitigation. The Case Studies touched, in varying degrees, on the perceptions of flood causation of the floodplain residents who believed the NRA to be culpable to some extent. This was a common finding and was recognised as such by the engineers. The engineers, however, emphasised the natural causation of flooding; flooding was seen as a largely natural event, albeit sometimes exacerbated by human factors.

> [4] "I think that anyone that floods, always feels that it's a human-induced event. As soon as there's a flood, people look around for someone to blame. It can't be a natural event; it's got to be someone's fault. It's obviously a bureaucrat that hasn't done what he should have done or...we tend to be blamed, people tend to blame us for the flooding. We have somehow caused it. Simply because its a natural reaction; its got to be someone's fault."

> [7] "It was a simple explanation that you are being flooded more frequently simply because it's raining harder, more often. I mean, people would never have considered that as one of the reasons because they were looking for someone being responsible."

If flooding were to be regarded as predominantly human-induced, for example by overdevelopment of floodplains, operational failures by NRA operatives, or as a result of previous engineering land drainage works (all of which were suggested by floodplain residents in the case studies discussed above), this would call for different solutions. Respectively: greater land use planning/development control, better supervised/more highly trained operational staff, or acknowledgement of professional failure and responsibility. All of these suggest a lesser role for the specific skills of the engineer.

To some extent engineers have colluded (albeit unconsciously) in the development of

floodplains which ultimately has put people and property at risk and has inevitably encouraged the introduction of (structural) flood defence schemes. Although this proposition (stated in such an uncompromising form) would be publicly denied by most engineers, the transcripts from the interviews provide some evidence for this view:

> [7] "...quite a longstanding problem. Initially arising as a result of development by the 'X' New Town Development Corporation...our predecessor authority enjoyed quite a good relationship with 'X' New Town Development Corporation...they were always ready to make contributions to scheme works which would allow future developments to take place."

> [5] "Planning liaison...wasn't done as effectively or as comprehensively in the past as it is now and in any case, with the best will in the world, if you've got a rapidly developing outer suburban area...you can't pick up everything."

This latter situation was acknowledged by Thames NRA who have for some time been unable, through lack of staff resources, to respond to all planning proposals sent to them and thus must operate a priority system[51]. A large number of these proposals are for small scale property extensions which individually may have a minor impact but incrementally may have a major effect on the hydrological regime of the catchment (Hollis, 1975).

The system in which NRA engineers operate is undoubtedly unsatisfactory in terms of their abilities to influence (in the interests of mitigation) the wider land use planning issues of floodplain management:

> [4] "Most of the problems nowadays are in the urban areas, and a lot of these problems we aren't empowered to solve and yes I think land drainage legislation was designed for a different sort of period in our history...yes I think it does need rationalising."

However, this situation has been recognized for some years and, arguably, could have been addressed more strenuously during the restructuring that led to the privatisation of the water authorities and the creation of the NRA. While the stated position of the engineer might generally be opposition to building in the floodplain, there is nevertheless an element of fatalism in their attitude towards the inevitability of development:

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[51] This observation is based on notes taken at a meeting at Maidenhead Town Hall between officers and members of Maidenhead and Windsor... and officers and consultants of the NRA Thames Region regarding the proposed Maidenhead, Windsor and Eton Flood Alleviation Scheme and a possible extension of flood relief downstream.

[5] "It's an uphill struggle and success is always less than a hundred percent. We can only try to mitigate the effects of floodplain development."

A less formal liaison procedure exists between the NRA and interested developers where the NRA believe it will gain significant flood defence benefits or offset costs. An example of this process is the initiation of the DWSC/89 Flood Study which was partially funded by development property interests (Thames Water, 1987b). In 1987 the NRA (then Thames Water) objected to a planning application for a large scale retail and leisure development on the grounds that it would encroach onto the Thames and Colne Brook (a tributary of the Thames) floodplains. The development company returned to the NRA requesting them to investigate ways in which the NRA's objections could be resolved; they subsequently financed (£60,000) a study of flooding problems and the collection of hydraulic data between Datchet and Chertsey (Thames Water, 1988) and, had their application succeeded on appeal, would have contributed £6.8 million to the future flood defence scheme (Gardiner, 1991).

Whereas this could be described as a mutually beneficial partnership approach (Gardiner, 1991), whereby development interests part-fund 'socially desirable' flood defence, an alternative interpretation would see it as an inappropriate liaison between a powerful private development organization and a supposedly disinterested public body. If the NRA's own development role is acknowledged, then this represents a conflict of interest between organizational and public goals.

13.3.10 Rationality

A view commonly held by engineers, but not consistently borne out in this research, is that attitudes to flood defence will be positive in the immediate aftermath of a flood and negative after a period of time has elapsed.

Thus, people do not always appear to consistently express rationality when their attitudes or behaviours are viewed over time. However, their behaviour (or expressed attitude) is likely to be rational when viewed in temporal or situational context. For example, the apparently rational response - positive attitude to flood defence - can be an emotional (therefore non-rational), 'knee-jerk' reaction focused on a single, uncommon stimulus: this may be modified (in some situations) to a truly rational response - negative attitude to flood defence - once the stimulus has passed and a range of other factors are evaluated simultaneously.

Ascertaining the rational individual response in the situation most commonly experienced in Britain (infrequently occurring floods, rarely of a serious, life-threatening nature and possible mitigating adjustments limited to a structural flood defence proposal with an inherent element of environmental impact) is more complex than the simplistic view, expressed above, of the floodplain resident's decision-making process.

The Lower Stour and West Bay interviews illustrated this process. In one of the Lower Stour interviews the informants (a couple), who were vehemently against the existing flood defence scheme, were pressed to follow through a series of questions that resulted in them confronting - uncomfortably - an inconsistent response pattern. Appendix G-13.4 contains a lengthy extract from this interview which illustrates two issues.

Firstly, from an 'interactionist' perspective, it indicates the very 'social' nature of this kind of research interview, which is more closely allied to 'normal', everyday social exchanges, and - perhaps because of this - more likely to elicit valid and reliable responses than is the formal, (unnatural) interview procedure of the questionnaire survey which aims to gather valid and reliable responses by strict adherence to a standardised interview protocol.

Secondly, it appears to support the engineers' view of the typical floodplain resident's simple decision-making process by showing that the informants ultimately agreed that, given a flood, the scheme would be worthwhile. However, on another level, it shows the extreme reluctance of some residents to accept what they feel to be an unsuitable adjustment but the only one they have been offered. Nobody **wants** to be flooded and while many may be prepared to **risk** being (hypothetically) flooded, few are prepared to agree to make that sacrifice when actually confronted with the choice. Thus, when pressed, most respondents/informants will agree to the worthwhileness of a flood defence scheme: particularly one already in existence which must, to some extent, be accommodated.

In West Bay, however, even a relatively serious flood event was not sufficient cause for one informant to express a positive attitude to the flood defence proposal. This informant was able to evaluate the consequences of the proposed adjustment in concert with other, environmental, factors that, in the emotional, 'knee-jerk' - apparently rational - response, appear to be either not evaluated or discounted. This informant was one of the few who are prepared to make a personal sacrifice for environmental reasons ("you cannot damage the environment just for the sake of property").

Engineers make what they believe to be a rational decision, based upon accurate information concerning the 'objective' level of flood hazard. However, this estimate nevertheless contains a subjective element. Past flood events provide the evidence from which the present level of flood risk is estimated but accurate measurements of past events are not commonly available and this is particularly the case with rare events which require many years of record to adequately gauge their estimated return period. Invariably much investigative work is necessary to unearth newspaper reports, photographs showing previous flood levels and other documentation. The presence of conveniently situated gauging stations can provide more reliable measurements and while computer modelling now provides more accuracy it still relies on secondary, historic data for calibration:

> [1] "If you want to know what the flood level was, you're never absolutely sure unless you had a recorder there. Even when you've got a recorder there, they need to be very carefully run to make sure that they're reliable. Even visual gauge boards...you'd think would be cared for and responsible, you can get funny answers. You just can't account for differences...you know they are due to human error."

Nevertheless, engineers promote, with apparent certainty, schemes designed to protect against very rare events, on the basis of uncertain information that sometimes conflicts with the reported experiences of the public. During interviews, engineers reported instances where they were certain that residents were denying (because it was allegedly in their interest to deny them) the existence of past floods which engineers were certain had occurred. Thus, a polarity of views can develop between engineers and public which can be almost impossible to reconcile.

In tidal flooding and sea defences the problems of estimation are compounded by the complexity and interaction of the determining factors (see above discussion of standards of protection, Section 13.3.8).

It is frequently the case that flood defence schemes are imposed on one population to protect another population on another reach of the river:

> [1] "Of course 'X' itself isn't the major beneficiary from the scheme; the benefits are upstream in the 'Y' industrial areas."
>
> [3] "So the dam is to be at a location where there isn't flooding, in order to protect people who live downstream at the location where there is flooding."
>
> [4] "And sometimes we get the fact that people have defences through their grounds when in fact they don't flood themselves."

Thus, as the latter extract illustrates, there may be no objective level of flood hazard - no flood hazard at all in fact - for particular populations who yet are asked to accept flood defence. This is particularly problematic where increased levels of flood risk in one area are perceived to have been caused by injudicious floodplain development and yet the impact of a proposed flood defence scheme is to fall on another area - with little or no flood risk itself - which has practised greater floodplain development control. This is believed by some (see discussion in Chapter 9, Maidenhead Case Study) to have been the case in Maidenhead to the detriment of other communities such as Taplow and Eton Wick.

13.3.11 Summary and conclusions

This series of interviews and related background observations and contacts indicated the complexity of the institutional influences on floodplain management decisions by pointing to where NRA engineers influenced, constrained or controlled the choices of floodplain residents.

The initial hypotheses were substantiated by the findings. The engineers did tend to prioritize technical above environmental factors in scheme design and implementation and yet showed some sensitivity about their role as guardians of the water environment (defensive positions were adopted at times to protect both their individual professional position and their organization).

There was evidence that they place greater emphasis on nature conservation impacts rather than aesthetics in scheme design. This was seen to be related to the scientific, and therefore objective, base of nature conservation (via professional ecologists) with which engineers could - to some extent - identify. Visual aspects, however, were seen to be more purely subjective and less easily legitimated. However, a degree of tension could arise between environmental professionals and engineers when scheme implementation was hindered. Furthermore, the technical assessments of environmental value made by professional ecologists and conservationists can themselves under-rate the more commonplace value of local environments to the general public.

While environmental factors have assumed a greater prominence in flood defence during the last five to ten years, the interviews suggested that they have been imposed on traditional engineering 'custom and practice' and have yet to be fully integrated and accepted within professional thinking. Flood defence remains the primary consideration

and environmental factors are secondary to this. Many engineers regarded themselves as 'environmentalists' but this term encompassed for them dimensions of control and utility that could conflict with the aesthetic or 'bioethical' concerns of some of floodplain residents.

The interviews suggested that the attitudes of engineers to both the environment and flood risk mitigation differed from those of many floodplain residents and that there was a lack of understanding, by each group, of how they reached their respective decisions. Although both engineers and residents made risk-environment trade-offs these were substantively different - the former making them on professional grounds and the latter making them on personal grounds. It is often the case that residents do not object to flood defence in principle but to the scale of the scheme chosen for them by the engineers.

The research highlighted a degree of ambivalence on the part of the engineers to the need or preference of the public for an input from them to floodplain decision-making. Levels of public consultation have also increased in recent years but they too have yet to reach a standard which might satisfy those members of the public with serious objections or whose timing conforms to the preference of the majority of floodplain residents interviewed in the case studies. Engineers can be said to 'set the agendas' in the decision-making environment and tend towards manipulation in the promotion of schemes. There appears to be no satisfactory system for dealing with minorities with legitimate grievances.

The wider socio-political system in which NRA engineers operate is undoubtedly unsatisfactory in terms of their abilities to influence (in the interests of mitigation) the wider land use planning issues of floodplain management: there is nevertheless an element of fatalism in their attitude towards the inevitability of development. The part-funding of flood defence schemes by development interests may represent a potential conflict of interest between organizational and public goals.

In terms of the individual components of the initial model of flood hazard perception and mitigating adjustment, the research findings suggest that the engineers intervene, to some degree, at every point. In view of the degree of involvement of the NRA in the flood defence decision-making process it is suggested that a concentration at the level of the individual floodplain resident is an inappropriate focus for the understanding of flood hazard mitigating adjustment and, in light of their different goals and objectives, it is unrealistic to subsume both engineers and residents under the same umbrella term:

'manager' (Kates, 1962).

The next chapter presents a revision to the conceptual model which guided the research and which represents a more realistic **starting point** for future research within the dominant paradigm.

14. THE INITIAL AND REVISED MODELS OF FLOOD HAZARD PERCEPTION AND MITIGATING ADJUSTMENT

14.1 The strengths and limitations of the initial model

The case studies of floodplain residents supported, to varying degrees, the hypothesized relationships of the initial research model, reiterating the importance of flood experience in influencing flood hazard perception - recent experience of an event increasing the expectancy of another - but also underlining the complexity of its relationship to choice (or acceptance) of mitigating adjustments.

Environmental factors were seen to be an important influence on attitudes to mitigation and analysis identified the particular usefulness of examining underlying value systems as explanatory aids to understanding aspects of floodplain decision-making. However, sufficiently wide-ranging and sensitive tools for measuring these factors have yet to be developed.

What was hypothesized initially to be a (linear) chain of action leading to mitigation, would seem to be more appropriately described as a web of interaction between individual and external factors. The qualitative research in particular suggested that the 'external influences' (especially 'institutional factors' and 'government policy') hypothesized in the initial model to connect with adjustment attitudes and choices, represent a much wider influence on the individual decision-making environment than had previously been understood: by, for example, pre-empting individual flood hazard perception, by eliminating the apparent need for adjustment search, by determining the 'objective' level of hazard and by constraining the available degrees and forms of adjustment.

The 'external influences' cell also incorporates a range of forces which act upon the engineer, constraining his/her choices. The study of the engineers illustrates how the sole focus on the individual unit of analysis (e.g. the floodplain resident) is inadequate for understanding decision-making processes in floodplain management. The findings indicate the institutional level to be the main initiator and agent of action in the choice of flood hazard adjustment in England and Wales.

While environmental factors may be important to individual residents (as the above findings suggest), the latter are relatively powerless in the floodplain management arena; their 'choices' are constrained, not only by the preferences of individual engineers and particular

organizational structures (in this case of the NRA), but also by the wider, land use planning context which itself comprises (as analytical categories) individual, organizational and societal levels.

The initial model, while functioning on a simple level, is severely limited by its focus on the individual unit of analysis and by its obscuration of the complexity of the decision-making process. The following section provides a development of the initial model - and thus a more appropriate starting point for any future research in this field - yet acknowledges the inherent complexity of any decision sequence[52] which, ultimately, makes its reduction to a few pre-determined and determining steps an inadequate summation.

14.2 A revision of the model of flood hazard perception and mitigating adjustment

The following revised conceptual model, showing factors of choice and constraint in flood defence, is tentative and purposely limited. It aims to highlight certain recently observed aspects of the flood defence decision-making environment that have been overlooked or misunderstood in the past. While retaining, for comparative purposes, a similar structure and cells, it shifts the main focus for the decision process from the individual to the institutional level as being more appropriate to Britain (and possibly elsewhere).

However, the range of possible initial conditions and the complexity of the interactions between the individual, institutional and societal levels are such that to attempt to model the whole decision structure would defeat the primary object of simplified explication. Thus, the following serves to draw together the research findings but is not to be regarded as comprehensive in either its descriptive or explanatory power.

The model is directed primarily at examining choice of adjustment, not flood hazard perception, and thus the precursors to the latter are, in this problem formulation, less important than the precursors to the former. While individual perception of flood hazard may be necessary for an individual to instigate a flood hazard mitigating adjustment, it is not a necessary condition of **acceptance** of adjustment (the more frequent endpoint to the decision-making process in England and Wales). Furthermore, acquiescence to authority (as represented by the NRA for example) can sometimes over-rule or replace the role of individual perception in this decision-making process.

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[52] As the law of requisite variety states, if you are to cope with the behaviour of a system you must have at least as much variety available to you as in the system (Ashby, 1964).

While the main determinant of action is posited to be at the institutional level, the discussion moves between the individual, institutional and societal levels because of the degree of interaction between them. The structure of the model (see Figure 14.1) divides into three levels - which are suggestive of a power hierarchy (individual; institutional; and societal) - and four sections (the focused environment system; the social and personal characteristics of the individual; values, beliefs and attitudes; and the decision-making process). The subsections are discussed individually below and comprise an initial, simplified description of the dominant paradigm view ('a') followed by the complexity found during fieldwork ('b').

14.2.1 Level 1: the individual level

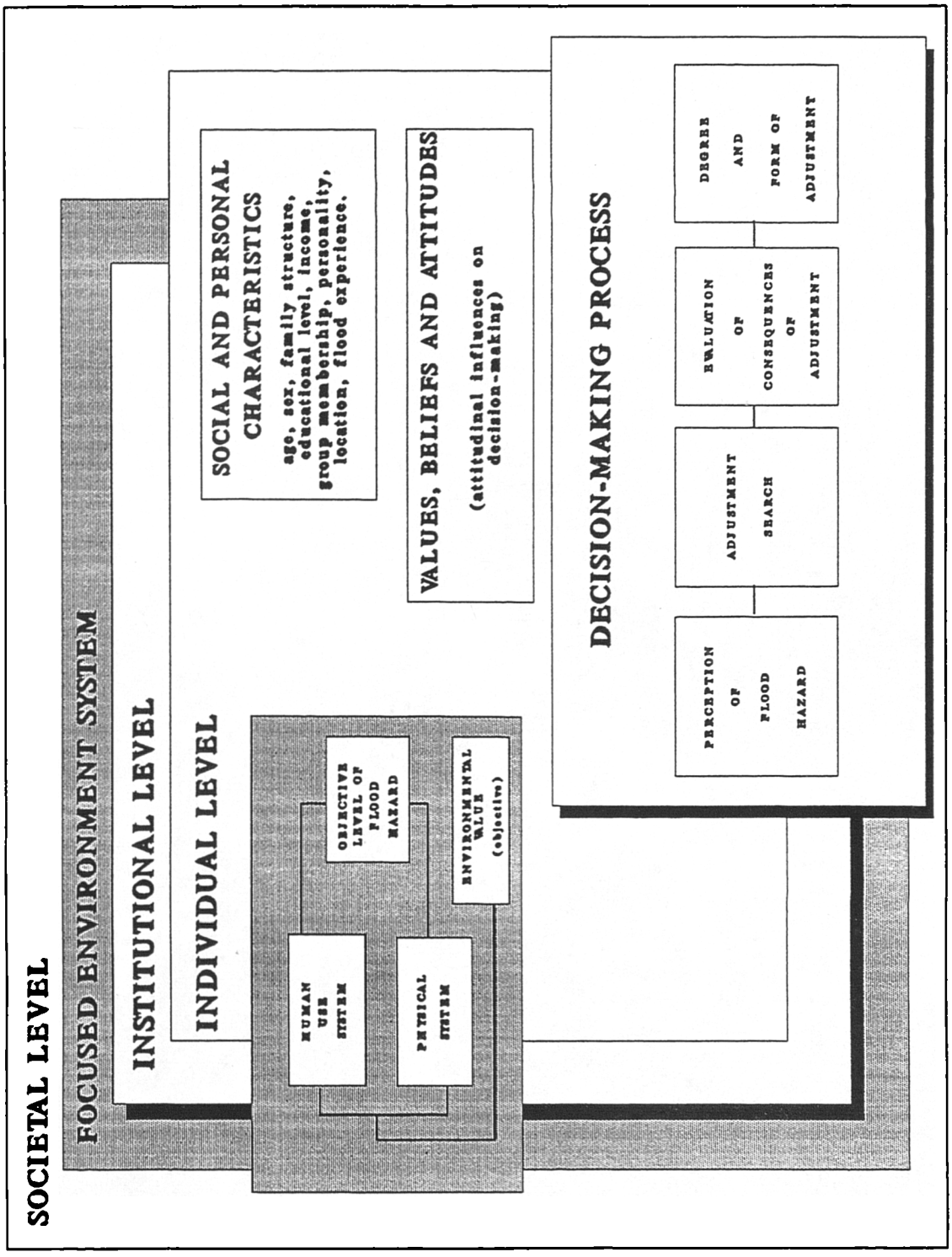
a) the simplified, dominant paradigm model: "It is [the] process of individual choice that is at the base of much of the action of people in dealing with extreme events" (Burton et al, 1978:81). There is no fundamental difference between individual and collective behavior: the latter is an aggregation of individual decisions nominally constrained by government (Kates, 1971).

b) the complex model: People rarely act as individuals; they are most often members of a social group. An individual may be a member of several social groups - at different times and simultaneously: a family group, an environmental group, a residents group, a property owner, a professional, a past flood 'victim', etc. For each of these socio-cultural identities there is likely to be an appropriate underlying value system and a reference group of significant others. The individual's value system can be seen more as a continuum than a discrete construct, with minor variations along it to accommodate the individual's range of social identities. Each of the socio-cultural identities produces its own focus point on the continuum and provides the (normative) framework for decision-making.

It is possible that some of these social roles may produce conflict in the personal value system when it is in conflict with the dominant societal value system. When this occurs, the presence of significant others (perhaps within an interest group) may be the culminating influence on the decision.

In this model the individual level is conceptualised as more reactive than pro-active; pro-activity, it is suggested, occurs more commonly at the institutional level. This is not a fixed condition however; a flood event or new information may shift the individual towards initial pro-activity in an adjustment search, to which the institutional level subsequently reacts.

Figure 14.1: Outline structure of a revised model of flood hazard mitigating adjustment.



Nevertheless, the development of the modelled sequence (see Figure 14.2) from initial 'decision-making stress' to the resulting 'degree and form of adjustment' is likely to return to a reactive mode simply through the long lead times necessary for the full implementation of many structurally orientated flood defence projects - the original initiators of action may no longer be resident in the latter stages of implementation.

Discussion of the individual role does not imply endorsement of a model of free individual choice but rather it addresses one aspect of social structure: the power nexus, it is suggested, is located elsewhere in the model.

14.2.2 Level 2: the institutional level

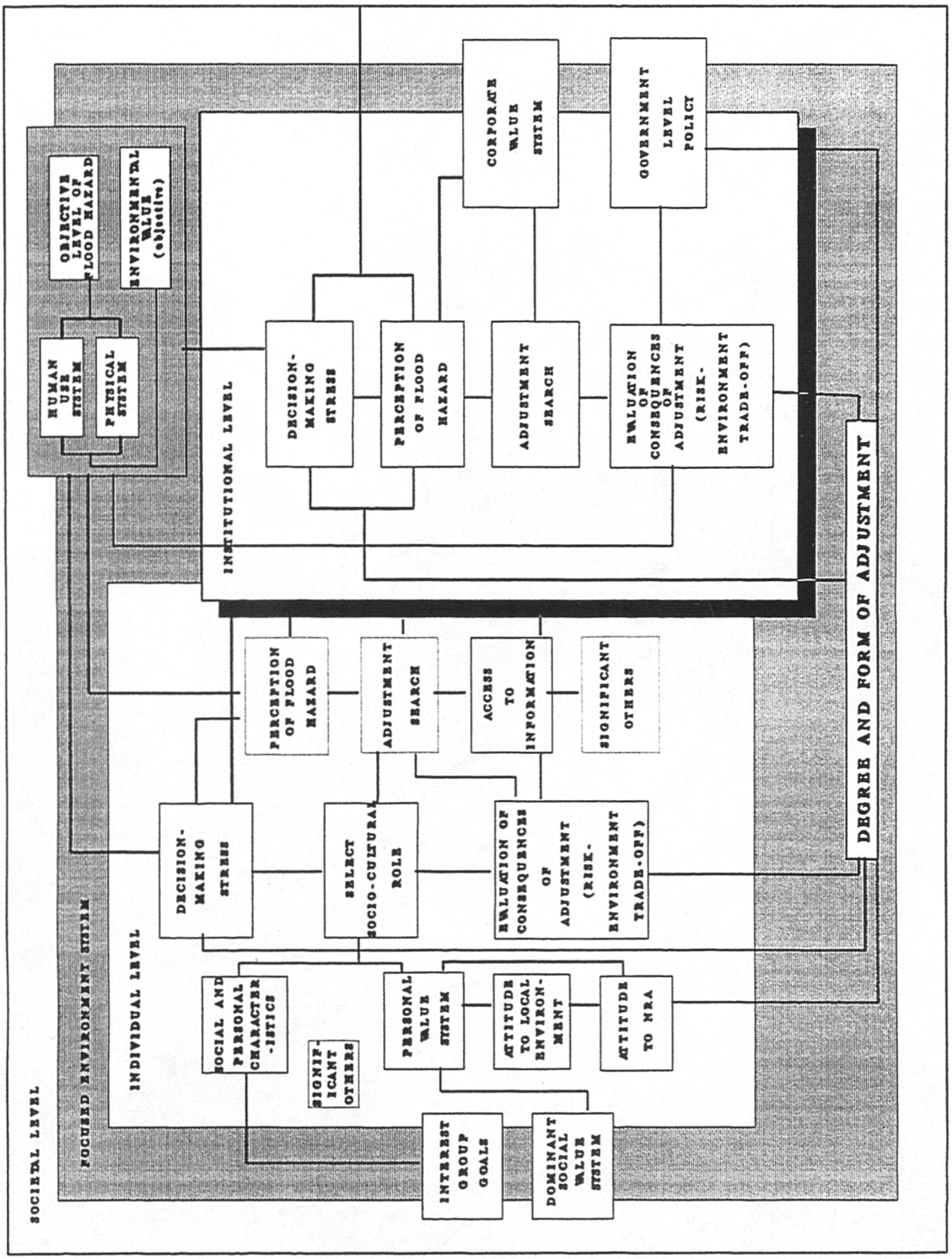
a) The simplified, dominant paradigm model: "...collective or corporate enterprises ["public, quasi-public, corporate, or commercial bodies"] differ little in their resource-using and hazard-related activities from their counterparts under individual management" (Burton et al, 1978:115).

b) The complex model: Beyond the individual and influencing her/his decision-making environment is the institutional level - in this case, the NRA flood defence division - which, it is argued here, is the main initiator of action in the decision-making process leading to (structural) adjustment. This level has its own dominant (engineering) culture, objectives, and appropriate value system. Within the 'corporate' engineering value system, there are sub-cultures related to different departmental groups and their objectives, and within that, individual engineers have a personal modification of the sub-cultural value system which will be related to the other social roles that they perform.

The institution is motivated by a degree of self-interest and self-perpetuation which may conflict with the public (or even individual) interest. The need to maintain institutional structures, to continue to support departments and individual employees by designing and implementing projects similar to those of the past, could lead, ultimately, to a concentration on projects of lower (relative) priority, such as those relating to protection against very rare events.

The institution is socially legitimated by the dominant political economic structure and its value system and thus, proposals emanating from an alternative social paradigm, for changes to, or in, the institutional structure, must overcome the considerable inertial forces which maintain the status quo.

Figure 14.2: A model of selected factors of choice and constraint in flood defence.



Intuitively one would expect there to be differences between a personal (e.g. floodplain resident) and a professional (e.g. NRA flood defence section) interest in flood hazard management. This was borne out to some extent in the interviews with engineers, some of whom expressed a personal divergence of opinion on particular flood defence schemes depending on whether they were to respond professionally or hypothetically as floodplain residents. As engineers they were committed to providing flood defence to a high (e.g. 100 year) standard: when assuming the role of floodplain resident, however, they could appreciate the difficulty inherent in the risk-environment trade-off - flood defence versus loss of landscape, conservation or amenity value.

The institutional level is closely related to the wider political economy structures that operate in society.

14.2.3 Level 3: the societal level

a) The simplified, dominant paradigm model: "...smaller managerial units would consist of households in most societies, but include as well all sorts of commercial, industrial, and governmental units, and on the highest level constitute an aggregate based on the nation-state" (Kates, 1971:444).

b) The complex model: In fairness to Kates, the above quote is followed by the following sentence: "Unfortunately, one cannot simply aggregate the smaller units to arrive at the higher levels of hierarchy". However, there is a strong sense within the work of the dominant paradigm that that is precisely what they do and this is the justification for the omission of the last qualifying sentence which more closely approximates the **sense** of the dominant view. When the societal level is addressed it is equated (as in the influential but much criticised 1978 volume of Burton et al) with a national/government policy focus rather than incorporating a more truly sociological perspective.

Cotgrove's (1982:27) model of the dominant social paradigm (reproduced in Table 2.1) has been selected in this study as appropriate for the socio-political framework as applied to Britain and with a particular focus on environmental factors. It is the paradigm, created and maintained by dominant power groups, which provides legitimation for the institutions and processes of a market economy and provides the framework to interpret and give meaning to experience.

Flood defence is widely accepted as a social welfare product but it is the dominant social

paradigm and its value system that defines social welfare and thus the flood defence function and its parent institution are related strongly to questions of political economy at the societal level. Flood defence professionals aim to maintain their economic position in society and tend to continue to operate into the future in a similar manner to the past. While the rhetoric claims flood defence to be in the public interest, the latter is never fully defined and may require (for low probability events) 'deals' with property developers and other commercial enterprises to achieve.

It must be emphasised here that this does not imply that flood defence is **never** in the public interest but rather that there can be multiple other dimensions operating in the decision-making process which must be identified and addressed if the widest possible public interest is to be served.

14.2.4 Section 1: the focused environment system

a) The simplified, dominant paradigm model: "The natural events system - the array of wind, water, and earth processes - functions largely independently of human activities...Conversely, for practical purposes, large parts of the social system may also be regarded as operating independently of natural events" (Burton et al, 1978:19).

b) The complex model: The particular background focus of the revised model is the interactions between the physical system and the human use system which determine an 'objective' level of environmental value and an 'objective' level of flood hazard. These represent the parameters which are the initial social and physical conditions of the model: they are not to be regarded as static but to be in a state of flux derived from changes in each other and in other components of the model.

As modelled, however, they are prone to the criticism made earlier (Chapter 2) and expressed in the above quotation, that environment is treated as an independent, exogenous factor influencing the socio-cultural system but not actually a part of it. This is not the intended representation but is due in large part[53] to the exigencies of the conceptual modelling process which preclude the diagramatic representation of the sum of human-social-environmental interactions.

[53] See also Watts (1983:231-262) for a discussion of the disjuncture between humans and their physical environment.

14.2.5 Section 2: the social and personal characteristics of the individual

a) the simplified, dominant paradigm model: Empirical research has shown conflicting findings related to the importance of social characteristics but hazard experience is regarded as of singular importance in influencing choice of adjustment.

b) the complex model: Variations in individual social and personal characteristics are liable to influence the form of the personal value system and attitudinal responses but in a complex manner due to the considerable interaction between the characteristics. As discussed above, the role of individual characteristics in descriptive or explanatory models of flood hazard management must be viewed in the context of the constraining mechanisms of societal structures. Furthermore, they should not be regarded as static elements but as subject to change through time and resulting from change elsewhere in the model.

While intuitively it appears logical that flood experience must affect subsequent attitudes and behaviour to mitigation to some degree, the research findings discussed above suggest that it is neither a necessary nor a sufficient cause when viewed in isolation: other factors can have a positive reinforcing effect or a negative, over-riding effect.

14.2.6 Section 3: values, beliefs and attitudes as influences on decision-making

a) The simplified, dominant paradigm model: Individual perceptions, attitudes and beliefs are of paramount importance in understanding and explaining actions or proposed behaviours. "At the heart of managing a natural resource is the manager's perception of the resource and of the choices open to him in dealing with it" (White, 1966a:105).

b) The complex model: In this section are contained those values, beliefs and attitudes pertinent to the focused environment. They can be subdivided into those of the individual floodplain resident and those of the institution (the engineering culture and shared, corporate value system). The beliefs and attitudes (also social and personal characteristics) of individual engineers are hypothesized to influence decision-making but to an untested degree and thus are subsumed under the corporate value system and not described further in the model.

Straddling the institutional and societal levels in the revised model is 'government level policy', which can take the form of, for example, MAFF restraints on institutional choice, DoE Environmental Assessment requirements, or other legislative restrictions or rulings which may influence all stages of the decision-making sequence. For example, cost is the

primary limiting factor for scheme development: if the benefit-cost ratio is poor or below unity then a scheme has very little chance of development, even though there may be significant flooding for some residential properties[54]. Project engineers, from their familiarity with the site and the preferences of some residents, may believe a scheme should be carried out but are limited by MAFF requirements to satisfy national economic efficiency criteria.

Thus engineers appear constrained in their available options by codes of practice decided at higher levels of organization[55] (pointing to the need for further investigation at the organizational level and above and exemplifying one of the limitations of investigation at the individual level).

Crossing the boundary between the individual and societal levels are 'interest group goals', which may or may not be in conflict with the dominant social paradigm and with the individual's personal value system. Interest group goals can influence the decision-making sequence at both an individual and institutional level.

Whatever the nature and extent of the role of individual values, beliefs and attitudes (and some considerable degree of importance is ascribed to them) it is argued here that their role is fundamentally constrained by social structures and ideology. As has been stated above (see Chapter 2), a major criticism of behavioural geography has been its reduction of social and historic complexity to individual psychological processes (Baran, 1969; Rieser, 1973).

14.2.7 Section 4: the decision-making process

a) The simplified, dominant paradigm model: this is based on Simon's (1957) model of a boundedly rational, individual decision-maker, seeking, not to maximize her/his utility, but for a solution which is 'good enough'; the individual 'satisficer' is limited by time and energy to collect information, and by cognitive limitations. Furthermore, "a behavioral model of choice for public decision making...has similar features to the sequential model for individuals" (Kunreuther and Slovic, 1986:178).

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[54] In many schemes the benefits accrue from the industrial and commercial sectors rather than the residential; if these sectors are limited or absent then the benefits may not be sufficient to support a scheme.

[55] It could be argued that if engineers had found themselves seriously in conflict with this situation, they could have made more strenuous representations to higher organizational levels to change it.

b) The complex model: The lack of any real differentiation in the dominant paradigm between individual, institutional and societal goals and power relations constitutes a fundamental underestimation of complex reality.

The full complexity of the decision-making process is not expressed in the revised model (which is based on the reserach study findings) but the main decision sequence is shifted to the institutional level, acknowledging interactions from both the individual and societal levels. An outline of the process is discussed below.

Decision-making stress and perception of flood hazard

The decision-making stress (see Figure 14.2) which initiates the decision-making sequence is linked closely to flood hazard perception at the institutional level. This is based on the assumption that the initiation of an active search for a flood hazard adjustment would not occur without first perceiving there to be some risk from flooding. Arguably, the existence of the flood defence function is indicative of a continual state of flood hazard perception, albeit subject to constant revision. The Section 24 surveys (see Chapter 3) carried out by the precursors to the NRA (indicative of a pro-active search for flood hazard) have identified most flood problems, although areas of flood risk, unknown to the NRA, still come to light, where flooding has occurred in the past but had been accepted by residents and no adjustment search initiated[56].

At the level of individual residents, they may or may not perceive there to be a hazard, yet may be expected to evaluate the consequences of adjustments promoted from elsewhere. The long lead times necessary for large scale, structural schemes can lead to the scenario whereby a scheme proposal, which may have been triggered by an earlier flood event, is eventually presented to a set of floodplain residents (independent of any adjustment search by them), the majority of whom may never have experienced flooding (those who originally experienced the flood event being no longer resident in the floodplain). Thus the adjustment proposal may be presented independent of any perception by the floodplain resident of a flood hazard. In this scenario the threshold of perception is induced by the NRA engineer.

At the individual level a complex process may occur as a result of a decision-making stress (Kasperson, 1969b; O'Riordan, 1983a; Penning-Rowsell et al, 1986). When an individual is

[56] That is, no adjustment search involving the NRA: small scale individual adjustments and coping mechanisms (such as buying insurance, getting sandbags, moving furniture, etc.) may have been initiated.

faced with a decision-making stress they must select the appropriate socio-cultural role for dealing with it and evaluate the decision against the appropriate variant of the value system[57]. There may be an immediate conflict: for example, in the case of a flood defence proposal as the decision-making stressor, they may have to choose the salient role from being a family group member (as a parent they may tend towards securing flood defence safety for their children); an environmentalist group member (as such they may be concerned about the environmental impact of a flood defence scheme); a householder (they may be concerned to protect their property from flood damage but may also be concerned that a large structural defence may have a negative affect on property value).

Each of these social roles could suggest a different response. There might then be a referral to significant others connected with the adopted social role(s); their influence will be dependent on their current salience (vis-a-vis their numbers, status, power, emotional attachment, etc.) and may sway the decision one way or another. There may also be a referral to the dominant societal value system in which the individual may find support or conflict.

Specific locational characteristics can influence the degree of salience of the decision-making stressor. If an individual is close to a river they may be either particularly concerned to avoid flooding or more concerned to protect the familiar river environment. If the individual is a prior flood 'victim' their previous experience may have been either distressing or benign and thus could influence their decision either way.

In this decision-making environment the interaction of the individual resident with the institutional level comes with the public exposure of a flood defence proposal[58]. The individual resident may or may not have had prior experience with the institutional level. The response of the individual to the institution and its proposal is likely to be influenced to some degree by the degree of congruity between the individual's value system and the dominant social value system. There is a bias in favour of the institution as a socially legitimated structure which will tend to induce a degree of acquiescence with institutional decisions.

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[57] Although this should not suggest a simple, mechanistic or deterministic process.

[58] In the recent past it was possible for flood defence works to be implemented with minimal interaction with the individual floodplain resident: this is less likely to happen now because of the need, for example, to produce and publicise environmental statements and because of current institutional concerns with 'public image' and 'the customer'.

Adjustment search

Further action (adjustment search) can be initiated in a number of possible ways at the institutional level. For example: as identified problem areas rise to the top of the priority list in the region's capital programme; when a flood occurs and pressure comes from outside (often from higher levels than the individual such as from local authorities or M.P.s); or when developers offer to make a contribution to scheme costs to facilitate acceptance of their development proposal.

The adjustment search by engineers can occur at some temporal distance from a flood event because their flood hazard perception is generalised, and not locationally discrete: it does not rely on personal experience of a flood event but on professional extrapolation from technical data. It is a lengthy process albeit within a range of options that are limited, ultimately, by economic factors.

The engineers' adjustment search may be triggered by an individual event or as a result of Section 24 surveys (these surveys can be seen as a generalised, not locationally specific, adjustment search). The Section 24 surveys allow a prioritisation of flood defence needs based on rateable value of the properties involved, the frequency of flooding and the estimated cost of a scheme. A possible scheme may come to the top of the priority list and be put into the capital programme but proposals may be rejected by the public who prefer to tolerate the flood risk rather than accept the proposed scheme. A flood event may exert political pressure on the NRA engineer to provide flood defence for a site lower down on the priority list:

> [2] "Most of the capital programme that we've built up has been built up due to political pressure following catastrophic events."

