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Sticks and carrots for reducing property-level risks to floods: an EU-US comparative perspective

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In discussing legal and policy frameworks for flood risk management, the attention is often put on increasing resilience in public spaces. In terms of private properties, discussions are geared toward enhancing the adaptive capacity of future developments. This paper focuses on the instruments associated with resilience of existing privately owned residential buildings mainly from the perspective of post-flood policies and compensation regimes. The paper scrutinizes the relevant legal and policy landscapes in the United States, the European Union and two Member States – the UK and the Netherlands. The goal is to provide mutual lessons learned between the EU, its Member States, and the US and to set forth generally applicable recommendations for improving post-flood policies for existing buildings.

Key words: **post-flood policy**, mitigation, existing privately owned buildings, insurance

Introduction

Both in the European Union (EU) and the United States (US), flood risk governance is an urgent societal issue as more and more communities are likely to experience more frequent extreme flood events or sea level rise due in part to Global Climate Change. For example, in the US, the Houston, Texas metropolitan area has experienced three 500 year floods between 2015 and 2107 (Ingram, 2017). New research continues to expand the extent of urban areas which will be inundated by sea level rise (Sanders, 2018). A variety of strategies, ranging from flood risk prevention, protection, risk mitigation, preparation and recovery, may be used to address flooding (European Floods Directive; Driessen et al., 2016; Larrue et al., 2013). Whereas flood risk prevention relates to efforts to keep people away from high risk zones, protection relates

to keeping the water away from the population, such as dykes and dams (Driessen et al., 2016). Preparation aims to inform the population about what to do in the event of a flood. Most of the flood risk management literature focuses on the prevention of flood events or the minimization of property damages and the loss of human life when a flood event occurs (Morrison, 2018). The more limited post-flood literature assumes that there are two objectives: “returning to normal conditions as soon as possible and mitigating both the social and economic impacts on the affected population” (COM(2004)472). Little attention has been given to the use of flood recovery instruments to mitigate the costs of future flood events.

This paper focusses on the rather neglected nexus between the flood mitigation and recovery and argues that post-flood recovery must be used both for humanitarian relief and to plan and construct more resilient spaces. Examples of post-flood measures associated with the mitigation strategy are adaptive building requirements, resilient reinstatement efforts and green infrastructure, whereas the prime measure of the recovery strategy relates to financially compensating people following the occurrence of a flood event, be it through public ex-post compensation schemes or insurance mechanisms (Suykens et al., 2016). Such schemes and mechanisms within the recovery strategy can and should have an important positive impact on strategies such as mitigation and prevention.

The analysis is guided by the research question: “what are the legal and policy requirements applicable to existing buildings after a flood event has occurred in the United States and the European Union, taking England and the Netherlands as examples” The following structure guides our findings: After setting the scene by shedding light on the institutional DNA of the relevant countries and the EU. We then analyze the differences in flood risk management approaches in the US and the EU, The Netherlands

and England. We then delve into post-flood policies specifically, and scrutinize the main key barriers in the recovery-mitigation nexus for all countries studied. Finally, we offer country-specific recommendations and more general conclusions on resilient post-flood policies.

The paper takes a legal research approach, more specific it contains a legal comparison. The comparison is a combination of the dogmatic and functional approach (Gorlé et al., 1991, p. 28). The dogmatic aspects relate to the in-depth analysis of primary and secondary legal sources (legislation of national governments, decentralised legislation, guidance and policy documents, case law) and a comprehensive overview of the legal system of the studied jurisdictions. The functional aspects regard the notion that a legal institution should not be considered on its own, but only in relation to its function, more specific in relation to the society. The paper therefore shows cases as illustrative examples of good practices drawn from the different jurisdictions (Groothuijse et al., 2018; Kaufmann et al., 2016; Dai et al., 2017).

Setting the Scene

Institutional DNA for Multi-Levelled Flood Risk Governance in the EU and the US

Before focusing on the specific flood related context, it is relevant to mention the institutional differences between the EU and US and their respective relationship with the States/states in question. Whereas the EU is a *sui generis* legal order whereby Member States have a distinct legal personality under international law, this is not the case for US federal states. Moreover, federal institutions in the US have more extensive competences in comparison to EU institutions, e.g. in terms of follow up of implementation. Legislative Acts issued at federal level in the US are directly binding upon the population, in contrast to the EU (Hoornbeek, 2004, p. 465; Kimber, 1995, p. 1686; Lavranos, 2006, p. 223).

