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## Chapter 43

# Desertification: competing knowledge claims and land-management agendas

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Desertification, like climate change (see chapter by Harris on climate change) and biodiversity loss (see chapter by Mauerhofer et al.), has been deemed a global environmental challenge that merits its own multilateral convention to achieve coordinated action to combat and mitigate its impact (see Chapters by Pattenger and Suechting on international environmental regimes and Hunter on international environmental law). The United Nations Convention to Combat Desertification (UNCCD), established in the wake of the 1992 Rio Earth Summit on sustainable development, orchestrates action on desertification at a global level. However, like many other environmental issues, desertification is a nebulous concept, where scientific knowledge, political opinion and operative-level experience and know-how converge and sometimes conflict. Over a hundred definitions of desertification are identifiable from the literature, but most relate it to the loss of an area's resource potential, through depletion of soil cover, vegetation cover or loss of useful plant species (Middleton 2013). Desertification is seen as a serious threat to food security in specific dryland regions and one that renders global

poverty and food security efforts such as the UN Sustainable Development Goal 2 (SDG 2 Zero Hunger) difficult to reach (IPCC 2018).

Desertification poses a so-called “wicked” challenge (Turnpenny et al. 2009) to environmental managers and legislators. Due to its complex and interdisciplinary nature, characterized by high uncertainty and ambiguous relations of cause and consequence that vary by context, the allocation of responsibility and identification of possible solutions in practice is hard.

This chapter outlines the debates surrounding the definition and extent of desertification globally and the evolution of global and local governance efforts focussed on addressing it. Particular attention will be given to the evidence base on which efforts to diagnose and address desertification are founded and some of the context specific political and socio-economic processes that are seen to drive desertification. The chapter concludes by summing up on the challenge of desertification and the extent to which policy and mitigation practices are beginning to embrace its complexity.

### **Extent of the problem: defining and governing desertification**

While desertification remains a debated term, the UNCCD defines it as “land degradation in arid, semi-arid and dry sub-humid areas resulting from various factors, including climatic variations and human activities” (UN 1994). Land degradation, in turn, is defined as:

the reduction or loss, in arid, semi-arid and dry sub-humid areas, of the biological or economic productivity and complexity of rainfed cropland, irrigated cropland, or range, pasture, forest and woodlands resulting from land uses or from a process or combination of processes, including processes arising from human activities and habitation patterns,

such as: (i) soil erosion caused by wind and/or water; (ii) deterioration of the physical, chemical and biological or economic properties of soil; and (iii) long-term loss of natural vegetation (UN 1994).

(UN 1994: 5)

As with other similar global governance regimes centring on climate change and biological diversity for example, the UNCCD has been a powerful force in institutionalising this definition globally and with that, the notion that desertification is a universal threat to localised productivity of land and subsequently, livelihoods and food security in already vulnerable dryland regions (IPCC, 2018).

But despite the global convention and the consensus that desertification concerns the loss of productivity of land, considerable discord remains around how to measure the extent of desertification, its exact drivers (human and natural) and its impacts (Behnke and Mortimore, 2016; Cherelet et al. 2018; Briassoulis, 2019). The World Atlas of Desertification (Cherlet et al. 2018) for example, has omitted any precise areal mappings of the occurrence and extent of desertification from its latest edition, and suggests that desertification cannot be represented by a comprehensive global model, as this would inevitably be inaccurate due to complexity and uncertainty. Blaikie and Brookfield (1987) suggest that the degree of degradation can only be meaningfully defined in relation to actual or potential uses of a specified area of land, and is therefore contingent. It makes sense that some deserts exist naturally, and are not by definition an adverse phenomenon. For example, Behnke and Mortimore, (2016; see also Thomas and Middleton 1994) point to the ‘Sahel desertification crises’ which stemmed from reports of a rapidly encroaching desert and was widely researched and publicised in the late twentieth century, but has since been refuted. These authors suggest that the notion of desertification is

misleading altogether and, while the loss of productivity of land is a real problem in certain regions, the Sahel serves as an example where the characteristic fluctuation of conditions in dryland environments has been misinterpreted as desertification (see UNCCD Knowledge Hub 2016). This is not to say that communities in the Sahel region do not suffer from vulnerability in terms of access to resources and nutrition, but that rather than encroaching deserts, these crises are driven by political and socio-economic causes (e.g. UN News 19<sup>th</sup> of October 2020). Nevertheless, it is indisputable that human actions and climatic changes are increasingly colluding to corrode the biological and economic functions of land. But this is driven and manifest in different ways depending on context. For example, land degradation can be associated with large intensive monocultures and heavy usage of chemical nutrients with detrimental impact on soil organic matter and the loss of these key nutrients from the natural circulation of matter on the planet (See e.g. Steffen et al. 2015). But conversely, degradation may also be driven by the abandonment of beneficial land management practices due to the declining viability of traditional farming methods and urban migration (e.g. Briassoulis 2019).