For the individual (resident), 'perception of hazard' and 'adjustment search' may both be circumvented and they may enter the decision-making sequence at the point of 'evaluation of consequences of adjustment'. While individual perception of flood hazard may lead to almost immediate adjustment search (e.g. they may pressurise the NRA to act), because of long lead times for structural works, the following stage - 'evaluation of consequences of adjustment' - may be 10 years or more distant in time.

Whether or not the floodplain resident makes an independent adjustment search will depend largely on their access to flood hazard information, whether there has been a recent flood to

trigger action, and/or whether s/he considers some (further) mitigating adjustment to be necessary. Some floodplain residents will not make a search for any mitigating adjustment even though they are aware of the flood hazard and have experienced flooding.

Access to information is likely to be a key influence on individual perception of hazard and adjustment decisions. In urban floodplain management, where populations may be highly mobile, information relating to past flood events, the existing flood risk and the availability of mitigation adjustment, may be almost solely at the institutional level (although significant others in the community may also be influential). Control of access to this information is also at the institutional level.

Evaluation of consequences of adjustment - the risk-environment trade-off

Engineers evaluate the consequences of adjustment on a professional basis: they are not themselves at risk of flooding or dwelling in the floodplain and thus will suffer no personal detriment. How far engineers empathise - as opposed to sympathise - with floodplain residents is likely to be a key factor in the degree to which their evaluation will be commensurate with that of the floodplain resident. Certain interviews with engineers indicated that in some (relatively clearcut) cases, engineers did empathise with residents and perceived the difficulty of making a decision to accept a flood defence scheme which would have a major environmental impact. However, institutional imperatives can over-rule such individual factors.

The result of the engineers' evaluation of the consequences of any adjustment is the selection of what they believe to be an appropriate adjustment (or sometimes more than one) to present to the public. Thus, this selection process should be linked to the previous model cell, the adjustment search, because it limits the availability, to the public, of adjustment options.

The engineer is concerned primarily to evaluate the impact a scheme would have on hydrology and hydraulics, and on the local community in terms of interference with communication links such as major roads and railways, for instance. The environmental (nature conservation, landscape, archaeological, etc.) consequences of adjustment are evaluated in consultation with possibly a range of environmental organizations and with in-house conservation staff, depending upon the scale of the adjustment. Consequences to individuals are dealt with sympathetically if this can be done without jeopardising the overall scheme, but generally there exists a belief that the adjustment is in the wider public interest and a minority should not put their preferences before the greater good of the majority. The

engineer thus becomes the arbiter of what is (or should be) in the public interest:

> [3] "in many ways I think it's part of an engineer's responsibility to the community to come up with the best solution."

Evaluation of consequences of adjustment is likely to be a much longer process at the institutional than at the individual level. After carrying out a range of cost-benefit procedures (see Chapter 3), the flood defence engineers are likely to select a single option to promote to the public. Thus the contribution of the individual resident to this decision-making process will have been curtailed by the limited choice and information offered by the institutional level.

As a result of public consultation, interest group goals may influence the evaluation process and subsequent revisions may be made. As discussed above, there appears to be an inverse relationship between the timing of public consultation and the degree of possible subsequent revision: the earlier the public input, the greater the likelihood that revision can or will occur and vice versa.

Degree and form of adjustment

The degree (standard) and form of adjustment is almost wholly in the hands of the engineer. Possibilities for individual adjustments by residents are few and rarely feasible without having a detrimental effect on other floodplain residents (excluding minor adjustments (see below) which are designed to mitigate the effects of a flood but not to remove the risk up to a given design level). Flood defence has long been regarded as a national or community level activity and, as such, requiring management at an institutional level: because of this, floodplain residents are rarely exposed to possible, individual floodproofing measures. However, some floodplain properties (in, mostly, riparian locations) have had their floor levels raised, have replaced wooden floors with concrete, and/or have raised the electrical circuitry above a known flood level, for example. Where a form of floodplain development control is in operation, new property developments may have to satisfy certain criteria in order to gain planning permission: this may take the form of raised floor and threshold levels with several steps up to the entrance, properties may be built on 'stilts', or the ground floor use may be limited to garage or utility space with the lowest habitable rooms at first floor level.

Thus the degree of protection offered by, and the final form of, the adjustment will be the result of a number of stages of evaluation but most of these will have occurred at the

institutional level with minimal input from the individual member of the public. There is, of course, an argument that, in a representative democracy, this is how it should be: the NRA is the institution with executive powers in the public interest. However, while the NRA's overseeing body (MAFF) may have an elected member at its head, the NRA engineers who make the majority of the decisions (including conducting the justifying cost-benefit analysis) are not elected representatives and their motivation in maintaining their positions must be acknowledged as constituting a possible conflict of interest. The NRA, in performing its flood defence function, is both 'poacher and gamekeeper': a potential floodplain developer policing itself.

14.2.8 Conclusions

The revised model described above represents a conventional modification of initial hypotheses as a result of research findings. However, a major conclusion of the research study is that the systems approach that was adopted cannot adequately deal with the complexity found during fieldwork. The suggested interactions between levels and cells represent a compromise between reality and clarity: to model all interactions (supposing it were possible to discover these) would obscure the point of the exercise. It is a conclusion of this research that the a priori model form itself can serve to blinker the researcher to other - non-modelled - possibilities and exclude that which lies beyond the expected and the status quo.

15. CONCLUSIONS AND RECOMMENDATIONS

This study set out to investigate a number of specific areas within set boundaries. The research aimed to examine the importance of environmental factors in flood hazard management and the role of NRA engineers in influencing, the choices of floodplain residents. The theoretical focus was the appropriateness of the dominant (North American) hazards research paradigm as an explanatory model in the British context. It further aimed to extend the previous, primarily quantitative, research design model to investigate the usefulness of a qualitative approach.

The concluding discussion is structured on these substantive areas of study. It summarises the key findings and, where appropriate, makes certain recommendations arising from these.

15.1 The importance of environmental factors in flood hazard management

Infrequent flood events lie in the area of greatest decision-making uncertainty (Kates, 1962); for this reason it is not surprising that some hazards research findings have been contradictory. While experience of flooding has been found to be an important factor in flood defence decision-making it is not a **sufficient** cause to determine response to scheme proposals. From a policy position it is problematical to rely on 'objective' measures of flood severity as an indication of likely response when it is the individual's subjective measure of severity (among other factors) which will determine their response and this response may not always be commensurate with the 'objective' measure.

Furthermore, while the environmental benefits of a particular location may be of considerable importance, neither are these a **sufficient** determinant of scheme attitude. This research study has found that underlying (environmental) value orientations, linked to specific locational and experiential factors, interact in a complex manner to affect attitudes and behaviours with regard to flood defence.

Flood defence, like flooding itself, entails both costs and benefits. For those living closest to the river, their environment represents both asset and hazard. They gain (potentially) the greatest environmental benefit but also, because they are likely to be flooded more frequently and to greater depths than those further away, tend to bear the greatest cost. Because flood schemes normally provide a defence between river and population, those living nearest to the river are also likely to live nearest to the scheme. Thus, they have more to gain from the scheme but potentially more to lose if they perceive the scheme to have a detrimental

environmental impact. The striking of a balance between these conditions represents a risk-environment trade-off that this research has demonstrated to exist.

The degree of centrality of environmental beliefs and attitudes remains uncertain, however. Similarly, the proximity of the engineers' value system to the (majority) social world view was not fully tested. If environmental beliefs and attitudes are but a part of a web of interconnected beliefs within the individual's value system (which the study findings tend to support), and if decision-making is dominated ultimately by the choices of the majority, then it is likely that there will continue to be a mismatch between the engineering response and the preferences of the more environmentally concerned (minority?) of the public with regard to structural flood defence.

It is also likely that the engineering culture will (continue to) set the agenda and make the final flood defence decisions within the bounds of national economic efficiency and within their socially legitimated institutional role. This will tend to marginalise issues of more fundamental environmental concern if they threaten these overriding imperatives.

15.2 The role of NRA engineers in influencing, constraining or controlling the choices of floodplain residents

Viewing a range of floodplain management issues through the eyes of two different floodplain managers - residents and engineers - has illuminated not only the relative importance of environmental factors but also, more generally, the problems of focusing solely at the individual level. This is not to argue, however, that an examination of the individual is valueless or inappropriate but rather that there is a need to mediate between individuals and their social context and that individually-focused studies must therefore give due consideration to the degree of constraint imposed by social structures.

While, as individuals, engineers may be more or less environmentally concerned, they do not act solely as individuals; they act in an institutional role and it is that which governs ultimately their environmental attitudes and behaviours within flood defence. It has been suggested above that the underlying value system of engineers is closely associated with the dominant social paradigm which privileges material wealth and the control of nature. Yet there remains, however, a degree of tension between the individual and organizational needs and imperatives of the engineer. The relationship between the individual engineer, the

organization within which s/he[59] is located and the government departments that ultimately control their actions, is an under-researched area that would benefit from further study.

15.2.1 Institutional and policy issues

Flooding is not a wholly natural event and flood defence is not a wholly technical issue. Thus, the dominant role of engineers in flood defence decision-making presupposes the adoption of a structural (engineering) solution. In the existing institutional system the wider socio-political factors are relegated to the margins of the decision-making environment because no unified system exists for incorporating them despite the centrality of land use planning issues in flood causation, exacerbation and control. There is some indication that problems resulting from a lack of liaison between NRA flood defence departments and local authority planning bodies are beginning to be addressed (Gardiner, 1991) and it is possible that, in the long-term, non-engineering professionals will take a more prominent role in decision-making.

The financial requirements of the (flood defence) 'capital programme' - a system devised ostensibly to protect the public purse - can, ironically, result in money being spent for its own sake. Engineers must bid for funds to carry out defence works; once gained, they are constrained to spend them. This process can exert pressure on project engineers to implement schemes that may have aroused public opposition. Conversely, without the ability to 'carry over' funds from one financial year to the next and with the lack of reserves, engineers may have to search for work (inevitably of low priority) on which to spend remaining funds. This system is particularly inappropriate for flood defence which to some extent is tied to long term perspectives and/or climatological conditions. There is a degree of periodicity in flood events: many years can pass with little flooding (as has been the case in the Thames Valley in recent years) and then notable flood years can occur (such as 1947 or 1968, for example) resulting in major flooding which may require immediate attention. The present funding system is not an efficient one for dealing with this situation.

Related to this, is the question of the appropriateness of cost-benefit analysis (at least in its present form) as the framework for the selection of factors deemed important. The cost-benefit methodology has serious flaws which are underestimated by its exponents. Perhaps the most important of these is its spurious assumption of decision-maker disinterest and independence. This research has shown that those (engineers) in positions of decision-making

[59] Gender issues were not examined in the engineers' research module but the almost exclusively male engineering culture suggests itself as a fruitful area of further research.

power are not disinterested but have their own criteria for judging the relevance and importance of factors which can differ from those of the public, particularly with respect to issues of aesthetics.

If the public are not involved in decision-making until a late stage there is little chance of them influencing decisions that are already considerably advanced and less chance of returning the debate to more fundamental issues that may have been overlooked by professional decision-makers.

This research has illustrated the limitations of the public consultation exercises carried out by the NRA and suggested the need for greater (and earlier) availability and provision of information to the public if they are usefully to contribute to floodplain management decisions. Many members of the public are not aware of any flood risk and, even when they are, they are not aware of its meaning. Thus, the educational aspect of public consultation is important but it should be separate from scheme promotion.

15.2.2 Policy implications/recommendations

The present structures for consultation are inadequate; greater opportunities for public participation are needed to provide a sense of ownership in the scheme or, preferably, the solution - ideally participation should occur before a scheme is chosen. This can only be generated if the public are involved early, and, if possible, before views become polarised.

NRA personnel need training to equip them for the public consultation work they are now required to do and for a future extension of this role (perhaps to include also training in conflict resolution). This should take account of theory as well as practice; that is, its purpose should not be merely to raise the level of efficiency of present (essentially, scheme promotion) practices but to examine the wider issues raised by public consultation and participation. There is, however, a potential drawback to this process which was noted by one engineer during interview: he suggested that the public tended to distrust more those who demonstrated a 'slickness' of approach which they viewed as closely associated with a public relations (and thus not disinterested) position.

This research showed that some interviewees'/informants' attitudes to the flood risk had been influenced by their insurance companies and their solicitors when they bought the property. If such professionals are acting as 'gatekeepers' (Pahl, 1975) they should be included specifically in any flood hazard information dissemination that the NRA might carry out in

the future.

While this research did not set out to specifically examine coping strategies, nevertheless, informants and respondents provided examples of where these had been adopted. More detailed research could usefully be carried out to estimate the degree of individual adjustment already adopted: for example, where foundations have been built above flood levels, where concrete floors have been laid, where electrical circuitry has been raised above known flood levels, etc. This knowledge would contribute to an understanding of how people do - and could - cope with floods rather than control them.

15.3 The appropriateness of the dominant (North American) hazards research paradigm as an explanatory model in the British context.

In its lengthy history the dominant paradigm in hazards research has contributed much of value - particularly its role in mapping out an initial framework for research - but its products have been more limited than the claims of some of its supporters might suggest: it can be criticised for a tendency towards self-aggrandizement, perhaps dating to the promise that quantitative methods appeared to hold in the 1960s and 1970s, through aims[60] to develop general laws and theories of human behaviour.

The theoretical base and original conception of the dominant hazards paradigm can be seen (albeit, largely with the benefit of hindsight) to be limited. Researchers within a positivist/empiricist framework sought to measure observable reality and ignored or underestimated values. The original, essentially static, model did not take account of, for example, historical factors related to coping with flood risks and attitudes to flood defence. The model's individual focus could not deal with structural or institutional levels of involvement in the decision-making environment. Neither was it an adequate explanatory aid within its own terms: floodplain residents are not a homogeneous group therefore any theory of their decision-making is fundamentally flawed if it concentrates solely on flood hazard management.

The focus on how to achieve mitigation through heightened flood hazard perception (although a straightforward link between the two conditions was not proven) failed fully to recognize the potentially unacceptable impacts on environment that ill-considered mitigation might

[60] See Calef's introduction to White's Human Adjustment to Floods (White, 1945) which claims "nothing less than a comprehensive theory of the geographic approach to the problem of dealing with floods" (chapter 8, vii. Quoted in Kates and Burton, 1986:10).

involve[61]. While the concept of 'man's (sic) relationship with nature' was acknowledged as important (i.e. control versus stewardship) this again focused at an individual level and did not address the role of competing value systems and powerful economic and political interests in society. The concentration on choice rather than constraint is built on a particular view of society which ignores the extent of social conflict and the self-interest of actors in the decision-making environment.

It seems that most researchers in the field of hazards must begin working within the 'dominant view' of the White/Kates/Burton school (Hewitt, 1983). Some appear to remain bound by this theoretical framework (Smith and Tobin, 1979); some move incrementally away from it (Penning-Rowsell et al, 1986); others revolt more completely (Hewitt, 1986). The pervasiveness of the 'dominant view' can be traced to one of its noted failings: a lack of attention to theory (Torry, 1979c). Workers within this paradigm - particularly geographers - have tended not to engage in theoretical debate, perhaps because the very dominance of the paradigm has led to the perception that no valid challenge to it exists.

The research discussed here has followed a similar progression to that just outlined: beginning with a traditional natural hazards research paradigm (studying the individual's perception of, and attitude to, flood hazard); advancing incrementally (contributing an examination of the environmental and institutional components via the study of individual residents' and engineers' perceptions and attitudes); and ending where perhaps it should rightfully have begun (with a less individually-based, empirical approach and a more socio-political examination of those factors modelled, somewhat naively, as 'external').

This analysis has been based on a conflict model of society: of conflicting power groups and value systems. Philosophically it has mediated between a humanist and a structuralist perspective: wherein the individual is viewed as not wholly determining but neither wholly determined. There is no suggestion that this is, or should be, the only framework for analysis: hazards research is open to disciplinary plurality. The eclecticism of social geography (as the parent discipline here) is at once limiting and liberating; the former because it can cause a crisis of identity and a lack of analytical focus; the latter because it allows the cross-fertilization of ideas and the complementary division of labour that is vital for such a multidimensional study area.

While acknowledging and supporting many of the criticisms of the dominant paradigm in

[61] Although James et al (1971) included environmental concern as a potentially important factor in choice of mitigation, measurement is based on responses to one attitude statement.

hazards research, the research discussed above has found much common ground but would suggest a change of emphasis in future work.

Earlier hazards research has focused on the perception of flood hazard: it has operated on the assumption that this **should** lead to adoption/acceptance of mitigating adjustment and has then examined why often it does not. The research discussed here has started at the end point of the dominant paradigm's model: the adjustment itself. This has highlighted the interconnectedness of these two points - hazard perception and mitigating adjustment - and shown that the former cannot be understood without understanding the nature of the latter: the contribution to the model of the environmental factor exemplifies this relationship.

It is a central contention of this thesis that variation in responses to proposals occasioning environmental change (such as flood defence schemes) are related, fundamentally, to differing value systems which are the result of socially constructed systems of meaning and are not to be understood fully by a primarily psychological, behavioural approach, focusing at the individual level: however, neither should this focus be omitted. As a result of an almost exclusive concentration on the individual, much hazards research (within the dominant hazards research paradigm) has been prone to the "fallacy of the wrong level of analysis" (Galtung, 1967:45), whereby inferences are made to another theoretical unit than that observed.

This work has bridged the early hazards research paradigm and the later, more policy-orientated, approach of Penning-Rowsell et al (1986). It has adapted these to a form of research design more appropriate to the urban British situation by bringing together the environmental, individual and institutional strands within the single issue of *floodplain* management and even within a single case study. There is a need however to advance this study area by similarly examining other institutional and societal levels and their role in floodplain (or catchment) management.

Future hazards research could benefit from a change of disciplinary emphasis: incorporating a greater contribution to its traditional geographical base from sociological, political, and anthropological perspectives. This would provide a wider theoretical base.

15.4 Methodological issues: quantitative and qualitative research designs

This research project has usefully combined quantitative and qualitative methods in various ways: using different data sources (written documents, personal interviews and newspaper

articles); making comparisons across quantitative studies; using both an observer and a participant observer's role to gain understanding of the internal operation of the NRA as a public institution.

Kates (1964) used the concept of "interpretation" to describe "the process whereby information is referred to an individual's underlying perception of the state of nature, and is assimilated in a unique personal way" (1964:49): this concept is closely allied to the pursuit of the "unique personal culture" of qualitative investigation. It can best be examined qualitatively, most particularly because of its extreme individualist focus: it is not possible to aggregate unique personal cultures.

The qualitative studies have suggested that the adoption of a more anthropological approach would be fruitful: to re-examine - at all analytical levels - the floodplain management milieu as a strange culture: to avoid the constraints on the development of research direction which can come from the imposition of a detailed prior model of research design.

15.4.1 'Underdog' research

The research discussed here has sometimes seemed to polarise the views of two groups: floodplain residents and engineers, and has adopted, at times, an adversarial and polemical stance in favour of the former. This is akin to a study of - in Silverman's (1985) terminology - 'underdogs' and 'top dogs' respectively. Silverman raises the issue of studies of the powerless sections of society ('underdogs') and calls for an element of balance through the study of 'top dogs' of which, he claims, too little is known (1985:19). This fails to acknowledge, however, a major purpose of such studies which aim, not only to describe a relatively unknown sector of the community but also, by giving expression to its views, to partly redress a social power imbalance. The latter purpose (and its inherent partisanship) must, in a small way, be acknowledged for this research.

While of a different scale to the major studies of the Chicago School of sociologists, this study has aimed to illustrate (if not redress) a power imbalance in floodplain management where, despite recent moves towards greater public consultation and 'giving the public what it wants', it is the organizational goals and aspirations that are dominant. Public institutions should be open to public scrutiny in order to control self-serving and self-perpetuating tendencies. However, to counterbalance the possibility of an underlying partiality, this research has attempted, in Popperian terms, to identify those cases or issues which undermine ('falsify') the stated hypotheses and has presented them where found.

15.5 Future research directions

It was stated above that the revised conceptual model (Figure 14.2: Factors of choice and constraint in flood defence), while comprising a development of earlier research, simply provides a more appropriate **starting point** for future research in this field but not a concluding statement. Furthermore, it was suggested that this research has ended where it should rightly have begun. This suggests that hazards research, despite many years of investigation, remains open for new contributions.

The study focus used above could be adapted and enlarged to include aspects of floodplain management in countries other than England and Wales. It would be of both academic and applied interest to examine North American floodplain management from the (ethnographic) perspective of a non-native and with the benefit of the revised model and the main study findings. In other words, to take the revised hazards research model back to its country and culture of origin to investigate, inter alia, how far the extension of the individual focus, to incorporate the institutional and societal, is appropriate outside the national bounds of the present study; and to incorporate social and cultural anthropological methods to examine the engineering culture of the U.S.A.C.E. and other institutions active in floodplain management.

It is perhaps more important, however, to approach the flood problems of other developed and developing countries from the suggested, alternative starting point if they too, in their often desperate need to manage catastrophic flooding, are not to implement inappropriate structural controls - with all their inherent potential for adverse environmental (and social) impact - when it is social, cultural and political solutions that may be required.

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APPENDIX A

Appendix A-2.1: Influential factors in hazards research findings (after McKay, 1984)

ATTRIBUTES	INFLUENTIAL	NOT INFLUENTIAL
SEX	Men more likely to determine family response to flood hazard (James, 1974).	Sex not related to awareness of flood risk (Kates, 1971; Mileti et al, 1975; McPherson, 1977). Sex not related to flood hazard perception (Parker, 1976).
LENGTH OF RESIDENCE	Longer residence, more aware (Waterstone, 1978). People living in same house longer than 5 years, less likely to evacuate than those resident less than 5 years (Baker, 1979),	Length of residence not related to awareness of flood problem or inclination to act (McPherson, 1977).
TENURE	Home owners more likely to mitigate (Waterstone, 1978). Urban homeowners more sensitive to hazard charcteristics; rural = opposite (Burton et al, 1978).	Tenure not related to flood hazard perception (Parker, 1976).
EDUCATION	The more educated the respondent, the higher the tendency to feel that the flood problem should be solved (McPherson, 1977). Hazard awareness increases with higher education but college graduates are less prepared than those with some college education (Turner, 1979).	Education not influential in respondents' inclination to act (McPherson, 1977). Education not significant in future flood expectation (Kates, 1962).

Appendix A-2.1 continued.

ATTRIBUTES	INFLUENTIAL	NOT INFLUENTIAL
AGE	Age associated with perception of importance of flood and knowledge of local flood problem: younger respondents more aware (Handmer, 1979). Age associated with hazard awareness: younger respondents more aware (Waterstone, 1978).	
FAMILY/ HOUSEHOLD STRUCTURE	Single family structure more likely to take action; however, homes with school age children are less aware of earthquake hazard than those without children (Turner, 1979). Families with children under 16 less aware of a flood problem (Parker, 1976).	
GROUP MEMBERSHIP	Group membership has a positive association with attitude to structural solutions (James, 1974).	
SOCIO-ECONOMIC INDICATORS	Socio-economic class associated with greater knowledge of flood protection structures (Roder, 1961).	Socio-economic indicators not associated with attitudes to future flooding (Burton, 1961).
DISTANCE FROM THE RIVER	Nearer to the river, more aware of flood hazard (Waterstone, 1978).	

Appendix A-4.1: Conceptual propositions underlying the research design (DWSC/89)

1. That the more highly valued (objective assessment) an environment, the less environmental change (e.g. a structural flood defence scheme) will be tolerated;

2. That those people who, generally, value the environment highly (subjective assessment), will be less likely to tolerate environmental change (and vice versa);

3. That those most concerned/worried about the flood risk, are likely to tolerate higher levels of environmental change arising from structural flood defence schemes (and vice versa);

4. That there exists a scale of (flood) risk matched to a scale of willingness to tolerate environmental change;

5. That those people who live in areas subject to recent high levels of environmental change will be more likely to accept further environmental change (e.g. in the form of a structural flood defence scheme) (and vice versa);

6. That those people who have experienced flooding will:
   a) be more aware of future flood risk;
   b) be better informed about flood alleviation proposals;
   c) be more favourably disposed to proposed flood defence works (and vice versa);

7. That those people who live nearest to the river will be most aware of the flood risk (and vice versa);

8. That those people who live nearest to the river will be more likely to accept structural flood alleviation measures (and vice versa);

9. That those people belonging to organizations/community groups etc will be more likely to:
   a) be aware of scheme proposals (should any exist)
   b) take a critical stance re scheme proposals (and vice versa);

10. That those people who often use local open spaces/recreational areas will be less tolerant of proposed environmental change (and vice versa).

OPERATIONAL DEFINITIONS REQUIRED (numbers relate to previous section)

1.1 environmental value - objective
1.2 environmental change
1.3 toleration of environmental change
2 environmental value - subjective
3.1 flood hazard (objective)
3.2 flood hazard perception
3.3 worry about flooding
4 scale of risk
6 flood experience (personal/subjective)
6a awareness of future flood risk
6b knowledge about flooding/personal information level
6c attitude to flood alleviation schemes/proposals
7 nearness to river
9 group/organization membership
9a awareness/knowledgeability of scheme proposals
9b critical attitude to scheme proposals
10.1 open space/recreational areas
10.2 measure of use of local open space/recreational areas

Appendix A-4.1 contd: Operational definitions (Question numbers from DWSC/89)

1.1 environmental value - objective:
landscape/amenity/recreation/nature conservation, designated areas: local/borough plans; reports from environmental and other organizations.

1.2 environmental change:
attitude statements (Question 6) and BSAS questions (Questions 7, 8).

1.3 toleration of environmental change
measurement of (1.2) above

2 environmental value - subjective:
attitude statements (Question 6), Questions 2, 3.

3.1 flood hazard (objective):
technical data/models etc.

3.2 flood hazard perception:
attitude statements (Questions 13, 14, 15, 17, 19).

3.3 worry about flooding:
attitude statements (Questions 14, 15), Question 16.

4 scale of risk tolerance:
high/medium/low? assessed from previous answers and Question 18

6 flood experience (personal/subjective):
Questions 10, 11.

6a awareness/expectation of present/future flood risk:
attitude statements (Questions 14, 15), Questions 13, 17, 19.

6b knowledge about flooding/personal information level?:
Questions 10, 19.

6c attitude to flood alleviation schemes/proposals:
attitude statements (Question 24).

7 nearness to river:
map data.

9 group/organization membership:
Question 41.

9a awareness/knowledgeability of scheme proposals:
Not applicable for this survey.

9b critical attitude to scheme proposals:
assessed from Question 24 above

10.1 open space/recreational areas:
map data + local/borough plans

10.2 measure of use of local open space/recreational areas:
Questions 4, 5.

Appendix A-4.1 contd: Conceptual propositions (appropriate question numbers from DWSC/89)

1 That:
the more highly valued (objective assessment) an environment,
the less environmental change will be tolerated;

2 That:
those people who, generally, value the environment highly (subjective assessment) **(Q2, 3, 6)**,
will be less likely to tolerate environmental change; and vice versa **(Q7, 8)**

3 That:
those most concerned/worried about the flood risk **(Q12, 16)**, are likely to tolerate higher levels of environmental change; and vice versa **(Q7, 8)**

4 That:
there exists a scale of risk
matched to a scale of willingness to tolerate environmental change;

6 That:
those people who have experienced flooding **(Q10)** will:
a) be more aware of future flood risk **(Q19)** ;
b) be better informed about flood alleviation proposals (n/a);
c) be more favourably disposed to proposed flood alleviation works **(Q24)**;

7 That:
those people who live nearest to the river **(Distance from the river measurement)** will be most aware of the flood risk **(Q19)** ;
[be most aware of past flooding **(Q13)**];
be more likely to accept structural flood alleviation measures **(Q24, 28)**;

9 That:
those people belonging to organizations/community groups etc **(Q41)** will be more likely to:
a) be aware of scheme proposals (should any exist) (n/a);
b) take a critical stance re scheme proposals **(Q24)**;

10 That:
those people who often use local open spaces/recreational areas **(Q5)**
will be less tolerant of **proposed** environmental change **(Q24)**;

APPENDIX B

Appendix B-1: Thames Perception and Attitude Survey (1989) Questionnaire

MIDDLESEX POLYTECHNIC

FLOOD HAZARD RESEARCH CENTRE

CONFIDENTIAL

THAMES ATTITUDE SURVEY
BASELINE QUESTIONNAIRE: DATCHET - WALTON BRIDGE

FOR OFFICE USE ONLY

Questionnaire number.....

Location.....

Grid Reference:.....

Distance from river

Within x metres....1.....
Beyond x metres....2 .....

Interviewer Name.....

Interview No.....

Date.....1989.....

Time interview started.....

Time interview finished.....

Length of interview (minutes).....

Does the dwelling where the interview was carried out have a ground floor?
[CIRCLE CODE THAT APPLIES]

Yes....1.....
No....2.....

We are carrying out a survey for the Flood Hazard Research Centre at Middlesex Polytechnic. The aim of the survey is to find out peoples' views on, and use of, local amenities and recreational areas; and how people feel about river management and environmental and planning issues.

The Flood Hazard Research Centre is responsible for designing the survey and for analysing and reporting the results. The survey is supported by, but is independent of, the National Rivers Authority Unit of Thames Water. The survey is completely confidential. The names and views of individuals participating will not be revealed to anyone outside the Centre and results will be published in statistical and unidentifiable form only.

1. How long have you lived in...
   Datchet/Wraysbury/Hythe End/Egham/Staines/Thorpe/
   Laleham/Chertsey/Shepperton/Weybridge/Walton?

   [INTERVIEWER TO SELECT AND CIRCLE APPROPRIATE NAME]

.....

   1a. And how long have you lived at this address?
   [ROUND UP TO NEAREST YEAR]

.....

2. What are the advantages or disadvantages of living locally?
   [SHOW CARD A]
   Please rate each of the following on a scale of -5, major disadvantage to +5, major advantage.

```
          -5 -4 -3 -2 -1  0  1  2  3  4  5
       major            neither          major
disadvantage              one             advantage
                    nor the other
```

[RECORD CODE IN CODING COLUMN FOR EACH ITEM]	CODE
a) Access to work....	.....
b) Rates....	.....
c) Being near the river....	.....
d) Housing....	.....
e) Availability of wildlife habitats....	.....
f) Countryside nearby....	.....
g) Shopping facilities....	.....
h) Neat and clean town....	.....
i) Risk of river flooding....	.....
j) Attractive environment....	.....
k) Transport facilities....	.....
l) Open spaces for outdoor recreation....	.....
m) Other local leisure and recreational facilities....	.....
n) Any other...please specify....	.....

3. So, generally, how do you rate this local area as a place to live, on a scale of

   -5, very bad to +5, very good

   [SHOW CARD B] [RECORD CODE IN CODING COLUMN]

	CODE
-5 -4 -3 -2 -1 0 1 2 3 4 5	
very bad / neither good nor bad / very good	

4. Have you visited the River Thames or other rivers near here for recreation in the last 12 months? [CIRCLE CODE THAT APPLIES]

Yes, Thames	1
Yes, other(s)...please specify	2
None	0

[IF NONE, GO TO 5]
[IF YES]

4a. About how often do you make these visits? [READ OUT] [CIRCLE CODE THAT APPLIES]

	R.Thames	other(s): a	b	c
Daily	1			
Weekly	2			
Fortnightly	3			
Monthly	4			
At least 4 times a year	5			
2 or 3 times a year	6			
Annually	7			

5. Have you visited for recreation any of the following parks, recreation grounds, local areas of open space or countryside, including footpaths, in the last 12 months?
[SHOW CARD C (MAP A)]
[IF YES, CIRCLE ALL CODES THAT APPLY]
[IF NONE (CODE 41), GO TO 5b]

	how often	rank top 3
DATCHET		
Datchet Reservoir.....1		
'Thames Water' Lakes.....2		
Windsor Home Park.....3		
Ham Fields.....4		
WRAYSBURY		
Kingsmead.....5		
Sunnymeads.....6		
Wraysbury No. 1 and No. 2.....7		
Ankerwycke Priory.....8		
Heron Lake.....9		
Windsor Great Park....10		
EGHAM		
Englefield Green....11		
Coopers Hill Slope....12		
Runnymede....13		
Langham Pond SSSI....14		
Whitehall Lane/Great Fosters/Muckhatch Farm area....15		
Callow Hill Woodland....16		
Virginia Water....17		
Pooley Green/Egham Hythe Recreation Ground....18		
STAINES		
Staines Moor....19		
Staines Reservoirs....20		
Shortwood Common....21		
Queensmead Lake....22		
Lammas Park....23		
THORPE		
Royal Hythe Farm/Norlands Lane....24		
Fields Ten Acre Lane area....25		
Thorpe Park....26		
St Anne's Hill....27		
Penton Hook Island and area....28		
CHERTSEY		
Laleham Park, Thames-side/Laleham Campsite and Abbey....29		
Abbey Chase, Abbey Field....30		
Abbey Mead....31		
Dockett Eddy Lane....32		
Dumsey Eyot....33		
Chertsey Meads....34		
Addlestonemoor....35		
SHEPPERTON/WEYBRIDGE/WALTON		
Footpath routes - Wey navigation....36		
Shepperton Ranges....37		
Desborough Island....38		
Walton Bridge....39		
Anywhere else? please specify....40		
None of these....41		

[IF YES, HAVE VISITED SITES]

5a. About how often do you make visits to each of the areas?
[READ OUT]
[RECORD APPROPRIATE CODE IN 'HOW OFTEN' COLUMN PREVIOUS PAGE]

Daily	1
Weekly	2
Fortnightly	3
Monthly	4
At least 4 times a year	5
2 or 3 times a year	6
Annually	7

5b. Which of these parks, recreation grounds, local areas of open space or countryside, including footpaths, if any, is most valuable to you and why? Please could you rank up to 3 areas in terms of their value to you?

[WRITE IN NAME OF AREA AND PROBE WHY]
[RANK 3 MOST IMPORTANT AREAS IN 'RANK 3' COLUMN PREVIOUS PAGE]

6. Here are some general statements that people have made about the environment and today's society. They are not questions and there are no right or wrong answers, we would just like your opinions on the statements and whether you agree or disagree with them and how strongly?

Please rate them on a scale of 1, strongly agree to 5, strongly disagree.

1	2	3	4	5
strongly agree	agree	neither agree nor disagree	disagree	strongly disagree

[SHOW CARD D]
[RECORD CODE 1-5 IN CODING COLUMN FOR EACH STATEMENT]

	CODE
a) People are more important than the environment.....	.....
b) Most insects are pests and wouldn't be missed.....	.....
c) Industry should keep prices down even if this causes damage to the environment.....	.....
d) It's wrong to use animals to test the safety of cosmetics.....	.....
e) We should live in harmony with Nature even if it means some sacrifices on our part.....	.....
f) I like to be in the open air of the countryside.....	.....
g) We have to be prepared to accept a lower standard of living in order to protect the environment.....	.....
h) It's right to use animals for medical research.....	.....
i) We have no choice: we have to protect the environment or we will destroy the human race.....	.....
j) The main reason for protecting the countryside is its importance for recreation.....	.....
k) The Earth and Nature are fragile and we can easily cause irreversible damage.....	.....
l) I would love to see a kingfisher.....	.....
m) The most important problems to-day are economic problems, like inflation or unemployment.....	.....

1	2	3	4	5
strongly agree	agree	neither agree nor disagree	disagree	strongly disagree

n) The main reason for protecting plants is that we can never know when a plant might turn out to have important medical or other uses.....

o) I love seeing butterflies and dragonflies.....

p) New jobs must be created, even if this sometimes causes damage to the environment.....

q) Today's society is too materialistic.....

r) These days, morality and trying to do what's right don't seem to matter.....

s) We owe a duty to animals and nature, they don't exist just for our enjoyment and use.....

t) Without economic growth, our country will not be able to afford to do the things we want.....

u) I want my children and grandchildren to see and enjoy those things I enjoyed as a child.....

v) If we kept on worrying about the future, nothing would ever get done.....

w) The most important problems to-day are the threats to the environment.....

x) Scientists will always be able to find the solution to a problem.....

y) We seem to know the price of everything and the value of nothing.....

7. I would like to ask you whether you think the local countryside and open spaces have changed in the last 20 years?
Do you think: [READ OUT]
[CIRCLE CODE THAT APPLIES]

They are much the same	1
They have changed a bit	2
They have changed a lot	3
don't know	-9

[IF CHANGED]

7a. Do you think the local countryside and open spaces have changed for the better or worse?

[CIRCLE CODE THAT APPLIES]

better	1
worse	2
better in some ways/worse in others	3
don't know	-9

---

8. I would like to ask you whether you are concerned about things that may happen to the local countryside and open spaces.

[CIRCLE CODE THAT APPLIES]

Are you: [READ OUT]

Very concerned	1
Quite concerned	2
A bit concerned	3
Not particularly concerned	4
Not at all concerned	5

---

9. Have you ever done any of the following

[SHOW CARD E] [CIRCLE ALL CODES THAT APPLY]

	Yes	No
a) Contacted MP or Local Councillor	1	2
b) Contacted Government or Local Council Department	1	2
c) Contacted radio, T.V. or newspaper	1	2
d) Signed a petition	1	2
e) Joined an action/protest group	1	2
f) Given money to a campaign	1	2
g) Volunteered to work for a campaign	1	2
h) Attended a public meeting	1	2
i) None of these	1	2

FLOOD RISK AND FLOOD PROTECTION

Now I would like to ask you some questions about flood risk and flood protection.

10. Have you ever experienced flooding from a river in your house or garden?
[CIRCLE CODE THAT APPLIES]

Yes	1
No	2

[IF NO GO TO 11]
[IF YES]

10a. Was that at this address, elsewhere or both?
[CIRCLE CODE THAT APPLIES]

This address	1
Elsewhere	2
Both	3

[IF THIS ADDRESS OR BOTH GO TO 10b]
[IF ELSEWHERE OR BOTH GO TO 10c]

10b. When you were flooded at this address, was that in the house and garden or the garden only, and how many times?
[WRITE IN NUMBER OF TIMES]
[NEVER = 0]

House and garden	
Garden only	

[IF ELSEWHERE OR BOTH]

10c. When you were flooded elsewhere, was that in the house and garden or the garden only, and how many times?
[WRITE IN NUMBER OF TIMES]
[NEVER = 0]

House and garden	
Garden only	

10d. And where was that?
[RECORD ADDRESS IF WITHIN STUDY AREA;
IF NOT, JUST RECORD NAME OF GENERAL AREA]

.....
.....
.....