Within the EU, the institutional DNA differs significantly between Member States. This is also the case for the Netherlands and the UK (England). The Netherlands is a decentralized unitary state, with so-called functional decentralization. Specific responsibilities are transferred from the central government to specific administrative bodies which are especially created to fulfil these responsibilities (Burkens et al., 2012), *i.e.* the regional water authorities (Rijswick and Havekes, 2012). The Dutch Constitution obliges public authorities to keep the country habitable and to protect and improve the environment. This generally formulated constitutional duty of care – upon which citizens cannot rely directly before the courts - is further implemented in regular legislation in the field of planning, environmental and water law. The corresponding responsibilities are divided among different public authorities, among others, the regional water authorities (Rijswick and Havekes, 2012; Doorn-Hoekveld, 2017). Water management is highly institutionalised in the Netherlands.

In the UK, the institutional set up is very different. Although legislation passed in Parliament often governs the United Kingdom as a whole, a distinction is made in statute law between these different regions of the UK. Flood risk management is one of these devolved responsibilities and therefore, only England will be discussed herein. English flood risk governance can be characterized by its complexity with a large number of different public, private and civil society actors involved, operating at national, sub-national as well as local scales. In contrast to the Dutch system, England does not have a written constitution and therefore governmental responsibilities for FRM are only defined by legislation.

Differences in flood risk management approaches

Mitigation hampering legacies in the United States

In the United States, the primary responsibility to prevent flood and sea level rise damage (damage) rests with the state and federal governments. Unlike the European Union, no over-arching policy comparable to the 2007 Floods Directive exists. Instead, an unintegrated accumulation of policies and laws have been adopted during the 200 plus years of flood control policy.

The US has seen flood policy evolve from riparian landowner responsibility to prevent damage, to the construction of locally and state funded levees, to the construction of large, upstream multi-purpose reservoirs (Shallat and Goetzmann, 1994) and finally to the downward devolution of responsibility back to the state and local governments (Chizewer and Tarlock, 2013). Following the great Mississippi River flood of 1927, the federal government began to assume the primary responsibility for damage prevention and later for post-disaster relief. However, federal dam and levee construction, which peaked in the last quarter of the 20th century, has left two legacies that hamper current damage mitigation efforts. The *first legacy* is the illusion that dams and levees could prevent all flood damage. In the early 20th century, advances in hydrology contributed the comforting notion that historic flood data would remain relatively constant over time, and thus levees and dams could prevent most damage. The dams could not do so. This failure led to the *second legacy*, moral hazard behavior encouraged by the dams and levees, also referred to as the “levee effect”, which is one type of moral hazard behavior (Di Baldassarre et al., 2018). The problem was first recognized by the great American geographer, Gilbert White, who argued that levees and dams opened up flood plains to more intensive development and thus when floods came, damages increased, and this

insight has shaped thinking about flood control in the United States and elsewhere (MacDonald, 2011).

The federal government now offers three basic kinds of post-flood financial and humanitarian relief: (1) subsidized federal flood insurance for certain private residential and commercial properties, (2) assistance from the Federal Management and Response Agency (FEMA) to administer a general federal disaster relief program, and (3) special federal legislation for an area damaged by a major hurricane or flood.

Risk-centered EU Floods Directive as primary tool

At the EU level, the main legislative instrument for flood risk governance is the 2007 Floods Directive. In contrast to the US, flood insurance and compensation schemes in the EU are administered at the levels of the respective Member States. The Floods Directive adopts a risk-based approach by focusing on dealing with the risks associated with floods, rather than assuming flood events can be prevented altogether. Compensation for damages resulting from floods and how these mechanisms are being sculpted is very much at the discretion of the various Member States. No legislative framework for the recovery strategy exists; the Floods Directive does not tackle it. The main instrument for ex post compensation at the EU level is the EU Solidarity Fund, which channels funds to the States to compensate for damages to public infrastructure as a result of flood events on their territories. Besides flood risk governance regulations and direct funding from the EU level to its Member States, other horizontal legislation is relevant. For example, the EU framework on state aid is relevant as support measures need to be reported by means of an official notification to the Commission. However, national support for damages following natural disasters is exempted from these mandatory state aid notification requirements under EU law (European Commission, 2014b).