All things considered, the overwhelming consensus in the scientific community is that desertification in terms of natural and human induced loss of productivity of land remains a growing threat in specific dryland regions (IPCC 2018). The Millennium Ecosystem Assessment along with several other global reports (MEA 2005; WRI 2005; IPBES 2018; FAO et al. 2020) collate evidence on the constituting processes and manifestations of desertification and portray various aspects of its impact on human well-being, pointing out that while the local magnitude of the impact varies in relation to degree of aridity and population pressure, desertification occurs on all continents except Antarctica, and affects millions of people, the majority of whom already live in poverty and can be classified as vulnerable. Many reports also place the problem of desertification in the context of the need to feed a global population of an estimated 9 billion people by 2050 on available and diminishing land resources, where

desertification, in many areas exacerbated by climate change, poses a threat to food security (IPCC 2018; 273).

The global convention (UNCCD) identifies 197 countries as parties to the Convention and thus as affected by processes of desertification (UNCCD 2020). The Convention constitutes the most significant legally binding international agreement linking environment and development to sustainable land management. It is committed to a bottom-up approach, encouraging the participation of local people in combating desertification and land degradation, as well as knowledge and technology transfer from North to South. Its principal aims are to improve the living conditions for people in drylands, to maintain and restore land and soil productivity, and to mitigate the effects of drought (UNCCD 2020). Figure 43.1 details the different institutions involved in the UNCCD.

[INSERT FIGURE 43.1 ABOUT HERE.]

The 2018-2030 strategic framework makes an explicit commitment to global “zero net degradation” or Land Degradation Neutrality (LDN) by 2030 (UNCCD 2017). This aim is also expressed in the UN Sustainable Development Goals (SDGs), where goal 15, and specifically target 15.3, is to, “by 2030, combat desertification, restore degraded land and soil, including land affected by desertification, drought and floods, and strive to achieve a land degradation-neutral world” (UN 2015: 27). LDN is hailed as a paradigm shift in addressing desertification as it places great emphasis on remediation. In practice, LDN is defined as involving (a) managing land more sustainably, which would reduce the rate of degradation; and (b) increasing the rate of restoration of degraded land, so that the two trends converge to give a zero net rate of land degradation (UNCCD 2017:44).

Perhaps because of the ambiguity surrounding the term, global policy efforts to address desertification have been accompanied by meagre economic means, however. The Global Mechanism (GM, see Figure 43.1) was established in 1998 with the remit to support developing countries in increasing investment in land as a resource at the national and international levels. The GM also helps countries to identify national and international, private and public sources of finance for sustainable land management practices. In 2010 the Global Environment Facility (GEF) finally adopted the mandate to finance the UNCCD. It directs fund towards monitoring and reporting the national Action Plans by Conference Parties, but in order to release any significant funding, it has been necessary to link desertification to other cross-cutting issues, such as climate change, and the Secretariat of the Convention plays a key role in this (Conliffe 2011). Scientific evidence linking climate change and incidences of desertification is widespread, and desertification has been hailed by many as a noteworthy potential contributor to carbon emissions – particularly in terms of loss of soil carbon sequestration capacity (Conliffe 2011; IPCC 2018). Since 2017, the GM-led initiative termed the Land Degradation Neutrality Fund (LDNF; UNCCD 2020) has worked to channel money from public and private impact investors – those, including national governments, wishing to invest with the specific goal of achieving beneficial outcomes – towards sustainable land management and restoration projects implemented by the private sector in areas affected by desertification. These financially viable projects funded through the LDNF are intended to create sustainable jobs and improve food and water security in their respective locations.