10e. Thinking of the worst flood you've experienced, how serious were the effects of the flood upon the household's life?

Please rate the effects on a scale from 0, not at all serious to 10, extremely serious
[SHOW CARD F]
[RECORD CODE IN CODING COLUMN]

CODE

0 1 2 3 4 5 6 7 8 9 10..... .....
not at all serious — extremely serious

10f. Was that at this address or elsewhere?
[CIRCLE CODE THAT APPLIES]

This address.... ..1.....
Elsewhere...please specify.... ..2.....
....
....
....

10g. What year was that?
[WRITE YEAR IN CODING COLUMN]

CODE

....

---

11. Have you known personally anyone who has experienced flooding in their house or garden?
[CIRCLE CODE THAT APPLIES]

Yes.... ..1.....
No.... ..2.....

---

12. If your house were to be flooded from the Thames or other rivers, how serious do you think the effects would be on the life of your household?

Please rate this event on the following scale:
[SHOW CARD F AGAIN]
[RECORD CODE IN CODING COLUMN]

CODE

0 1 2 3 4 5 6 7 8 9 10..... .....
not at all serious — extremely serious

13. Are you aware of...

Datchet/Wraysbury/Hythe End/Egham/Staines/Thorpe/
Laleham/Chertsey/Shepperton/Weybridge/Walton.....

[CIRCLE APPROPRIATE NAME]

...having been flooded in the last 50 years?
[CIRCLE CODE THAT APPLIES]

Yes	1
No	2
Don't know	-9

[IF NO GO TO 14]
[IF YES]
13a. When was that?
[WRITE DATE(S) ON DOTTED LINES,
LEAVE CODING COLUMN FREE]

.....
.....
.....
.....

13b. Was this house or garden affected by the flooding that occurred then?

[CIRCLE ALL CODES THAT APPLY]

	Yes	No	dk
House	1	2	-9
Garden	1	2	-9

.....
.....

[IF YES]
13c. What was the depth of flooding here?
[DON'T KNOW = -9]

[WRITE IN FEET/INCHES/METRES - PLEASE SPECIFY]
[LEAVE CODING COLUMN FREE]

DATE:.....
DATE:.....
.....
.....

13d. Do you know if the flooding was caused by river flooding or by some other cause such as blocked drains etc?

Don't know	-9
River flooding	1
Other cause, please specify	2
DATE:	
DATE:	

[IF RIVER FLOODING]

13e. Do you know which river caused the flooding?

Yes (please name)	1
RIVER	
No	2

13f. Do you have any photographs of the flood(s)?

Yes	1
No	2

13g. Do you have any other recollections of the flooding?

Yes	1
No	2

[IF YES TO (f) or (g)]

13h. Would you be willing to lend the photographs or agree to this information being released to the National Rivers Authority Unit of Thames Water, as they are trying to build up a picture of past flooding?

Yes	1
No	2

13i. Would you mind possibly being re-interviewed about your recollections?

Yes	1
No	2

14. Here are some statements about flooding and what it is like. I would like to ask you whether you agree with them or not and how strongly.

Please rate them on a scale of 1, strongly agree to 5, strongly disagree.
[SHOW CARD G]

1	2	3	4	5
strongly agree	agree	neither agree nor disagree	disagree	strongly disagree

[RECORD CODE 1-5 IN CODING COLUMN FOR EACH STATEMENT]

	CODE
a) There are problems getting insurance in this local area because of the flood risk	.....
b) You can get some fun out of every situation - even flooding	.....
c) It takes months rather than weeks to get the house back to normal after a flood	.....
d) Nobody wants to buy your house if it gets flooded	.....
e) If you live in flood prone areas, flooding is at the back of your mind all the time	.....
f) If you live in areas liable to flooding, you can't get any insurance	.....
g) We don't have real floods here	.....
h) The worst thing about floods is not the monetary costs but the loss of personal possessions like letters and photographs	.....
i) Flooding brings out the best in people	.....
j) A flood affects people's mental and physical health long after the event	.....

15. Here are some opinions that have been expressed about the flood risk in this area.
Do you agree or disagree with them, and how strongly?

Please rate them on a scale of 1, strongly agree to 5, strongly disagree.
[SHOW CARD H]

1	2	3	4	5
strongly agree	agree	neither agree nor disagree	disagree	strongly disagree

[RECORD CODE 1-5 IN CODING COLUMN FOR EACH STATEMENT] — CODE

(a) The Thames Barrier at Woolwich has removed the risk of flooding in this area..... .....

(b) Flooding is only likely in the area if rivers, streams, locks and weirs are not properly maintained or operated.. .....

(c) Past flooding was a freak event, unlikely to happen again..... .....

(d) The likelihood of flooding in the area is increasing all the time because of changes in climate and other things.. .....

(e) A flood could happen again any year..... .....

(f) A flood won't happen again because the Water Authority can now control flooding through river management..... .....

(g) We are now due for another flood..... .....

(h) Building roads and houses in the flood plain makes flooding worse..... .....

---

16. How worried are you about the possibility of flooding in the future in your local area?
Please indicate on a scale of 0, not at all worried to 6, very worried

[SHOW CARD I] [RECORD CODE IN CODING COLUMN] — CODE

0	1	2	3	4	5	6.....
not at all worried						very worried

17. How likely do you think it is that this house/flat will be flooded in the following time periods?

Please rate each of the following on a scale of 0, no chance of flooding to 10, certain to be flooded [SHOW CARD J]

0 1 2 3 4 5 6 7 8 9 10
No chance Almost certain

[RECORD CODE IN CODING COLUMN FOR EACH ITEM]

	CODE
(a) In the next 5years...	.....
(b) In the next 10 years...	.....
(c) In the next 50 years...	.....
(d) In the next 100 years...	.....
(e) In the next 200 years...	.....

18. Would you be prepared to live in this same area if the risk of flooding were as follows:

[SHOW CARD K]
[CIRCLE ALL CODES THAT APPLY]

	Yes	No
a) a 1 in 200 risk, each and every year, that your house would be flooded.....	1	2
b) a 1 in 100 risk, each and every year, that your house would be flooded.....	1	2
c) a 1 in 50 risk, each and every year, that your house would be flooded.....	1	2
d) a 1 in 25 risk, each and every year, that your house would be flooded.....	1	2
e) a 1 in 10 risk, each and every year, that your house would be flooded.....	1	2
f) a 1 in 5 risk, each and every year, that your house would be flooded.....	1	2

19. Flooding has occurred in the past in this study area - between Datchet and Walton Bridge - and there is no reason to believe that it will not happen again. Are you aware that there is this possibility of flooding?
[CIRCLE THAT WHICH APPLIES]

Yes	1
No	2

[IF NO GO TO 20]
[IF YES]

19a. Where did you hear this?
[CIRCLE ALL CODES THAT APPLY]

	Yes	No
Newspaper	1	2
Television	1	2
Neighbour(s)	1	2
Personal observation/experience	1	2
Other...please specify	1	2
.....		
.....		
.....		
.....		

19b. Were you aware of this possibility when you moved here?
[CIRCLE CODE THAT APPLIES]

Yes	1
No	2
Don't know/can't remember	-9

[IF NO]

19c. Would you still have moved here if you had known of the possibility of flooding?

Yes	1
No	2
Don't know	-9

[IF YES]

19d. Could you tell me your reasons for moving here even though you knew about the possibility of flooding?
[RECORD ANSWER VERBATIM: PROBE]

.....
.....
.....
.....
.....

20. The Local Authority is responsible for granting planning permission to build in the flood plain. The Water Authority advises it on the flood risk.

Here are some statements about planning and planning decisions in flood prone areas.

Do you agree or disagree, and how strongly, with the following statements?
[SHOW CARD L]

Please rate them on a scale of 1, strongly agree to 5, strongly disagree.

1	2	3	4	5
strongly agree	agree	neither agree nor disagree	disagree	strongly disagree

[RECORD CODE 1-5 IN CODING COLUMN FOR EACH STATEMENT]

	CODE
a) Local Authorities shouldn't allow houses to be built in areas where there is a 1 in 50 risk of flooding.....	.....
b) Local Authorities shouldn't allow houses to be built in the wider area where there is a 1 in 100 risk of flooding.....	.....
c) The Local Authority should ensure that houses are built with thresholds above the flood level in flood prone areas.....	.....

21. What restrictions, if any, should the Local Authority place on new developments and redevelopment in this study area - between Datchet and Walton Bridge - because of the flood risk?

[SHOW CARD M] [CIRCLE ALL CODES THAT APPLY]

Should it...	YES	NO
a) allow no new developments in this area because of the flood risk	1	2
b) allow only a percentage of new developments to be built because of the flood risk	1	2
c) allow new developments up to a limited ground cover size because of the flood risk	1	2
d) allow applications for house extensions as long as they do not exceed 100 square metres because of the flood risk	1	2
e) place no planning restrictions on new developments or redevelopment because of the flood risk	1	2
f) or do you think there is no flood risk in this area and therefore no planning restrictions are necessary	1	2
g) other...please specify	1	2
.....	.....	
.....	.....	

Now I would like to ask you some questions about flood protection.

Water authorities and local authorities can provide varying degrees of protection from flooding by structural means such as widening, dredging and embanking the river and by digging flood relief channels to carry away flood waters. They can also provide flood warning systems and other assistance to reduce the effects of flooding.

22. Could you tell me which of the following alternative methods of flood protection you would prefer in both urban and rural areas.

[SHOW CARD N]

For URBAN areas would you prefer:

[CIRCLE CODES 1 or 2, and 3 or 4 IN URBAN CODING COLUMN]

	URBAN	RURAL
1. floodwalls, of up to a metre in height, made of concrete or brick	1	1
OR		
2. embankments, of up to a metre in height, made of grassed over earth mounds	2	2

Would you prefer:

3. a landscaped, concrete-lined flood relief channel to carry away excess flood waters	3	3
OR		
4. a landscaped river channel with natural earth banks to carry away excess flood waters	4	4

22a. And for RURAL areas? which would you prefer:

[REPEAT Q.22]
[CIRCLE CODES 1 or 2, and 3 or 4 IN RURAL CODING COLUMN ABOVE]

23. Here are some factors which people have said should be taken into account when carrying out river management and flood relief schemes.

Would you indicate how much weight you think should be given to each of the following factors.

Please rate them on the following scale
[SHOW CARD O]

0 1 2 3 4 5 6 7 8 9 10
No importance ... Very important

[RECORD CODE 0-10 IN RATING COLUMN FOR EACH STATEMENT]

	RATE	RANK
(a) The effect on the landscape		
(b) The effect on value of houses		
(c) The effect on wildlife habitats		
(d) The effect on recreational opportunities for walking, fishing etc		
(e) The effect on access to the Thames		
(f) The effect on historical or archaeological sites in the area		
(g) The cost of the works		
(h) Safety considerations		
(i) Disturbance to everyday life caused by construction works		
(j) Any other factors. Please specify		
.....		

23a. Now please can you rank the 5 most important from:

1, the most important factor to 5, the least important
[RECORD CODES 1-5 IN RANKING COLUMN ABOVE]

24. Here are some statements that have been made about flood protection in this area.
Do you agree or disagree with them and how strongly?

Please rate them on a scale of 1, strongly agree to 5, strongly disagree.
[SHOW CARD P]

1	2	3	4	5
strongly agree	agree	neither agree nor disagree	disagree	strongly disagree

[RECORD CODE 1-5 IN CODING COLUMN FOR EACH STATEMENT]

	CODE
a) Anything designed to reduce flooding is desirable.....	.....
b) There are many more important things which need to be done than flood relief schemes.....	.....
c) Metre high flood protection embankments spoil the view....	.....
d) A flood relief scheme should be carried out in this area regardless of cost.....	.....
e) It is a waste of money to spend it on flood relief channels: nature will always win in the end.....	.....
f) A flood relief channel could offer new opportunities for recreation.....	.....
g) I would rather put up with flooding than spoil the open space here with flood relief channels.....	.....
h) I would rather the Thames were widened and dredged than a new flood relief channel were dug in this area.....	.....
i) Flood relief schemes will only bring more development into the area.....	.....
j) A flood relief scheme can enhance the environment.....	.....
k) I would rather have any scheme than be flooded.....	.....
l) I would rather rely on flood warnings and risk being flooded than have any flood relief scheme in this area....	.....
m) A flood relief channel would be preferable to raised flood embankments in this area.....	.....
n) A flood relief channel the size of the Thames would have a terrible impact on the environment.....	.....
o) There is no need for a flood relief scheme in this area because the flood risk is too low.....	.....

Choosing a level of flood protection involves a choice between the risk and severity of flooding which must be accepted AND the size of the works required for protection. The scale of the works depends on the quantity of floodwater in a given flood.
Works can consist of (amongst other things) one or more of the following:

a) dredging and widening the river;
b) building floodwalls or embankments;
c) digging new flood channels.

The bigger the flood that you are providing protection against, the less choice there is in the method of protection.

25. Can you estimate how much extra flood water there would be in the Thames in a repeat of the 1947 flood which was the last major Thames flood? Would it be: [READ OUT] [CIRCLE CODE THAT APPLIES]

a) half as much again as the Thames can carry to the top of its banks without flooding	..1.....
b) the same amount again as the Thames can carry to the top of its banks without flooding	..2.....
c) twice as much again as the Thames can carry to the top of its banks without flooding	..3.....
d) don't know	.-9.....

26. Can you estimate how many households between Datchet and Walton Bridge would be flooded above floor level in a repeat of the 1947 flood? Would it be:
[SHOW CARD Q]
[CIRCLE CODE THAT APPLIES

under 100	.1.....
100	.2.....
500	.3.....
1,000	.4.....
5000	.5.....
10,000	.6.....
20,000	.7.....
30,000	.8.....
more than 30,000	.9.....
don't know	-9

27. Can you estimate for how long, on average, households could be flooded in a repeat of the 1947 flood? Would it be: [READ OUT]
[SHOW CARD R] [CIRCLE CODE THAT APPLIES]

a few hours	.1.....
1 day	.2.....
3 days	.3.....
1 week	.4.....
2 weeks	.5.....
3 weeks	.6.....
longer than 3 weeks	.7.....
don't know	-9

28. The following are generalised accounts of the kind of flooding that might occur as a result of floods of different magnitudes.

Based on these accounts, what level of flood protection do you think the Water Authority should provide in this study area - between Datchet and Walton Bridge?

Should it carry out flood protection schemes to help protect against flooding...

[CIRCLE CODE THAT APPLIES]

1) that has a 1 in 10 chance of happening every year:

which would mean, within a limited area and for a limited number of people;

a flood that would last for about 1 to 3 days;

involving garden flooding and possibly some flooding of riverside properties; having to drive through floodwater; particularly inconvenient for children, elderly and disabled;

and which would require a fairly low level of protection;
that would not protect people or property from rarer floods (with a 1 in 25, 1 in 50, or 1 in 100 chance of happening every year, for instance) that cause greater damage;

involving limited works to the river and possibly embanking or building flood walls.....|..1.....

2) that has a 1 in 25 chance of happening every year:

which would mean, within a larger area and for a larger number of people;

a flood that would last for about 5 to 6 days;

involving all of the above plus some riverside houses flooded, work journeys severely disrupted; foul drainage overflowing and contaminating floodwaters; severe annoyance;

and which would require a medium level of protection; that would not protect people or property from rarer floods (with a 1 in 50, or 1 in 100 chance of happening every year, for instance);

involving dredging, widening and embanking of the River Thames and possibly building flood walls.....|..2.....

3) that has a 1 in 50 chance of happening every year:

which would mean, over a much larger area and for a much greater number of people,

a flood that would last for about a week to 10 days;

involving all of the above plus work journeys impossible; water entering many outhouses and house foundations; some house flooding with water above floor level; severe annoyance and financial loss and worry; localised loss of services (gas, electricity, telephone etc);

and which would require a high level of protection;

that would not protect people or property from rarer floods (with a 1 in 100 chance of happening every year, for instance);

possibly involving a flood relief channel.....3.....

4) that has a 1 in 100 chance of happening every year:

which would mean, over a considerable area and for a communities of people;

flooding that would last for about a fortnight or more;

involving all of the above plus house flooding with water above floor level; widespread disruption; general loss of services (gas, electricity, telephone etc); substantial financial losses and worry;

and which would require a very high level of protection;

probably involving a flood relief channel and other works.....4.....

e) No flood protection scheme.....5.....

28a. What was the most important factor in making your choice?
Could you rank the following factors from 1 most important to 4 least important factor.
[WRITE CODES IN RANKING COLUMN]
[IF ALL EQUALLY IMPORTANT RECORD 1 AGAINST f.]

RANK

a) the frequency of flooding.....
b) the area and number of people to be affected.....
c) the nature of the flooding in terms of the likely distress and disruption.....
d) the nature of the flood protection works.....
e) other...please specify.....
f) all equally important.....

29. Do you think that the Water Authority should provide the same level of flood protection throughout the study area between Datchet and Walton Bridge - or should it provide different levels of flood protection depending on local conditions and the wishes of local communities?
[CIRCLE CODE THAT APPLIES]

Same level of protection throughout the study area	1
Different levels of protection depending on local conditions and the wishes of local communities	2

[IF 2, GO TO 29a.]

29a. Would you choose a different level of protection, and if so what, for your local area?

Yes, different	1
No, the same	2

[IF YES, DIFFERENT, REFER BACK TO GENERALISED ACCOUNTS IN 28. ABOVE]
[CIRCLE CODE THAT APPLIES]

1 IN 10	1
1 IN 25	2
1 IN 50	3
1 IN 100	4
NONE	5
OTHER...PLEASE SPECIFY	6

.....
.....

30. Do you feel you have enough information with which to decide the level of flood protection you would like for the study area - between Datchet and Walton Bridge?
[CIRCLE CODE THAT APPLIES]

Yes	1
No	2

[IF YES, GO TO 30b.]
[IF NO]

30a. What kind of information do you think would be helpful?
[RECORD VERBATIM AND PROBE]

.....
.....
.....
.....
.....

30b. Do you have any other comments to make on flood protection?
[RECORD VERBATIM AND PROBE]

.....
.....
.....
.....

31. The NRA Unit of Thames Water Authority is currently the main body responsible for designing and implementing schemes to protect against river flooding in this area.

Here are some statements that have been made about the way the Water Authority carries out this responsibility.

Do you agree or disagree with the following statements and how strongly?

[SHOW CARD U]

1	2	3	4	5	-9
strongly agree	agree	neither agree nor disagree	disagree	strongly disagree	don't know

[RECORD CODE 1 TO -9 IN CODING COLUMN FOR EACH STATEMENT]

	CODE
(a) The Water Authority knows best what kind of flood relief scheme is needed: I trust their experts' opinion..	.....
(b) The Water Authority only proposes flood relief schemes when they are really needed to reduce the flood risk.....	.....
(c) The Water Authority can now control flooding through river management so that flood relief schemes are not necessary.....	.....
(d) The Water Authority cannot be relied upon to design an environmentally sensitive flood relief scheme.....	.....
(e) The Water Authority doesn't take the public's views into account when deciding on a flood relief scheme.....	.....
(f) The Water Authority consults the people affected fully when developing plans for a flood relief scheme....	.....
(g) Some people affected by a flood relief scheme have more influence on the decisions of the Water Authority than others.....	.....
(h) The Water Authority spends too much money on flood relief schemes.....	.....
(i) The Water Authority designs flood relief schemes that enhance the local environment.....	.....

32. If the National Rivers Authority Unit of Thames Water were to propose a flood relief scheme for this area, how soon do you think it should consult the public? Should it consult them...
[SHOW CARD V]
[CIRCLE CODE THAT APPLIES]

a) Before it selects any options for the design or route?	1
b) When it has selected a number of possible options for the design and route so that the public can choose between them?	2
c) When it has chosen a preferred option for the design and route for people to comment upon?	3
d) Or do you think it shouldn't consult at all but should go ahead with whatever it thinks best	4
e) Other...please specify	5

33. In your view, should the NRA Unit of Thames Water...
[SHOW CARD W]
[CIRCLE CODE THAT APPLIES]

a) only consult the general public directly	1
b) only consult through representatives such as parish councils, residents' committees, wildlife and amenity groups etc	2
c) consult both the public directly and through representatives	3
d) shouldn't consult	4
e) other...please specify	5

34. How would you prefer to be consulted about any flood risk or flood relief proposals for this area?
[CIRCLE ALL CODES THAT APPLY]
[SHOW CARD X]

	Yes	No
a) Public meetings	1	2
b) Walk-round exhibitions	1	2
c) Video presentations	1	2
d) Regular newsletters	1	2
e) Other...please specify	1	2

GENERAL.
These questions are standard for questionnaires and are only for our own classification purposes. Your answers are entirely confidential.

35. Respondents sex
[CIRCLE CODE THAT APPLIES]

Female	0
Male	1

36. To which of the following age groups do you belong?

Under 18	1
18 - 34	2
35 - 54	3
55+	4

37. How many people are there in your household in each of the following groups?
[RECORD NUMBER IN EACH GROUP ON DOTTED LINE BUT LEAVE CODING COLUMN FREE]

Children 10 and under	.....
Children 11 - 16	.....
Adults aged 65 and over	.....
Other adults	.....

38. Can you tell me at what age you completed full-time education

.....	.....
Still in full-time education	1

39. Do you own your own home?

Yes	1
No	2

40. Which of the letters on this card represents the gross annual income, from all sources, of your household?
[SHOW CARD Y] [CIRCLE THAT WHICH APPLIES]

g	under 5,000	1
d	5,001 - 10,000	2
s	10,001 - 15,000	3
b	15,001 - 20,000	4
e	20,001 - 25,000	5
m	25,000 and over	6

[CODE BUT DON'T READ OUT]

Refused	7
Don't know	-9

41. Would you please tell me whether you are a member of, or regularly give money to, any of the following organisations?
[SHOW CARD Z]

	Yes	No
National Trust	1	2
World Wide Fund for Nature (used to be the World Wildlife Fund)	1	2
A Political Party	1	2
Local or County Naturalists' Trust	1	2
Royal Society for the Protection of Birds	1	2
A Sports Club	1	2
A Civic or Community Association	1	2
Any other environmental group (e.g. Greenpeace/Friends of the Earth)	1	2

41a. Is there anyone else in your household who is a member of, or regularly gives money to, any of these organizations?

Yes	1
No	2
Don't know	-9

42. Does your insurance policy/policies cover the risk of flooding?
[CIRCLE CODE THAT APPLIES]

Yes	1
No	2
Don't know	-9
Don't have any insurance	3

43. Have you taken any precautions against flooding?

Yes	1
No	2

[IF YES]
43a. What precautions have you taken?
[RECORD VERBATIM]

That is the end of the questionnaire and I would like to thank you for giving so much of your time.

It would be helpful if you could give me your name, address and telephone number as the Flood Hazard Research Centre makes random checks to ensure that interviews have been carried out satisfactorily. These details will be on a detachable sheet and the confidentiality of your answers is assured. Please do not feel you have to give these details if you do not wish to.

RESPONDENT'S NAME.....

RESPONDENT'S ADDRESS.....

.....

RESPONDENT'S TELEPHONE NUMBER.....

INTERVIEW NUMBER.....

INTERVIEWER'S NAME.....

INTERVIEWER'S SIGNATURE.....

ADDITIONAL NOTES.....

.....

.....

.....

.....

.....

.....

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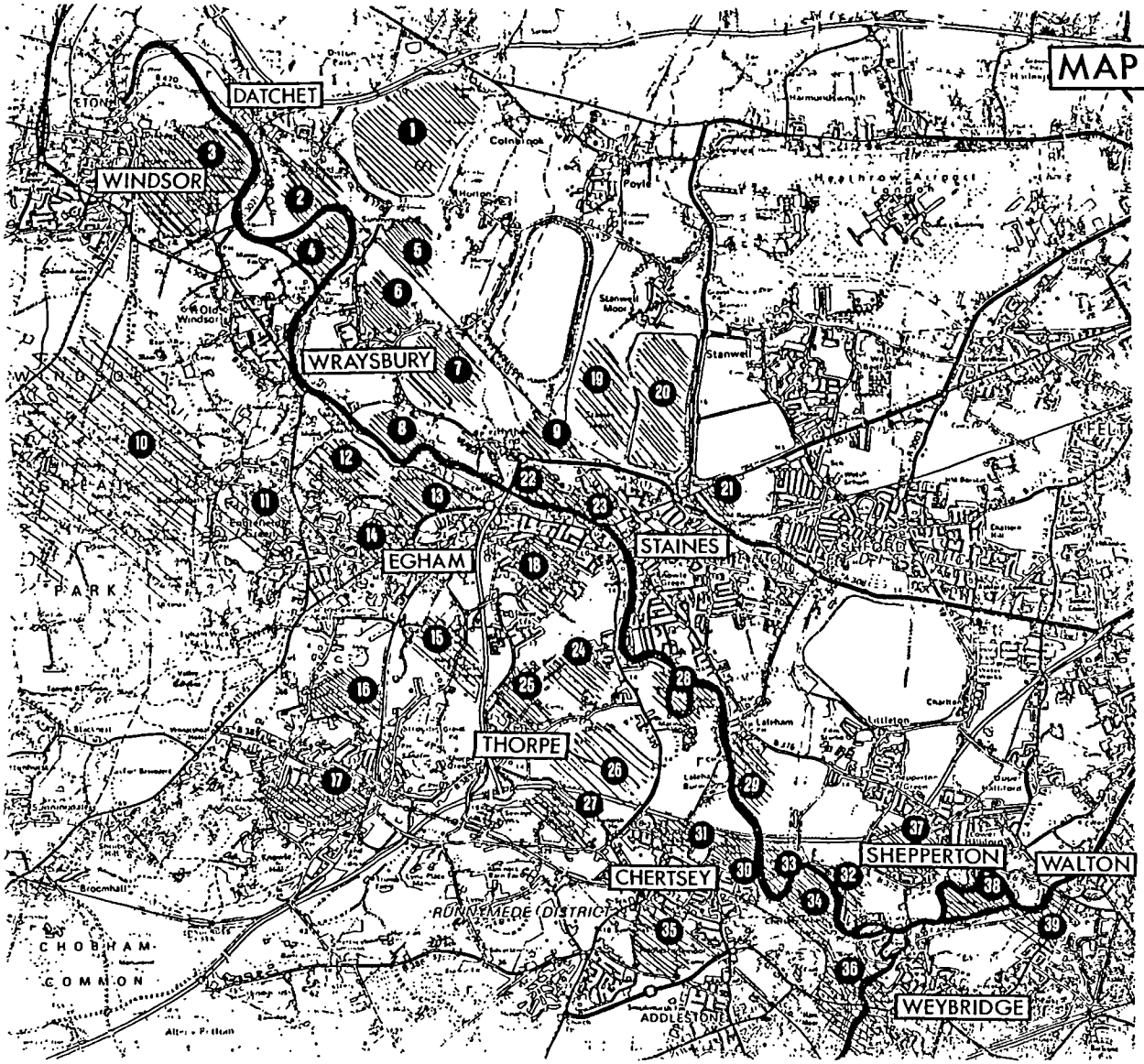
FOR OFFICE USE ONLY:
QUESTIONNAIRE NUMBER:.....

[MAINBASE SUMMER 1989]

MAP OF LOCAL AREAS



DATCHET
1 Datchet Reservoir
2 'Thames Water' Lakes
3 Windsor Home Park
4 Ham Fields

WRAYSBURY
5 Kingsmead
6 Sunnymeads
7 Wraysbury No. 1 and No. 2
8 Ankerwycke Priory
9 Heron Lake
10 Windsor Great Park

EGHAM
11 Englefield Green
12 Coopers Hill Slope
13 Runnymede
14 Langham Pond SSSI
15 Whitehall Lane/Great Fosters/
Muckhatch Farm area
16 Callow Hill Woodland
17 Virginia Water
18 Pooley Green/Egham Hythe
Recreation Ground

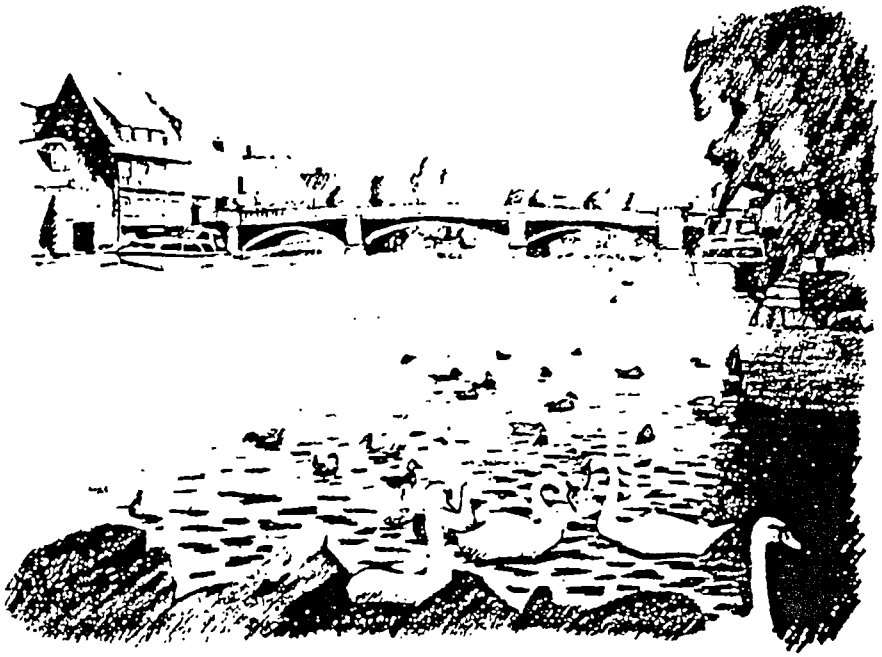
STAINES
19 Staines Moor
20 Staines Reservoirs
21 Shortwood Common
22 Queensmead Lake
23 Lammas Park

THORPE
24 Royal Hythe Farm/Norlands Lane
25 Fields Ten Acre Lane area
26 Thorpe Park
27 St Anne's Hill
28 Penton Hook Island and area

CHERTSEY
29 Laleham Park, Thames-side/
Laleham Campsite and Abbey
30 Abbey Chase, Abbey Field
31 Abbey Mead
32 Dockett Eddy Lane
33 Dumsey Eyot
34 Chertsey Meads
35 Addlestonemoor

SHEPPERTON/WEYBRIDGE/WALTON
36 Footpath routes - Wey navigation
37 Shepperton Ranges
38 Desborough Island
39 Walton Bridge

The River Environment and You



Middlesex Polytechnic
Flood Hazard Research Centre

MIDDLESEX POLYTECHNIC

FLOOD HAZARD RESEARCH CENTRE

THE RIVER ENVIRONMENT AND YOU

CONFIDENTIAL

For your assurance:

(1) the names and views of individuals participating in this survey will not be revealed to anyone outside the Flood Hazard Research Centre; and
(2) the results will be published in an unidentifiable statistical form only.

Please write any extra comments you would like to make on the blank areas of the questionnaire, but leave the right hand margin free.

[Q.1] How long have you lived in this area?

.....Years .....Months

[Q.2] What are the advantages or disadvantages of living locally?

PLEASE RATE EACH OF THE FOLLOWING ON A SCALE OF:
1 = Major disadvantage, to 5 = Major advantage

1	2	3	4	5
Major Disadvantage	Disadvantage	Neither advantage nor disadvantage	Advantage	Major advantage

PLEASE WRITE EACH RATING NUMBER IN THE BOX PROVIDED

(a) Ease of access to work.....
(b) New building developments.....
(c) Being near the river.....
(d) Aircraft noise.....
(e) Attractive countryside.....
(f) Risk of river flooding.....
(g) Any other?.....

[Q.3] So, how do you rate this local area generally as a place to live?

On a scale of: 0 = Very bad, to 10 = Very good

PLEASE TICK BOX

Very bad										Very good
0	1	2	3	4	5	6	7	8	9	10
☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐

[Q.4] Do you visit the river(s) nearby for recreation?

PLEASE TICK BOX

Yes..... ☐ No..... ☐

[Q.4a] IF YES, Which river(s) do you visit and how often?

NAME OF RIVER.....

PLEASE TICK BOX

daily..... ☐
weekly..... ☐
monthly..... ☐
twice a year..... ☐
once a year..... ☐

NAME OF SECOND RIVER.....

PLEASE TICK BOX

daily..... ☐
weekly..... ☐
monthly..... ☐
twice a year..... ☐
once a year..... ☐

[Q.4b] What is it that you like about visiting the river?

.....

.....

.....

.....

.....

[Q.5] Here are some general statements that people have made about the environment and today's society. They are not questions and there are no right or wrong answers - we would just like your opinions on the statements.

PLEASE RATE THEM ON A SCALE OF:
1 = Strongly agree, to 5 = Strongly disagree

1	2	3	4	5
Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree

PLEASE WRITE EACH NUMBER IN THE BOX PROVIDED

(a) People are more important than the environment.... ☐

(b) We should live in harmony with Nature even if it means some sacrifices on our part..... ☐

(c) The most important problems today are the threats to the environment..... ☐

(d) It's right to use animals for medical research.... ☐

(e) Scientists will always be able to find the solution to a problem..... ☐

(f) These days, morality and trying to do what's right don't seem to matter..... ☐

(g) The most important problems today are economic problems, like unemployment or inflation..... ☐

(h) It's wrong to use animals to test the safety of cosmetics..... ☐

(i) I like to be in the open air of the countryside... ☐

(j) We seem to know the price of everything and the value of nothing..... ☐

Now we would like to ask you some questions about flood risk and flood protection.

[Q.6] Have you ever experienced flooding from a river in your house or garden?

PLEASE TICK BOX: Yes..... ☐ No..... ☐

IF 'YES', GO ON TO ANSWER QUESTION [Q.6a]
IF 'NO', GO ON TO [Q.7]

[Q.6a] When did you experience flooding from a river in your house or garden? (Month/Year)

House.....

.....

Garden.....

.....

[Q.6b] When you experienced flooding, was that at this address or elsewhere?

PLEASE TICK BOX

This address..... ☐ elsewhere..... ☐

[Q.6c] Do you know which river caused the flooding?

No, I don't know (please tick).....

Yes, the name of the river is.....

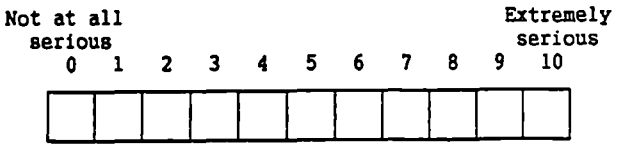
.....

.....

[Q.6e] Thinking of the worst flood you've experienced, how serious were the effects of the flood upon the household's life?

PLEASE RATE THE EFFECTS ON A SCALE FROM:
0 = Not at all serious, to 10 = Extremely serious

PLEASE TICK BOX



Please use the space below for any additional comments about the flood you experienced

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

[Q.7] Are you aware of the flooding that occurred in February 1990?

PLEASE TICK BOX

In this area? Yes.... ☐ No.... ☐

In other areas? Yes.... ☐ No.... ☐

[Q.7a] If 'yes', which other areas?.....

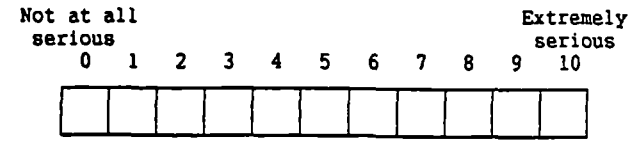
.....

.....

[Q.8] If your house were to be flooded from the Thames or other rivers, how serious do you think the effects would be on the life of your household?

PLEASE RATE THE LIKELY EFFECTS ON A SCALE FROM:
0 = Not at all serious, to 10 = Extremely serious

PLEASE TICK BOX



.....

.....

.....

.....

[Q.9] Here are some statements that people have made about floods and the flood risk in this area. I would like to ask you whether you agree with them or not.

PLEASE RATE ON A SCALE OF:
1 = Strongly agree, to 5 = Strongly disagree

1	2	3	4	5
Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree

PLEASE WRITE EACH RATING NUMBER IN THE BOX PROVIDED

(a) A flood could happen again any year..... ☐

(b) A flood affects people's mental and physical health long after the event..... ☐

(c) The Thames Barrier at Woolwich has removed the risk of flooding in this area..... ☐

(d) There are problems getting insurance in this local area because of the flood risk..... ☐

(e) A flood won't happen again because the National Rivers Authority can control flooding through river management..... ☐

(f) The likelihood of flooding is increasing all the time because of changes in climate and the global environment..... ☐

(g) We don't have real floods here..... ☐

(h) Flooding is only likely in the area if rivers, streams, locks and wiers are not properly maintained or operated..... ☐

(i) Past flooding was a freak event and is unlikely to happen again..... ☐

[Q.10] How worried are you about the possibility of flooding in the future in this area?

PLEASE INDICATE ON A SCALE OF:
0 = Not at all worried, to 6 = Very worried

PLEASE TICK BOX

Not at all worried						Very worried
0	1	2	3	4	5	6

[Q.11] How likely do you think it is that this house/flat will be flooded in the following time periods?

PLEASE RATE ON A SCALE OF:
0 = No chance, to 10 = Almost certain

0	1	2	3	4	5	6	7	8	9	10
No chance										Almost certain

PLEASE WRITE EACH RATING NUMBER IN THE BOX PROVIDED

In the next 5 years.....	
In the next 10 years.....	
In the next 50 years.....	
In the next 100 years.....	
In the next 200 years.....	

[Q.12] Would you be prepared to live in this same area if the risk of flooding were as follows:

PLEASE TICK EITHER YES OR NO FOR EACH QUESTION

(a) a 1 in 200 risk, each and every year, that your house would be flooded? Yes.....No.....

(b) a 1 in 100 risk, each and ever year, that your house would be flooded? Yes.....No.....

(c) a 1 in 50 risk, each and every year, that your house would be flooded? Yes.....No.....

(d) a 1 in 25 risk, each and every year, that your house would be flooded? Yes.....No.....

(e) a 1 in 10 risk, each and every year, that your house would be flooded? Yes.....No.....

(f) a 1 in 5 risk, each and every year, that your house would be flooded? Yes.....No.....

For any additional comment(s).....

.....

.....

.....

.....

.....

.....

[Q.13] **Flooding has occurred in the past in this area and there is no reason to believe that it will not happen again. Were you aware before receiving this questionnaire that there is this possibility of flooding?**

PLEASE TICK BOX Yes..... ☐ No..... ☐

IF YOU ANSWERED 'YES' PLEASE GO ON TO ANSWER Q.13a AND FOLLOWING QUESTIONS.
IF YOU ANSWERED 'NO' PLEASE GO ON TO ANSWER Q.13e.