Public Responsibilities in the Netherlands

In the Netherlands, the responsibility for flood risk management is concentrated with public authorities, which is in line with the high institutionalization of water management in general. After the disaster of 1953, when a large storm surge hit the Dutch coast with over 1,800 casualties, the probability-reducing approach was reinforced in line with the maxim ‘never again’ (Kaufmann et al. 2016, p. 5). Together with the high flood risks in the country, protection against flooding through hard flood defense structures has historically formed the most dominant Dutch flood risk management strategy (Rijswick and Havekes, 2012; Doorn-Hoekveld, 2014). Flood protection is the main responsibility of the central and regional water authorities. Recently there is a visible shift from protection alone towards a combination of protection and prevention through spatial planning (Van Doorn-Hoekveld, 2017). See examples included in boxes 1 and 2.

Box 1: ‘Mitigation in the Project Noordwaard in the Netherlands’ should be inserted here.

A drawback of this institutionalized protective flood risk management is the lack of awareness of citizens of the fluvial flood risks they are facing. This is caused by little existing private responsibility by individual citizens. Only those living outside (at the river or seaside) of dikes and a protection level hold responsibility that in practice even sometimes goes beyond the legally binding flood protection standards that the public authorities have to guarantee. The lack of awareness is also caused by the fact that the need for flood risk management has never been the subject of public debate. Furthermore there is a large amount of expertise on flood protection. Finally the high safety standards and limited governmental risk communication (Terpstra and Gutteling, 2008) are relevant in understanding the lack of awareness. However, a lack of awareness for flood risks is remarkable in such a flood prone country. The axiom that characterizes flood risk

governance in the Netherlands is that every inhabitant is paying taxes and these taxes are used to keeping the whole country safe and this is done by the state (Doorn-Hoekveld et al., 2016). In several surveys, ‘major flooding in your area’ is the second last of the worries of potential hazards (Terpstra 2009, p. 8).

Box 2 ‘Mitigation in Project Zuidplaspolder’ should be inserted here.

Private responsibilities in England

Responsibilities for flood risk governance in England primarily rest with the property owner established through common law. Riparian owners have the right to protect their property from flooding as well as a legal duty to ensure that the use of their property does not increase the risk of flooding elsewhere (Environment Agency, 2013). Another key feature of the English approach to FRM is its comprehensiveness. A broad range of strategies to managing flood risk have been present for many decades, a reflection of the susceptibility of England to flooding from a number of different sources.

A further key feature of flood risk management in England is taking the opportunities to learn lessons from flooding events. Following flooding there is often a period in which the performance of existing strategies are examined and decisions analyzed (e.g. Independent reviews of the Easter 1998 floods; Bye and Horner, 1998; Independent review of the 2007 floods; Pitt, 2008; National Resilience Review 2016; HM Government, 2016). This scrutiny offers the potential to influence flood risk management moving forward and an wholesale change and shift in approaches to managing risk, by reinforcing the need to be more resilient.

Post-Flood Policies: Exchanging Experiences

Both at the EU level and in the Member States investigated, post-flood policies are currently under heavy scrutiny. In the EU, the presumed lacuna in the legal framework

is under evaluation. In the Netherlands, debates have been going over the past years to analyze whether a need exists to increase insurance coverage for fluvial flooding. The English system has recently been subject to significant changes. Lessons learned exist for these three levels of governance from best practices and failures associated with the existing regime in the United States and vice versa.

US: broken flood insurance system.

In the US, the National Flood Insurance Program (NFIP) induced by the cost of moral hazard behavior, dates from 1968. Federal flood damage prevention and post-disaster relief laws provide classic examples of tendencies of politicians to distribute resources rather than compel costly behavior changes. Influenced by White's thinking, the legislation both provides post-flood insurance not available on the private market and requires communities to regulate development of areas prone to flooding. NFIP provides reduced-rate flood insurance to residents in high-risk areas only when local governments enact zoning ordinances that discourage future development in these flood-prone areas. Community participation is voluntary. Under the NFIP, the federal government provides reduced-rate flood insurance to property located in a special flood hazard area, a 100 year flood plain of a participating community. Insurance is mandatory for all properties that apply for a federally backed mortgage.