### **The politics of desertification**

The complexity of desertification – the plethora of processes and factors that drive the loss of land productivity – and their variation across geographic contexts, as well as the socially

constructed nature of the phenomenon have left ample space for its politicisation. Literature identifies several modes of the politicisation of desertification and explores and identifies different manifestations, ranging from the political motives behind the framing of the UN Desertification Convention itself (Adger et al. 2001) to unravelling some of the “myths” associated with desertification and revealing the underpinning uncertainties (Thomas and Middleton 1994). Piers Blaikie and Harold Brookfield suggested already in 1987, that land degradation (that in many cases amount to desertification) is driven by certain social, economic and cultural processes of resource use and modification that produce highly politicised patterns of appropriation and link to uneven relationships of power. The link between environmental degradation resulting from marginalisation, where land users have been forced to move to areas that are not fit for cultivation for example, is well established (e.g. Benjaminsen 2015). While this may be driven by ‘land grabbing’ in a context of poorly established property rights or insecure tenancy conditions (Benjaminsen and Bryceson 2012), expansion of cultivation onto unsuitable land may also happen as an unintended consequence of policy, such as the spread of durum wheat cultivation to ‘badlands’ in southern Europe (Clarke and Rendell 2000). It is now commonly accepted that desertification needs to be understood as a resource use issue taking place within a bigger picture of socio-economic structures, processes, needs and disparities (Halbac-Cotoara-Zamfir et al. 2020).

Blaikie and Brookfield (1987) also highlight the need to think carefully about how we define and conceptualize the society–degradation relationship – not only what are the underlying drivers of harmful land management practices, but what potential land uses and benefits that are being lost to desertification – because this is significant for how we address the problem. The varying interpretations of the extent and manner in which desertification is actually posing a problem for livelihoods in specific areas are rife among stakeholders, and this has a significant impact on how natural resource management policies and programmes are

implemented (Wilson and Juntti 2005; Briassoulis 2019). Therefore, the local perspective is crucial in understanding what desertification means in context and how it has come about.

But according to Adger et al. (2001), policies orchestrating local solutions to desertification and other major global environmental issues are often informed by powerful international knowledge regimes and are the result of multilevel actions and interactions that rarely reflect the multiplicity of local contexts in a realistic way (see Chapter by Karvonen and Brand). Global discourses tend to be guided by a managerialist ideal, where the issues at hand are presumed to be somehow resolvable via global action, and incorporate shared “myths” and blueprints (Thomas and Middleton 1994; Behnke and Mortimore 2016). Adger et al. (2001) identify a strong discourse of crisis on which much of the international desertification policy is based but often does not resonate with local level experiences of desertification. The WRI report (2005) provides an explanation of how this crisis discourse might have come about by suggesting that a political motivation can be identified for the founding of the UNCCD. The USA acted as an unexpected proponent of the African demands for a global convention on desertification because it harboured hopes that African states would support the broader Rio Declaration in return. The USA may also have been responding to criticism regarding its lack of action on the other multilateral conventions. The subsequent establishment of a desertification control unit within the UN Environment Programme (UNEP) further institutionalized the crisis discourse, whereby it became purposeful in order to maintain the existence of the unit (Warren and Agnew 1988, cited in Middleton 2013; see also Behnke and Mortimore 2016). Whether more politically motivated or deriving from valid evidence, the crisis discourse shapes much of the managerial approach to combating desertification, embodied by the UNCCD, which binds all Parties to the Convention to establishing National Action Plans (NAPs) to combat desertification.



This managerial approach obscures what many term the deeper drivers of desertification processes, embedded in global trade relations, weak property and tenancy rights and unequal access to resources such as water, resulting marginalization of smallholders who are thus forced to exploit lands that are prone to desertification processes (Adger et al. 2001; Benaminsen 2015). A powerful interpretation stemming from the crisis discourse is that desertification is the catalyser of underdevelopment and that local level human actions are the root causes of desertification (for prevalence of this, see WRI 2005). But more critical local perspectives have begun to gain recognition in the past decades and this is manifest in the emphasis on participatory approaches and indigenous and local knowledge (ILK) in more recent global initiatives addressing desertification (IPCC 2018). Increasing number of authors highlight that desertification processes need to be considered as taking place in a scalar and often unequal socio-economic context of land use drivers, motivations and needs (Halbac-Cotoara-Zamfir et al. 2020). Better representation of local stakeholders in desertification discourses and remedial actions may be a route to uncovering the deeper drivers of harmful land management practices.