[Q.13a] **Were you aware of the possibility of flooding when you moved here?**

PLEASE TICK BOX Yes..... ☐ No..... ☐

IF 'YES', ANSWER [Q.13b]. IF 'NO', GO ONTO [Q.13e]

[Q.13b] **Where did you hear this?**

PLEASE TICK BOX

Newspaper..... ☐
Television..... ☐
NRA/Thames Water leaflet..... ☐
Solicitor (when buying house)..... ☐
Insurance company..... ☐
Neighbour(s)..... ☐
Personal observation/experience..... ☐
Other..... ☐

.....

[Q.13c] **Did this influence your decision to move here and, if so how?**

PLEASE TICK BOX: Yes..... ☐ No..... ☐

.....

.....

[Q.13d] Could you tell me your reasons for moving here even though you were aware of the possibility of flooding?

.....

.....

.....

.....

.....

.....

(PROCEED TO [Q.14])

[Q.13e] Would you still have moved here if you had known about the possibility of flooding?

PLEASE TICK BOX Yes..... ☐ No..... ☐

IF 'YES', ANSWER [Q.13f]. IF 'NO', GO ON TO [Q.14]

[Q.13f] Could you tell me the reasons why you would still have moved here if you had known about the possibility of flooding?

.....

.....

.....

.....

.....

.....

[Q.14] The local authority is responsible for granting permission to build in the flood plain. The National Rivers Authority (N.R.A.) advises the local authority on the flood risk.

Here are some statements about planning and planning decisions in this area. Do you agree or disagree with them?

Please rate them on a scale of:
1 = Strongly agree, to 5 = Strongly disagree

1	2	3	4	5
Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree

PLEASE WRITE EACH RATING NUMBER IN THE BOX PROVIDED

(a) The local authority should not allow houses to be built in areas where there is a 1 in 50 chance of flooding each year..... ☐

(b) The local authority should not allow houses to be built in areas where there is a 1 in 100 chance of flooding each year..... ☐

(c) The local authority should ensure that houses are built with thresholds above the flood level in flood prone areas..... ☐

(d) The local authority should not allow any new developments because of the flood risk..... ☐

(e) The local authority should only allow applications for house extensions in this area if they do not exceed 10 square metres..... ☐

(f) If the alternative sites for development involve damage to areas of landscape or environmental value, the local authority should allow development in the flood plain..... ☐

For any additional comments.....

.....

.....

.....

[Q.15] Here are some statements that have been made about flood defence in this area. Do you agree or disagree with them?

PLEASE RATE THEM ON A SCALE OF:
1 = Strongly agree, to 5 = Strongly disagree

1	2	3	4	5
Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree

PLEASE WRITE EACH RATING NUMBER IN THE BOX PROVIDED

(a) A flood relief scheme should be carried out in this area regardless of cost..... ☐

(b) I would rather put up with flooding than spoil the open space here with a flood relief channel... ☐

(c) I would rather have any scheme than be flooded.... ☐

(d) There is no need for a flood relief scheme in this area because the flood risk is too low..... ☐

(e) A flood relief scheme should be carried out in this area regardless of impact on the environment..... ☐

(f) I would rather the Thames were widened to twice its existing width than a new flood relief channel were dug in this area..... ☐

(g) I would rather rely on flood warnings and risk being flooded than have any flood relief scheme in this area..... ☐

(h) Anything designed to reduce flooding is desirable..... ☐

(i) Flood relief schemes will only bring more development into the area..... ☐

[Q.16] The National Rivers Authority (N.R.A.) Thames Region is the main body responsible for designing and implementing flood defence schemes in this area.

Here are some statements that have been made about the way the N.R.A. carries out this responsibility - do you agree or disagree?

Please rate them on a scale of:
1 = Strongly agree, to 5 = Strongly disagree

1	2	3	4	5
Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree

PLEASE WRITE EACH RATING NUMBER IN THE BOX PROVIDED

(a) The National Rivers Authority knows best what kind of flood relief scheme is needed: I trust their experts' opinion..... ☐

(b) The National Rivers Authority cannot be relied upon to design an environmentally sensitive flood relief scheme..... ☐

(c) The National Rivers Authority doesn't take the public's views into account when deciding a flood relief scheme..... ☐

(d) The National Rivers Authority spends too much money on flood relief schemes..... ☐

(e) Some people affected by a flood relief scheme have more influence on the decisions of the National Rivers Authority than others..... ☐

(f) The National Rivers Authority should inform people who live in flood-prone areas of the risk..... ☐

[Q.17] Are you aware of the flood defence scheme -which includes a major flood defence channel- that has been proposed by the National Rivers Authority for the Maidenhead, Windsor and Eton area?

PLEASE TICK BOX Yes..... ☐ No..... ☐

[Q.18] Do you think a similar flood defence channel would be the best option for flood defence in this area?

PLEASE TICK ONE BOX

(a) Yes, this would be the best option..... ☐

(b) No, there is a better alternative..... ☐
(please specify below)

(c) No, for other reasons..... ☐
(please specify below)

(d) Don't know..... ☐

(e) Don't have enough information to decide..... ☐

[Q.19] If the National Rivers Authority Thames Region were to propose a flood defence scheme for this area, how soon do you think it should consult the public? - Should it consult them...

PLEASE TICK ONE BOX ONLY

(a) Before it starts any studies of a flood problem?..... ☐

(b) Before it selects any options for the design or route?..... ☐

(c) When it has selected a number of possible options for the design or route so that the public can chose between them?..... ☐

(d) When it has chosen a prefered option for the design or route for people to comment upon?..... ☐

(e) Or, do you think it shouldn't consult at all but should go ahead with whatever it thinks best?..... ☐

(f) Other? (Please specify)..... ☐

[Q.20] Has the River Thames flooding in February 1990 changed your attitude to the flood risk in this area?

PLEASE TICK ONE BOX

(a) No, it hasn't - I am still unconcerned..... ☐
(b) No, it hasn't - I am still concerned..... ☐
(c) Yes, it has - I am more concerned..... ☐
(d) Yes, it has - I am less concerned..... ☐
(e) No, I didn't know about the flooding..... ☐

[Q.21] How near is your home to a river or stream (approximately)?

(a) Overlooking..... ☐
(b) Within 250 metres/yards..... ☐
(c) Between 250 and 500 metres/yards..... ☐
(d) Over 500 metres/yards..... ☐
(c) Don't know..... ☐

[Q.22] Which river or stream is your home near?

.....

.....

[Q.23] Were you interviewed by one of our interviewers last year (1989)?

PLEASE TICK BOX Yes..... ☐ No..... ☐

[Q.24] Does your insurance policy/policies cover the risk of flooding?

PLEASE TICK BOX

YES..... ☐

NO..... ☐

DON'T KNOW..... ☐

DON'T HAVE ANY INSURANCE..... ☐

[Q.25] Have you taken any precautions against flooding?

PLEASE TICK BOX Yes..... ☐ No..... ☐

IF YES

[Q.25a] What precautions have you taken?

.....

.....

.....

.....

.....

.....

The following questions are standard for questionnaires and are only for our own classification purposes. Your answers are entirely confidential.

[Q.26] Please tick whether you are: Female..... ☐
Male..... ☐

[Q.27] What is the year of your birth?.....

[Q.28] At what age did you complete full-time education?

.....

[Q.29] Do you own or are you buying your own home?

PLEASE TICK BOX Yes..... ☐
No..... ☐

[Q.30] How old is the flat/house in which you live?

.....

[Q.31] As head/joint head of household, what is your present occupation or, if unemployed or retired, what was your last occupation?

.....

.....

Never had a job (please tick).....

[Q.31a] In your work, do you (or did you) supervise any workers?

PLEASE TICK BOX: Yes..... ☐ No..... ☐

[Q.32] Would you please tick any of the following organisations of which you are a member, or to which you regularly give money:

National Trust..... ☐

World Wide Fund for Nature (formerly World Wildlife Fund)..... ☐

A Political Party..... ☐

Local or County Naturalists' Trust..... ☐

Royal Society for the Protection of Birds..... ☐

A Sports Club..... ☐

A Civic or Community Association..... ☐

Any other environmental group..... ☐
(eg. Greenpeace/Friends of the Earth)

.....

.....

.....

That is the end of the questionnaire and we would like to thank you for giving so much of your time. Please return the questionnaire in the envelope provided as soon as possible.

FOR OFFICE USE ONLY

Questionnaire number... ☐ Date returned... ☐

Appendix B-3: 'The River Thames, Maidenhead Flooding Survey' (1990). Relevant sections of the questionnaire.

M I D D L E S E X P O L Y T E C H N I C
F L O O D H A Z A R D R E S E A R C H
C E N T R E

C O N F I D E N T I A L

RIVER THAMES, MAIDENHEAD FLOODING SURVEY

TRANSFER FROM CONTACT SHEET
LOCATION .....
ADDRESS NUMBER .....

Interviewer name .....

Interviewer number ☐☐☐/☐

Interview Number .....
Interview type .....Residential
Date of interview ...../.../...
Time interview started .....
Time interview finished .....
Duration of interview (minutes).....

CIRCLE CODE

Dwelling Type:	Age of dwelling:
Detached house = 1	Pre 1918 = 1
Semi-detached house = 2	1919 - 1938 = 2
Terraced house = 3	1939 - 1965 = 3
Bungalow = 4	1966 - 1977 = 4
Flat = 5	Post 1977 = 5

Does the dwelling occupied by this household have a ground floor? Yes.....1 No.....2

1. How long have you lived in this house/flat?

years.....

since February 1990.....CLOSE

2. Do you own your house/flat? Yes.....

No.....

3 a) What are the advantages and disadvantages of living in this area? Please rate each of the following aspects from -5, major disadvantage to +5, major advantage.

SHOW CARD 1 READ OUT AND CODE EACH

-5 -4 -3 -2 -1 0 1 2 3 4 5

major disadvantage ... major advantage

Access to work.....

Being near the river.....

New developments.....

Aircraft noise.....

Shopping facilities.....

Attractive environment.....

Quality of the housing.....

Risk of river flooding.....

Transport facilities.....

3 b) So generally, how do you rate this local area as a place to live on a scale of -5, very bad to, +5 very good?

SHOW CARD 2

-5 -4 -3 -2 -1 0 1 2 3 4 5 .....

very bad ... neither good nor bad ... very good

4. How near is this property to a river or stream?

READ OUT

overlooking.....1
within 250 metres(270 yards or 820 feet).....2
over 250 but within 500 metres(270 to 550 yards or 820 to 1640 feet)....3
over 500 metres(over 550 yards or 1640 feet)....4

5. Were you aware of the possibility of flooding in this area when you moved here?

Yes.....1
No.....2
Don't know.....-9

IF YES ASK Q5a AND Q5b THEN GO TO Q6. OTHERS GO TO Q5c

(a) Where did you hear or read of this possibility?

READ OUT AND CIRCLE CODE FOR EACH

	Yes	No
Newspaper	1	2
Television	1	2
Thames Water Authority leaflet	1	2
National Rivers Authority leaflet	1	2
Neighbours	1	2
Solicitor (when buying house)	1	2
Personal observation/experience	1	2
other, please specify	1	2

(b) Could you tell me your reasons for moving here although you were aware of the possibility of flooding.

PROBE FULLY, RECORD ANSWER VERBATIM

GO TO Q6

IF NO

(c) Would you have moved here if you had known of the possibility of flooding?

Yes.....1
No.....2

IF YES ASK Q5d. OTHERS GO TO Q6

(d) Could you tell me the reasons why you would have moved here if you had known about the possibility of flooding?
PROBE FULLY, RECORD ANSWER VERBATIM

6. Have you ever been warned about possible flooding by any of the following while living at this address?
READ OUT AND CIRCLE CODE FOR EACH

	Yes	No
Police	1	2
Water or Rivers Authority	1	2
Flood warden	1	2
Local Authority	1	2
Media (T.V./radio)	1	2
don't know	-9	

IF YES

How many warnings have you received **in the last five years** or since you have been living here? (IF LESS THAN FIVE YEARS).....

7. How many times altogether **in the last 5 years** or since you have been living here (IF LESS THAN FIVE YEARS) have you been flooded in your:
READ OUT WRITE IN NUMBER OF TIMES

a) House, garden and land.....
b) Garden, outbuildings and land only.....
c) Total number of times (a+b).....

8. How did you <u>first</u> become aware of the possibility of a flood in February this year?
CIRCLE ONLY <u>ONE</u> ANSWER DO NOT PROMPT

1. water entered property.....1
2. own judgement.....2
3. message from neighbour.....3
4. message from relative.....4
5. warning from National Rivers Authority.....5
6. warning from police.....6
7. warning from flood warden.....7
8. warning from local authority.....8
9. media (T.V./radio).....9
10. other (please specify).....0

9. What further warnings did you receive? Please answer YES or NO for each statement.
READ OUT AND CIRCLE CODE FOR EACH **Yes No**

1. water entered property.....1....0
2. own judgement.....1....0
3. message from neighbour.....1....0
4. message from relative.....1....0
5. warning from National Rivers Authority.....1....0
6. warning from police.....1....0
7. warning from flood warden.....1....0
8. warning from local authority.....1....0
9. media (T.V./radio).....1....0
10. other (please specify).....1....0

18. Had you taken any actions to reduce the effects of flooding before you knew of the risk of flooding in February 1990? Yes.....1
No.....2

IF YES What sort of things had you done?
PROBE FULLY, RECORD VERBATIM

19 a) Did you do any of the following when you first became aware of the flood risk in February 1990?
SHOW CARD 6 RING CODE FOR EACH ACTION

	19a. Yes	No	19b
Tried to find out more information.....	1	2	....
Went to check river water level.....	1	2	....
Warned others on site/at home.....	1	2	....
Warned others elsewhere: neighbours, relatives.....	1	2	....
Tried to prevent water entering premises.....	1	2	....
Moved vehicles.....	1	2	....
Moved property: furniture, equipment.....	1	2	....
Moved animals, pets.....	1	2	....
Turned off electricity supplies.....	1	2	....
Household member(s) moved upstairs for safety.....	1	2	....
Household member(s) left premises for safety.....	1	2	....
Other actions please specify.....	1	2	....

19 b) Please tell me the order that you did these things? Which did you do first.....? WRITE IN 1 - 5 AT 19b

ASK ALL

20. As a result of **any** prior warning(s) about the floods in February 1990, either oficial or unofficial, did you take any actions to reduce the potential damages of a flood?

Yes.....1
No.....2

IF YES Can you estimate the value of the damages avoided?

£.....

21 a) In February of this year floods occurred along the River Thames. Were you flooded in any of the following and to what depth ? **READ OUT 1 - 5. CODE EACH AND WRITE IN ESTIMATED MAXIMUM DEPTH FOR EACH.**
PLEASE SPECIFY m/cm or ft/ins FOR EACH

	YES	NO	N/A	DK	DEPTH
(1) House ground floor	1	2	-8	-9	.....
(2) House underfloor/basement/ cellar	1	2	-8	-9	.....
(3) Garage/outbuildings	1	2	-8	-9	.....
(4) Garden	1	2	-8	-9	.....
(5) Road/pavement outside property	1	2	-8	-9	.....

IF FLOODED (1 to 5) ASK Q21b. OTHERS GO TO Q22

21 b) On what date and at what time did the flooding start and how long did the floodwater stay in?
SPECIFY HOURS/DAYS FOR EACH

	Date flooding started	Time 24hr	Duration days/hrs
(1) House ground floor			
(2) House underfloor/basement/cellar			
(3) Garage/outbuildings			
(4) Garden			
(5) Road/pavement outside property			

ASK ALL

24. At the time of the floods in February 1990, did you have an insurance policy for the structure of your house/flat and outbuildings that covers flooding?

Yes.....1
No.....2
Don't know.....3
No: Others/landlord responsible.....4

25. Did you have a 'new for old' contents insurance policy at the time of the flood?

Yes, 'new for old'.....1
No, other policy.....2
No contents insurance.....3

26. In your experience has the risk of flooding led to any problems getting insurance cover?

Yes.....1
No.....2

IF YES What sort of problems?
RECORD VERBATIM
PROBE FOR STRUCTURE AND CONTENTS

a) structural insurance

b) contents insurance

56. We would like you to try to summarise all these different affects of the flooding upon your household's life. Overall how serious were the effects of the flood upon your household?
SHOW CARD 10

0	1	2	3	4	5	6	7	8	9	10.....
no effect									still have not recovered	

57. Please rate the following consequences of the flood upon your household's life on the following scale:
SHOW CARD 11 READ OUT 1 - 12 AND CODE FOR EACH EFFECT

-8	0	1	2	3	4	5	6	7	8	9	10
not applicable	no effect										most serious

1. Effect upon your health/ your family's health.....
2. Having to leave home.....
3. Damage to replaceable items eg.furniture, contents.....
4. Worry about flooding in the future.....
5. Loss or damage of irreplaceable objects (photos etc.).....
6. All the problems and discomfort whilst trying to get the house back to normal afterwards.....
7. Damage to the house itself.....
8. Stress of the flood itself.....
9. Effect on gardens, land and outbuildings.....
10. Foul smell of the flood water.....
11. Inconvenience caused by road and bridge flooding.....
12. Other (please specify) .....

58. If your house and/or property were to be flooded (again) from the Thames or other rivers, how serious overall do you think the effects would be on the life of your household?
SHOW CARD 12

0	1	2	3	4	5	6	7	8	9	10.....
not at all serious									extremely serious	

61. How worried are you about the possibility of flooding here in the future? **SHOW CARD 15**

0	1	2	3	4	5	6
nothing to worry about					very worried.....	

62. Now I would like to ask your views on the flood problem. How likely do you think it is that this house/flat will be flooded in the following time periods?
SHOW CARD 16 READ OUT AND CODE EACH STATEMENT

0	1	2	3	4	5	6
very unlikely					very likely	

(1) In the next 5 years.....
(2) In the next 10 years.....
(3) In the next 50 years.....
(4) In the next 100 years.....
(5) In the next 200 years.....

63. Would you be prepared to live in this same area if the risk of flooding were as follows:

READ OUT AND CODE EACH STATEMENT	**Yes**	**No**
(1) a 1 in 200 risk, each and every year, that your house would be flooded.....	1	2
(2) a 1 in 100 risk, each and every year that your house would be flooded.....	1	2
(3) a 1 in 50 risk, each and every year that your house would be flooded.....	1	2
(4) a 1 in 25 risk, each and every year that your house would be flooded.....	1	2
(5) a 1 in 10 risk, each and every year that your house would be flooded.....	1	2
(6) a 1 in 5 risk, each and every year that your house would be flooded.....	1	2

64. Here are some statements that have been made about the environment and environmental decision making. There are no 'right' answers, we are just interested in your opinions about these statements and how strongly you feel about them.

SHOW CARD 17 READ OUT AND CODE EACH STATEMENT

1	2	3	4	5	-9
strongly agree	agree	neither agree nor disagree	disagree	strongly disagree	don't know

(1) People are more important than the environment.....

(2) We should live in harmony with nature even if it means some sacrifices on our part.....

(3) The most important problems today are the threats to the environment.....

(4) Scientists will always be able to find the solution to a problem.....

(5) It's wrong to use animals to test the safety of cosmetics.....

(6) These days, morality and trying to do what's right don't seem to matter.....

(7) The most important problems today are economic problems like inflation and unemployment.....

(8) It's right to use animals for medical research.....

(9) I like to be in the open air of the countryside.....

(10) We seem to know the price of everything and the value of nothing.....

65. Here are some statements that people have made after a flood. Do you agree or disagree with them?

SHOW CARD 18 READ OUT AND CODE EACH STATEMENT

Agree = 1
Disagree = 2
Not Applicable = -8

(1) We hardly worry about the possibility of flooding.....
(2) When we go away on holiday, we arrange with neighbours to contact us in case of a flood.....
(3) We are so worried that we do not go on holiday or long visits.....
(4) When we go away on holiday we move important things above the possible flood level.....
(5) We are afraid to go out when it rains heavily.....
(6) When it rains heavily we move our car(s) to a safe place.....
(7) We worry every time it rains heavily.....
(8) We are afraid to go out when a storm is forecast.....
(9) We stay up all night when it rains heavily.....
(10) We would move to another house if we could.....
(11) When it rains we check the level of water in the stream.....
(12) We have stopped using the cellar in case of flooding.....
(13) We have spent money trying to stop floodwater getting into the house.....
(14) When it rains heavily at night, we are too worried to sleep.....
(15) We keep a stock of candles, matches and supplies in case we are surrounded by a flood.....
(16) We feel there is nothing we can do about flooding.....

66. Here are some statements that have been made about the flood risk. Do you agree or disagree with them and how strongly?
SHOW CARD 17 READ OUT AND CODE EACH STATEMENT

1	2	3	4	5	-9
strongly agree	agree	neither agree nor disagree	disagree	strongly disagree	don't know

(1) The Thames Barrier at Woolwich has removed the risk of flooding in this area.....
(2) Flooding is only likely in the area if rivers, streams locks, and weirs are not properly maintained or operated.....
(3) Past flooding was a freak event, unlikely to happen again.....
(4) A flood could happen again any year.....
(5) A flood won't happen again because the Rivers Authority can now control flooding through river management.....
(6) The likelihood of flooding in the area is increasing all the time because of changes in climate and other things.....
(7) We don't have real floods here.....

67. Have you any comments you would like to make about the flood problem here and what should be done about it?
PROBE FULLY, RECORD VERBATIM

68. The local authority is responsible for granting permission to build in the flood plain. The National Rivers Authority (NRA) advises the local authority on the flood risk.
Here are some statements about planning and planning decisions in Maidenhead. Do you agree or disagree, and how strongly?
SHOW CARD 17 READ OUT RECORD CODE FOR EACH STATEMENT

1	2	3	4	5	-9
strongly agree	agree	neither agree nor disagree	disagree	strongly disagree	don't know

(1) The local authority should not allow houses to be built in areas where there is a 1 in 60 chance of flooding each year.....
(2) The local authority should not allow houses to be built where there is a 1 in 100 chance of flooding each year.....
(3) The local authority should ensure that houses are built with thresholds above the flood level in flood prone areas.....
(4) The local authority should allow no new developments of any kind because of the flood risk.....
(5) The local authority should not allow any developments which would increase the flood risk to existing properties.....
(6) The local authority should only allow small housing extensions (i.e. not exceeding 10 square metres.....
(6) If the alternative sites for development involve damage to areas of landscape or environmental value, the local authority should allow development in the flood plain.....

69. What, if any, other comments would you like to make about planning controls and developments in the flood plain?
PROVE FULLY, RECORD VERBATIM

70. Here are some statements that have been made about flood defence for Maidenhead, Windsor and Eton. Do you agree or disagree with them and how strongly?
SHOW CARD 17 READ OUT AND CODE FOR EACH STATEMENT

1	2	3	4	5	-9
strongly agree	agree	neither agree nor disagree	disagree	strongly disagree	don't know

(1) Anything designed to reduce flooding is desirable.....
(2) A flood relief scheme should be carried out in this area regardless of cost.....
(3) A flood relief scheme should be carried out in this area regardless of environmental impact.....
(4) I would rather put up with flooding than spoil the open space with flood relief channels.....
(5) Flood relief schemes will only bring more development into the area.....
(6) I would rather have any scheme than be flooded.....
(7) I would rather rely on flood warnings and risk being flooded than have any flood relief scheme in this area.....
(8) There is no need for a flood relief scheme in this area because the flood risk is too low.....
(9) I would rather the Thames were widened to twice its existing width than a new flood relief channel were dug.....

71. The National Rivers Authority for the Thames Region is responsible for designing and implementing flood defence schemes in this area.
Here are some statements that have been made about the way it caries out this responsibility.
Do you agree or disagree and how strongly?
SHOW CARD 17 READ OUT AND CODE FOR EACH STATEMENT

1	2	3	4	5	-9
strongly agree	agree	neither agree nor disagree	disagree	strongly disagree	don't know

(1) The NRA knows best what kind of flood relief scheme is needed: I trust their experts' opinion.....
(2) The NRA cannot be relied upon to design an environmentally sensitive flood relief scheme.....
(3) The NRA doesn't take the public's views into account when deciding on a flood relief scheme.....
(4) Some people affected by a flood relief scheme have more influence on the decisions of the River Authority than others.....
(5) The NRA spends too much money on flood relief schemes.....

72. When proposing flood relief schemes, how soon do you think the NRA should consult the public? Should it consult them...
SHOW CARD 19 CODE ONE ONLY

(a) as it starts studying the flood problem.....1
(b) before it selects any options for the design or route.....2
(c) when it has selected a number of possible options for the design and route so that the public can choose between them.....3
(d) when it has chosen a preferred option for the design and route for people to comment on.....4
(e) or do you think it shouldn't consult at all but should go ahead with whatever the experts advise.....5
(f) other...please specify.....6

73. In your view, should the NRA...
SHOWCARD 20 READ OUT AND CODE ONLY ONE

(a) only consult the general public directly.....1
(b) only consult the general public through representatives such as local authorities parish councils, residents' committees, wildlife and amenity groups etc.....2
(c) consult the public both directly and through representatives.....3
(d) shouldn't consult the public.....4
(e) other...please specify.....5

74. How would you prefer to be consulted about any flood risk or flood relief proposals for this area?
SHOWCARD 21 CAN MULTICODE IF MORE THAN ONE STATED

a) public meetings.....1
b) walk-around exhibitions.....2
c) video presentations.....3
d) regular newsletters.....4
e) other...please specify.....5

75. Are you aware of the flood alleviation scheme (which includes a major flood relief channel) that has been proposed by the National Rivers Authority for the Maidenhead, Windsor and Eton area?

Yes.....1
No.....2

IF YES ASK (a) AND (b). OTHERS GO TO Q79

(a) Where did you hear this? (a) (b)
READ OUT AND CODE ALL APPLICABLE

Newspaper...1.....1
Television...2.....2
Public meeting...3.....3
National Rivers Authority leaflet...4.....4
National Rivers Authority video...5.....5
Neighbours...6.....6
other, please specify...7.....7

(b) Which was the best source of information?.....
ONE CODE ONLY

76. You say that you have heard about the proposed scheme. I'd like to know what you have heard about or read about any details of the proposed scheme? For example, do you know:

a) Whether the proposed route for the channel is to be on the Maidenhead side or the Taplow, Dorney and Eton side of the River Thames?

Maidenhead side.....1
Taplow, Dorney and Eton side.....2
Don't know.....-9

b) Whether the proposed channel will have mainly natural banks or mainly concrete lined banks?

Mainly natural banks.....1
Mainly concrete banks.....2
Don't know.....-9

c) Whether the size of the proposed channel is to be half as wide as the River Thames, twice as wide as the Thames or the same width as the Thames?

Half as wide.....1
Twice as wide.....2
The same width.....3
Don't know.....-9

d) Do you think that the proposed scheme is the best option for alleviating flooding in this area?

Yes, this is the best option.....1
No, there is a better alternative...please specify.....2
No, for other reasons...please specify.....3
Don't have enough information to decide.....4
Don't know.....-9

77. Has the recent (February 1990) flooding changed your attitudes to the flood alleviation scheme proposals?

Yes.....1
No.....2

IF YES In what way?
PROBE FULLY, RECORD VERBATIM

78. What, if any, other comments do you have on the Maidenhead, Windsor and Eton Flood Alleviation Scheme?
PROBE FULLY, RECORD VERBATIM

ASK ALL

79. Has the recent (February 1990) flooding changed your attitudes to the flood risk in the area?

Yes.....1
No.....2

IF YES In what way?
PROBE FULLY, RECORD VERBATIM

These remaining questions are standard for most questionnaires and are only used for our own classification purposes. **Your answers are entirely confidential.**

79. Sex of respondent
Male.....1
Female.....2

80. To which of the following age groups do you belong?
Under 18.....1
18 - 34.....2
35 - 49.....3
50 - 64.....4
65 and over.....5

81. Please tell me at what age you completed your full time education?
Still in full-time education.....1
At age.....

82. How many people are there in your household in each of the following groups including yourself?
Children 10 and under.....
Children 11 - 16.....
Adults aged 65 and over.....
Other adults.....

83. Do you know when your house/flat was built?
date.....1
don't know.....2

84. Which of these do you have?
'O' level/CSE/GCSE.....1
'A' level.....2
professional qualifications..please specify.....3
Degree.....4
Higher degree.....5
other...please specify.....6

85. Which of the letters on this card represents the gross annual income from all sources of your household?
SHOW CARD 22
Don't know.....-9
Refused.....-7
(N.B. That is before tax or national insurance contributions)

APPENDIX C

Appendix C-7.1: Community activism scale (DWSC/89)

Question 9. "Have you ever done any of the following:

	%	frequency
Contacted MP or Local Councillor	48%	(237)
Contacted Government or Local Council Department	60%	(298)
Contacted radio, T.V. or newspaper	27%	(135)
Signed a petition	75%	(370)
Joined an action/protest group	25%	(124)
Given money to a campaign	62%	(305)
Volunteered to work for a campaign	28%	(139)
Attended a public meeting	52%	(257)
None of these"	9%	(42)

Scale characteristics:

Number of items	8
alpha for scale	.76
Range	0-8
Mean score	3.8
Std.dev.	2.3
Skewness	0.1
Kurtosis	-.98
Valid cases	489

Appendix C-7.2: Environmental values scale (DWSC/89)
Statements taken from Question 6: 1, strongly agree to 5, strongly disagree.

		mean	stddev
Q6d	It's wrong to use animals to test the safety of cosmetics.	2.0	1.2
Q6e	We should live in harmony with Nature even if it means some sacrifices on our part.	1.9	0.7
Q6f	I like to be in the open air of the countryside.	1.6	0.7
Q6g	We have to be prepared to accept a lower standard of living in order to protect the environment.	2.7	1.0
Q6i	We have no choice: we have to protect the environment or we will destroy the human race.	2.0	0.9
Q6k	The Earth and Nature are fragile and we can easily cause irreversible damage.	1.9	0.7
Q6l	I would love to see a kingfisher.	1.9	0.7
Q6o	I love seeing butterflies and dragonflies.	1.9	0.7
Q6q	Today's society is too materialistic.	2.1	0.8
Q6s	We owe a duty to animals and nature, they don't exist just for our enjoyment and use.	1.8	0.5
Q6u	I want my children and grandchildren to see and enjoy those things I enjoyed as a child.	1.8	0.6
Q6w	The most important problems to-day are the threats to the environment.	2.6	1.0
Q6y	We seem to know the price of everything and the value of nothing.	2.5	0.9

Scale characteristics:

Number of items	13
alpha for scale	.72
Min-max	29-60
Mean score	47.4
Std.dev.	4.6
Skewness	-.165
Kurtosis	.618
Valid cases	472

Appendix C-7.3: Optimistic utilitarianism scale (DWSC/89)
Statements taken from Question 6: 1, strongly agree to 5, strongly disagree.

		mean	stddev
Q6j	The main reason for protecting the countryside is its importance for recreation.	3.3	0.9
Q6m	The most important problems to-day are economic.	3.0	1.0
Q6n	The main reason for protecting plants is that we can never know when a plant might turn out to have important medical or other uses.	2.7	1.0
Q6p	New jobs must be created, even if this sometimes causes damage to the environment.	3.2	0.9
Q6t	Without economic growth, our country will not be able to afford to do the things we want.	2.4	0.8
Q6v	If we kept on worrying about the future, nothing would ever get done.	3.0	1.0
Q6x	Scientists will always be able to find the solution to a problem.	3.5	0.9

Scale characteristics:

Number of items	7
alpha for scale	.65
Min-max	10-32
Mean score	20.7
Std.dev.	3.8
Skewness	.17
Kurtosis	-.22
Valid cases	477

Appendix C-7.4: High and low scores: environmental values and optimistic utilitarianism scales (DWSC/89)

	HIGH ENV	LOW ENV	HIGH OPT	LOW OPT	ALL SAMPLE
Sex	%	%	%	%	%
female	58	41	47	55	50
male	42	59	53	45	50
Age	%	%	%	%	%
18-34	21	32	12	29	21
35-55	34	39	30	53	39
55+	45	30	57	18	40
Age at completion of education					
	%	%	%	%	%
up to 15	36	27	47	18	31
16-17	33	49	36	35	40
18 and over	31	23	15	48	29
Home owner	%	%	%	%	%
yes	83	86	84	90	86
no	15	17	16	10	14
Income	%	%	%	%	%
<10k	26	15	33	8	19
10-25k	36	27	29	34	33
>25k	17	26	7	34	21
Refused	13	23	20	14	16
Distance from river					
	%	%	%	%	%
riverside	13	10	8	11	11
<250m	26	37	39	27	32
250-500m	34	34	32	30	31
>500m	27	19	22	31	26
Advantages/disadvantages of the area					
Being near the river					
mean	3.1	2.6	2.8	2.7	2.9
median	4	3	3	3	3
Risk of flooding					
mean	-0.3	0.3	-0.1	0.2	0.1
median	0	0	0	0	0
Attractive environment					
mean	2.7	2.4	2.6	2.6	2.6
median	3	3	3	3	3
General rating of area					
mean	3.2	3.0	3.3	2.9	3.2
median	4	3	4	3	3

Appendix C-7.4 continued.

	HIGH ENV	LOW ENV	HIGH OPT	LOW OPT	ALL SAMPLE
Preparedness to live with flood risks:					
1:200 risk	%	%	%	%	%
yes	74	85	79	82	80
no	25	15	22	18	20
1:100 risk					
yes	69	79	71	72	73
no	31	21	29	27	27
1:50 risk					
yes	53	58	50	54	55
no	46	42	50	45	45
1:25 risk					
yes	37	32	37	33	36
no	63	68	63	66	64
1:10 risk					
yes	27	25	31	22	25
no	72	75	69	77	75
1:5 risk					
yes	24	21	30	18	22
no	76	80	70	81	77
Organization membership/support:					
National Trust	%	%	%	%	%
yes	22	24	19	26	23
World Wide Fund for Nature					
	%	%	%	%	%
yes	31	13	20	23	20
Political party					
	%	%	%	%	%
yes	10	8	9	9	11
Local/county Naturalists' Trust					
	%	%	%	%	%
yes	7	4	6	3	4
RSPB	%	%	%	%	%
yes	27	10	18	22	19
Sports Club	%	%	%	%	%
yes	22	38	23	32	28
Civic/community Association					
	%	%	%	%	%
yes	20	10	17	22	19
Other environmental group					
	%	%	%	%	%
yes	23	8	10	19	16

Appendix C-7.4 continued.

		HIGH ENV	LOW ENV	HIGH OPT	LOW OPT	ALL SAMPLE
Scheme statements: Question 24						
Q24a	mean	2.4	2.5	2.1	2.9	2.5
	median	2	2	2	3	2
	stddev	1.08	0.92	0.76	1.05	0.99
Q24b	mean	2.9	2.6	2.8	2.6	2.7
	median	3	2	3	2	3
	stddev	0.97	0.79	0.94	0.84	0.88
Q24c	mean	2.8	2.9	2.9	3.1	2.9
	median	3	3	3	3	3
	stddev	1.03	0.98	0.96	0.92	0.96
Q24d	mean	2.9	3.3	2.9	3.1	3.1
	median	3	4	3	3	3
	stddev	0.96	0.96	0.98	0.96	0.94
Q24e	mean	3.6	3.6	3.5	3.7	3.6
	median	4	4	4	4	4
	stddev	0.84	0.73	0.82	0.76	0.78
Q24f	mean	2.6	2.7	2.6	2.5	2.6
	median	2	2	2	2	2
	stddev	0.89	0.82	0.79	0.86	0.82
Q24g	mean	3.6	3.6	3.7	3.6	3.6
	median	4	4	4	4	4
	stddev	0.92	0.87	0.86	0.84	0.86
Q24h	mean	2.6	2.9	2.7	2.9	2.7
	median	2	3	2	3	3
	stddev	1.07	0.98	0.98	0.99	1.00
Q24i	mean	2.9	3.0	2.8	3.3	3.0
	median	3	3	3	3	3
	stddev	0.87	0.88	0.86	0.82	0.87
Q24j	mean	2.7	2.8	2.8	2.8	2.7
	median	2	3	3	3	3
	stddev	0.80	0.81	0.82	0.84	0.80
Q24k	mean	2.7	2.7	2.3	3.2	2.7
	median	2	2	2	3.5	2
	stddev	1.11	1.06	0.92	1.04	1.05
Q24l	mean	3.5	3.5	3.5	3.6	3.5
	median	4	4	4	4	4
	stddev	0.96	0.88	0.93	0.93	0.91
Q24m	mean	2.6	2.7	2.5	2.7	2.6
	median	2	3	2	3	2
	stddev	0.95	0.81	0.89	0.87	0.86
Q24n	mean	2.4	2.5	2.3	2.5	2.4
	median	2	2	2	2	2
	stddev	1.02	0.90	0.94	1.06	0.93
Q24o	mean	3.1	2.9	2.8	3.2	3.0
	median	3	3	3	3	3
	stddev	0.92	0.86	0.90	0.94	0.94

Appendix C-7.5: Perceptions of change in the local countryside and open spaces (DWSC/89)

BSAS*: "Do you think the countryside generally is much the same as it was twenty years ago, or do you think it has changed? [IF CHANGED] Has it changed a bit or a lot?"

DWSC/89: "I would like to ask you whether you think the local countryside and open spaces have changed in the last 20 years. Do you think...they are much the same; they have changed a bit; they have changed a lot?"

	BSAS 1985	BSAS 1986	BSAS 1987	DWSC 1989
	%	%	%	%
Much the same	20	22	20	11
Changed a bit	23	25	21	25
Changed a lot	49	48	55	60
Don't know /not answered	7	5	3	4

BSAS: "Do you think the countryside generally has changed for the better or worse?"

DWSC/89: "Do you think the local countryside and open spaces have changed for the better or worse?"

	BSAS 1985	BSAS 1986	BSAS 1987	DWSC 1989
	%	%	%	%
Has not changed	27	22	20	11
Better	11	13	12	7
Worse	49	51	56	38
Better in some ways /worse in others	11	8	8	42
Don't know/not answered	1	6	3	2

Appendix C-7.6: Concern about the local countryside and open spaces (DWSC/89)

BSAS: "Are you personally concerned about things that may happen to the countryside, or does it not concern you particularly?
[IF CONCERNED] Are you very concerned, or just a bit concerned?"

DWSC/89: "I would like to ask you whether you are concerned about things that may happen to the local countryside and open spaces."

	BSAS 1985	BSAS 1986	BSAS 1987	DWSC 1989
	%	%	%	%
Very concerned	31	40	44	37
Quite concerned*	N/A	N/A	N/A	42
A bit concerned	37	40	33	16
Does not concern me particularly/not particularly concerned	32	25	22	4
Not at all concerned**	N/A	N/A	N/A	0
Don't know/not answered	0	0	1	0

* BSAS = British Social Attitudes Survey
** These categories DWSC 1989 only.