The program is widely considered to be broken (GAO, 2017). For example after Hurricane Harvey in 2017 FEMA faced a 1.1 billion dollar shortfall in payouts and revenue, on top of the over 21 billion it has borrowed from the US treasury over the years. Despite efforts to use evolving technology, many flood plain maps are out of date. FEMA is still using the 100 year flood plain paradigm instead of mapping broader at risk areas and accounting for climate change. Also recent legislative attempts to fix the system did not succeed.

Multi-level governance issues impacting post-flood policies.

The Mississippi River flood of 1927 led to shift in flood protection policy from levees to dams and started a debate about whether disaster relief was a federal or state responsibility. Congress enacted the first federal disaster relief legislation in 1950. The current general act, the Stafford Disaster Act, was enacted in 1974 (Public Law 93-288 (1974), 43 USC § 5121 et seq). The Act requires both disaster prevention planning which provides a framework to help individuals who have lost their property or livelihood to obtain temporary relief. The second option is a special act for the damaged area that can obtain a combination of grants and structural measures. The Act is triggered by a state of emergency declaration by the President and provides a wide variety of disaster relief to public facilities and private property owners. Owners whose homes have been damaged are eligible for temporary housing assistance as well as for grants for the repair or replacement of damaged structures (43 USC § 5174). However, if the damaged property is in a mapped flood plain, FEMA may not waive flood federal insurance requirements. FEMA may also purchase or relocate damaged properties to open up flood plains.

For the most part, the use of land use control instruments to minimize flood damage rests with local governments, and they have traditionally used their land use control authority to regulate new development in high risk areas. The United States Supreme Court, however, has not been as receptive to refusing to compensate moral hazard behavior (Albrecht and Tarlock, 2018). Thus, despite the success of local governments in upholding flood control regulations in state courts, the Supreme Court's takings jurisprudence holds out the hope that land use regulation to minimize flood damage is potentially subject to the challenge that it represents an unconstitutional expropriation (Chizewer and Tarlock, 2016).

Box 3: 'New Orleans: The Dutch Structural Solution with State and Local Rebuilding standards' should be inserted here.

State Building Codes: Cost-Saving Sticks.

All states have adopted statewide building codes and many include requirements that new construction to minimize flood and hurricane damage. They are often based on international codes, and these requirements for more resilient structures have been very successful in minimizing water and wind damage. However, they are not mandatory in all states (Insurance Institute for Business and Home Safety). For example, Florida has a mandatory statewide hurricane code, but Texas gives local governments the power to adopt or not its statewide code. Unfortunately, in the current climate of climate change denial, but several Gulf Coast states, which experience frequent hurricanes, have weakened their codes.

Local Government Power to Retrofit Damaged Buildings: Thin Sticks.

More sophisticated flood mapping upgrades and the growing dissemination of the scientific consensus about the increased flood risks of global climate change strengthen the case for shifting some of costs of adaptation to private property owners (Serkin, 2014). However, local government's power to require the modification or removal of existing buildings without compensation is limited because existing structures enjoy a high level constitutional and statutory protection from complying with new local regulations. There is a major exception to the protection of the status quo that is increasingly being used after floods and hurricanes. If a property is destroyed or substantially damaged by an Act of God such as a flood or hurricane, most zoning ordinances only allow its rebuilding as a use that conforms to current zoning regulations (*Sams v. Dep't of Env'tl. Protection*, 63 A.3d 953 (Conn. 2013)). State law however may constrict municipal options to terminate non-conforming uses by granting extra-constitutional protection to vested rights, thus encouraging inappropriate rebuilding (Code of Virginia § 15.2-2307).

Box 4: 'Cedar Rapids, Iowa: Opening a Flood Plain by Buy Outs' should be inserted here.

Post-flood policies are lacking at the EU level.