It is important to understand that desertification can be a highly politicised issue at the local scale in particular. What should be a simple matter of agreeing what desertification means in practice in a specific location frequently uncovers quite disparate stakeholder understandings of the term, its extent and the processes involved. Perceptions regarding the driving forces of desertification processes at local level may vary greatly, with some stakeholders emphasising climatic drivers and others placing more focus on human causes such as intensive land management practices and irrigation. Confusion prevails between the concepts of desertification, drought and progressive desiccation (Goudie 1990). Desertification is an evocative and misleading concept: it does not necessarily manifest itself in the spreading of desert-like conditions and it certainly does not consist of a single process but rather of a combination of mutually reinforcing and often cyclical developments (Wellens and Millington

1992). It may therefore be difficult to provide exact evidence of desertification even in a well-defined location. Indeed, over the years, it has proved very difficult, even though empirical scientific exploration, to define whether an area is desertified or not.

While the acceleration of land degradation processes may be both climatically induced and anthropogenic (as per the UNCCD definition), the relative influence of these drivers is difficult to determine. Juntti and Wilson (2005) point out that the difference in emphasis detectable in the above definitions can lead to very different ways of conceptualizing and diagnosing the problem and the appropriate remedial methods, and crucially, that different emphases can also be deployed to serve different stakeholder interests. For example, from an analysis of desertification discourses in four northern Mediterranean countries, Juntti and Wilson (2005) identify five different ways of defining desertification at the “operative” level, by stakeholders such as farmers, water and environmental officials and citizens living and working in environments that the UNCCD identifies as affected by desertification. While the five categories overlap to some extent, each holds a different interpretation of the role of the natural resources in the economy, the justifiable ends towards which these resources are to be used and, hence, a different morality according to which the extent and nature of desertification has been defined and is influencing how natural resources are managed. For example, in areas where intensive agriculture and the use of water resources for irrigation was linked to resource scarcity but also to significant economic growth, a reductive understanding of desertification as a water provisioning issue was prevalent. This reflects a morality where the rural population and the existing forms of land management (mainly irrigation farming and horticultural production) are regarded not only as necessary economically productive functions, but also as examples of good management of the natural resources of the locality, especially the productivity of the soil (Oñate and Peco 2005). Economic development is often seen to justify overexploitation of natural resources and technological solutions such as desalination or water

transfers are seen as the solution, with much of the responsibility for providing these falling on the state and water officials.

Both of the above interpretations shift responsibility away from land managers and sanction the continuation of resource management practice as usual. In this sort of a normative context, the lack of broader political will to undertake economically detrimental policy decisions at the local level poses a significant problem for any desertification mitigation efforts questioning land use intensity (Juntti and Wilson 2005). This has meant that water management and the implementation of land use policies in these water-scarce regions has since been guided by the aspirations of the irrigation farming industry rather than by resource availability and sustainable use (Oñate and Peco 2005; Ripoll et al. 2010; ).

This plurality of understandings of desertification and its drivers poses a challenge for the design and implementation of the National Action Plans that the UNCCD requires from all designated parties, as well as any individual efforts to combat desertification in practice. The following section looks critically at the role of evidence in the emergence of desertification into the global arena as a significant environmental problem and considers options for managing the complexity and competing knowledge claims in policy and practice.

### **Desertification drivers, competing knowledge claims and implications for global policy**

Adger et al. (2001) outline two types of global desertification discourses that allocate the blame for desertification to either international power relations or locally induced resource depletion, respectively. While this can be seen as a polarised debate, it is likely that both interpretations apply to a varying extent in different contexts. Understanding desertification and identifying its extent and impact in a locality requires a contextualised understanding of the biophysical resource base, land and water management practices, key sectors and actors such as farmers,

other land owners and the local business sector, and their linkages to broader socio-economic scales through processes such as trade and tourism. As discussed above, acquiring a sound scientific understanding of ecology, soil morphology and the hydrological conditions and relevant cause-consequence relationships underpinning possible desertification alone, is a challenge. But despite the complexity, science has made significant progress in understanding and identifying desertification in the last decades and there are now some well-established assessment practices and indicators (Briassoulis 2019).