Approximate numbers of correspondents (percentages may vary due to rounding and the calculation of sub-groups):

BSAS 1885	1805
BSAS 1986	1548
BSAS 1987	1410
DWSC 1989	494

Appendix C-7.7: Reasons for moving to the area (DWSC/89)

Question 19d. "Could you tell me your reasons for moving here even though you knew about the possibility of flooding?"

Reasons for moving to the area	Number of times mentioned spontaneously	% of those interviewed mentioning spontaneously
Like the area	109	22%
Convenient for travel/work	83	17%
No/low flood risk	76	15%
Better house/garden	72	15%
Wanted to live by river	62	13%
Other social/family/non-environmental reasons	57	12%
No choice over housing	28	6%
Accept flood risk	27	6%
Countryside nearby	13	3%

Cases: 494

Appendix C-7.8: The nature of flooding and its effects (DWSC/89)

Question 14: "Here are some statements about flooding and what it is like. I would like to ask you whether you agree with them or not and how strongly."

(Mean, median and standard deviation)

	ALL	FLOODED	NOT FLOODED	
There are problems getting insurance in this local area because of the flood risk	3.8	3.7	3.8	mean
	4	4	4	med.
	0.8	0.8	0.7	S.D.
You can get some fun out of every situation - even flooding	3.1	2.7	3.3	mean
	3	2	4	med.
	1.2	1.0	1.2	S.D.
It takes months rather than weeks to get the house back to normal after a flood	1.9	1.9	1.8	mean
	2	2	2	med.
	0.7	0.8	0.6	S.D.
Nobody wants to buy your house if it gets flooded	2.6	2.7	2.5	mean
	2	2	2	med.
	1.0	1.0	1.0	S.D.
If you live in flood prone areas, flooding is at the back of your mind all the time	3.1	3.1	3.1	mean
	3	4	3	med.
	1.1	1.0	1.1	S.D.
If you live in areas liable to flooding, you can't get any insurance	3.7	3.7	3.6	mean
	4	4	4	med.
	0.7	0.6	0.8	S.D.
We don't have real floods here	2.6	2.6	2.6	mean
	2	2	2	med.
	0.9	0.9	0.9	S.D.
The worst thing about floods is not the monetary costs but the loss of personal possessions like letters and photographs	2.6	2.7	2.5	mean
	2	3	2	med.
	1.0	1.0	1.0	S.D.
Flooding brings out the best in people	2.8	2.6	2.8	mean
	3	2	3	med.
	0.9	0.9	0.9	S.D.
A flood affects people's mental and physical health long after the event	2.4	2.6	2.4	mean
	2	2	2	med.
	0.8	0.9	0.9	S.D.

Cases:

All	468-493
Flooded	115-118
Not flooded	352-374

Appendix C-7.9: Causation and likelihood of flooding in the area (DWSC/89)

Question 15: "Here are some opinions that have been expressed about the flood risk in this area. Do you agree or disagree with them, and how strongly?"

(Mean, median and standard deviation)

	ALL	FLOODED	NOT FLOODED	
The Thames Barrier at Woolwich has removed the risk of flooding in this area	3.2	3.3	3.1	mean
	3	4	3	med.
	0.9	0.9	0.9	S.D.
Flooding is only likely in the area if rivers, streams, locks and weirs are not properly maintained or operated	2.7	2.6	2.7	mean
	2	2	2	med.
	1.0	1.0	1.0	S.D.
Past flooding was a freak event, unlikely to happen again	3.3	3.2	3.3	mean
	4	4	4	med.
	0.9	1.0	0.9	S.D.
The likelihood of flooding in the area is increasing all the time because of changes in climate and other things	2.9	3.0	2.9	mean
	3	3	3	med.
	0.9	0.9	0.9	S.D.
A flood could happen again any year	2.4	2.4	2.4	mean
	2	2	2	med.
	0.8	0.8	0.8	S.D.
A flood won't happen again because the Water Authority can now control flooding through river management	3.4	3.4	3.4	mean
	4	4	4	med.
	0.9	1.0	0.9	S.D.
We are now due for another flood	3.5	3.4	3.5	mean
	3	3	3	med.
	0.7	0.8	0.7	S.D.
Building roads and houses in the flood plain makes flooding worse.	2.8	2.6	2.8	mean
	3	2	3	med.
	1.0	1.0	0.9	S.D.

Cases:

All	453-488
Flooded	112-117
Not flooded	337-370

Appendix C-7.10: Perceived seriousness of experienced flood, worry about future flooding and awareness of flood risk, across 3 datasets

Thames Attitude Survey (1989) (DWSC/89)
'The River Environment and You', Postal Survey (1990) (DWSC/90)
Maidenhead Flooding Survey (1990) (M'head)

		DWSC/89	DWSC/90	M'HEAD
SERIOUSNESS OF EXPERIENCED FLOOD				
%	mean	4.4	3.9	4.0
	median	3.5	3	3
	stddev	3.8	3.5	2.9
cases		(116)	(144)	(196)

Scale: 0, not at all serious to 10, extremely serious.
M'head and Severn Scale: 0, no affect (on household) to 10, still have not recovered.

WORRY ABOUT FUTURE FLOODING				
	mean	1.6	2.7	3.0
	median	1	3	3
	stddev	1.6	1.7	2.1
cases		(493)	(599)	(198)

Scale: 0, not at all worried to 6, very worried

AWARE OF PAST FLOODING				
%	Yes	80	62	N/A
cases		(492)	(565)	N/A

* DWSC/90 Survey question wording: "Are you aware of the flooding that occurred in February 1990...in this area?"
DWSC/89 Survey question wording: "Are you aware of [this local area] having been flooded in the last 50 years?"

AWARE OF POSSIBILITY OF FUTURE FLOODING				
%	Yes	75	81	N/A
cases		(494)	(599)	N/A

AWARE OF FLOOD RISK WHEN MOVED				
%	Yes	52	58	77
cases		(384)	(616)	(195)

Appendix C-7.11: Attitudes to flood protection - scheme response scale (DWSC/89)

Statements taken from Question 24: scale: 1, strongly agree to 5, strongly disagree

		mean	stddev
Q24a	Anything designed to reduce flooding is desirable.	2.5	1.0
Q24b	There are many more important things which need to be done flood relief schemes.	2.7	0.9
Q24c	Metre high flood protection embankments spoil the view.	2.9	1.0
Q24d	A flood relief scheme should be carried out in this area regardless of cost.	3.1	0.9
Q24e	It is a waste of money to spend it on flood relief channels: nature will always win in the end.	3.6	0.8
Q24f	A flood relief channel could offer new opportunities for recreation.	2.6	0.8
Q24g	I would rather put up with flooding than spoil the open space here with flood relief channels.	3.6	0.9
Q24j	A flood relief scheme can enhance the environment.	2.7	0.8
Q24k	I would rather have any scheme than be flooded.	2.7	1.0
Q24l	I would rather rely on flood warnings and risk being flooded than have any flood relief scheme in this area.	3.5	0.9
Q24o	There is no need for a flood relief scheme in this area because the flood risk is too low.	3.0	0.9

Scale characteristics:

Number of items	11
alpha for scale	.69
Min-max	21-49
Mean score	35.7
Std.dev.	4.9
Skewness	-.385
Kurtosis	-.208
Valid cases	463

Appendix C-7.12: Responses to selected scheme statements according to distance from the river and flood experience (DWSC/89)

Question 24k "I would rather have any scheme than be flooded."

Distance from river	Flood experience	Attitude to scheme		
		agree	neither	disagree
Nearest to river	flooded	38%	0%	63%
	not fld.	22%	11%	67%
Up to 250m from river	flooded	61%	9%	30%
	not fld.	60%	10%	31%
250-500m from river	flooded	50%	13%	37%
	not fld.	50%	21%	29%
Over 500m from river	flooded	63%	17%	21%
	not fld.	58%	21%	21%
ALL	flooded	53%	10%	37%
ALL	not fld.	53%	17%	30%

Question 24d " A flood relief scheme should be carried out in this area regardless of cost."

Distance from river	Flood experience	Attitude to scheme		
		agree	neither	disagree
Nearest to river	flooded	25%	13%	63%
	not fld.	33%	11%	56%
Up to 250m from river	flooded	33%	24%	42%
	not fld.	35%	19%	46%
250-500m from river	flooded	27%	37%	37%
	not fld.	30%	32%	38%
Over 500m from river	flooded	33%	21%	46%
	not fld.	37%	22%	41%
ALL	flooded	30%	24%	46%
ALL	not fld.	34%	23%	43%

Question 24g "I would rather put up with flooding than spoil the open space around here with flood relief channels."

Distance from river	Flood experience	Attitude to scheme		
		agree	neither	disagree
Nearest to river	flooded	46%	17%	38%
	not fld.	19%	0%	82%
Up to 250m from river	flooded	24%	9%	67%
	not fld.	11%	21%	68%
50-500m from river	flooded	17%	7%	77%
	not fld.	18%	12%	71%
Over 500m from river	flooded	9%	22%	70%
	not fld.	14%	8%	78%
ALL	flooded	24%	13%	64%
ALL	not fld.	14%	13%	73%

Appendix C-7.12 continued:

Question 24l "I would rather rely on flood warnings and risk flooding than have any flood relief scheme in this area."

Distance from river	Flood experience	Attitude to scheme		
		agree	neither	disagree
Nearest to river	flooded	38%	8%	54%
	not fld.	22%	7%	70%
Up to 250m from river	flooded	31%	9%	59%
	not fld.	16%	17%	67%
250-500m from river	flooded	27%	13%	60%
	not fld.	14%	18%	68%
Over 500m from river	flooded	21%	8%	71%
	not fld.	18%	8%	74%
ALL	flooded	29%	10%	61%
ALL	not fld.	16%	14%	70%

Question 24o "There is no need for a flood relief scheme because the risk is too low."

Distance from river	Flood experience	Attitude to scheme		
		agree	neither	disagree
Nearest to river	flooded	57%	30%	13%
	not fld.	50%	8%	42%
Up to 250m from river	flooded	52%	12%	36%
	not fld.	40%	24%	36%
250-500m from river	flooded	23%	33%	43%
	not fld.	36%	36%	28%
Over 500m from river	flooded	21%	29%	50%
	not fld.	26%	31%	44%
ALL	flooded	38%	26%	36%
ALL	not fld.	35%	29%	36%

Question 24a "Anything to reduce flooding is desirable."

Distance from river	Flood experience	Attitude to scheme		
		agree	neither	disagree
Nearest to river	flooded	71%	4%	25%
	not fld.	56%	15%	30%
Up to 250m from river	flooded	66%	6%	28%
	not fld.	67%	10%	24%
250-500m from river	flooded	73%	17%	10%
	not fld.	68%	12%	20%
Over 500m from river	flooded	71%	8%	21%
	not fld.	64%	8%	27%
ALL	flooded	70%	9%	21%
ALL	not fld.	66%	11%	24%

Appendix C-7.12 continued:

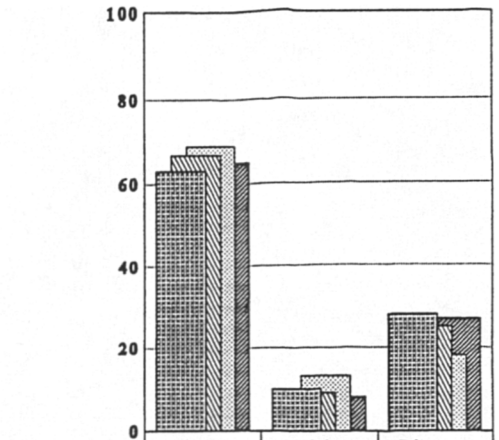
Question 24b "There are many more important things which need to be done than flood relief schemes."

Distance from river	Flood experience	Attitude to scheme		
		agree	neither	disagree
Nearest to river	flooded	48%	22%	30%
	not fld.	56%	22%	22%
Up to 250m from river	flooded	69%	6%	25%
	not fld.	45%	33%	22%
250-500m from river	flooded	30%	30%	40%
	not fld.	49%	30%	21%
Over 500m from river	flooded	58%	21%	21%
	not fld.	44%	30%	26%
ALL	flooded	51%	19%	29%
ALL	not fld.	47%	30%	23%

Appendix C-7.13: Responses to scheme statements (Questions 24 a, d, e, g, k and o) according to flood experience, distance from the river, environmental values scale score and optimistic utilitarianism scale score.

Appendix C-7.13a: "Anything to reduce flooding is desirable"

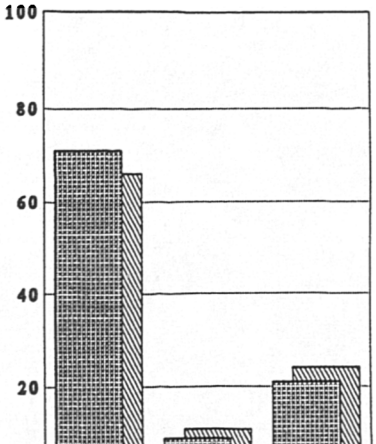
"Anything...to reduce flooding is desirable" (DWSC/89).



	Agree	Neither	Disagree
>500m	65	8	27
250-500m	69	13	18
<250m	67	9	25
Riverside	63	10	28

% frequency

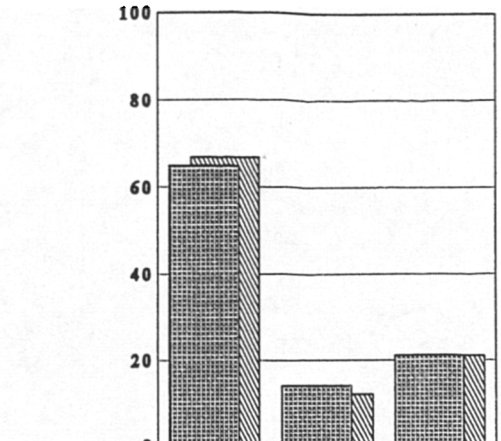
"Anything...to reduce flooding is desirable" (DWSC/89).



	Agree	Neither	Disagree
Not flooded	66	11	24
Flooded	71	9	21

% frequency

"Anything...to reduce flooding is desirable" (DWSC/89). Environmental Values Scale

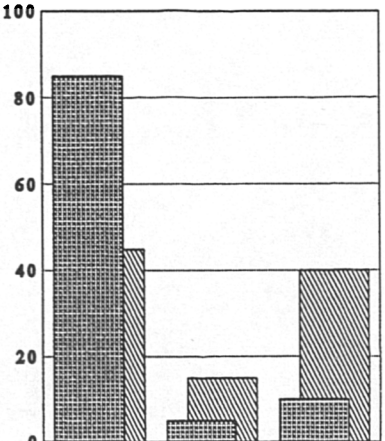


	Agree	Neither	Disagree
Low score	67	12	21
High score	65	14	21

% frequency

High score = upper quartile
Low score = lower quartile

"Anything...to reduce flooding is desirable" (DWSC/89). Optimistic Utilitarianism Scale



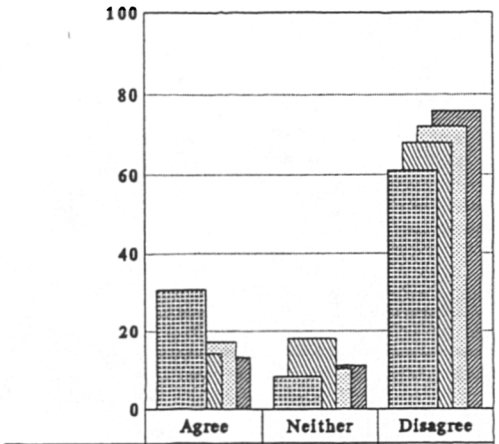
	Agree	Neither	Disagree
Low score	45	15	40
High score	85	5	10

% frequency

High score = upper quartile
Low score = lower quartile

Appendix C-7.13b: "I would rather put up with flooding than spoil the open space here with flood relief channels"

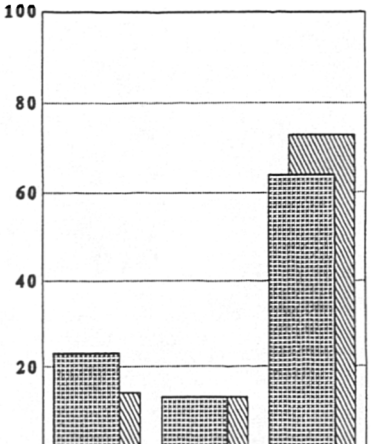
"I would rather put up with flooding than spoil the open space here with flood relief channels".



	Agree	Neither	Disagree
>500m	13	11	76
250-500m	17	10	72
<250m	14	18	68
Riverside	31	8	61

% frequency

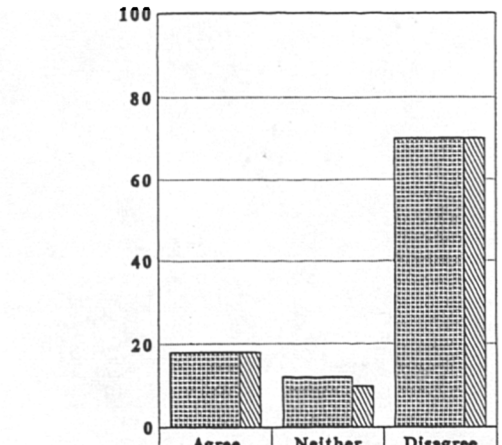
"I would rather put up with flooding than spoil the open space here with flood relief channels".



	Agree	Neither	Disagree
Not flooded	14	13	73
Flooded	23	13	64

% frequency

"I would rather put up with flooding than spoil the open space here with flood relief channels".

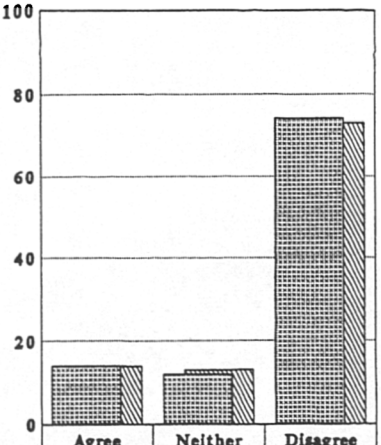


	Agree	Neither	Disagree
Low score	18	10	70
High score	18	12	70

% frequency

High score = upper quartile
Low score = lower quartile
Environmental Values Scale.

"I would rather put up with flooding than spoil the open space here with flood relief channels".



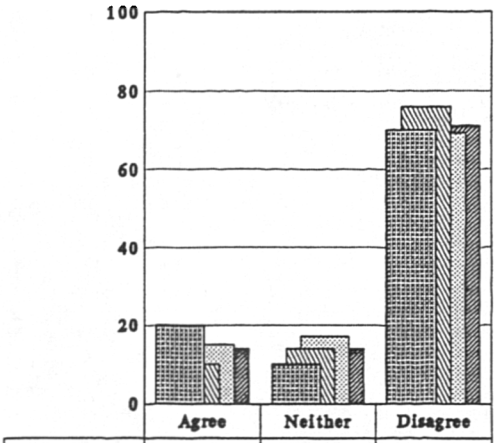
	Agree	Neither	Disagree
Low score	14	13	73
High score	14	12	74

% frequency

High score = upper quartile
Low score = lower quartile
Optimistic Utilitarianism Scale.

Appendix C-7.13c: "It is a waste of money to spend it on flood relief channels: nature will always win in the end"

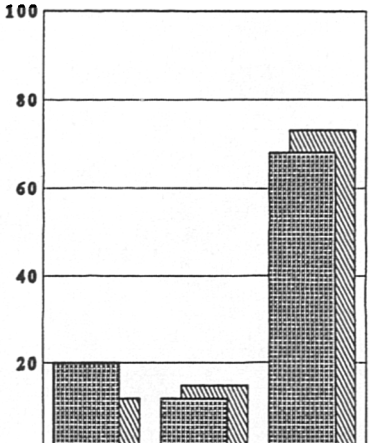
"It is a waste of money to spend it on flood relief channels: nature will always win in the end".



	Agree	Neither	Disagree
>500m	14	14	71
250-500m	15	17	69
<250m	10	14	76
Riverside	20	10	70

% frequency

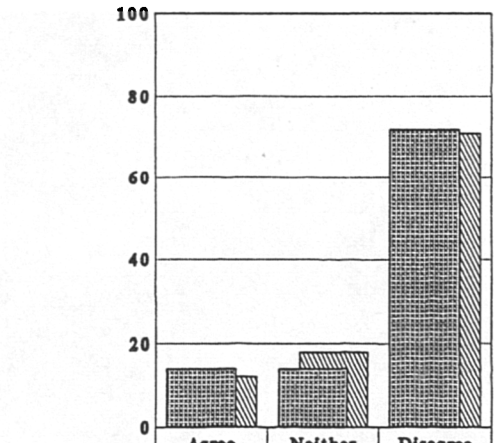
"It is a waste of money to spend it on flood relief channels: nature will always win in the end".



	Agree	Neither	Disagree
Not flooded	12	15	73
Flooded	20	12	68

% frequency

"It is a waste of money to spend it on flood relief channels: nature will always win in the end".

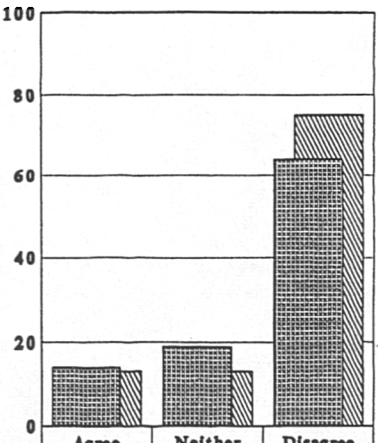


	Agree	Neither	Disagree
Low score	12	18	71
High score	14	14	72

% frequency

High score = upper quartile
Low score = lower quartile
Environmental Values Scale

"It is a waste of money to spend it on flood relief channels: nature will always win in the end".



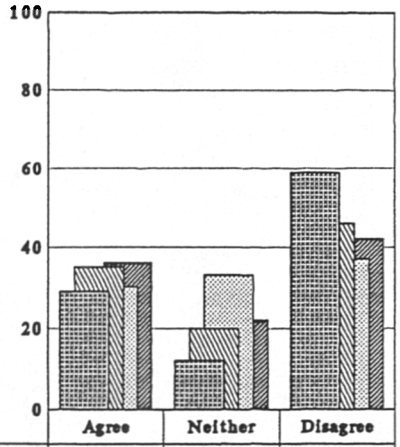
	Agree	Neither	Disagree
Low score	13	13	75
High score	14	19	64

% frequency

High score = upper quartile
Low score = lower quartile
Optimistic Utilitarianism Scale

Appendix C-7.13d: "A flood relief channel should be carried out in this are regardless of cost"

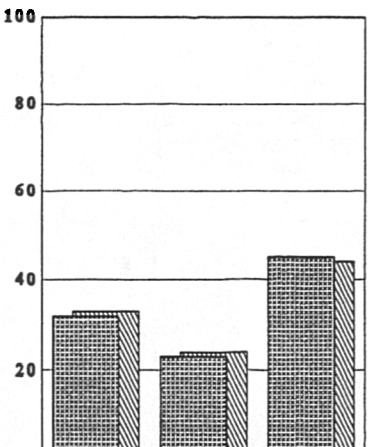
"A flood relief scheme should be carried out in this area regardless of cost".



	Agree	Neither	Disagree
>500m	36	22	42
250-500m	30	33	37
<250m	35	20	46
Riverside	29	12	59

% frequency

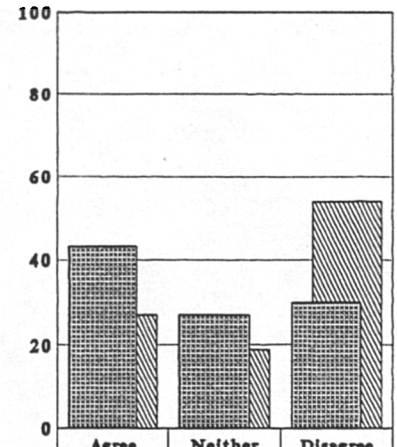
"A flood relief scheme should be carried out in this area regardless of cost".



	Agree	Neither	Disagree
Not flooded	33	24	44
Flooded	32	23	45

% frequency

"A flood relief scheme should be carried out in this area regardless of cost".

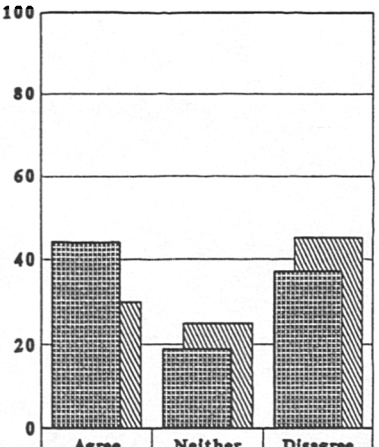


	Agree	Neither	Disagree
Low score	27	19	54
High score	43	27	30

% frequency

High score = upper quartile
Low score = lower quartile
Environmental Values Scale

"A flood relief scheme should be carried out in this area regardless of cost".



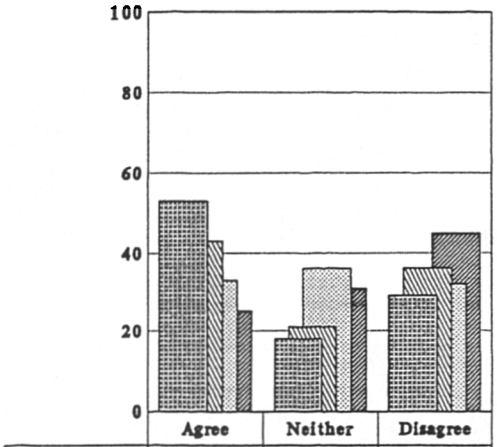
	Agree	Neither	Disagree
Low score	30	25	45
High score	44	19	37

frequency

High score = upper quartile
Low score = lower quartile
Optimistic Utilitarianism Scale

Appendix C-7.13e: "There is no need for a flood relief scheme in this area because the flood risk is too low"

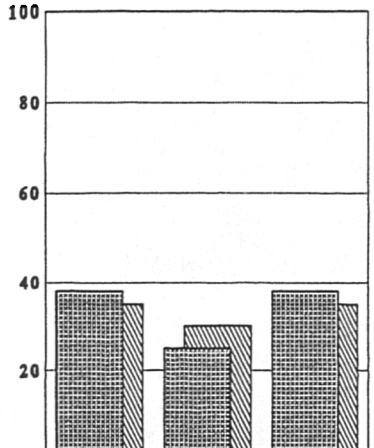
"There is no need for a flood relief scheme in this area because the flood risk is too low".



	Agree	Neither	Disagree
>500m	25	31	45
250-500m	33	36	32
<250m	43	21	36
Riverside	53	18	29

% frequency

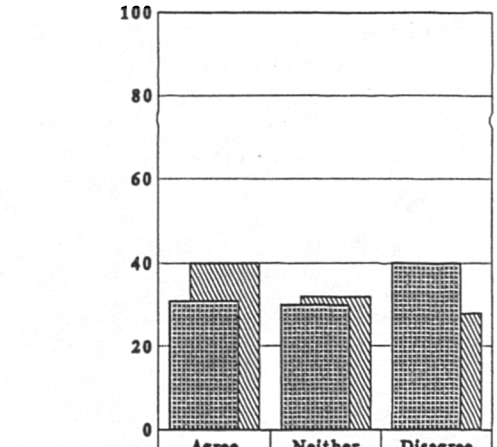
"There is no need for a flood relief scheme in this area because the flood risk is too low".



	Agree	Neither	Disagree
Not flooded	35	30	35
Flooded	38	25	38

% frequency

"There is no need for a flood relief scheme in this area because the flood risk is too low".

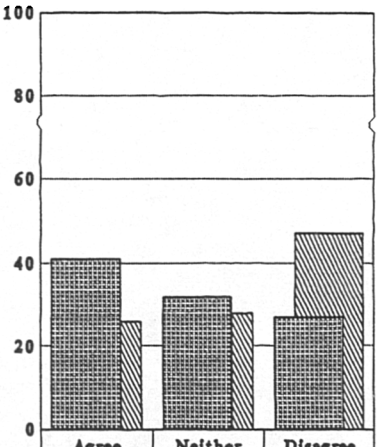


	Agree	Neither	Disagree
Low score	40	32	28
High score	31	30	40

% frequency

High score = upper quartile
Low score = lower quartile
Environmental Values Scale

"There is no need for a flood relief scheme in this area because the flood risk is too low".



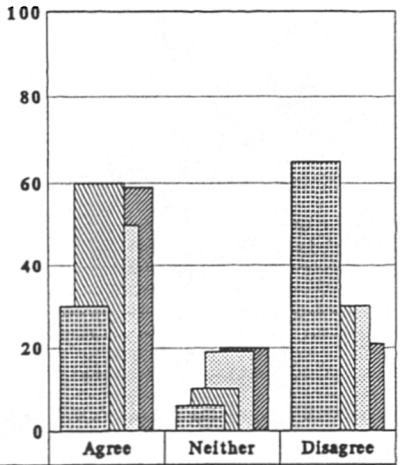
	Agree	Neither	Disagree
Low score	26	28	47
High score	41	32	27

% frequency

High score = upper quartile
Low score = lower quartile
Optimistic Utilitarianism Scale

Appendix C-7.13f: "I would rather have any scheme than be flooded"

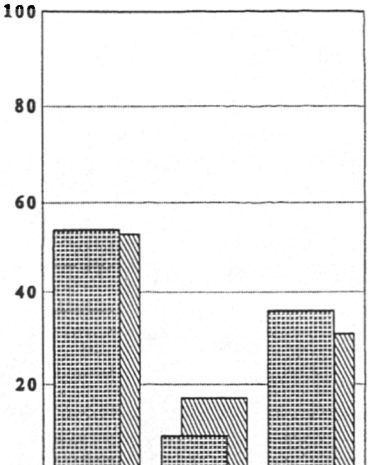
"I would rather have any scheme than be flooded".



	Agree	Neither	Disagree
>500m	59	20	21
250-500m	50	19	30
<250m	60	10	30
Riverside	30	6	65

% frequency

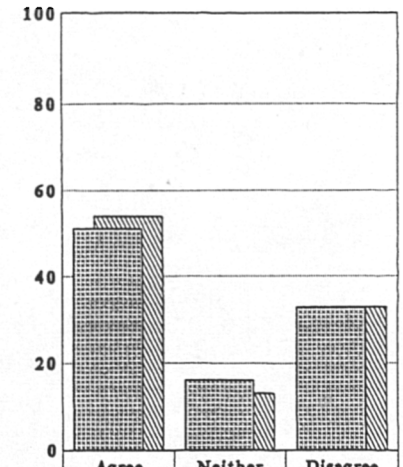
"I would rather have any scheme than be flooded".



	Agree	Neither	Disagree
Not flooded	53	17	31
Flooded	54	9	36

% frequency

"I would rather have any scheme than be flooded".

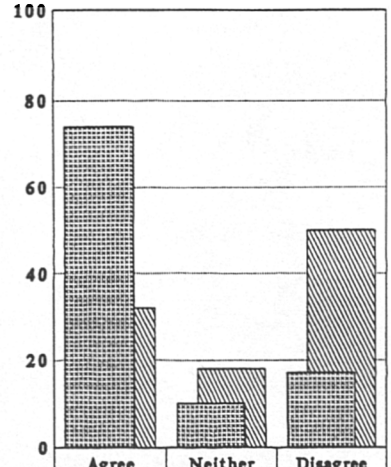


	Agree	Neither	Disagree
Low score	54	13	33
High score	51	16	33

% frequency

High score = upper quartile
Low score = lower quartile
Environmental Values Scale

"I would rather have any scheme than be flooded".



	Agree	Neither	Disagree
Low score	32	18	50
High score	74	10	17

% frequency

High score = upper quartile
Low score = lower quartile
Optimistic Utilitarianism Scale

Appendix C-7.14: Attitudes to consultation and the NRA (DWSC/89)

	agree	disagree	neither agree nor disagree
Question 31g			
"Some people affected by a flood relief scheme have more influence on the decisions of the Water Authority/NRA than others."	64%	16%	21%
Question 31e			
"The Water Authority/NRA doesn't take the public's views into account when deciding on a flood relief scheme."	41%	31%	27%
Question 31f			
"The Water Authority/NRA consults the people affected fully when developing plans for a flood relief scheme"	17%	55%	28%

Cases: 377-415

	YES	NO
Question 30		
"Do you feel you have enough information with which to decide the level of flood protection you would like for the study area?"	17%	83%

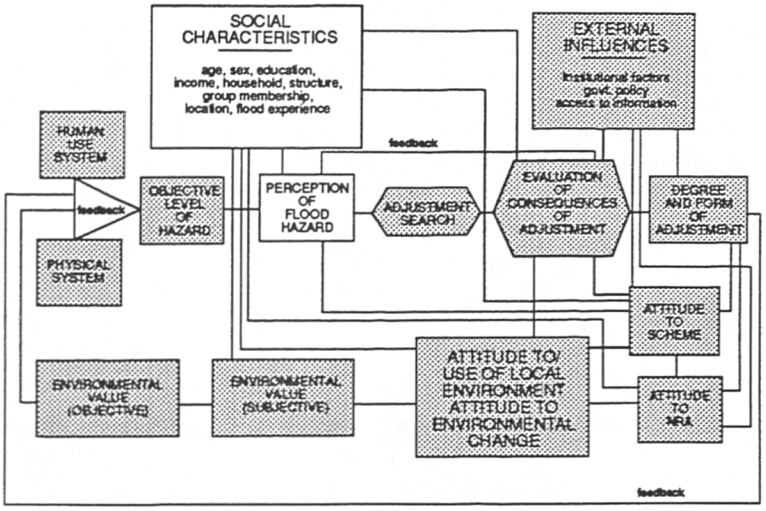
Cases: 489

Appendix C-7.15: Testing the Model. Discussion of hypothesized relationships: DWSC/89.

Testing the Model. Discussion of hypothesized relationships: DWSC/89.

Associations between dependent and independent variables significant at or above the 95% confidence level. Analysis showed some significant associations for all the major hypothesized relationships: with so many significant associations it is highly probable that some will be statistical artifacts and not substantive. Discussion has been limited to those relationships which were deemed to be of interest or importance and also subject to logical interpretation.

Social characteristics with perception of flood hazard.



Model of flood hazard perception and mitigating adjustment

(Social characteristics were measured by questions 1, 10, 10e, 11, 35, 36, 37, 38, 39, 40, 41 and distance from the river. Perception of flood hazard was measured by question numbers 14, 15, 16, 17, 18 and 19.)

Few attitude statements elicited significant associations with respondents's sex but those that did suggested that males tended to take a more optimistic view of the likelihood and nature of flooding (i.e. they believed it to be less likely and less distressing) while females were more cautious. Males were also more likely to have been aware of the flood risk in the area when they moved there.

There was agreement from the older age group (55 years+) with many of the statements (both positive and negative with regard to hazard perception), except where the statements suggested that the flood risk was either increasing or imminent, where they showed greater disagreement. Overall the older age group displayed a relatively low level of flood hazard perception as measured by the statements. The youngest age group (18-34) displayed more uncertainty and a tendency to disagree with many of the statements which resulted in their having a higher flood hazard perception than the oldest age group. The middle age group (35-54) showed the highest flood hazard perception overall but in many cases their responses were split between agreement and disagreement.

The older age group were more aware of past flooding in the area and did not underestimate the seriousness of a possible future flood but rated it higher than did the younger age groups. They were less worried about flooding, perhaps because they also believed it to be less likely. The older age group were more prepared to live with the more remote risks (possibly because they felt they would be less likely to experience them) and less prepared to live with the more frequent risks.

When preparedness to live with varying levels of risk was scaled to give a broad indication of behavioural intent[1], the oldest group were split between those not prepared to live with any level of risk (scoring 0 on the scale) and those prepared to live with most or all levels of risk (scoring 5 or 6 on the scale). The younger age groups were clustered more in the middle ranges (prepared to live with between 1 and 4 of the risk levels but less prepared to live with all or none).

Those who completed their education at the age of 15 displayed a tendency towards an acquiescent response

[1] See Question 18a to 18f: the scale was constructed by scoring the number of levels of risk respondents were prepared to live with, giving scores from 0 to 6.

except, again, where the statements suggested an increased likelihood of flooding. It is probable that this is related to the age variable as the older age group also tended to have the least education. Those with higher levels of education tended to show a higher degree of flood hazard perception but also expressed higher levels of uncertainty.

A similar pattern was found with the income variable as had been found with age and education, that is, higher levels of agreement from those with the lowest income levels (up to £10,000) and, from those with the highest (£25,000+) income level, disagreement with statements suggesting that past flooding was a freak event and unlikely to recur. Questions and scales measuring the likelihood of flooding in varying time periods showed the lower income group to believe flooding to be less likely than the higher income groups. This was particularly the case for the longer time periods.

Distance from the river elicited some variability in response where significant associations were found but generally those living closest to the river displayed a different response from the majority; they tended to have lower flood hazard perception, as measured by the statements, but were also uncertain. Those living furthest from the river (over 500 metres away) were closer to the majority view and generally had higher flood hazard perception. Those in between were often uncertain or split in their responses but the nearer of the two (up to 250 metres from the river) had a generally lower degree of flood hazard perception while those a little further from the river (between 250 and 500 metres away) showed a generally higher level. Those living closest to the river also had more flood experience and the unexpected direction of their flood hazard perception must be viewed in relation to this factor.

Those living nearer to the river believed flooding to be less likely in the short term and were generally less worried than those living further away.

Organization membership or support did not give a clearly interpretable pattern. Responses varied depending on both the statement and the organization. It seems likely that membership or regular support of any organization is closely related to other social variables and little can be explained in this case by the membership variable alone. A contributory factor in the variability of response is likely to be the low frequencies for members/supporters, giving too few numbers in the cells for reliable analysis.

The household structure variable showed that generally those with children took a more cautious view of the likelihood of flooding, having a greater expectancy of its return, compared to those without children. The households with older members (particularly those comprising exclusively older members) presented a similar pattern to the age variable discussed above; the older households having a lower flood hazard perception.