As explained, EU Floods Directive does not include post-flood policies. The Directive provides a procedural framework by requiring a three-step approach from Member States. Since its entry into force, the Directive has required Member States to undertake preliminary flood risk assessments, draw flood risk and hazard cartography and submit Flood Risk Management Plans (FRMPs) to the EU Commission. The Directive does not include any substantive obligations, which means that Member States are in compliance if they fulfil their procedural requirements, e.g. submitting the FRMPs in a timely fashion (Priest et al., 2016). The significant amount of discretionary freedom for Member States in the specific measures they adopt as part of their flood risk governance framework can be explained by the institutional differences as well as the geographical differences in terms of aspects such as susceptibility to floods and so forth, across the EU.

But The Times They are A Changin'?

In recent years, there has been debate at the EU level as to how to move forward with disaster insurance both in terms of the best ways to design these schemes and the degree of harmonisation at EU level would be desirable (European Commission 2014a; Faure and Bruggeman 2013; Surminski et al., 2015). At the time of the first wave of evaluation in 2013, taken into account *i.a.* the regional differences between the States in terms of types of flood risks and resulting economic losses, the European Parliament did not support a mandatory framework for compensation of natural disasters steered from the EU level, but instead endorsed a flexible insurance market for natural disasters designed at the national level (European Parliament, 2014).

As is clear from the following analysis of Dutch and English post-flood policies and their respective approaches to the recovery strategy are related to all flood risk management strategies and changing only the recovery strategy might affect other strategies in an unforeseen and unwanted way. The discrepancies between these approaches might be too significant to reconcile (Doorn-Hoekveld et al., 2016; Priest et al., 2016; Suykens et al., 2016). As of now, the main incentivizing tool in the hands of the EU Commission for inducing risk reduction measures through financial schemes is the abovementioned EU Solidarity Fund. This fund has been subject to heavy criticism, which has led to a reform in 2014. One of the elements of reform relates to the ability to link compensation to the Member State in question by the measures taken by the Member States in question, with the EU Court of Justice empowered to determine failure to comply with EU legislation on disaster risk prevention and management (European Union, 2014, Art. 4). Recently, the UK has received +- EUR 60 million for flood events in January 2016, the impact of Brexit of such future eligibility remains unclear.

Weak ad hoc public compensation scheme and marginal insurance coverage in the Netherlands.

The Netherlands has a governmental compensation scheme, the Calamities Compensation Act (CCA). The scheme is an entirely public system, funded by public resources. The Act can come into force after a natural disaster. When the Act comes into force, a specific ministerial regulation is written in which the rights to compensation are laid down. The damage will not be fully compensated and the Act contains many imponderables. It is not beforehand clear whether the Act will come into force after a flood and if so, which damage will be compensated and what the amount of compensation will be. At this moment that Act has been used five times and compensated loss in the range of € 1.115.647 to € 147.209.966 (Veiligheid en Justitie 2017).

No mandatory flood insurance exists. Only one insurer offers a flood insurance, the *Neerlandse*. Currently discussions have been held with respect to flood insurance of secondary floods, i.e. fluvial floods caused by breaches of secondary flood defense structures (interview 2).ⁱ

Currently, the system of compensation flood damage is plagued by uncertainties. In particular, this is the case for losses following minor flooding events that cannot be designated as a “disaster”, and that will not be compensated by the governmental scheme.

Dominance of insurance scheme in England and existing barriers.

Very much in contrast to the Dutch situation, in England, insurance and individual responsibilities play a major role in the flood risk governance realm. One might therefore expect a close relationship between flood risk management and individual responsibilities and the encouragement of those living with flood risk to take action to reduce their risk. Although there are some situations where this has occurred, there have been a number of intervening factors. First, although there is no statutory duties on the government to provide flood management, the State has intervened for many years and has provided protection. This intervention has in many cases established a disconnect between individual residents and their responsibilities for managing flood risk. Although only having permissive powers, the English government has consistently invested in FRM approaches (Defra, 2014; 2017) over many years which has led to many expecting intervention. However, the situation is changing. Many of the higher risks have received investment in England and as such, cost-benefit analyses for unprotected areas are becoming more difficult to justify. The high cost, coupled with the nature of flooding makes it difficult to offer protection, meaning that it is not technically and economically feasible to offer protection as a solution to FRM in all communities. Similar to much of

Europe, flood risk management in England has seen a move towards a greater emphasis on individual and community responses (Alexander et al., 2016). This shift places increasing responsibility and pressure on at-risk communities to manage their own risk, key actions being increasing preparedness and adopting measures to make their communities more resilient. The English context differs from many other countries is that for decades England has adopted a broad spectrum of approaches. In the recent context, it has been recognised that government approaches should also be aiming to facilitate local scale approaches to resilience and look to opportunities to assist individuals and communities to manage their own risk (Cabinet Office, 2011; Environment Agency, 2012).