Many still complain of the domination of uncertain scientific evidence and obscure modelling in understanding and assessing the extent of desertification risk, and most indices that are commonly used focus solely on biophysical variables (D’Odorico et al. 2013). However, science based approaches are increasingly beginning to emphasise the need to understand the role of socio-economic structures such as land use subsidies, the structure of landownership and the existence and implementation of mitigating policies (Kosmas et al. 2013), the omission of a broader range of contextually informed socio-economic drivers of desertification risk, such as processes of trade and price setting, intensification and marginalisation portray desertification as a depoliticised concept and hinder the identification of relevant, workable and legitimate solutions.

To really pin down the manifestations, drivers and impacts of desertification in a locality, it is necessary to look at local land-use needs and practices, nested socio-economic structures and processes that drive these as well as demographic and social factors that modulate human-nature interactions. Based on a secondary analysis of a broad range of case study data, Geist (2017) suggests that in the majority of cases globally, desertification is caused by a combination of intensifying agricultural practices (particularly livestock and to a lesser extent crop production), increasing aridity (often associated with climate change), extension of infrastructure (including that associated with urban sprawl but mainly irrigation infrastructure

such as the establishment of dams and canals), and extraction of wood or other materials. Underpinning these processes, are institutional and socio-economic drivers that need to be understood at regional and local levels (Geist 2017; Halbac-Cotoara-Zamfir et al. 2020). For example, in some cases, agricultural intensification is driven by low prices and the need to extract more value from scarce land or to expand farming into vulnerable territories, and in others, policies aimed at modernisation and increasing the competitiveness of agricultural practices have underpinned unsustainable expansion, intensification and the adoption of harmful production practices (Blake et al. 2020; D’Odorico et al. 2013; Juntti and Wilson 2005).

Understanding what is driving desertification in a given context requires careful consideration. Adger et al. (2001) refer to a case study of subsistence farmers in Mali (Benjaminsen 2000 cited in Adger et al. 2001) to illustrate how the presumption that poor subsistence farmers are forced to overexploit forest resources for firewood is over simplistic and overlooks the methods whereby local subsistence farmers have managed to sustainably use local forests for firewood for centuries (see Gray and Moseley 2005 on many similar myths related to the poverty–environment relationship). This renders many of the managerial solutions to deforestation overly coercive and inefficient or even detrimental to the existing actually sustainable livelihoods. As Thomas (1997) points out, scientific solutions are rarely easily transferrable from one context to another and, where this is done, it is the small variations in physical and environmental factors as well as the socio-economic context that often lead to unexpected and inefficient outcomes and downright rejection by local land managers. For instance, Middleton (2013) describes how the diversity of processes whereby overgrazing encourages desertification, not just by removal of biomass but also through trampling and resulting erosion and changing of soil chemical components inviting an invasion of desert shrubs, are well understood, but nevertheless, the impacts of measures taken to curb

overgrazing may vary unexpectedly in context. Where settlement of nomadic pastoralists has in some instances proven a good way to curb growing herd sizes, forced settlement has in many cases just become an alternative underpinning driver of accelerated desertification processes particularly near watering holes and in the best grazing lands (Geist 2017).

In a positive development, the engagement of the experiential understanding of many nomadic tribes of how their environments work and respond to different management options is now recognised as crucial in global policy (IPCC 2018; UNCCD 2018). This message remains relevant even for the proponents of the more critical analytical approaches that recognise power relations and scalar drivers of desertification. As Adger et al. (2001) point out, those assign the blame for desertification to cash crops and marginalization through resource appropriation, may also underestimate the resource management knowhow of local people that has accumulated through generations. Adger et al. (2001) cite a further example from Benjaminsen's research in Mali to show that sustainable cash-crop farming is possible and can even reinforce the ability of the local farmers to undertake sustainable management practices of food crops.