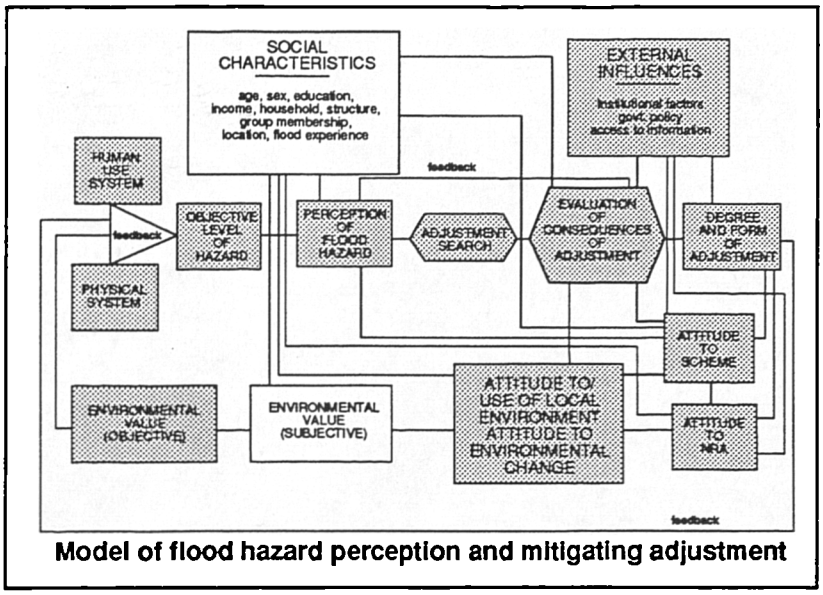
Length of residence also appeared age-related (those residing in the area longer, being older people) and showed a similar response to the age variable: those in residence longest showing a generally lower level of flood hazard perception, *as measured by the statements, and expectancy, as measured by the scale of* likelihood.

Greater numbers than expected of those with flood experience were, as might be expected, aware of past flooding in the area and aware of the possibility of future flooding but they were also prepared to live with the more frequent flood risks. Responses tended, paradoxically, towards a lower level of flood hazard perception than for those without experience (see discussion of statements elsewhere for a suggested explanation of this finding).

House tenure showed a significant association with one variable only and this was the scaled preparedness to live with varying flood risks. Higher numbers than expected of those who did not own their property were prepared to live with a larger range of risks compared to property owners.

In summary, social characteristics (as defined by the model) were related to perception of flood hazard but in a complex manner; many being interrelated. Increasing age and decreasing levels of income and education were associated with acquiescence and low flood hazard perception (as measured by the statements). Those living closest to the river generally exhibited a different response to those living further away and tended to have a lower perception of flood hazard despite having greater flood experience. Flood experience itself was associated with low flood hazard perception.

Social characteristics with environmental value.



Model of flood hazard perception and mitigating adjustment

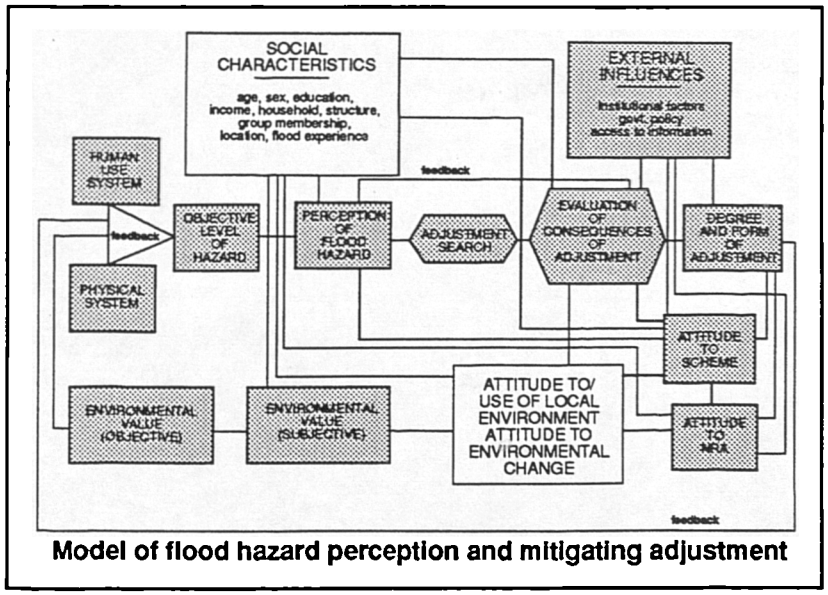
(Environmental value was measured by Question 3 and by the Environmental Values Scale and the Optimistic Utilitarianism Scale.)

There were few significant associations between social characteristics and the variables chosen to measure subjective assessment of environmental value. However, the next section (attitude to/use of local environmental/attitude to environmental change) contains a number of variables which related closely to this section and which showed a much greater number of significant associations.

On the environmental values scale the higher scorers were females, who also rated the area generally more highly, and older people, although the latter were slightly split between a high and a lower score. Members/supporters of the WWFN, the RSPB and other environmental groups scored more highly on this scale while members/supporters of sports clubs scored lower.

High scorers on the optimistic utilitarianism scale also tended to be older; they were longer resident, with lower levels of income and education. Members/supporters of 'other environmental groups' had a lower score.

Social characteristics with attitude to/use of local environmental/attitude to environmental change.



Model of flood hazard perception and mitigating adjustment

(Attitude to/use of local environmental/attitude to environmental change was measured by questions 2, 4, 4a, 5, 7, 7a and 8.)

Females regarded the countryside nearby and shopping facilities as more of an advantage, and the risk of river flooding and transport facilities as more of a disadvantage, than did males.

The attractive environment and being near the river were rated as more of an advantage to older respondents although they were also seen to be an advantage to the younger age groups. As might be expected, access to work was not as important to older respondents, more of whom rated it as neither an advantage nor a disadvantage; the middle age group rated it as a major advantage of the area. Open spaces for outdoor recreation were an advantage to all age groups but a major advantage to the oldest, many of whom also made daily visits to the river. Greater numbers than expected of the oldest age group thought that the local area had changed

a lot while the middle group thought it was the same and the youngest did not know. Increasing levels of perceived environmental change were linked to both increasing age and length of residence categories.

Household structure echoed the age pattern above. Households with older members rated transport facilities and the risk of flooding as a greater disadvantage. Those households without older members rated access to work as a major advantage. Households with children believed flooding a greater disadvantage. They were likely to visit more recreational areas and were more concerned about things that happen to their local environment.

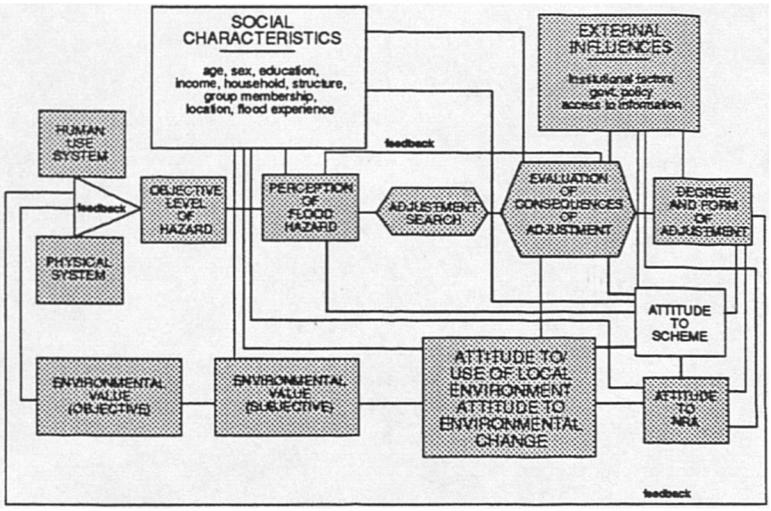
The attractive environment was rated more advantageous by those with higher levels of education; who were also more concerned about their local environment and more of whom visited the river.

Homeowners tended to rate as more of an advantage housing, rates, nearby countryside and the river than did non-homeowners. Those with a higher income also tended to rate local attributes as more of an advantage, visited more recreational areas and visited the river more frequently. They also tended to acknowledge both positive and negative aspects of environmental change.

Those nearest to the river rated as more advantageous a number of local environmental attributes including the risk of river flooding which was rated as a greater disadvantage by those living furthest from the river. As might be expected, those living nearest the river visited it more frequently but they also visited more recreational areas and were more concerned about things that might happen to the local area.

Higher numbers than expected of members of organizations showed greater levels of concern about the local environment. These included members of sports clubs and civic/community groups as well as the more environmentally oriented groups. Other responses were variable but in general members of several organizations visited the river and recreational areas more often, and rated the environmental attributes as more of an advantage.

Social characteristics with scheme attitudes.



Model of flood hazard perception and mitigating adjustment

(Scheme attitudes were measured by Question 24.)

Those nearest to the river tended generally to show less support for flood relief schemes and those furthest from the river to show most support. Those living up to 250 metres from the river generally showed support but were sometimes split. These respondents are in a problem zone as they are not close enough to the river to enjoy the highest environmental benefit it can offer but are close enough to suffer its disbenefits in terms of flooding. This can make their reponses somewhat volatile.

Length of residence, age and household structure were closely related variables, with the older residents (including households with older members and the longest residence periods) showing a generally acquiescent response which could be inconsistent (that is, showing both agreement and disagreement with the positive scheme statements). In the Datchet to Walton Bridge study area there was a high level of ignorance about both the need for and the nature of flood defence schemes and in the face of this uncertainty it is possible that some respondents, who had an unfounded belief that what the statements said was 'true', gave an acquiescent response rather than display this ignorance to the interviewer.

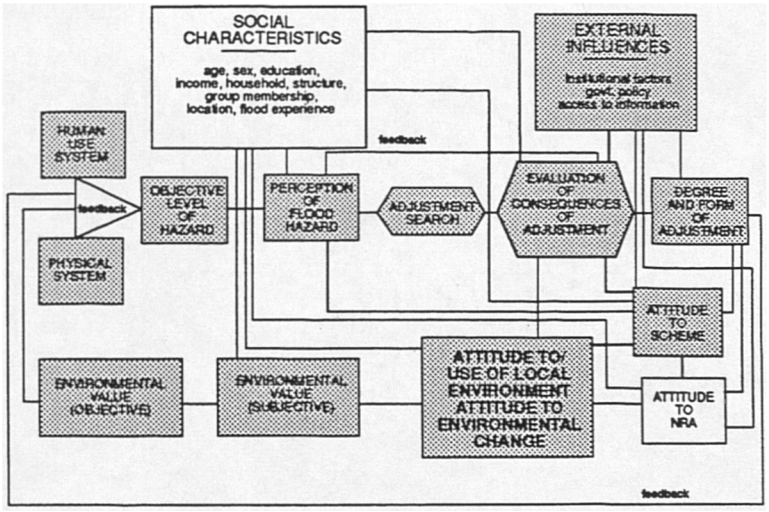
Only two statements (Q24c and Q24j) produced significant associations between sex and scheme response. Higher numbers of males than expected felt more positively that schemes could enhance the environment and that embankments do not spoil the view. This was reversed for females who also showed more uncertainty. Males tended to be more prepared to commit themselves to an opinion on scheme statements and females tended towards greater uncertainty.

Households with children tended to have a slightly more positive attitude to schemes although they also showed greater uncertainty. Greater levels of education were associated with anti-scheme attitudes. The less educated tended to support scheme statements and this may again be a tendency towards an acquiescent response related to the age variable (older age groups tending to have less education). Those with higher incomes tended to show less support for scheme statements and vice versa.

Members and supporters of groups showed a varied response. Higher numbers than expected of members/supporters of civic/community associations showed both positive and negative attitudes to schemes. Members/supporters of the World Wide Fund for Nature, the RSPB and political parties had a generally more positive attitude to schemes while members/supporters of sports clubs and naturalists trusts had a generally more negative attitude to schemes.

Perhaps surprisingly there were only two significant associations with flood experience and scheme attitudes. Although the majority disagreed with the statement "I would rather rely on flood warnings and risk being flooded than have any flood relief scheme in this area", higher numbers than expected of those with flood experience preferred to rely on flood warnings. Those with flood experience showed a bimodal distribution on the scheme response scale. Thus, flood experience per se does not appear to be a strong explanatory factor in attitude to potential schemes.

Social characteristics with attitude to the NRA.



Model of flood hazard perception and mitigating adjustment

(Attitude to the NRA was measured by Question 31.)

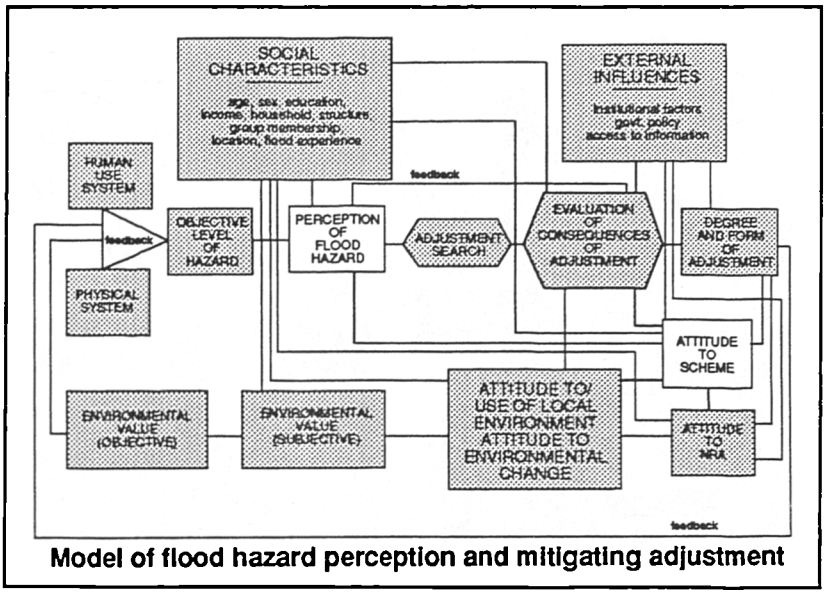
Very large numbers of respondents gave 'don't know' or 'neither agree nor disagree' responses to the set of statements designed to test people's attitude to the NRA. For many respondents the NRA is a shadowy organization with whom they have had little or no contact and of whose responsibilities and past actions little is known.

Once again there was considerable acquiescence with many of the statements from the older, less educated and lower income respondents where other respondents tended towards uncertainty.

Greater numbers than expected of those with flood experience believed that the NRA cannot be relied upon to design an environmentally sensitive scheme and only in the group living up to 250 metres from the river did more believe that the NRA takes the public's views into account when deciding on a scheme.

Overall, attitudes varied between positive and negative and no very clear picture emerged from the social data to suggest that particular groups had either a positive or a negative attitude to the NRA.

Perception of flood hazard with attitude to scheme.



Model of flood hazard perception and mitigating adjustment

Significant associations between the two sets of statements measuring perception of flood hazard and attitude to schemes tended to show a logical relationship and were indicative of the internal validity of the statements. Those who had a higher expectation of flooding were more likely to show support for schemes while those who were more prepared to live with the flood risk tended to show less support. However, awareness of past flooding did not lead to unconditional support for schemes. Those aware were less likely to support a scheme regardless of cost, more likely to agree that it is a waste of money to spend it on flood relief schemes because "nature will always win in the end", and more likely to agree that there is no need for a scheme in the area because the flood risk is too low. Those who were aware of the flood risk when they moved to the area were less likely to want any scheme rather than be flooded.

Agreement with the statement: "you can get some fun out of every situation - even flooding" points to an optimistic and positive attitude to flooding. Although, when cross-tabulated with scheme attitude statements, the majority of floodplain residents responded in what might be assumed to be a logical manner (i.e. the majority who disagreed that you can get fun out of flooding, also scored highly on the scheme response scale) nevertheless agreement with the statement was also often associated with an optimistic attitude towards both the necessity for, and the nature of, flood relief.

Higher than expected numbers of those agreeing that you can get fun out of flooding also agreed that there are more important things than flood relief; that they would rather put up with flooding than spoil the open space with flood relief channels; would not rather have any scheme than be flooded; and agreed that there is no need for a flood relief scheme in the area because the flood risk is too low. However, they also agreed, more positively, that a flood relief channel could offer new opportunities for recreation.

The influence of personality factors on beliefs about, and attitudes to, flooding and the environment, were not examined empirically in any of the case studies discussed here, partly because they are difficult to operationalise but also, related to this, because there was a need to keep the length of the survey instrument to a minimum. However, the crosstabulations did suggest an underlying optimism in some floodplain residents influenced their beliefs and attitudes. The variation in the responses was sufficient, however, to dismiss the notion of a response set; acquiescence was not habitual.

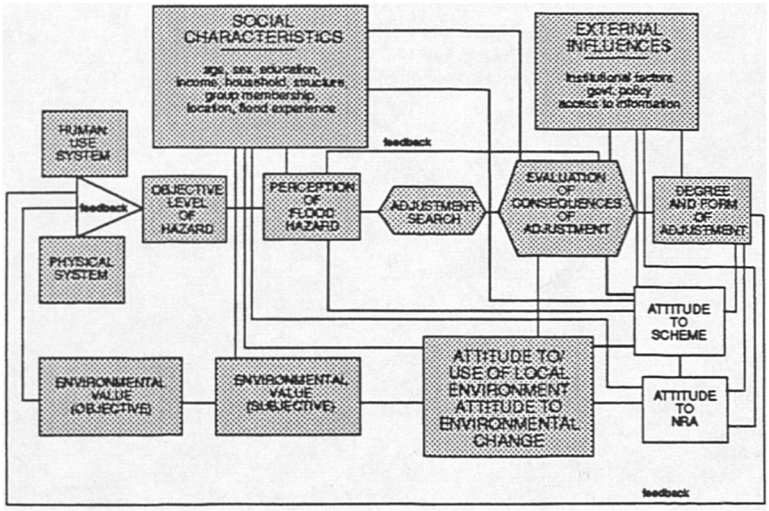
Some statements that expressed support for flood relief were associated with statements expressing ignorance of flood causation and a low flood hazard expectancy. However, the scheme response statements that were used were both specific to the area and more general and it is possible that some residents can have a positive attitude to flood relief in general while believing that there is no flood risk in their area. For example, higher than expected numbers of those who agreed with the statements "we don't have real floods here" and "past flooding was a freak event, unlikely to happen again" also agreed that anything designed to reduce flooding is desirable (general); and would rather have any scheme than be flooded (general).

Higher than expected numbers of those who agreed with the statement that "the Thames Barrier at Woolwich has removed the risk of flooding in this area", agreed with the same general statements and also with the more specific: "a flood relief scheme should be carried out in this area regardless of cost". So, even if a respondent believed the flood risk to have been removed or non-existent they could still argue in favour of a scheme.

The two general statements: "anything designed to reduce flooding is desirable" and "I would rather have any scheme than be flooded", in particular, commanded majority support (67% and 53% respectively). The former statement was the first to be asked of respondents in the DWSC/89 survey and the reduction in the percentage agreeing between it and the latter statement may be due to an increasing awareness by respondents of the more negative aspects of flood relief as suggested by subsequent statements. (This interpretation was supported by the findings of the DWSC 1990 survey. See the Lower Stour Case Study for a discussion of the qualifying process used in response to these statements).

Thus it would appear that even among certain respondents with a negative flood experience this statement ("anything designed to reduce flooding is desirable") can draw an initial acquiescent response. This may be associated with the respondents' lack of any 'image of damage' for flood defence whereas they might have a stereotypical image of (perhaps catastrophic) flood damage which they cannot relate to their particular local environment. The vagueness of the word 'anything' contrasts with the second statement which more specifically uses the word 'scheme' and follows statements which present an alternative view of flood relief.

Attitude to scheme with attitude to NRA/Attitude to NRA with attitude to scheme.



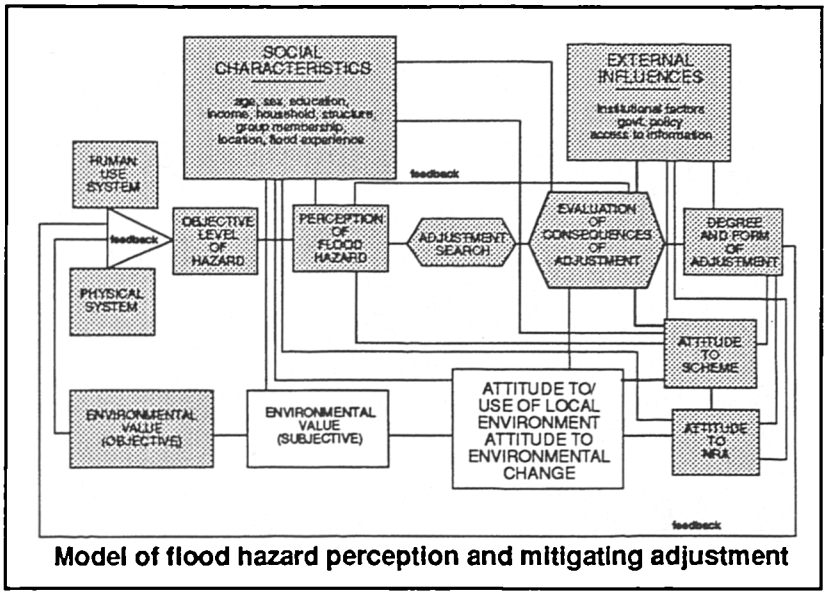
Model of flood hazard perception and mitigating adjustment

It was hypothesized that attitude to the NRA would influence attitudes to schemes but when respondents have little experience of the NRA it is possible that the relationship can be reversed, as appeared to be the case in some of the Lower Stour interviews. It seems likely that the two variables are closely interlinked and subject to continual revision following the accumulation of further experience or information.

A consistent relationship was not found between attitude to the NRA and attitude to schemes. Positive attitudes to the NRA were not a necessary condition of positive attitudes to schemes (and vice versa) although generally this was the case.

Examples of exceptions to the expected pattern were those who agreed that there should be a scheme regardless of cost also agreed that the Water Authority/NRA cannot be relied upon to design an environmentally sensitive scheme and do not take the public's views into account when deciding on a scheme. Whether or not people would rather have any scheme than be flooded was not necessarily associated with whether they believed the NRA could be relied upon to design environmentally sensitive schemes.

Environmental value with attitude to/use of local environment/attitude to environmental change.



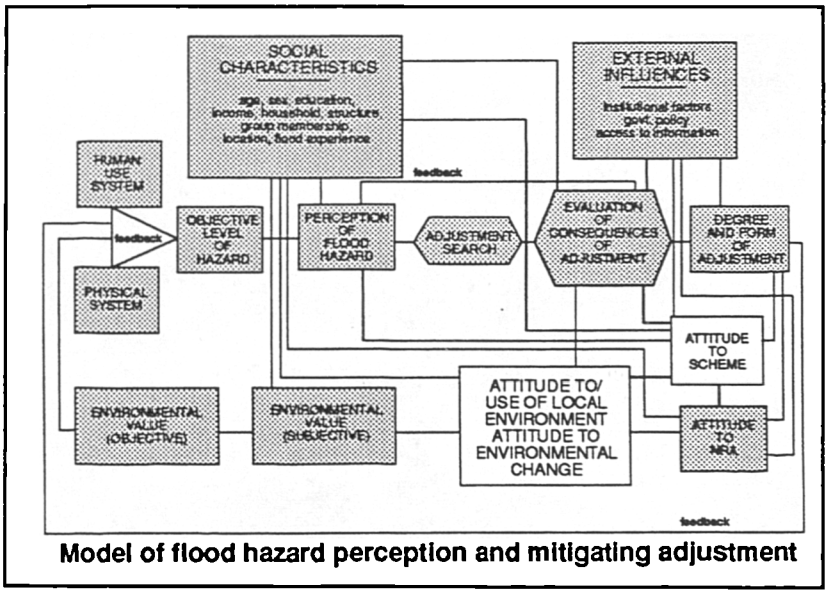
Model of flood hazard perception and mitigating adjustment

Those with the highest scores on the environmental values scale also rated the availability of wildlife habitats and nearby countryside as more of an advantage and were more concerned about things that may happen to the local countryside and open spaces.

Conversely, those with the highest scores on the optimistic utilitarianism scale were less concerned, visit less recreational areas and more of them do not visit the river.

Multiple regression analysis indicated that the factors contributing most to the overall rating of the local area are the environmental factors (being near the river, availability of wildlife habitats, countryside nearby and the attractive environment). The risk of river flooding contributes very little to the rating of the area generally.

Attitude to/use of local environment/attitude to environmental change with attitude to scheme.



Model of flood hazard perception and mitigating adjustment

Those most concerned about things that might happen to their local environment and who visited the river more often had the most negative attitude to scheme statements. They were not prepared to accept anything to reduce flooding. Those who believed the local area to have changed little, disagreed that a scheme should be carried out regardless of cost, while those who believed the area to have changed a lot tended to agree (although there was more uncertainty also). It was stated earlier that many of those who believed the area to have changed a lot were in the older age group who showed a tendency toward agreement with many attitude statements and thus it cannot be assumed from this association alone (between a belief that the area has greatly changed and a positive attitude to a scheme) that those areas that have seen a lot of environmental change will accept more.

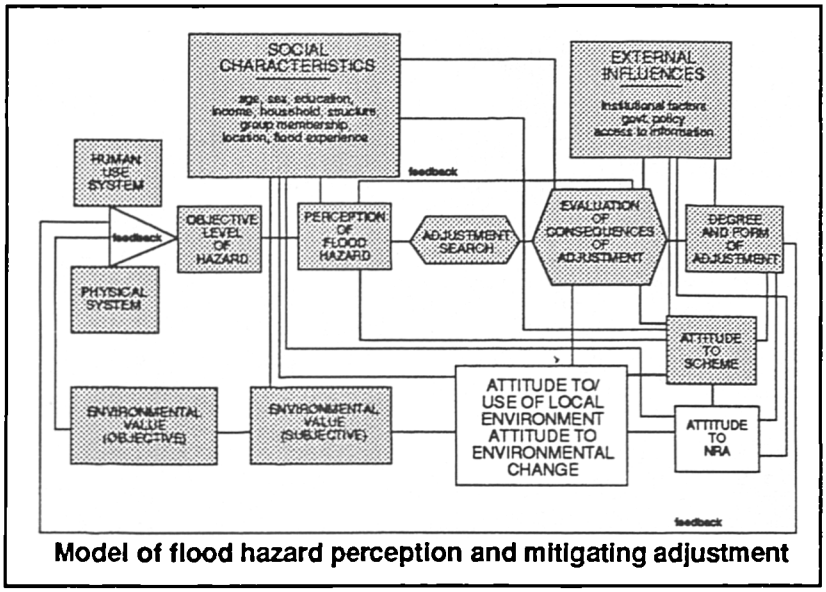
Those that rated the flood risk as a disadvantage were more positive towards flood relief schemes and had a higher score on the scheme response scale.

Those that rated the area most highly agreed that embankments spoil the view but also that a flood relief channel could offer new opportunities for recreation and a scheme could enhance the environment. However, they both agreed and were uncertain about whether they would rather put up with flooding than

spoil the open space with channels, more preferring to rely on warnings. They were split over the flood risk and the need for any scheme.

Generally, those that rated the area most highly showed a positive tendency towards flood relief schemes but needed to be convinced that any scheme would not damage the environment.

Attitude to/use of local environment/attitude to environmental change with attitude to NRA.



Model of flood hazard perception and mitigating adjustment

Greater numbers than expected of those who rated highly being near the river, disagreed that the Water Authority/NRA only proposes flood relief schemes when they are really necessary. However on other statements they were more positively disposed, agreeing that the WA/NRA consults people affected, and designs schemes that enhance the environment for example.

Negative attitudes to the NRA were associated to beliefs that the environment has changed a lot and for the worse. Other attitudes to environmental change showed that those who were very concerned did not believe the NRA consults people fully.

A scale of attitude to the NRA showed that those who believed the local countryside and open spaces have changed for the better had a more positive attitude to the NRA and vice versa. It is possible that this and similar responses could be explained by a personality variable (not used here) which would be a general indicator of optimistic and pessimistic dispositions.

Appendix C-7.16: Testing the model: Associations between dependent and independent variables significant at, or above, the 95 percent confidence level. DWSC/89

[NS = Not significant 0.n = Significance level]

DEPEND-ENT VARS.	- INDEPENDENT VARIABLES - SEX	AGE	LENGTH RESIDE	FLOOD EXP.	2NDARY FL.EXP.	DISTANCE FROM RIV	INCOME	EDUC	MEMBER-SHIP [1]	H'HOLD STRUCT-URE [2]	TENURE
Perception of flood hazard											
Q14a	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Q14b	.02	NS	NS	.00	NS	.02	NS	NS	SIG	NS	NS
Q14c	.03	NS	NS	NS	NS	.00	NS	NS	SIG	NS	NS
Q14d	NS	.04	NS	NS	NS	.01	NS	.04	SIG	SIG	NS
Q14e	NS	.00	NS	NS	NS	NS	NS	.00	NS	SIG	NS
Q14f	NS	.05	NS	.02	NS	NS	NS	NS	SIG	SIG	NS
Q14g	NS	.00	.00	NS	NS	NS	.04	.01	NS	SIG	NS
Q14h	.00	NS	.00	.01	NS	.01	.01	.00	NS	NS	NS
Q14i	NS	.00	NS	.01	NS	NS	.04	.00	SIG	SIG	NS
Q14j	NS	.02	NS	.03	NS	.03	NS	NS	NS	NS	NS
Q15a	NS	.02	NS	NS	NS	NS	NS	NS	SIG	NS	NS
Q15b	NS	.00	.00	NS	NS	NS	.04	.00	SIG	SIG	NS
Q15c	NS	.00	.00	NS	NS	NS	.03	.01	SIG	SIG	NS
Q15d	.05	.00	NS	NS	NS	.00	NS	NS	SIG	SIG	NS
Q15e	NS	.00	NS	NS	NS	.01	.03	.00	SIG	SIG	NS
Q15f	NS	.00	.00	.01	NS	NS	.00	.00	SIG	SIG	NS
Q15g	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Q15h	NS	.00	NS	.04	NS	NS	NS	NS	SIG	SIG	NS
Q12	.04	.00	.02	NS	NS	NS	NS	NS	SIG	NS	NS
Q13	NS	.00	NS	.00	.00	NS	NS	NS	NS	SIG	NS
Q16	NS	.01	NS	NS	NS	.03	.01	NS	SIG	SIG	NS
Q17a	NS	NS	NS	NS	NS	.01	NS	NS	NS	SIG	NS
Q17b	NS	.02	NS	.01	NS	.01	.03	NS	NS	SIG	NS
Q17c	NS	NS	NS	NS	NS	NS	NS	NS	NS	SIG	NS
Q17d	NS	.02	NS	NS	NS	NS	.03	NS	NS	SIG	NS
Q17e	NS	.00	NS	NS	NS	NS	.01	NS	SIG	SIG	NS
Q18a	NS	.04	NS	NS	NS	.04	NS	NS	NS	SIG	NS
Q18B	.04	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Q18c	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Q18d	NS	NS	NS	NS	NS	NS	NS	NS	SIG	NS	NS
Q18e	NS	.01	NS	.00	NS	NS	NS	NS	NS	SIG	.04
Q18f	NS	.00	NS	.00	NS	NS	NS	NS	NS	SIG	.02
Q19	NS	.00	NS	.00	.01	NS	NS	NS	SIG	SIG	NS
Q19b	NS	NS	NS	NS	NS	NS	NS	NS	NS	SIG	NS
V352[3]		.00	.00	NS			NS	.00	NS	SIG	.03
V353[4]		.00	.02	.02			.01	NS	SIG	SIG	NS
Environmental value											
Q3	.04	NS	NS	N/A	N/A	NS	.00	NS	NS	NS	.00
V350[5]	.03	.01	NS	N/A	N/A	NS	NS	NS	SIG	NS	NS
V351[6]	NS	.00	.00	N/A	N/A	NS	.00	.00	SIG	NS	NS

- INDEPENDENT VARIABLES -

DEPEND-ENT VARS.	SEX	AGE	LENGTH RESIDE	FLOOD EXP.	2NDARY FL.EXP.	DISTANCE FROM RIV	INCOME	EDUC	MEMBER-SHIP [1]	H'HOLD STRUCT-URE [2]	TENURE
Attitude to/use of local environment, attitude to environmental change											
Q2a	NS	.00	NS	N/A	N/A	NS	.03	NS	NS	SIG	NS
Q2b	NS	NS	NS	N/A	N/A	NS	NS	NS	NS	NS	.01
Q2c	NS	.04	NS	N/A	N/A	.00	NS	NS	SIG	SIG	.00
Q2d	NS	NS	NS	N/A	N/A	.05	.00	NS	SIG	NS	.02
Q2e	NS	NS	NS	N/A	N/A	NS	NS	NS	SIG	NS	NS
Q2f	.01	NS	NS	N/A	N/A	NS	NS	NS	NS	NS	.01
Q2g	.02	NS	NS	N A	N/A	NS	.00	NS	SIG	NS	NS
Q2h	NS	NS	NS	N/A	N/A	NS	.02	NS	SIG	NS	NS
Q2i	.01	NS	NS	N/A	N/A	.02	.01	NS	SIG	SIG	NS
Q2j	NS	.01	.00	N A	N/A	.00	.01	.00	SIG	NS	NS
Q2k	.05	NS	NS	N/A	N/A	NS	.02	NS	NS	SIG	NS
Q2l	NS	.05	NS	N A	N/A	NS	NS	NS	NS	NS	NS
Q2m	NS	NS	.03	N A	N/A	NS	.01	NS	NS	NS	NS
Q2n	NS	NS	NS	N A	N/A	NS	NS	NS	SIG	NS	NS
Q4	.03	NS	.00	N/A	N/A	NS	.00	.00	SIG	SIG	.00
Q4a[7]	NS	.02	NS	N/A	N/A	.00	.03	NS	SIG	SIG	NS
Q5[8]	NS	NS	NS	N A	N/A	.05	.00	NS	SIG	SIG	.00
Q7	NS	.01	.00	N A	N/A	NS	NS	NS	NS	NS	NS
Q7a	NS	NS	NS	N A	N A	NS	.01	NS	NS	SIG	NS
Q8	NS	NS	NS	N A	N/A	.00	NS	.01	SIG	SIG	.00
Attitude to scheme											
Q24a	NS	NS	NS	NS	NS	NS	.02	.00	SIG	NS	NS
Q24b	NS	NS	NS	NS	NS	NS	NS	NS	SIG	NS	NS
Q24c	.01	.05	NS	NS	NS	NS	NS	NS	SIG	NS	.04
Q24d	NS	NS	NS	NS	NS	.00	.00	.03	SIG	SIG	NS
Q24e	NS	.04	.00	NS	NS	NS	.01	NS	SIG	SIG	NS
Q24f	NS	NS	NS	NS	NS	NS	NS	NS	NS	SIG	NS
Q24g	NS	NS	NS	NS	NS	.02	NS	NS	SIG	NS	NS
Q24h	NS	.03	.00	NS	NS	NS	.02	NS	SIG	SIG	.05
Q24i	NS	.04	NS	NS	NS	.01	.04	.00	SIG	NS	NS
Q24j	.01	NS	NS	NS	NS	.03	NS	NS	NS	NS	NS
Q24k	NS	.00	.03	NS	NS	.00	.00	.00	SIG	SIG	NS
Q24l	NS	NS	NS	.03	NS	NS	NS	NS	NS	SIG	NS
Q24m	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Q24n	NS	.05	.04	NS	NS	NS	NS	NS	NS	SIG	NS
Q24o	NS	.01	NS	NS	NS	.00	.03	NS	NS	SIG	NS
V342[9]	NS	NS	NS	.00	NS	NS	.05	NS	SIG	NS	NS
Attitude to NRA											
Q31a	NS	.01	NS	NS		NS	.04	NS	NS	NS	NS
Q31b	NS	NS	NS	NS		NS	NS	NS	NS	NS	.01
Q31c	NS	.00	NS	NS		.00	.02	.01	NS	SIG	NS
Q31d	NS	NS	NS	.04		NS	NS	NS	NS	NS	NS
Q31e	NS	.00	NS	NS		.03	NS	.00	NS	SIG	NS
Q31f	NS	NS	NS	NS		NS	.04	.01	NS	SIG	NS
Q31g	.01	.04	NS	NS		NS	NS	NS	NS	NS	NS
Q31h	NS	NS	NS	NS		.00	NS	.04	NS	NS	.04
Q31i	NS	.00	NS	NS		NS	NS	.03	NS	NS	NS

- INDEPENDENT VARIABLES -

DEPEND-ENT VARS.	PERCEPTION OF FLOOD HAZARD										
	Q14a	Q14b	Q14c	Q14d	Q14e	Q14f	Q14g	Q14h	Q14i	Q14j	contd.
Attitude to scheme											
Q24a	NS	.00	.00	.00	.01	.00	.00	.00	.08	.01	
Q24b	NS	.02	NS	.02	NS	NS	.00	NS	NS	NS	
Q24c	NS	.00	.03	.00	NS	.04	NS	.00	.00	NS	
Q24d	NS	.02	NS	.00	.01	NS	.00	.00	.01	.01	
Q24e	.00	.01	.00	NS	.03	.00	.01	.03	.00	.02	
Q24f	NS	.00	.03	NS	.00	.00	NS	NS	.02	.00	
Q24g	NS	.00	.00	.00	.00	NS	NS	NS	NS	.00	
Q24h	NS	.00	NS	.00	NS	.00	.00	.00	.01	NS	
Q24i	NS	NS	NS	NS	NS	.00	.00	NS	NS	NS	
Q24j	NS	.00	NS	NS	.00	.00	.03	NS	.00	NS	
Q24k	NS	.00	.00	.00	.00	.00	.00	.00	.00	.00	
Q24l	.05	.00	.00	.00	.00	.03	.00	.02	NS	NS	
Q24m	.03	.00	NS	.00	.03	NS	.01	.05	.03	NS	
Q24n	.00	.01	.00	.00	NS	.00	.00	NS	NS	.04	
Q24o	NS	.00	NS	.01	NS	.00	.00	NS	NS	.02	
v342	NS	.00	NS	NS	NS	NS	NS	NS	NS	.00	

- INDEPENDENT VARIABLES -

DEPEND-ENT VARS.	PERCEPTION OF FLOOD HAZARD										
	Q15a	Q15b	Q15c	Q15d	Q15e	Q15f	Q15g	Q15h	Q16	Q17a	contd.
Attitude to scheme											
Q24a	.00	.00	.00	.00	NS	.02	NS	.00	NS	NS	
Q24b	.00	NS	NS	.00	NS	.00	NS	NS	.00	NS	
Q24c	.00	.00	NS	.01	.02	.00	NS	.02	NS	NS	
Q24d	.00	.02	.01	.00	.00	.00	.00	.00	.00	.02	
Q24e	NS	NS	NS	.00	.00	.02	NS	NS	NS	NS	
Q24f	.00	NS	.00	NS	.00	NS	.01	.00	NS	NS	
Q24g	NS	NS	NS	NS	NS	NS	.02	.00	.05	NS	
Q24h	.00	NS	.00	.00	.00	NS	NS	.00	NS	NS	
Q24i	NS	.00	.00	.00	NS	.05	.01	.00	NS	NS	
Q24j	NS	NS	NS	.00	NS	NS	NS	.02	.01	.01	
Q24k	.00	.00	.01	.00	NS	.00	NS	NS	NS	NS	
Q24l	.02	NS	.00	.05	NS	.00	.00	.01	.03	NS	
Q24m	NS	.03	NS	NS	.01	NS	.00	.00	NS	NS	
Q24n	NS	.02	NS	NS	NS	NS	NS	.00	NS	NS	
Q24o	.00	.01	.00	.00	.00	.00	.00	NS	.00	.04	
v342	.01	NS	NS	NS	NS	.04	.00	NS	.00	NS	