A second barrier between individuals adopting post-recovery resilience has been the wide scale availability and use of flood insurance. Comprehensive flood insurance has been available since 1922 (Arnell et al., 1984) and has relatively high penetration rates (ABI, 2017).ⁱⁱ Post-event recovery has been a key strategy for many years and, as such, has been acting as a buffer for those affected by flooding and offering financial assistance for recovery (Penning-Rowsell et al., 2014). As such, the provision of insurance is a key player in incentivising and facilitating more resilient recovery.

Promising potential of the private insurance market.

Greater potential can be found within the private market. Insurance provision is the key measure whereby individual homeowners can be encouraged to adopt more resilient approaches post flood and create properties which are better adapted to resist or absorb future flood events. The adoption of individual risk reduction measures are in principle beneficial to all interested stakeholders. For property owners, the risk reducing benefits are clear and obvious, providing them with less damages and disruption from future events and protecting their assets. Similarly, for mortgage lenders the protection of

the asset is critical. For insurers, the adoption of individual property level resilience measures will reduce their overall exposure and make the coverage of that property more attractive. From a government perspective, the use of these measures recognises that property owners are aware of the risk and are taking some individual responsibility for their risk, and in turn increasing communities' resilience to flooding.

However, the use of these measures remains relatively low in comparison to the overall number of properties at risk with the opportunities for influencing the uptake of these measures being curtailed in the context of a private market flood insurance approach by a number of different factors. These factors include: annual premiums, the Competition Act 1998, scope within the premium cost to provide a reduction, awareness by those insured that they are at risk, an appreciation of those measures that can be taken to reduce risk and unwillingness of those insured to adopt measures. See for an example the box 5 on the Property Flood Resilience Action Plan. Following flooding under standard insurance coverage agreements, private insurers are required to provide recompense on a like for like basis. Insurers increasingly recognise that only reinstating properties to their pre-flood condition does nothing to reduce future risk. There are informal guidance documents in place that demonstrate the willingness of the insurance sector to encourage adaptive development (e.g. ABI, 2009). Moreover, ABI and government are producing a Flood Risk Report template for homeowners to declare resilience measures to their insurance provider (although it is not clear how such measures will be rewarded; Surminski and Eldridge, 2014). However, in general the encouragement of risk reduction measures is limited as the process of 'betterment' would be more expensive. The nature of annual premiums means that it is not in the interest of insurers to spend more on recovery than they are contracted as those insured could in the next year move their coverage to a new insurer. Insurers are also prevented to certain extent from

working together to agree to provide betterment by the Competition Act 1998, which views this type of collaboration as anti-competitive.

Some of these challenges and in particular, the ability of flood insurance to better incentivise resilient reinstatement and future adaptation are key features, which may be tackled in the future through the adoption of a new UK flood insurance system; Flood Re. Implemented since April 2016, Flood Re is a government-regulated but private company run flood insurance system which was introduced to ensure the continuation of universal affordable insurance in high-risk areas. The approach functions by capping insurance premiums for those in high-risk areas (thereby maintaining affordability) which are then ceded by private insurers into the Flood Re scheme. To cover any claims for these properties a levy of c. £11 is applied on all domestic flood insurance premiums which is put into an insurance pool (Flood Re, 2018). The Flood Re scheme is advocating an approach to encouraging risk reduction measures either proactively or following a flood event. Therefore, a key feature of Flood Re is the production and update of a transition plan in which the capping on the premiums will be slowly increased thereby providing an incentive for policyholders to adopt risk reduction to reduce the premiums that they pay for insurance. The first of these transition plans was released in February 2016 (Flood Re, 2016), however, formal incentive mechanisms to promote risk reduction measures at the property scale are absent from the new Flood Re scheme and there is a lack of guidance about how to deal with repeated claims. Currently, there is no requirement for insurers to inform property owners that they are at high risk and ceded into the scheme and therefore some property owners may not realise that they are at risk, although the EU floods directive aims for this awareness by prescribing flood risk hazard maps that should inform citizens about the risks they face. Additionally, the decision about whether it is cost effective to adopt risk reduction measures (i.e. essentially the cost