What scientists and practitioners involved in combating desertification have come to realize, is that little can be done to reverse desertification processes without the complete involvement of those farmers, pastoralists and other natural resource users being directly affected by desertification in its many forms. But while the UNCCD is explicitly supportive of bottom-up action, deeming participation of stakeholders as crucial for achieving workable NAPs, genuine and equitable participation is difficult to achieve. Seely (1998) points to the significance of conducive policy and planning framework, environmental framework and socio-economic framework conditions for achieving full participation. It is often, however, the policy and planning frameworks themselves that have led to land use changes accelerating desertification and triggered the institutionalization of unsustainable resource management

practices, and policies often have contradictory impacts (Oñate and Peco 2005; Juntti and Wilson 2005; Briassoulis 2019). Insecure land tenure conditions and lack of land policy which permits land-grabbing by those who have the means are often blamed for degrading land management (Bugri 2008). Briassoulis (2019) suggest that while land use planning is in a pivotal position in curbing the human drivers of desertification, as with environmental policies and individual efforts to address desertification, its ideal functioning is also hindered by the highly politicised stakes and complex drivers of the phenomenon. Where unsustainable land and water uses have become deeply embedded in resource management institutions and practices as well as local economic fortunes, the implementation of any mitigating measures is extremely difficult as these are perceived by many locals to be detrimental to their livelihoods. Subsequently, for example the development and implementation of the Spanish National Action Plan to Combat Desertification, which was passed in 2008 after considerable delay, has been slow and ineffectual (Oñate and Peco 2005; MMA 2008).

The Spanish example illustrates how policies and other socio-economic factors can lead to conditions where local management structures as well as resource managers themselves are highly resistant to desertification mitigation measures, but broader 'social' factors can lay a role also. Bradley and Grainger (2004) discuss the role of what they term 'social resilience' in aiding the mitigation of and adaptation to desertification in a developing country context where technological fixes are not available. Exploring a case study of two nomadic pastoral tribes in Senegal, Bradley and Grainger demonstrate how land managers have historically adapted their management systems in response to repeated eco-climatic fluctuations or social constraints. While learning from past experience or indigenous knowledge passed from previous generations is significant for continuous sustainable management, it becomes even more crucial when a constraint, such as resource depletion or appropriation, is imposed. In this case land managers must choose between substituting an activity wholly or partially by others that

function better under more constrained conditions; adopting new non-extractive or non-land-based activities under severe or prolonged survival conditions; travelling longer distances to avoid place-based constraints; or becoming more reliant on support from other households or on income generated by household members who have moved elsewhere (Bradley and Grainger 2004: 454; see also Dorward et al. 2009 for livelihood strategies). The choice between these alternatives can be made partly through trial and error, and Bradley and Grainger conclude that the social resilience of communities, built through a cyclical model of learning, could help explain the lack of widespread desertification in the silvopastoral zone of Senegal where the two tribes operate. It is important to understand these kinds of existing strategies in order to devise sustainable desertification mitigation measures for any context.

Many other social factors influence the ability of communities to make sustainable decisions regarding resource management and, as Seely (1998) points out, it is also important to identify any weaknesses in these. Bugri (2008) highlights a broader range of factors as significant. One of these is the marginalization of women in decision-making relating to land resources, although women are often in charge of agricultural work. Although the roles of women and men in land management differ widely between regions, women tend to have lower levels of education, and lower participation in community-based organizations (OECD 2002). Pirmoradi et al. (2011) found that there was a positive relationship between the level of literacy, income and participation in training courses, and participation in plans to combat desertification among farmers in Iran; and, indeed, women's position is seen by many as requiring attention in the pursuit of successful desertification mitigation measures. Effective participation requires local-level gender-sensitive understanding of livelihood roles (FAO 2003; OECD 2002). Building on these understandings, Blake et al. (2020) emphasise the need to 'co-design' desertification mitigation activities with local land managers, as this facilitates



the engagement of scientific findings and techniques while not overlooking local knowhow, needs and aspirations.

While the UNCCD does not define exactly what is meant by participation, it makes several references to local populations, communities and nongovernmental organizations (NGOs) and thus to more empowering and democratic decision-making (Stringer et al. 2007; see Chapters by Downie on NGOs and by Marquart-Pyatt on public participation). NGOs and community-based organizations (CBOs) play a key role in the UNCCD and have been drafted in to establish a link with land users who, through NGO initiatives, are supposed to help identify and assess cases of desertification and contribute ideas for mitigation measures (see Figure 43.1). However, NGO accountability and ability to enable equal participation opportunities for all communities regardless of socio-economic status has been found to be challenging in many case studies (Stringer et al. 2007; Blake et al. 2018). This is particularly problematic where existing inequalities between communities and within communities exist and are linked to the root causes of desertification, as discussed above (Bugri 2008). However, Reed et al. (2008) report on successful collaboration between ecologists and pastoralists in identifying and evaluating a set of indicators suitable for assessing land degradation in three field locations in Botswana by applying a scientific methodology to validate local indicator knowledge. Reed et al. also note that the use of focus groups in the study methodology increased the exchange of information also among the pastoralists, which addressed the initially “thinly spread” indigenous knowledge relating to species and land uses linked to degradation (see Chapter by Mauerhofer et al. on biodiversity).