- INDEPENDENT VARIABLES -

DEPEND-ENT VARS.	PERCEPTION OF FLOOD HAZARD										
	Q17b	Q17c	Q17d	Q17e	Q18a	Q18b	Q18c	Q18d	Q18e	Q18f	contd.
Attitude to scheme											
Q24a	NS	NS	NS	NS	.00	NS	NS	NS	NS	NS	
Q24b	.00	.01	.02	NS	.04	NS	NS	NS	NS	NS	
Q24c	NS	.04	NS	NS	NS	NS	NS	NS	NS	NS	
Q24d	.00	.00	.00	.00	.02	.02	.02	.00	NS	NS	
Q24e	NS	NS	NS	NS	NS	.00	NS	.03	NS	NS	
Q24f	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	
Q24g	NS	NS	NS	NS	NS	.00	.00	.00	.03	NS	
Q24h	NS	.05	NS	NS	NS	NS	NS	NS	NS	NS	
Q24i	NS	NS	NS	NS	NS	NS	NS	.02	.05	.04	
Q24j	NS	NS	NS	NS	NS	NS	.05	.00	.01	.03	
Q24k	NS	NS	.01	.01	.01	.02	.00	.00	NS	NS	
Q24l	.04	.01	NS	.03	NS	.01	.00	.00	.00	.01	
Q24m	NS	.01	NS	NS	NS	NS	NS	NS	NS	NS	
Q24n	NS	.03	.00	.01	NS	NS	NS	NS	NS	NS	
Q24o	.00	.00	.00	.00	NS	.05	NS	NS	NS	NS	
V342	.00	.02	.02	NS	.01	NS	.01	.00	NS	NS	

- INDEPENDENT VARIABLES -

DEPEND-ENT VARS.	PERCEPTION OF FLOOD HAZARD					
	Q19	Q19b	Q12	Q13	V352	V353
Attitude to scheme						
Q24a	NS	NS	NS	NS	.01	NS
Q24b	NS	NS	.02	NS	NS	NS
Q24c	NS	NS	NS	NS	NS	NS
Q24d	NS	NS	NS	.01	.03	.00
Q24e	NS	NS	NS	.01	.03	NS
Q24f	NS	NS	NS	NS	.04	NS
Q24g	NS	NS	NS	NS	.00	NS
Q24h	NS	NS	NS	NS	NS	NS
Q24i	NS	NS	NS	NS	NS	.04
Q24j	NS	NS	NS	NS	.00	NS
Q24k	NS	.01	.05	NS	.00	.05
Q24l	NS	NS	NS	NS	.00	.00
Q24m	NS	NS	NS	NS	.05	NS
Q24n	NS	NS	.02	NS	NS	NS
Q24o	.02	NS	NS	.00	NS	.00
V342	NS	NS	NS	NS	.01	.02

- INDEPENDENT VARIABLES -

ATTITUDE TO NRA

DEPEND -ENT VARS.	Q31a	Q31b	Q31c	Q31d	Q31e	Q31f	Q31g	Q31h	Q31i		
Attitude to scheme											
Q24a	NS	NS	NS	NS	NS	.00	NS	NS	NS		
Q24b	NS	NS	.01	NS	.00	NS	NS	NS	.00		
Q24c	NS	.00	.01	.04	NS	.02	NS	NS	NS		
Q24d	NS	.01	.00	.01	.00	NS	.03	.00	NS		
Q24e	NS	NS	.00	.03	.01	NS	NS	NS	NS		
Q24f	NS	NS	.00	.00	NS	.00	NS	NS	.00		
Q24g	NS	NS	NS	NS	NS	NS	NS	NS	.01		
Q24h	NS	NS	.00	.03	.00	NS	NS	NS	NS		
Q24i	NS	.00	.00	.01	NS	NS	NS	NS	.00		
Q24j	NS	NS	.00	NS	NS	NS	NS	NS	.00		
Q24k	.00	.00	.00	.00	NS	.00	NS	.01	NS		
Q24l	NS	NS	.00	NS	NS	NS	.00	NS	NS		
Q24m	.05	.01	NS	.01	NS	NS	NS	NS	NS		
Q24n	NS	NS	.00	.02	NS	NS	NS	NS	NS		
Q24o	NS	NS	.00	.00	NS	NS	NS	NS	.00		
V342	NS	NS	.00	NS	NS	NS	NS	NS	NS		

- INDEPENDENT VARIABLES -

ATTITUDE TO/USE OF LOCAL ENVIRONMENT, ATTITUDE TO ENVIRONMENTAL CHANGE

DEPEND -ENT VARS.	Q2a	Q2b	Q2c	Q2d	Q2e	Q2f	Q2g	Q2h	Q2i	Q2j	contd.
Attitude to scheme											
Q24a	NS	NS	NS	NS	NS	NS	.00	.00	.02	NS	
Q24b	NS	NS	NS	NS	NS	NS	NS	NS	.00	NS	
Q24c	NS	NS	.00	NS	.05	.00	NS	NS	NS	.02	
Q24d	NS	NS	NS	.00	NS	.02	NS	NS	.01	NS	
Q24e	NS	NS	NS	NS	NS	NS	NS	.05	NS	NS	
Q24f	NS	NS	.03	.00	NS	.00	NS	.02	NS	.04	
Q24g	NS	NS	.01	.05	.00	NS	NS	.01	.02	NS	
Q24h	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	
Q24i	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	
Q24j	NS	.04	.00	NS	.00	.00	NS	NS	.04	NS	
Q24k	NS	NS	.01	NS	NS	NS	NS	NS	NS	NS	
Q24l	NS	.01	.04	.04	NS	.00	NS	.02	.01	NS	
Q24m	NS	NS	.04	NS	NS	NS	NS	NS	NS	NS	
Q24n	.04	NS	NS	NS	.00	.00	NS	NS	NS	NS	
Q24o	.01	NS	NS	.00	NS	NS	NS	NS	.00	.02	
v342	NS	NS	NS	NS	NS	NS	NS	NS	.00	NS	

- INDEPENDENT VARIABLES -

DEPEND-ENT VARS.	ATTITUDE TO/USE OF LOCAL ENVIRONMENT, ATTITUDE TO ENVIRONMENTAL CHANGE										
	Q2k	Q21	Q2m	Q3	Q4	Q4a	Q5	Q7	Q7a	Q8 Q8	
Attitude to scheme											
Q24a	.00	NS	NS	NS	.00	NS	NS	NS	NS	.00	
Q24b	NS	NS	NS	NS	.03	NS	.03	NS	NS	NS	
Q24c	.05	NS	NS	.01	NS	NS	NS	NS	NS	NS	
Q24d	.04	NS	NS	NS	NS	NS	NS	.00	NS	.04	
Q24e	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	
Q24f	NS	NS	NS	.01	NS	NS	NS	NS	NS	NS	
Q24g	NS	NS	NS	.01	.02	NS	NS	NS	NS	.05	
Q24h	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	
Q24i	NS	NS	NS	NS	NS	NS	NS	.01	NS	NS	
Q24j	NS	NS	NS	.00	NS	NS	NS	NS	NS	NS	
Q24k	.05	NS	NS	NS	.00	NS	NS	NS	NS	.03	
Q24l	NS	.01	NS	.04	NS	NS	NS	NS	NS	NS	
Q24m	NS	NS	NS	NS	NS	NS	NS	.03	NS	NS	
Q24n	NS	NS	NS	.01	NS	NS	NS	NS	NS	NS	
Q24o	NS	.03	NS	.00	NS	NS	NS	NS	NS	NS	
v342	.01	NS	NS	NS	NS	NS	NS	NS	NS	NS	

- INDEPENDENT VARIABLES -

DEPEND-ENT VARS.	ATTITUDE TO/USE OF LOCAL ENVIRONMENT, ATTITUDE TO ENVIRONMENTAL CHANGE										
	Q2a	Q2b	Q2c	Q2d	Q2e	Q2f	Q2g	Q2h	Q2i	Q2j	contd.
Attitude to NRA											
Q31a	NS	NS	NS	NS	NS	NS	.01	NS	NS	NS	
Q31b	NS	NS	.00	.00	.02	NS	NS	NS	NS	.02	
Q31c	NS	NS	NS	NS	NS	NS	.05	NS	NS	NS	
Q31d	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	
Q31e	NS	NS	.00	NS	.01	NS	.01	NS	NS	NS	
Q31f	NS	.01	.05	NS	NS	NS	.00	NS	NS	.00	
Q31g	NS	NS	.00	.00	NS	NS	NS	NS	NS	.01	
Q31h	NS	.02	NS	NS	NS	NS	NS	NS	NS	NS	
Q31i	NS	.02	.00	.00	.00	.05	NS	NS	NS	.04	

- INDEPENDENT VARIABLES -

DEPEND-ENT VARS.	ATTITUDE TO/USE OF LOCAL ENVIRONMENT, ATTITUDE TO ENVIRONMENTAL CHANGE										
	Q2k	Q21	Q2m	Q3	Q4	Q4a	Q5	Q7	Q7a	Q8 Q8	
Attitude to NRA											
Q31a	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	
Q31b	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	
Q31c	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	
Q31d	NS	.01	NS	NS	NS	NS	.03	.00	.01	NS	
Q31e	NS	NS	NS	NS	.01	NS	NS	.02	NS	NS	
Q31f	NS	NS	NS	NS	NS	NS	NS	NS	NS	.01	
Q31g	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	
Q31h	NS	NS	NS	NS	NS	NS	.01	NS	NS	NS	
Q31i	NS	NS	NS	.01	NS	NS	NS	NS	.00	.00	

DEPEND-ENT VARS.	- INDEPENDENT VARIABLES - ENVIRONMENTAL VALUE (SUBJECTIVE) Q3	V350	V351
Attitude to/use of local environment, attitude to environmental change			
Q2a	NS	NS	NS
Q2b	NS	NS	NS
Q2c	.00	.05	NS
Q2d	.00	NS	NS
Q2e	.00	.00	NS
Q2f	.00	.00	NS
Q2g	.00	NS	.03
Q2h	.00	NS	NS
Q2i	NS	NS	NS
Q2j	.00	NS	NS
Q2k	.03	NS	NS
Q2l	.00	NS	NS
Q2m	.00	NS	NS
Q4	.00	NS	.00
Q4a	NS	NS	NS
Q5	NS	NS	.02
Q7	NS	NS	NS
Q7a	NS	NS	NS
Q8	NS	.00	.03

[1] MEMBERSHIP: This table does not tabulate the individual organization membership/support variables. Where significant relationships were found between a dependent variable and any of the organisation membership support variables this is marked SIG. A detailed breakdown can be found in Appendix C-7.15.

[2] HOUSEHOLD STRUCTURE: This table does not tabulate the individual household structure variables. Where significant relationships were found between a dependent variable and any of the household structure variables this is marked SIG. A detailed breakdown can be found in Appendix C-7.15.

[3] V352 is the variable number of the scale score of Question 18, preparedness to live with flood risks.

[4] V353 is the variable number of the scale score of Question 17, the likelihood of flooding.

[5] V350 is the variable number for the Environmental Values Scale score.

[6] V351 is the variable number for the Optimistic Utilitarianism Scale score.

[7] Q4a: how often visit River Thames.

[8] Q5: score for number of sites visited.

[9] V342 is the variable number for the Scheme Response Scale score.

APPENDIX D

Appendix D-8.1: Agreement with environmental attitude statements (DWSC/90 and DWSC/89)

'The River Environment and You' (DWSC/90: Question 5) and 'Thames Attitude Survey' (DWSC/89: Question 6).

	% AGREEING	
	DWSC/90	DWSC/89
People are more important than the environment	**29**	40
We should live in harmony with nature even if it means some sacrifices on our part	**92**	91
The most important problems today are the threats to the environment	**65**	54
It's right to use animals for medical research	**33**	46
Scientists will always be able to find the solution to a problem	**16**	18
These days, morality and trying to do what's right don't seem to matter	**47**	64
The most important problems today are economic problems, like unemployment or inflation	**36**	39
It's wrong to use animals to test the safety of cosmetics	**75**	76
I like to be in the open air of the countryside	**94**	94
We seem to know the price of everything and the value of nothing	**61**	63

Cases: 582 - 592

Appendix D-8.2: Agreement with selected statements about floods and flood risk (DWSC/90 and DWSC/89)

'The River Environment and You' (DWSC/90: Question 9) and 'Thames Attitude Survey' (DWSC/89: Questions 14 and 15).

	% AGREEING	
	DWSC/90	**DWSC/89**
A flood could happen again any year	**87**	73
A flood affects people's mental and physical health long after the event	**70**	63
The Thames barrier at Woolwich has removed the risk of flooding in this area	**9**	29
There are problems getting insurance in this local area because of the flood risk	**6**	8
A flood won't happen again because the National Rivers Authority can control flooding through river management*	**8**	22
The likelihood of flooding is increasing all the time because of changes in climate and the global environment*	**57**	40
We don't have real floods here	**32**	62
Flooding is only likely in the area if rivers, streams, locks and weirs are not properly maintained or operated	**32**	57
Past flooding was a freak event and is unlikely to happen again*	**8**	26

* Slight change in question wording between 1989 and 1990

Cases: DWSC/90: 585 - 597
DWSC/89: 475 - 491

Appendix D-8.3: Perceived seriousness of experienced and hypothetical future floods, and worry about future flooding (DWSC/90 and DWSC/89)

DWSC/90: Questions 6e, 8 and 10; DWSC/89: Questions 10e, 12 and 16.

	DWSC/90	DWSC/89	
"Thinking of the worst flood you've experienced, how serious were the effects of the flood upon the household's life?"	**3.9**	4.4	mean
	3	3.5	median
"If your house were to be flooded from the Thames or other rivers, how serious do you think the effects would be on the life of your household?"	**7.8**	7.9	mean
	9	9	median
"How worried are you about the possibility of flooding in the future in this area?"*	**2.7**	1.6	mean
	3	1	median

* Slight change in question wording between 1989 and 1990

Cases: DWSC/90: 144 - 599
DWSC/89: 116 - 493

Appendix D-8.4: Agreement with scheme statements:

DWSC/90: Question 15 and DWSC/89: Question 24.

	% AGREE	MEAN	SURVEY
A flood relief scheme should be carried out in this area regardless of cost	**37**	**2.9**	**DWSC/90**
	33	3.1	DWSC/89
I would rather put up with flooding than spoil the open space with flood relief channels	**18**	**3.4**	**DWSC/90**
	16	3.6	DWSC/89
I would rather have any scheme than be flooded	**40**	**2.9**	**DWSC/90**
	53	2.7	DWSC/89
There is no need for a flood relief scheme in this area because the flood risk is too low	**27**	**3.1**	**DWSC/90**
	36	3.0	DWSC/89
I would rather rely on flood warnings and risk being flooded than have any flood relief scheme in this area	**20**	**3.4**	**DWSC/89**
	20	3.5	DWSC/90
Anything designed to reduce flooding is desirable	**48**	**2.8**	**DWSC/89**
	67	2.5	DWSC/90
Flood relief schemes will only bring more development into the area	**32**	**2.9**	**DWSC/89**
	34	3.0	DWSC/90

Cases: DWSC/90: 569 - 580
DWSC/89: 479 - 493

APPENDIX E

Appendix E-9.1: Environmental values scale (Maidenhead 1990)

Question 64.

		mean	stddev
2	We should live in harmony with nature even if it means some sacrifices on our part	4.0	0.7
3	The most important problems today are the threats to the environment	3.4	1.2
5	It's wrong to use animals to test the safety of cosmetics	4.0	1.2
6	These days, morality and trying to do what's right don't seem to matter	3.2	1.1
9	I like to be in the open air of the countryside	4.5	1.0
10	We seem to know the price of everything and the value of nothing	3.6	1.1

Scale characteristics:

Number of items	6
alpha for scale	.55
Min-max	17-66
Mean score	34.9
Std. dev.	5.9
Skewness	.32
Kurtosis	4.07
Valid cases	193

Appendix E-9.2: Agreement with selected flooding statements (DWSC/89 and Maidenhead 1990)

DWSC/89: Questions 14 and 15;
DWSC/90: Question 9;
Maidenhead 1990: Question 66.

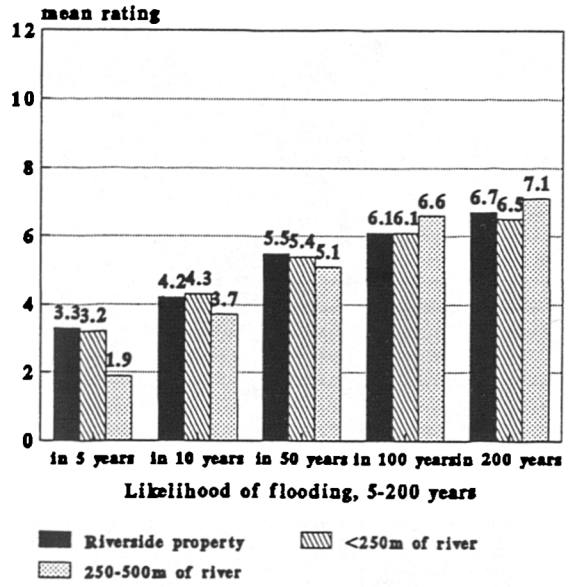
	% AGREE	MEAN	SURVEY
The Thames Barrier at Woolwich has removed the risk of flooding in this area	29	3.2	DWSC/89
	9	3.5	DWSC/90
	4	**4.4**	**M'HEAD**
Flooding is only likely in the area if rivers, streams, locks and weirs are not properly maintained or operated	59	2.7	DWSC/89
	32	3.2	DWSC/90
	27	**3.5**	**M'HEAD**
Past flooding was a freak event, unlikely to happen again	26	3.3	DWSC/89
	8	3.9	DWSC/90
	8	**4.1**	**M'HEAD**
A flood could happen again any year	73	2.4	DWSC/89
	87	2.0	DWSC/90
	91	**1.8**	**M'HEAD**
A flood won't happen again because the Rivers Authority* can now control flooding through river management	21	3.4	DWSC/89
	8	3.6	DWSC/90
	5	**4.2**	**M'HEAD**
The likelihood of flooding in the area is increasing all the time because of changes in climate and other things	40	2.9	DWSC/89
	57	2.5	DWSC/90
	59	**2.6**	**M'HEAD**
We don't have real floods here	61	2.6	DWSC/89
	32	3.2	DWSC/90
	12	**4.0**	**M'HEAD**

* The wording was changed from "Water Authority" used in the DWSC/89 survey.

Cases: DWSC/89: 453 - 491
DWSC/90: 585 - 597
M'HEAD: 185 - 194

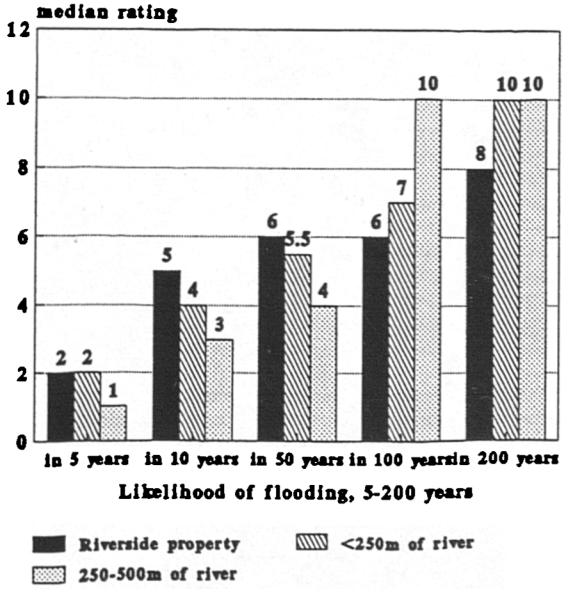
Appendix E-9.3: Perceived likelihood of flooding according to distance from the river: mean and median ratings (Maidenhead 1990)

Mean perceived likelihood of flooding according to distance from river (Maidenhead 1990).



Scale: 0, no chance to 10, almost certain

Median perceived likelihood of flooding according to distance from river: Maidenhead 1990.



Scale: 0, no chance to 10, almost certain

Appendix E-9.4: Agreement with scheme statements (DWSC/89 and Maidenhead 1990)

DWSC/89: Question 24;
Maidenhead 1990: Question 70.

	% AGREE	MEAN	SURVEY
Anything designed to reduce flooding is desirable	**66**	**2.3**	**M'HEAD**
	67	2.5	DWSC89
A flood relief scheme should be carried out in this area regardless of cost	**58**	**2.7**	**M'HEAD**
	33	3.1	DWSC89
I would rather put up with flooding than spoil the open space with flood relief channels	**10**	**3.9**	**M'HEAD**
	16	3.6	DWSC89
Flood relief schemes will only bring more development into the area	**32**	**3.2**	**M'HEAD**
	34	3.0	DWSC89
I would rather have any scheme than be flooded	**40**	**3.2**	**M'HEAD**
	53	2.7	DWSC89
I would rather rely on flood warnings and risk being flooded than have any flood relief scheme in this area	**11**	**3.9**	**M'HEAD**
	20	3.5	DWSC89
There is no need for a flood relief scheme in this area because the flood risk is too low	**6**	**4.3**	**M'HEAD**
	36	3.0	DWSC89

Cases: DWSC/89: 479 - 493
M'head: 172 - 198

APPENDIX F

COMMENTS

I Think that all of us kids won't be able to play over there

Will write to W.W. after thinking about all the pro's and against's.

Violently opposed to the whole scheme. Would rather be flooded once every 70 years!! The proposed embankment, with people climbing on top of it will be a blatant invasion of our privacy & will devalue our property. This is particularly the case in Windsor Rd as the gardens are so small, and ours being only 30 ft in length.

Anything that the appropriate Authorities can do to make sure that we are never flooded again will have our whole approval. Anyone who prefers to be flooded rather than have a wall or embankment must have had a lot of help when they were flooded.

* Very concerned that "no mans land" area will develop behind embankment and our boundary. Am afraid Council will not keep this area clean. Also that personal canal will develop. More #insects. Stagnating water. — Would hope that if development does proceed, that a symathetic back fill would be allowed for. Incidently, height appears to be approx 3 to 4ft above 1979 flood height. Is it necessity to go so high? Would have thought that clearing Flood Bridge, and dredging river would be sufficient.

In view of the fact that you will dredge the river the embankment seems higher than necessary. Also the trees & the bank will meet & there will be no view at all from the houses & bungalows along Linden Drive. Also see that there remains access to the recreation ground from Linden Drive.

COMMENTS

My property is the only one who's lounge window is oriented towards the Mead and river. The wall is too high. I will make formal objection to the proposal unless the wall is reduced by 6". I also have direct access to the Mead and I wish to keep it. Otherwise I agree with the proposal in principal.

In theory the scheme should work, however if the price to be paid by residents is an increase in break-ins and other antisocial behaviour associated with the construction of embankments and walls, together with the inconvenience and possible lowering of house values, then things should remain as they are. My bungalow was not flooded and perhaps a less expensive alternative to this undoubted "following" of flood protection should be considered first.

I disagree with the Scheme and would prefer the open space on Bernards Mead to be left as it is. If you want to protect residents from flooding why not put individual brick walls round the properties of those who want them. The scheme as shown will ruin an area of great beauty.

We were flooded but would still like the open space left alone & full the DITCH IN NOW

My interest is mainly that of conservation and aesthetic appeal as the technicalities of the scheme are not too clear to me. I feel that Wessex Water's record of conservation and attractiveness of the environment is poor — I am thinking particularly of the 'canalising' of the rives at Longham and the changes at Throop

Appendix F-10.2: Extended list of themes (with examples) from those reported in the comments book for the Lower Stour Flood Alleviation Scheme consultation.

1. PROPERTY VALUE
- the scheme will result in the lowering of house values

2. IMPACT OF SCHEME ON AMENITIES
- the recreation ground will be ruined.

3. AGAINST SCHEME BECAUSE OF AESTHETIC REASONS
- the scheme as shown will ruin an area of great beauty.
- We bought the bungalow for the view.

4. INFREQUENCY OF FLOOD RISK:
- Flooding as in 1979 only happens about once every 70 years.

5. DO SOMETHING ELSE INSTEAD:
- Fill the ditch in!
- why not put individual brick walls round the properties of those who want them

6. ACCESS TO REC GROUND:
- How does one get on [The Mead] with walls and ramps I wonder

7. 'THEY' ARE PLANNING SOMETHING ELSE OTHER THAN WHAT THEY HAVE SAID:
- Its my opinion that you no longer wish the residents to use [The Mead] as a recreation ground and intend to flood it.

8. 'THEY' CAN'T BE TRUSTED:
- I do not feel that you could be trusted not to fill all this [meadow] with water either soon or at a later date.

9. DON'T LIKE SCHEME ELEMENTS:
- the open ditch as it is a health hazard
- object to the building of a 10' high embankment when one of 5' would be adequate.

10. SAFETY ASPECTS:
- [DITCH] very dangerous
- increase in break-ins and other anti-social behaviour associated with the construction of embankments and walls,

11. PUBLIC REQUESTING CHANGE OF PLANS:
- hope you will alter these stupid plans

12. SENSE THAT OUTSIDERS HAVE MADE PLANS NOT SUITED TO RESIDENTS:
- give it much more thought and consideration for local residents
- it is a pity that the planers [sic] do not reside in the area

13. LEAVE THINGS AS THEY ARE:
- would prefer the open space on [The Mead] to be left as it is

14. SCHEME COSTS:
- perhaps a less expensive alternative to this undoubted "Rolls Royce" of flood protection should be considered first.
- I think it is money ill spent

15. ABUSE OF [NRA] POWER:
- I find it disgusting that Wessex Water should use their Statutory powers to overide the objections of the people of Christchurch

16. SCHEME WON'T WORK/WON'T DO THE JOB:
- The flooding will obviously occur at some other point

17. SCHEME ASPECTS THAT SHOULD BE DONE:
- I am in favour of the dredging of the river which is much needed

18. REASON WHY BOUGHT PROPERTY:
- [beautiful view of golf course etc] why we bought it in the first place.

19. THE CURE IS WORSE THAN THE ILLNESS
- the cure is far worse than the illness

20. DOUBTS ABOUT THE VIABILITY OF THE SCHEME
- Whatever the Engineers and Water people say that particular area that I live in is going to become a swamp!!! Because they do not know where the water is going

21. WOULD RATHER RISK FLOODING THAN HAVE SCHEME
- as a person whose house was flooded I think I would rather take the risk of flooding

22. ENVIRONMENTAL DAMAGE LIKELY FROM SCHEME
- I find the scheme in its present form totally unacceptable especially the environmental damage

23. IN FAVOUR OF FLOOD PROTECTION BUT AGAINST PRESENT PROPOSALS
- I agree with flood prevention but to put a 10 ft embankment at the bottom of our garden...is horrendous

24. SCHEME WILL AFFECT PRIVACY
- would completely spoil our privacy

25. SCHEME WILL CREATE ANNOYANCE
- [the scheme] would become an ideal playground for children with their BMX cycles etc

26. AGREEMENT WITH THE SCHEME
- I agree with the scheme as proposed

Appendix F-10.3: Outline interview schedule (Lower Stour)

FLOODING:

EXPERIENCE:	Were they there during 1979 flood
BELIEFS ABOUT:	Causes
	Consequences/seriousness [0 to 10 scale]
	Likelihood of return

EFFECT ON ATTITUDE OF RECENT (FEBRUARY) FLOODING

Standard question from DWSC/89 survey:

"Would you be prepared to live in the same area if the risk of flooding were as follows:

- a 1 in 200 risk each and every year that your house would be flooded;
- a 1 in 100 risk
- a 1 in 50 risk
- a 1 in 25 risk
- a 1 in 10 risk
- a 1 in 5 risk"

LOCAL ENVIRONMENT:

PERCEIVED VALUE	
CONCERN ABOUT	
IMPORTANCE FOR	landscape
	nature conservation
	recreation
	house value

FLOOD DEFENCE SCHEME:

What were original attitudes to scheme proposal
Have attitudes changed since comments made
How important are various factors in making decision:
- landscape - views from/to houses
- nature conservation
- cost of scheme
- house value
- recreational possibilities
- access
- privacy
- safety

Have there been problems during construction
- were they resolved

What now are perceived as positive aspects of the scheme
What now are perceived as negative aspects of the scheme
How much of a priority is flood defence:
- what other problems/issues are more urgent/important

Standard questions from DWSC/89 survey:

"I would rather have any scheme than be flooded"
"Anything designed to reduce flooding is desirable"

[Scale: 1 strongly agree to 5 strongly disagree]

PUBLIC CONSULTATION:

How successful as a means of finding out people's preferences
Suitability of timing
methods
Did they have enough information to make decision
How were public's concerns treated by nra engineers
Should public be involved in decisions about flood defence - are they qualified to participate

NRA:

Technical ability
'Customer care'

INSURANCE:

Cover flooding yes/no
High premiums?

Appendix F-10.4: Interview number and selected informant details (Lower Stour)

Interview number	Selected informant details (age, gender, single or couple)
INT1:	1 female informant: 60+ years old;
INT2:	couple: early 40s years old;
INT3:	couple: late 40s/early 50s years old;
INT4:	couple: 60+ years old;
INT5:	couple: 60+ years old;
INT6:	1 male informant (wife entered later but contributed little): early 60s years old;
INT7:	1 male informant: 70+ years old;
INT8:	couple: mid-70s years old;
INT9:	couple: 60+ years old;
INT1UT:	1 male informant: 60+ years old;
INT2UT:	1 male informant: 50+ years old;
INT3UT:	1 female informant: 40+ years old;
INT4UT:	couple (but mostly the female): 50+ years old.

Appendix F-10.5: Selection of themes, with examples, taken from the interview transcripts (Lower Stour)

THE SCHEME

WHAT PEOPLE DO ON THE BANK/WALL:

[1] "And I planted all the flowers up there [on floodbank] and they came up and they're quite nice"

[2] "now of course you get the children playing out there, all with their bikes, motorbikes up and down it"

[8] "we frequently get people walking up and down, having a look in to see what's happening because they've got a good view"

WHAT PEOPLE CALL/FEEL ABOUT SCHEME/SCHEME HEIGHT/IMPACT ON VIEW:

[3] "I was horrified at the height in some places. It was like walking along the Great China Wall it was that high and wide"

[5] "we're trying to hide the monstrosity"

[6] "but when you...started to see these profiles going up, you thought, my god! they're not putting that bank up as high as that, and, sure enough they were then!"

[7] "So, its spoilt our view; its invaded our privacy because of people walking on it and I suppose its [...] a security risk because people can walk along it and drop over onto the back gardens"

[8] "in fact, it's been a success"

GETTING USED TO IT:

[1] "I seemed to lose my privacy I thought but again I've got used to it"

[8] "...but we got over it you know you do eventually...and if it stops flooding well that's the main thing"

THERE IS A FAULT IN THE SCHEME DESIGN/CRITICISM OF DESIGN:

[2] "And I don't ever think that that system they've got there where you see the layers is going to grow, that is never ever going to grow that. That is grass in there you see and that is never going to grow"

[3] "its too steep for a gang mower to mow it I would think"

[5] "Oh and then on top of that they put that hideous fence, can you see it? You know why that's there? To stop the kids cycling!"

THINGS RESIDENTS WANT/DON'T WANT DONE NOW:

[1] "I don't [laughs] want one tree in my [laughs] in my vision. Oh I don't mind bushes"

[2] "why don't they have a few trees put there or something ...we'd rather have something to cover it up"

[7] "I think there should be a notice up somewhere, at both ends, saying its prohibited to walk on the walls from the council and that would er might help to some extent"

WHAT 'THEY' [NRA] SHOULD HAVE DONE:

[3] "whether the cladding could have been sort of less startling a sort of more old fashioned type of brick or a stonework type finish rather than that...this harsh red brick"

[7] "I would have said an earth bank, which is more in keeping with nature, but er about half the height of that wall, would have been sufficient to contain any flood around here and er and up the golf course"

CONCERNS ABOUT FUTURE/LONG TERM MAINTENANCE OF SCHEME:

[3] "But that will be the major problem the up...keeping it looking nice"

[3] MR: "The culvert is their responsibility"..MRS: "Well they certainly don't maintain that"

WHAT (NRA) SAID THEY'D DO BUT HAVEN'T:

[2] "they promised me it would be landscaped but it's not been landscaped so I'm not happy about that"

SENSE OF LOSS NOW VIEW GONE:

[2] "The thing is its gone for ever. That view is never ever going to come back and its gone"

FEELING OF HELPLESSNESS/FATALISM:

[2] "Problem is it's never going to be altered now though is it"

SUSPICION OF ULTERIOR/ADDITIONAL MOTIVES FOR THE SCHEME:

[2] "I've got a funny feeling that it's connected with 2 other things, this bank..."

DIFFERENCE IN ATTITUDES FROM ONE SIDE OF STREET TO OTHER:

[2] "Well obviously they're all for it the other side and we're all against it this side which is only natural isn't it...'cos it only affects us; doesn't affect the other side"

APPROVAL FOR A SCHEME BUT DISCONTENT WITH PRESENT ONE:

[2] "We're all for the flood scheme but um we're disappointed at the height it had to be"

[5] "we also told them that we were not against a normal wall, but not a 12 foot wall, you see"

GOLF COURSE IS MONEYMAKER FOR COUNCIL/HAS HAD SPECIAL TREATMENT:

[2] "Course there's a lot of ground been lost by the golf course but that golf course there, its about the only best paying profitable thing in Christchurch Council that is. About the only thing that makes money um so I think that's why they were so concerned about making it so pretty that side"

[5] "in my opinion, it looks much better on the golf course side, I think they're not bothered about a handful of people here but there's a lot of people use the golf course, and they've made it pretty for them, you know"

CONSTRUCTION PERIOD ATTITUDES:

[8] "they were doing their best but they were working against time and they were all behind with their contract and er it seemed to me that there weren't enough people on it"

[9] "I've never seen such dust! It was just as if it was a permanent fog wasn't it? Awful"

<u>THE FLOOD RISK</u>

CAUSES OF FLOODING/WHAT NRA HAVE DONE HAS WORSENED FLOOD RISK:

[3] "one of the things that have been said, the reason we were flooded before was because that Wessex Water or whatever, straightened out, although they say no, part of the river further up which, when you talk to local people who've been living here for years um they say that is the reason it happened because it...the flow of water...it quickened the flow of water um whereas the river meandered before um you know that was why we were really flooded"

[6] "you see the other thing about this particular river, it hadn't been dredged for 20 something years and so, I mean, everything was in favour of it actually flooding in matter of fact"

[3] "But I don't think there's any doubt that what they've done here is going to push the flooding further down"

FLOOD RISK EXACERBATED BY DEVELOPMENT:

[4] "with all these huge housing estates they've built along Castle Lane as well as hospitals, supermarkets, all the rain comes off very, very rapidly into the river. And all the way up the Stour"

FLOOD RISK NOT REALLY RECOGNIZED:

[1] "I'd still have that attitude that it couldn't happen really"

CONFUSION OVER STATISTICAL EXPRESSION OF FLOOD RISK:

[2] "We were told by the engineers of Wessex Rivers that it would never be flooded for another hundred years"

CONSULTATION

ATTITUDES TO THE CONSULTATION PROGRAMME:

[2] "Allright, they had us up there and you write in a book but [...] they weren't really interested in it at all"

[3] "I don't it was too bad, the actual consultation but there were, I think, alterations and variations that came about afterwards that perhaps the public weren't made as aware of as they should have been which caused some consternation and aggravation"

[3] "I think you should have had consultations yearly or...keep people more updated"

PEOPLE WERE NOT AWARE OF WHAT IT WOULD REALLY LOOK LIKE:

[2] "I don't think really everybody didn't think what that was going to look like"

[3] "even when we saw the markers that they put up that was supposed to indicate the height, I didn't...it didn't signify"

THE CONSULTATION WOULD INEVITABLY FAVOUR THE MAJORITY:

[2] "they went a bit too far with their leaflets to get a lot of votes...those people weren't concerned, see...they weren't concerned about it were they, they weren't worried 'oh yes, let's go for the higher scheme'"

WHAT THE ENGINEER(S)/'THEY' SAID:

[2] "We were told by the engineers of Wessex Rivers that it would never be flooded for another hundred years"

ATTITUDE TO ENGINEER ON SITE:

[2] "he's a very nice chap yeah. When I went and complained he came down here and it was half past six at night"

MISCELLANEOUS

WHY WE/I MOVED HERE:

[5] "We bought this bungalow knowing about the floods. I mean my er daughter-in-law's mother said, 'oh J they had a flood...'; I said 'well we don't care, we like the outlook, we like this, we like that; it's a risk we've got to take"

INSURANCE COMPANY ATTITUDES:

[2] "The insurance company, they weren't concerned"

[3] "I mean before we bought the place, we went to the insurance company and said well, were they prepared to insure the property and, b, would they ask for an additional premium and this was what, 5 years after the event and they were quite happy, they they regard it as a freak incident"

GREENHOUSE EFFECT:

[1] "seeing how [...] the water is rising, so I was quite happy, yes I was quite happy with it [scheme]"

[4] "and of course, in the past 10 years you've had, you know, the greenhouse effect becoming more and more prominent for example and the rising of the waters. That wasn't around when that information was discussed"

Appendix F-10.6: Photographs of parts of the Lower Stour Flood Alleviation Scheme

Appendix F-10.6a:	The Lower Stour Scheme (part): showing the gradient of the floodbank, access path and temporary fencing
Appendix F-10.6b:	The Lower Stour Scheme (part): showing the impact on views from houses across the golf course to the river
Appendix F-10.6c:	The Lower Stour Scheme (part): showing the structure of the floodbank and the repairs to damaged sections
Appendix F-10.6d	The Lower Stour Scheme (part): showing poor turf growth and weed invasion
Appendix F-10.6e:	The Lower Stour Scheme (part): showing the proximity of the floodbank to some properties
Appendix F-10.6f:	The Lower Stour Scheme (part): showing the proximity of the floodwall to some properties

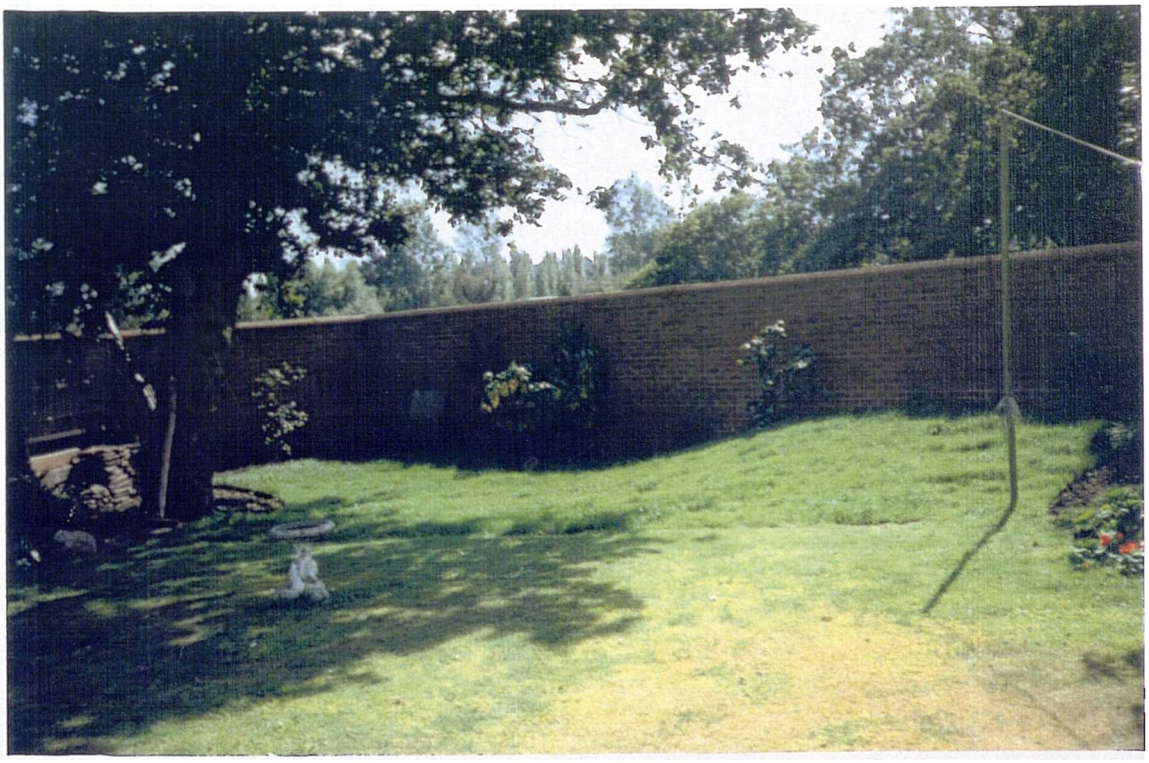
Appendix F-10.6a

Appendix F-10.6b

Appendix F-10.6c (top)
Appendix F-10.6d (bottom)

Appendix F-10.6e

Appendix F-10.6f



Appendix F-10.7: Analysis of conditions, consequences, interactions, strategies/tactics, applied to selected dimensions of scheme and flood risk (Lower Stour)

THE SCHEME and ATTITUDES TO IT

What are the CONDITIONS which govern attitudes (positive/negative, present/future) to the scheme?