of the risk reduction measures against the benefits through premium reduction) is a complex one, particularly when insurers are themselves not clear on what premium reductions might be offered. In the consultation documents, the Government stated an expectation for Flood Re to “set out clear proposals on how it will create incentives for policyholders to take ownership and invest in resilience measures, including through all appropriate financial incentives” (Defra, 2014d, p 9); however this is currently lacking.

Box 5: Planning for success - The Property Flood Resilience Action Plan (Defra, 2016) should be inserted here.

Grant Schemes that hold potential in England.

The UK government by principle does not offer many forms of compensation; however following flooding has offered a number of different ad hoc approaches which offer different types of financial and other assistance/support to different groups of those affected. A key governmental approach which has assisted homeowners following flooding, and which tackles the issue of betterment, is the introduction of the *Property Level Flood Resilience Grant Scheme* (previously known as repair and renew grants). These aim to encourage the movement away from standard reinstatement techniques and a ‘return to normal’ discourse. Applicants are able to apply to their local authority (although the scheme is ultimately funded by central government) for a grant of up to £5000 to fund additional flood resilience and resistance measures for their property. For the most part, the funds will be paid by the insurance company with the specific aim of these grants being to enable resilient reinstatement and to bridge the gap between returning a property to its pre-flood state and adaptation measures for the future (DCLG/Defra, 2016).

In principle, this approach should increase the resilience of properties that have been affected by flooding, but the way in which they have been implemented may reduce their effectiveness.

Conclusions

We have engaged with literature on flood risk management, the bulk of which focuses on preventing flood events and limiting damage to property and the loss of human life (Morrison, 2018; Surminski, 2018). We have delved into the nexus between the recovery and the mitigation strategies and have scrutinized how measures related to the mitigation strategy are addressed within post-flood policies and mechanisms. In line with the UN's International Strategy for Disaster Reduction, nations need a flood policy that links risk prevention and mitigation and post-flood compensation (Bubeck, 2013; Surminski, 2018). The emphasis must be on the promotion of property redevelopment and land use choices such as retreat or limited development that decrease the risks of future damage. However, our research has shown, in line with international literature referred to throughout the paper, that the linkages between recovery mechanisms, especially post-flood compensation, within the recovery strategy, and prevention c.q. mitigation measures are largely ineffective or lacking altogether.

The nations included in its scope have very different post-flood policy set-ups and responses to the compensation of properties damaged by a flood. Post-flood compensation plays a major role in the US, an important but more limited role in England, a very limited role at the EU level and an even more limited role in the Netherlands. The reason for the limited impact of EU flood regulations on post-flood compensation in its Member States is twofold. First, the emphasis of the EU Floods Directive is on risk-based prevention. Second, the EU Floods Directive does not have a substantive impact on the scope and content of Member States' flood risk governance measures as its nature is

entirely procedural (Herman, 2010). Post-flood compensation schemes in EU Member States are impacted somewhat through various EU policies beyond the Floods Directive, e.g. the Solidarity Fund and financial regulations set forth at EU level related to, for example, state aid.

In general, the main instruments of post-flood relief are flood insurance and government payments. In the US and England, both serve two purposes. The first is humanitarian; victims should be restored to the status quo. The second links post-flood compensation to flood damage prevention and uses compensation as a way to promote more resilient ways of building construction and land use. The two objectives often conflict; on the whole the resilience objective has been subordinated to the humanitarian one, often driven by the real estate development industry and property owner and local government to the costs of resilience investment. As sea level rise and inland flooding becomes more frequent due to global climate change, the pressure for post-flood compensation will increase.