While Redclift (2005) argues that traditional scientific definitions and categories obscure local meanings of nature and natural resources, the study by Reed et al. (2008) appears to serve as an example of participatory research where, crucially, community members’ experience-based expertise is engaged in the whole research process, from the identification of analytical

units to defining the use of findings (Fischer 2002). The notion of co-design implies a genuinely empowered position for community members in the identification of the local nature of the desertification problem and the design of mitigation measures (Blake et al. 2018). In participatory planning literature, Booher and Innes (2002) advocate marshalling of “network power” through “authentic communication” which empowers all parties to communicate and contribute to an equal extent so that collaboration is as innovative as possible. This requirement highlights the need to pay attention to the purpose and form of participation; ideally participation is seen not as instrumental for compliance with management prescriptions but intrinsic to the creation of new knowledge, better contextual understanding and achieving innovative new management options. How much of the participation under the UNCCD aspires to these kinds of aims and objectives seem to have increased in the past decade or so.

## **Conclusion**

This chapter has illustrated the complex nature of the phenomenon of desertification itself and the implications this has for efforts to address it. It is evident that the barriers and challenges related to managing desertification are as varied as the contexts where it manifests itself. A wicked or highly politicized issue, desertification must be addressed through approaches that embrace the complexity of the scientific evidence and the methodologies used to derive it, appreciate the significance of physical and environmental variations for the workability of any scientific solutions and remain awake to the implicitly and inevitably politicized nature of knowledge production, adoption and application in complex and varied socio-economic conditions (see Chapter on expertise by Karvonen and Brand). This is of course a challenging task and the different sections of this chapter illustrate the fault lines but also some positive examples in mitigating desertification.

The extent to which mitigation initiatives are willing and able to address the underlying causes of desertification such as product price driven intensification or marginalisation due to insecure land ownership and tenancy conditions, remains limited. This suggests that as with climate change resilience and adaptation, there is an evident need to embrace transformational change that addresses power imbalances at the grassroots level as well as other scalar drivers of unsustainable land uses. While technical solutions are important, these must not create dependency or be used to justify land grabbing. Scientific evidence is of course important but measures addressing desertification need to be co-designed to integrate indigenous and local knowledge.

The land degradation neutrality target and the accompanying fund (LDNF) are new developments that suggest that the international community, including funders, are beginning to take desertification and the state of soils seriously. The UNCCD submission to the Rio+20 conference (UNCCD 2011) saw addressing land degradation and desertification as key to achieving the kind of adaptation capacity and resilience that the impending challenges of population growth combined with climate change will pose to food security and water provision globally (see also CGIAR 2011; see Chapter on climate change by Harris). The strategy outlines payments for ecosystem services as a good means of addressing the short-term economic losses that landowners will incur from introduction of the kind of rates of sustainable land management that enable meeting the zero net degradation aim. The failure to establish legally binding instruments for soil management, for example the inability to pass the EU soil directive (CEC2012), is regrettable, but the emphasis given to decertification in the 2018 IPPC report on Climate Change and Land and the FAO et al. (2020) report on soil biodiversity as well as the EUs new soil strategy (CEC2020) provide a more optimistic picture. These initiatives arguably respond to the UNCCD (2011: 5) call for “scientifically credible, transparent and independent assessment of existing, policy-relevant but not policy-prescriptive

knowledge. This assessment should be provided by a globally recognized, strong and effective science–policy interface, similar to those established for climate and biodiversity (IPCC and IPBES respectively)”.

It remains to be seen how well the new funding instruments, mainly the LDN Fund, function within the context of the deeper drivers of desertification such as institutionalised land-use interests, uncertain tenancy conditions, price competition that drives intensification and urban sprawl. As these are increasingly recognised in literature, perhaps the actions needed to address them will slowly gain traction also.

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