- that it doesn't spoil the view;
- a belief that when landscaping is complete it will look better;
- a belief that it will work;
- a belief that the level of protection [and scheme] is too high;
- a belief that they [those overlooking the scheme] are not as important as the golf course [on whose side there is better vegetation growth as a result of a less steep slope];
- a belief that they were promised much which did not transpire;
- human nature - getting used to it;
- interactions in the community;
- the comparison between what existed before the scheme (an uninterrupted view across the golf course and down to the river) and what exists now;
- that it will be well maintained;
- a condition of present attitude to the scheme is an element of surprise that the scheme is so high - consultation did not prepare them for this
- a belief in the global warming hypothesis;
- a belief that the problem is not an engineering problem but a social and political one and so a structural scheme is not a suitable solution;
- a belief that single solutions, such as barriers to the floodwaters, are inadequate, because there are a number of possible causes of flooding in the area, including extensive agricultural land drainage and floodplain development;
- the scheme results in a loss of open space;
- the construction was managed inefficiently;
- that the past flood was caused by human error; thus, to build a structure is not a rational solution for dealing with the true cause of the flooding: human error;
- a belief that the river needed dredging and that this would be a better solution to the flood risk;
- a belief that the scheme is a waste of money and overdesigned. a belief that a contributory cause of the flooding was the earlier straightening of the river by the NRA, so the necessity for the scheme is based in part upon the past mistakes of the NRA;
- a preference for a bank rather than a wall (but it would have to have been about half the size);
- a preference for a wall rather than a bank;
- the meadow is a flood meadow [and therefore a flood control mechanism];
- a condition of a more favourable attitude to the scheme would be the planting of some trees; the control of thistles and other weeds; more aesthetically pleasing fencing and paths; the control of walkers, bike riders and dogs
- the steep angle of the bank;

What are the CONSEQUENCES of the scheme?

- [during construction] the dust meant people were unable to open windows during the hot summer months;
- [during construction] the noise of the lorries;
- [during construction] it affected the moles in the area by driving them away temporarily;
- [during construction] trail bikers used the site;
- [during construction] there were vibrations to the house;
- [during construction] the contractors drove tractors along the top of the bank (close to the informants' property) which caused the informants anxiety;
- [during construction] an informant suffered severe asthma attacks during the construction process which resulted in x-ray examination and medication;

- a number of shrubs were removed which "people" missed;
- some people have acquired more land [a benefit];
- some people have gained land they did not want [a disbenefit];
- children play [on the bank];
- bikes and motorbikes are ridden up and down it;
- cars drive up it at night time;
- police have had to patrol it;
- people walk along the bank and look over into people's gardens;
- there is a high risk of burglaries;
- those nearest to the scheme have swapped a flood risk for a security risk;
- there has been a loss of view;
- it has reversed the value of the outlook from the house: what was once the best view is now the worst view;
- the damage that the NRA have caused;
- friends of the informants now remarked upon the scheme: 'I s'pose you've lost your nice view now then?': most of them come and say "what on earth's that?";
- the grass on the bank would be prevented from growing (as a consequence of the children playing);
- the informants can no longer see the golfers on the golf course (which previously gave them much amusement);
- friends on the golf course can no longer wave to them;
- the contractors began work at an unacceptably early hour on some occasions;
- wildlife has suffered a loss of habitat from removal of areas of vegetation used for nesting etc;
- our hedgehogs have disappeared due to this work;
- "it [the environment] is not as natural as it was; it's more synthetic";
- it is now impossible for the annual fair to be sited there as it had been previously [mixed response likely to this];
- the flood defences will push the floodwaters further downstream to the detriment of other residents;
- "we've noticed a change in the type of birds we get here" [less variety now];
- wildlife have difficulty getting over these embankments and walls;
- the scheme's negative impact on wildlife;
- loss of privacy;
- loss of peace and quiet;
- loss of access to the meadow and the river;
- a belief that [the floodplain residents] will have to pay for the scheme ("they'll slide it on our bills gradually so we don't notice anything");
- perceived loss of value of the property;
- golfers walk up the bank and damage it;
- people walk up the bank and create a nuisance by looking in through windows;
- possibly as a consequence of the scheme, the golf club has changed the layout of the course and the informants now get far fewer golfballs coming in to their garden [a positive benefit];
- it is less 'pleasant' than before the work started;
- the informants now feel safer;
- the informants have more privacy;
- it is necessary to stand up to see over the bank.

What INTERACTIONS (engineers/other residents) were made in connection with the scheme?

- the NRA (about loss of privacy and they offerred to put up a trellis);
- the NRA (described as 'the Water Board' and 'Wessex Water') (mentioned in terms of the consultation process, a consequence of which was that "you knew what was going on");
- the Site Engineer (who had disclosed some design changes and took the informant into his confidence by giving technical information and treating her as an (technical) equal;

- "one of the people from the Council" (giving a talk on the 'greenhouse effect' and the threat this posed through rising water levels);
- neighbours who opposed the works (blamed for putting a stop on the work;
- people in the community (bringing up the possibility of flooding);
- the Residents Association; (tactic) to leave the argument to those who could better argue the case for completion of the floodwall;
- other residents (from whom information was received about the previous flood);
- informant's priest (who "told her off" for bringing such matters into church where she was discussing it with neighbours);
- people who walk on the bank and invade privacy by looking through windows.

What STRATEGIES/TACTICS were/are used in connection with the scheme?

- planted flowers on the floodbank to make it look nice;
- making a public fuss to try to get the scheme changed;
- contact the Mayor;
- "we kicked up a bit of a...hell of a storm";
- to discuss possible alternatives with the NRA (tactics of conciliation);
- to collect and keep scheme related correspondence and newspaper cuttings and compare the promises made therein with what had actually transpired;
- preparedness to join with other residents and sue over the losses of view, privacy, security and property value;
- writing letters and attending meetings to try and get preferences accepted;
- perceived tactics of the NRA: to extend the questionnaire coverage too far, to people whose property had never flooded; not to have published the results in the local paper so that local people could verify them;
- perceived tactics of the NRA: the omission of detailed plans of the proposed scheme in the area where the informants lived;
- perceived tactics of the NRA: to tell the local residents that they could telephone with any suggestions for improving the appearance of the scheme (tactics of conciliation);
- perceived tactics of the NRA: it told lies as a tactic for getting the scheme accepted.

ATTITUDE TO RISK
(tolerable levels of flood risk)

What are/were the CONDITIONS for tolerating the risk?

- could not move anywhere else;
- would not want to uproot home;
- the belief that the last flood was a 'freak' flood;
- the insurance companies regarded the last flood as a freak flood and did not raise the premiums;
- it is something that cannot be anticipated and so must be tolerated;
- there is insufficient evidence on which to base the statistical estimate of risk;
- the outlook and the immediate environment is worth it;
- the risk is a remote one;
- the belief that the 1979 flood was a result of a number of factors coming together and it is highly unlikely that this set of circumstances will recur;
- the perception of the cause of flooding as a rare event exacerbated by a lack of river maintenance (now rectified by dredging and clearing the flood arches) leads to toleration of risk without floodbank/wall;
- earlier experiences in Australia where severe flooding was witnessed: the levels of flooding in Christchurch are 'nothing' by comparison;

- experiences of high rainfall in the past which had caused the river water to 'lap the banks' and 'waterlog' the pasture but not flood property;
- having insurance;
- being prepared to tolerate a flood if it occurred;
- knowledge of the previous flood;
- the belief that the informant will no longer be alive when a flood recurs;
- the existence of a long view across open land.

CONDITIONS for not tolerating flood risk

- advanced age;
- ill health (mental and/or physical);
- previous flood experience;
- that global weather conditions have changed making the risk more likely and possibly more serious.

What STRATEGIES/TACTICS are/were used to tolerate risk

- get sandbags to manage the flood;
- deny the risk;
- make flood plans for evacuation;
- get insurance.

APPENDIX G

Appendix G-13.1: Outline interview structure (Engineers)

1. EXAMPLES OF REFUSALS OF FLOOD DEFENCE ON GROUNDS OF UNACCEPTABLE ENVIRONMENTAL IMPACT

1.1 Are there examples of cases where:
   a) the proposed design standard had to be lowered because the environmental impact (in its broadest sense) was too great?
   b) the proposed design standard was maintained in the face of public opposition?

1.2 What were the main objections?

1.3 Would NRA handle it differently if it were to happen again?

1.4 Was anything learned from this case?

1.5 How do engineers balance risk and environmental impact?

1.6 Is there a point (eg 1:5 -> 1:200 risk) where scheme design standard conflict with existing locational benefits?

1.7 In what sorts of situation would you be prepared to impose a scheme? Has that happened?

1.8 Do you think as much/less/more consideration should be given to impact of schemes on the view from people's houses as is given to, eg, impact on nature conservation and ecology?

1.9 Can you give me examples of an environmentally 'good' scheme (ie care for wildlife, natural banks etc) and a 'bad' scheme (ie a concrete trapezoidal channel)?

2. LIAISON AND CONSULTATION

2.1 What are the statutory requirements regarding consultation?

2.2 When are the general public involved?

2.3 How much time is spent on consultation/liaison?

2.4 How confident are you about the information on which you base your decisions? e.g. flood maps, modelling etc.

2.5 How important is it to liaise with landowners and developers?

2.6 Do engineers have any training in carrying out public consultation?

2.7 Do you think engineers are the right people to do public consultation work?

2.8 Do you think involving the public much more directly in the planning/designing process is a good idea?

3. THE PUBLIC

3.1 Can the public contribute anything substantive to scheme design?

3.2 Have they in past schemes? e.g. have members of the public provided information/suggestions that have led to design alterations?

3.3 How useful are the public as information sources? How reliable is the information that the public has?

3.4 Do you think the public/lay person should have the right to challenge the decisions of professional/technical experts?

3.5 What sort of people oppose flood schemes?

4. ENGINEERS

4.1 Is an engineer a particular type of person?
4.2 How would you characterise an engineer?
4.3 How does this characterisation differ from the general public?
4.4 Do different types of people do different types of engineering work? eg do Site Engineers have to be a particular type of person?
4.5 Would you say flooding was a natural hazard?
4.6 How much is it a physical problem and how much a social problem?
4.7 Would you say " A fundamental goal of the engineering profession is the control of nature? (Sewell)
4.8 How do you think the 'greenhouse effect' or global warming will affect water engineers?
4.9 Have you noticed any changes in your profession over the years?
4.10 Do you think the importance of environmental factors in engineering design is just a 'fad'/fashionable at the moment and will be less important in a few years time?
4.11 Do you think it would be better if engineers were left to make decisions on their own, without public involvement? Would this result in better, faster decisions?
4.12 What do you see as the key problems in scheme promotion?

5. PERSONAL DETAILS

5.1 What is your job title?
5.2 How long have you been an engineer?
5.3 What kind of experience have you had:
  a) with public consultation?
  b) as a Site Engineer?
5.4 Would you move onto a floodplain?
5.5 Have you learned anything that you would like to pass on to other engineers?
5.6 Are you a member of any organisations - professional/recreational/community etc. E.G. Iwem, national trust, rotary club...

Appendix G-13.2: List of themes taken from interview transcripts (Engineers)

Conflict situations/resolution:
Consultation, descriptions of:
Consultation, general issues:
Consultation: how:
Consultation: time spent on:
Consultation: when:
Consultation: who:
Costs and benefits:
Democracy and questions of representation:
Development comparisons:
Differences between river and tidal flooding
Distrust of/attitudes to public authorities:
Engineers: attitudes to the public:
Engineers: attitudes to schemes:
Engineers: environmental attitudes:
Engineers: experience:
Engineers: types of:
Engineers, attitudes to themselves/their profession:
Engineers: frustrations of the job:
Environmental attitudes: change over time:
Environmental sensitivity
Experts
Floodplain management issues:
Flood risk: perceptions of:
Floods: natural versus social causation
Form and function:
Institutional issues, e.g. As a result of reorganisation:
Levels/standards of protection:
Maff: general:
Maff: attitudes to grant aiding environmental 'extras':
Majority versus minority:
National characteristics:
NCC/conservationists/environmentalists: dealings with, conflicts with:
Perceptions of the cause of flooding:
for the Public good/in the public interest:
the Public as a source of information/suggestions:
Scheme development/promotion issues
Schemes: aesthetics (visual impact) issues:
Schemes: cost constraints
Schemes: general issues:
Schemes: getting used to it:
Schemes: prioritisation of:
Schemes: reactions to by different groups:
Schemes: responses to proposals
Schemes: spatial differentiation between (scheme/flood) costs and benefits:
Schemes: 'triggers' for development:
Subjectivity/objectivity
Tolerance of flooding:
Trade-offs
Type of people who oppose schemes:

Appendix G-13.3: A list of themes with examples (Engineers)

CONFLICT SITUATIONS/RESOLUTION:
[5] "How do you get a consensus view? There are some who are going to say 'never mind the birds and flowers, we demand flood protection' and others are going to say 'we are custodians of the environment and no short term consideration of property values should interfere with that'."

CONSULTATION, DESCRIPTIONS OF:
[3] "It's taking us an awful lot of labour and trouble."
[11] "It's a bit hairy at times."

CONSULTATION, GENERAL ISSUES:
[1] "Although we had consulted everybody, the public didn't generally realize what was being done."
[2] "We've never been in a situation where we've promoted a scheme in opposition to public opinion. All our schemes are done by agreement with...certainly the people directly affected."
[4] "[Consultation is] a fundamental part of the job. I think its something, if you don't get adept at doing it you fall by the wayside."

CONSULTATION, HOW:
[3] "We opted to take the planning permisision route as a way of getting a final answer."
[3] "One of the disadvantages of the SI1217 route for consultation is that anybody has a right to object, for any reason, even if its an irrelevant reason, its very difficult for somebody in the Ministry to ignore it."
[7] "When you go to your public meetings, you will explain all the various options which are available."
[11] "We started it off with a public meeting and we chose a local school in the area of this estate and just an open discussion to anyone to come along...we gave them a presentation with slides and overhead projectors and mounted photographs of what we'd actually done on the scheme and how it was intended to work."

CONSULTATION, TIME SPENT ON:
[1] "The main activity is public consultation. And promotion of the scheme."
[2] "[Consultation is] the vast bulk of the time spent on the scheme. It outweighs the amount of time spent on design by a great amount. Design is a relatively insignificant part of scheme promotion these days."
[8] "The public relations exercise has grown and grown."

CONSULTATION, WHEN:
[2] "You can't consult until you know what you're consulting people on but we would say that was the earliest stage. Once you've got outline proposals, that's the first point at which you can consult people. There's no point consulting them before then."
[9] "It's no good putting forward options if you know they're going to be shot down in terms of benefit:cost and the scheme is going to be stopped. I mean, that's giving people a false choice."

CONSULTATION: WHO:
[2] "When I say we approached the local residents, we tend to do that through the Parish Councils as the lowest level of public involvement that you can actually consult as a statutory body rather than trying to call a public meeting of people."
[3] "Well we consult...not only the statutory consultees, we go to the local wildlife trusts who are delegated consultees, we go to the County Conservation Officer, the County Archaeologist, who are not the statutory consultees but we consult them all the same, and the RSPB and we used to consult the Vincent Wildlife Trust...so we've consulted everybody who has professional expertise about the environment."
[5] "...approaching all the people who might have had an interest in the land that was going to be flooded and explaining to them what was going to happen - what we proposed to happen."

Appendix G-13.3 continued

COSTS AND BENEFITS:
[2] "Well...the problem is, things that you have to take account of in schemes now, like conservation matters and visual amenities, are not very easy to put on the benefit side of the equation - well in fact, in conservation terms they're impossible to put on the benefit side of the equation."

COSTS AND BENEFITS continued:
[7] "Of course the big question mark is if we can justify carrying out scheme works and in fact an initial survey of properties at risk would suggests that the benefit-cost ratio would be rather below unity in which case we may well do nothing at all."

DEMOCRACY AND QUESTIONS OF REPRESENTATION:
[3] "Well I suppose from a democratic perspective, the best way to solve that is to let the local planning authority have its say because the councillors represent the local people and it seems to be appropriate that they should have the say."
[4] "Where we do have problems are the sort of groups...I won't mention any but they set themselves as being the 'Thames Conservation Society', you know, a little group of people set themselves up and they're sort of unelected and they're unrepresentative, pushing their own sort of little...they might be a group of fishermen or something like that."

DEVELOPMENT COMPARISONS:
[5] "I'm contrasting the efficiency and speed with which the TGV has been pushed through northern France compared to what they're having to struggle with in Kent to try to get a railway to the channel tunnel through Kent."

DIFFERENCES BETWEEN RIVER AND COASTAL FLOODING:
[1] "In river situations those low frequencies, like 1 in 10 years, maybe they're significant. In the case of tidal flooding they are not."

DISTRUST OF/ATTITUDES TO, PUBLIC AUTHORITIES:
[4] "Yes well we're knocked, we're generally knocked, I mean its all in the paper, you know, the public authority...we're sort of everybody's fall guys."

ENGINEERS, ATTITUDES TO THE PUBLIC:
[1] "But the public will generally not have enough experience of...knowledge of what is the problem...not many people, except us, know a lot about it so you have to take the lead in explaining or formulating what are the possibilities."
[4] "Well I think that people that buy properties that are liable to flood are foolish or uninformed."
[7] "We do in our business meet some very difficult people..."
[8] "I think we're more prepared now to discuss and to try and satisfy people's preferences as much as we can."
[11] "I think people just don't want change, unless its their carpets which are actualy floating on the water and where they very definitely do want change."

ENGINEERS, ATTITUDES TO SCHEMES:
[2] "We're not in the business of promoting schemes in opposition to people's views."
[3] "We didn't really want to let the scheme drop because we feel...you feel some responsibility, its part of the NRA aims and objectives to protect people from flooding...So in line with our objectives, we can't simply leave people there behind because its awkward."
[5] "The contract is well under way at the moment. Its an absolute dog's breakfast."
[6] "The sort of technology of flood defence has improved such that they look a lot better and you can sort of blend them in."

Appendix G-13.3 continued

ENGINEERS, ENVIRONMENTAL ATTITUDES:
[1B] "Well I don't know what the NRA thinks but I think people are much more important than any other species personally."
[4] "There isn't that much mystique about nature conservation. We tend to know what is wanted and what is unacceptable ourselves."
[8] "We have adapted and learned by experience and we've developed a lot and we've got a new insight into the value of the environment and the requirements, no doubt about that."
[9] "Where we can do things to enhance, we do. You know, we're not forced into it, we do it quite happily."

ENGINEERS, EXPERIENCE:
[1] "Well happily, my experience of talking to people who've just been flooded is limited."
[5] "However good your theoretical knowledge, you will design things that are silly if you haven't had the experience of trying to build them."

ENGINEERS, TYPES OF:
[1] "We paid for a **Liaison Engineer**, who was in addition to the normal **Resident Engineer**, whose job was to calm the residents. Because it was a potentially an extremely disruptive job'
[2] "A **Principal Engineer** would deal with a scheme right from the initial identification of the problem through to completion of the whole project."
[7] "If you're using **consulting engineers** on a scheme, they don't have the same feel for the situation that our own people have."
[11] "My experience of **consultants** [engineers] is that if NRA engineers are not practised at presentation work, consultants are a damned sight worse."

ENGINEERS, ATTITUDES TO THEMSELVES/THEIR PROFESSION:
[1] "Engineers though have had a...they still have to a certain extent, a bad image. Which of course concerns the whole profession very much."
[4] "You don't come into the NRA necessarily because you want high pay, you want to be a high flyer; you come into the job because basically you like that sort of existence."
[8] "The science of river engineering and flood protection is growing and developing and will continue to do so."

ENGINEERS, FRUSTRATIONS OF THE JOB:
[5] "There must have been an awful lot of frustration. There's nothing worse, if you're actually directly involved in engineering design, to keep on churning out work which doesn't get built."

ENVIRONMENTAL ATTITUDES, CHANGE OVER TIME:
[6] "Nobody likes to feel that they're doing a job where they're actually...these days...causing environmental damage. So you usually find that very few engineers that you come across these days are actually actively wanting to cut a trapezoidal channel, dead straight, for three miles across the countryside."
[8] "Engineers have been criticised strongly for their rough approach and their insensitive approach but in the '60s the environment was of no value."

ENVIRONMENTAL SENSITIVITY
[7] "And we were persuaded that it wasn't right to do it when we heard about the impact it would have upon a lot of flora and fauna in the area. And we did take it out of the scheme although it reduced the benefits...the cost ratio quite considerably."
[8] "A very...extremely environmentally sensitive area and we recognised this right at the beginning of the design stage and we embarked upon trying to design engineering works with environmental sensitivity."

Appendix G-13.3 continued

EXPERTS
[1b] "I think it's actually a national characteristic. I don't know if it's any different on the continent. Nobody believes experts in this country do they?"
[7] "And then you come across people who sort of measure the size of bridges and work out how much water's escaped and check the size of storage reservoirs to make sure you've got your figures right. They don't understand the sort of detail which we, as sort of specialists, go into."

FLOODPLAIN MANAGEMENT ISSUES:
[1] "In the case of flood defences, what you can do for yourself is very limited."
[3] "What you can do is take personal actions to mitigate what happens during a flood."
[4] "We basically are a body which is employed to look at these flood schemes...its our job to come up with an option which we think is an engineering solution."
[5] "We have no control over floodplain development, we can only work by trying to influence planning decisions by local authorities."
[7] "But we can't always count on the cooperation of the local authorities and the local authority, if we do carry out some limited flood alleviation works, are only then quick to take advantage of it by allowing further development to take place."
[7] "I think...we've not been very well prepared before to counter development proposals."

FLOOD RISK, PERCEPTIONS OF:
[3] "Well I think the way the engineer sees it may arise out of the analysis that you carry out because you look at the situation in terms of statistical averages whereas the residents' view may well be coloured by whether or not there's been a recent flood event."

FLOODS, NATURAL VERSUS SOCIAL CAUSATION:
[5] "We regard flooding as a natural event, exacerbated in many cases by human activity."

FORM AND FUNCTION:
[5] "I suppose it goes against the grain really, that if you have designed a good job, to in effect conceal it by sticking bricks on the face and planting shrubs and flowers all over it. If you've done a good job you want people to see it."
[7] "Now some people might argue that you shouldn't attempt to disguise a pumping station or...to look like something else. I mean you should make it look what it is, its a functional thing..."

INSTITUTIONAL ISSUES, e.g. AS A RESULT OF REORGANISATION:
[7] "We had perhaps a few reservations earlier on because it seemed to be that...a lot of red tape but its not turned out quite as bad as we imagined and we now...we're beginning to enjoy things like the exchange of information with the other regions and also of course, the power and authority of the NRA as a national organization...so I think certainly those things greatly outweigh perhaps the loss of a little bit of local control which we had enjoyed in previous organizations."
[8] "Five or ten years ago we didn't have ecologists, we didn't have river corridor surveys, biologists etc etc so the structure within the organization has expanded to bring in these specialists."

LEVELS/STANDARDS OF PROTECTION:
[1] 'a 1000 year was the accepted thing for the local areas, ten years ago...all the urban areas though, the 1000 year - no questions...Q: What about now? A: Between 1 and 200'
[1B] "That was the old fashioned way of doing things. Before any benefit-cost analysis and had to put a frequency on the figures; what used to happen was people used to wait for a flood and say 'oh gosh, that mustn't happen again. We'll build..take that plus a foot or two of freeboard'."

Appendix G-13.3 continued

LEVELS/STANDARDS OF PROTECTION continued:
[4] "I'd say in the general case, I would go for a high standard of protection rather than look for a lower standard simply because its more cost-beneficial or for other reasons, people can't see the river or that sort of thing."
[10] "That's quite important, that there are regional standards, in other words we're not applying one standard in one part of the region and another standard in another part of the region."

MAFF, GENERAL:
[1] "I think MAFF are only concerned...about spending money properly."
[6] "The scheme certainly was overtaken by a change in attitude of MAFF...MAFF were agreeing the scheme because they were getting a lot of pressure from local farmers, but by the end they were embarassed by it."

MAFF, ATTITUDES TO GRANT-AIDING ENVIRONMENTAL 'EXTRAS':
[6] "The atmosphere changed...a lot of it came back to MAFF...MAFF's line was they looked at everything that you went and put into a scheme, and anything they felt wasn't essential to the flood protection was knocked out."
[7] "This is perhaps one of the problems, not knowing precisely how much we can spend on the environment. We...feel there are restraints on us because if we go a little bit overboard then we're not likely to get the approval of MAFF for the works which we're proposing. Now obviously we can't be given a blank cheque but I don't think there are any clear guidelines for us, you know, just how much we can spend."

MAJORITY VERSUS MINORITY:
[1b "But, there's often somebody that really rather would not have it done. You say to them 'well, you know, you're in a minority and we're sure we're right and hard luck."
[1] "We were extremely careful to consult everybody and get a majority...you couldn't call it a consensus but a majority anyway in favour of doing something about it."

MAJORITY VERSUS MINORITY continued:
[2] "You're into a very difficult value judgement as to whether you say 'well the majority are in favour, so for the good of the majority we'll bash on with the scheme' or do you say 'well some people don't like it so, you know, perhaps we'll forget it'. What we would try and do is satisfy the minority who are still not happy, by a process of consultation."

NATIONAL CHARACTERISTICS:
[1] "I don't know if this is a particularly English characteristic; there is always a tendency to try and find someone to blame if something nasty happens to you for whatever reason."
[3] "I think the French are far more practical about these things, they seem to spend far less money on using stone facing on their engineering structures; they're basically more honest. If you have a concrete structure, why not let it be concrete?"
[4] "A friend of mine he goes off to holidays in France and he says he comes back and they treat him over there a bit like you would over here a doctor or something like that whereas in Britain, the engineer is the chap with a spanner."

NCC/CONSERVATIONISTS/ENVIRONMENTALISTS: DEALINGS/CONFLICTS WITH:
[4] "I don't think nowadays that there is a particular conflict between, certainly the people in the NRA and conservationists."
[5] "We did our conservation consultation, went to the NCC and they said 'oh no you don't. That is the habitat for a rather unusual type of...'And we had quite a lot of to-ing and fro-ing with them last year but in the end we came really to a total impasse. We couldn't go any further."
[5] "It's a partly scientific argument [from NCC] but I think that politics and influence all come into it as well."

Appendix G-13.3 continued

NCC/CONSERVATIONISTS/ENVIRONMENTALISTS: DEALINGS/CONFLICTS WITH continued:
[7] "That was...certainly my first, encounter with the conservationists and you know we've learnt a lot over the years, initially it was very difficult to bring the views of the conservationists and engineers together, I still think there's, you know, a gap there."

PERCEPTIONS OF THE CAUSE OF FLOODING:
[1] "We do have a lot of people who say 'oh, no wonder we had a flood, they closed the Thames Barrier yesterday.' Of course the Thames Barrier has nothing to do with it whatever."
[7] "It was a simple explanation that you are being flooded more frequently simply because its raining harder, more often. I mean, people would never have considered that as one of the reasons because they were looking for someone being responsible."
[8] "I don't think they [the public] do think that it [flooding] has been a natural thing but it's been an unnatural occurrence that's caused it."

for the PUBLIC GOOD/IN THE PUBLIC INTEREST:
[2] "So I think, I can only assume that people [engineers having problems with consultation] are adopting a confrontational attitude and if you're doing something for people's benefit, what's the point?"
[7] "...because it's for the benefit of the community at large and the powers which we have are intended to get around this problem of the isolated objector...denying other people a proper standard of flood protection."

the PUBLIC AS A SOURCE OF INFORMATION/SUGGESTIONS:
[3] "One of the elements in the present scheme is the proposal to jack the properties up. And that actually was a suggestion which came from the village at a public meeting."
[4] "Well they're extremely useful on historic flood levels: what has happened, we find that they are very very good, they will know that a flood in 1947 came up to the fourth brick below their window or something...Quite often their views on the causes of these things and the answer to how to solve these things isn't very good."

SCHEMES, DEVELOPMENT/PROMOTION ISSUES:
[7] "There's a real need to persuade people that you're going to carry out works which are going to be an improvement to the local amenities."
[8] "So I think if there is a threat and if they've had past experience
of flooding...my experience tells me, we don't find a lot of problems in promoting the works and they don't get over-interested..."

SCHEMES, DEVELOPMENT/PROMOTION ISSUES continued:
[9] "So we used the same method [of scheme promotion] and it worked at one and it didn't work at the other."

SCHEMES, AESTHETICS (VISUAL IMPACT) ISSUES:
[1] "...the flood defence committee, I mean, having already built two thirds of the scheme, were quite certain that they were not going to build the rest of the scheme to a lower standard just because of some objections to...it wasn't going to look so nice."
[6] "The standards we're producing for those schemes are far in excess of the standard that would have been done on a similar scheme ten years ago. We're using these reinforced masonry walls for floodwalls...there's planting schemes going in alongside the works and while they're still not perhaps...going to win awards...they look very good."
[11] "Schemes benefitted no end in having the architects there...as the engineer was developing the schemes, the architect was there saying 'well don't do it this way, do it this way; and instead of having that shape there why don't you...'; you could see it...it was very good, it worked well."

Appendix G-13.3 continued

SCHEMES, COST CONSTRAINTS:
[1] "The people wanted us to put it somewhere else. Well, you know, where they couldn't see it, but [the] further down river you go, the more expensive it gets."
[7] "Often it's the economic factors which are going to determine a scheme...a scheme has to be viable otherwise there's no chance of getting it through."
[7] "I think if you get more money made available for that [environmental works], we could spend it but we often have to limit what we do by the amount of money we're likely to get approved."

SCHEMES, GENERAL ISSUES:
[2] "Well, we put in the scheme whatever needs to be put in to avoid any...well, not quite the right way of putting it...we [went] as far as we needed to go to satisfy people and to obtain their approval for the scheme."
[4] "It's alright pointing nowadays to schemes that were done twenty or thirty years ago and saying 'that was terrible' but it wasn't terrible then. That was when it was done. The schemes that are done nowadays you know, reflect public, what the public want now."

SCHEMES, GETTING USED TO IT:
[4] "But when people tend to get used to it they tend to think its a good idea. It doesn't last beyond the building of the scheme. Its quite peculiar. I think...people tend to resist change...I think, at the end of the day, you tend to accept anything...fait accomplis."
[11] "I think at the end of the day what people don't want is change. And what doesn't look nice initially when it's built, and if you want to go along 25 years later and do something different, then the thing, whatever it is, has kind of matured, it's become part of the landscape and people will try and protect it. Whereas, 25 years ago they were screaming blue murder."

SCHEMES, PRIORITISATION OF:
[2] 'there are the two types, there's the small community that suffers frequent flooding which, because there's only a small number of properties involved, is low down the priority list, or there's the larger community which is at risk from less frequent flooding but obviously a far larger number of properties involved.'

SCHEMES, REACTIONS TO BY DIFFERENT GROUPS:
[3] "Even when you've reached agreement with all the conservation bodies about what the scheme should be, you're then obliged to advertise the fact in two local papers and anybody can send in some spurious objection. Not based on any proper understanding of the environment, it can be a totally subjective objection."

SCHEMES, RESPONSES TO PROPOSALS:
[1] "The whole place blew up."
[3] "In fact we met district councillors and parish councillors to talk about the scheme and they almost pulled our arms off wanting the scheme to go ahead."
[6] "It had got very emotional by this stage and the people just didn't want any scheme, didn't want any work, any disturbance, there at all."

SCHEMES, SPATIAL DIFFERENTIATION BETWEEN (SCHEME/FLOOD) COSTS AND BENEFITS:
[1] "Of course X itself isn't the major beneficiary from the scheme; the benefits are upstream in the X industrial areas."
[5] "It's a hard thing to put over to say to people down river there 'you've got to have your delightful stream turned into a concrete channel because the people up here...because there's been intensification of development here."

Appendix G-13.3 continued

SCHEMES, 'TRIGGERS' FOR DEVELOPMENT:

[2] "Well you would never dare have a scheme before the catastrophic flood if you don't have to, you see. That's the problem, you're always reacting to the situation."

[4] "Most of the push that comes for a new scheme tends to be people that move into the area; they haven't quite realised what flooding is like, they then get a little flood and then realise and then they start making sort of representations about getting a flood scheme."

[9] "And then we had the '81 [flood] which was the trigger for the reappraisal because some people got a fright."

SUBJECTIVITY/OBJECTIVITY:

[5] "You would have to put in a value for perhaps a scheme that had a positive benefit in environmental and conservation terms, against one that had a positive detriment or a trade-off between the two...I accept that you can't...you're measuring in two different scales of value but nonetheless I think you can do that even if its in rather subjective terms."

[6] "I did feel that was a number of factors which we didn't put in the report to the RFDC because they were subjective, if you like."

TOLERANCE OF FLOODING:

[1] "I reckon after they've been flooded they won't tolerate any sort of flooding, even if it was quite a small flood."

[4] "An interesting point that we find...is that the people who've...lived in a place for a long time and have experienced flooding for a long time, tend to accept it. They, well they just accept it. Their buildings have always smelt musty and they tend to think that is the norm. It's quite peculiar."

[9] "The older property had been lived in by people who accepted the flooding...and they didn't expect anyone to do anything about it. Then it changed hands and suddenly somebody realized that the property flooded and there was a problem."

TRADE-OFFS:

[2] "But there are the odd schemes where, for particular reasons, the only solutions that are available to us may have adverse effects. And people then have to choose between having the scheme done and not having a scheme done. And there have been situations where we've suggested a scheme to a local community and they've said 'no thanks, we'd rather carry on and put up with the flooding'. And we haven't then done anything."

TYPE OF PEOPLE WHO OPPOSE SCHEMES:

[1] "Most of the objections were from people who don't actually live on the front in the flood-prone area. It came from people who were not liable to floods but liked the view as it was."

[11] "They're far more likely to complain if the work is actually going to affect them, if the work is actually planned on their land, and then they'll complain probably longer and harder than if its on somebody else's land."

Appendix G-13.4: Extract from a Lower Stour interview dealing with decisions about flood risk (Engineers)

The interview took place with a married couple (MR. and MRS.): questions denoted by 'Q'.

Q: "If I said 'I would rather have any scheme than be flooded', would you agree or disagree...?
MR: Oh, yeah, we would rather have the scheme than be flooded, yeah I would...
Q: Would you give that 1 strongly agree, 2 agree...?
MR: No, I would have a 1 on that. I would really strongly agree to have it, a flood scheme yeah I would...
Q: 'Any scheme' the wording is. 'I would rather have any scheme than be flooded.'
MR: [laughs] what a big moat dug out there? [laughter] Yeah. Yeah obviously people who've gone into it and built it, must feel that there must be something wrong there but oh yeah I would go strongly with it to say to have a scheme, any scheme, as long as it...it **suits** [said emphatically] **the environment** really isn't it, don't you think? [asks wife]
MRS: Mmm...
Q: What about you [said to wife], would you agree with that?
MRS: Yes. I definitely wouldn't like to be flooded.
Q: What about the statement 'anything designed to reduce flooding is desirable'?
MRS: Oh dear, they're awkward questions aren't they?
MR: They are awkward. Especially for a Sunday evening [laughs]...
Q: 'Anything designed to reduce flooding is desirable', strongly agree to strongly disagree?
MR: Yeah, I'd strongly agree with that, yeah I would.
Q: But I could argue that you've got anything designed to reduce flooding...
MR: Mmmm. Mmmm.
MRS: Yes, well they're awkward questions...
MR: Mmmm, they are...
MRS: We've just contradicted ourselves really [laughs]...
MR: Yeah...yeah [pensively]...
Q: If there were a flood, would that be worth having that out there?
MR: Yeah I think it would. Yes it would but as I said before we started we are all for...
MRS: Yes that's it, we're not against it...
MR: No we weren't against it. I don't think anybody here was against it...
MRS: No, everybody wanted it...but the whole thing is, that is grotesque isn't it. If it was a bit lower, that's all we wanted wasn't it?"