The legal and policy frameworks analyzed in this paper serve are mutually inspiring, thereby laying the groundwork for future research, notwithstanding the importance of context specificity and avoiding transplants. As post-flood compensation in the Netherlands is in its infancy, a closer look at the drawbacks and positive experiences of the elaborate scheme applicable in the United States can be beneficial. Likewise, existing instruments such as resilient reinstatement grants issued post-floods, as applicable in England, are rather straightforward and versatile in promoting the link between risk prevention and mitigation and post-flood compensation. However, practice shows that these grants have been unsuccessful in the past – the underlying cause of this problem is useful for other nations.

In the US, despite the lack of a coherent national flood and climate change policy, local governments are taking important steps to link post-flood recovery efforts with flood management strategies which will minimize future flood damage. These efforts would benefit from uniform federal flood management guidelines and grant programs that reward innovative local programs which seek to reduce moral hazard behavior.

In the Netherlands, the strong emphasis on flood protection has proven to be effective in general. However, such a strong role for the government might not fit in the DNA of other countries. The Dutch sophisticated legal framework, with standards, policy instruments that provide for easy implementation of flood protection measures, a strong long term planning approach as well as the investments in knowledge, innovative approaches and incorporating nature-based solutions over the last years may serve as an example, especially for those countries that are vulnerable for the effects of climate change. However, moral hazard behaviour, including the levee effect, exists as sometimes other values and interests prevail over flood protection. More attention should be paid to ex post recovery systems and increasing awareness. Individual flood protection is almost impossible due to the physical circumstances in the Netherlands. However, inspiring is the idea of stricter – more flood prone and resilient – building requirements in general and especially when rebuilding post flood. Regulating this is feasible in the Dutch system as it will not be regarded as expropriation of property rights as in the US. Introduction of an insurance scheme might raise awareness but should not hamper the current focus on prevention, as this would make the country as a whole less habitable as the risks might rise to an unacceptable level. Also the legally binding safety standards that oblige the governments to guarantee a high level of protection and which in the near future might be qualified as obligations of result will influence any insurance system. In the possible

evolution toward a more elaborate insurance scheme, premiums should be differentiated in order to stimulate preventive and mitigation measures by citizens.

In England, the strong reliance on insurance has had some positive impacts in terms of mitigation, but also drawbacks. There is high potential there but realizing and incentivizing it is challenging and taking time. Recognizing the role of a public-private partnership between government and insurers is something that might be further developed in the other countries. The grants for resilient reinstatement following flooding (i.e. bridging the insurance gap) although in their infancy can provide a good model for elsewhere – although these have their own challenges.

A commonality between the Dutch and the English system in terms of recommendations, is that building regulations should be improved so that properties are less likely to become damaged in the first place. On the other hand, in England, the greatest opportunities at this point in time are situated in the private market, which avoids government regulation when it can. Paramount is a smooth transition to differentiated, i.e. risk reflective pricing, through the adoption of an approach where there is a much stronger tie between insurance premium payouts and resilient reinstatement. But there currently are many barriers that need to be overcome in relation to information provision and clarity about the transition approach. Furthermore, more technical evidence is required to demonstrate the effectiveness of resilience measures – providing confidence to property-owners (that it is worth their investment), insurers (that it is worth a premium reduction) and government (that money is provided as a grant – that it is efficient use of public funds).

Having looked at the Dutch and English post-flood legal and policy landscape, it is clear that a harmonization in this area imposed by the EU level is not feasible in the foreseeable future. However, post-flood measures could be integrated into the procedural

framework of the Floods Directive, and more specifically the Flood Risk Management Plans. The lack of reference to post-flood policies in the Floods Directive and its implementation hampers resilient flood risk management, as linking flood risk management strategies is an important condition toward achieving such resilience (Driessen et al., 2016; Gilissen et al., 2016).

Finally, enhancing the synergies between public and private actors involved in flood risk governance is important both in the EU and the US. Indeed, linkages between the flood risk management strategies are often hampered by issues such as a lack of up-to-date risk cartography which could be remediated through improved public-private partnerships. Future research could further flesh out and compare specific instruments in the post-flood policies realm. Furthermore, research could focus on such public-private partnerships and how these could be used to further post-flood policies, both in a public ex post compensation setting and an insurance-centered policy landscape.

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ⁱⁱ In 2016 72% of households had contents and 61% had buildings insurance.