Chapter 3
Institutional Framework of (In)Action Against Land Degradation

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Abstract While econometric and spatial data are increasingly helpful to quantify and locate the extent and costs of land degradation, there is still little understanding of the contextual factors that determine or influence the land users' practices that aggravate or counteract land degradation. In this chapter, we take an institutional economic approach to analyse the persistence of degrading practices, the low adoption of sustainable land management (SLM), or the eventual organisational reaction to land degradation. The chapter reviews four examples of land degradation in different contexts to reveal the multiple driving forces and contextual factors. We then propose a conceptual framework to better understand the incentive structure and factors determining the land users' decision making. A layered analysis of the social phenomena is applied, following Williamson (2000). The chapter shows how actions at different layers can help improve land management. The chapter concludes with practical recommendations for the institutional economic analysis of land degradation.

Keywords Land degradation · Institutional economics · Economics of land degradation · Mixed method analysis · Sustainable land management

The chapter builds on earlier work with, and significant contributions of, Ephraim Nkonya and Julia Kloos, which is highly appreciated by the two authors.

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Introduction

Land degradation as a global phenomenon occurs in many countries and in very different ecological, socioeconomic and climatic contexts. Estimations suggest that between 20 and 30 % of the global land surface is already degraded (Imeson 2012; Stavi and Lal 2014; Le et al. 2014). Anthropogenic as well as natural drivers of land degradation continue to exist and some even accelerate (see Chap. 7), mainly due to climate change and population growth. Sustainable land management (SLM) and mitigating measures are widely known, but adoption rates remain low. Two explanations for action and inaction prevail: (i) actor-oriented explanations that focus on socio-economic characteristics of the land user, suggesting that resource-poor households do not have the capacity, incentives or resources to invest in land improvement, and (ii) institutional economic explanations that underline the importance of constraining and enabling environments within which the land users take their land-use decisions.

This chapter presents a framework that combines and links both perspectives, demonstrating their complementarity. The framework includes the different layers of the institutional environment within which land users take their decisions. It builds on the works of Williamson (2000) and his analytical framework for institutional analysis as well as relevant sections in Nkonya et al. (2011).[1]

The chapter starts with a review of the existing literature on the action/inaction against land degradation and identifies, by means of four instructive case studies, the knowledge gap in the institutional understanding of this action/inaction. A structured analysis of the four cases reveals that the drivers of land degradation and the actors' behaviour related to land degradation are regulated and modified through different institutional layers.[2] In the second half of the chapter, we list a number of possible institutional responses to land degradation, showing how multiple entry paths can address the issue sustainably. The chapter concludes with policy recommendations and indications for future research.

Review of Institutional Causes of Land Degradation

About 3.2 billion people are affected by land degradation globally (Chap. 4). Population pressure, poverty, and market and institutional failures are commonly identified as the main drivers of land degradation (Kirui and Mirzabaev 2014). However, the link between the drivers on the one hand and land degradation on the

[1]We expand on discussions in Nkonya et al. (2011) by adding examples to underline the implication of applying a layered approach to economic analysis of land degradation.

[2]These different institutional layers are understood as different sets of economic/social rules that act upon individuals/society at different speeds, with different purposes, and with different degrees of formality. Therefore, these different layers need to be analysed separately.

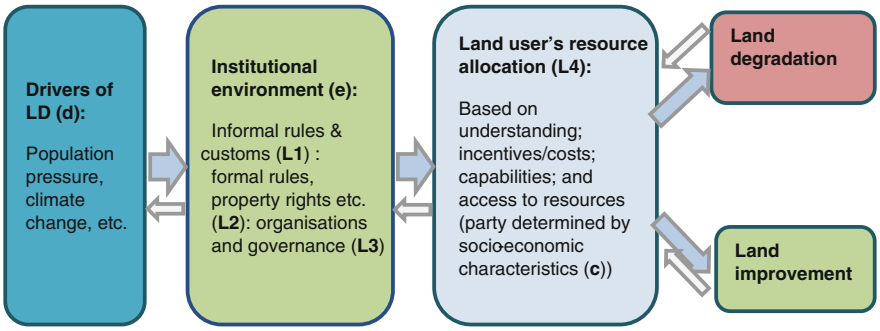

Fig. 3.1 *Conceptual framework* The mediating role of institutions in land degradation and land improvement (*Note* The links are not necessarily uni-directional; there are feed-back loops. However, to understand the behaviour of the land-user, the simplified scheme shows how his or her decisions "filter" through a number of institutional levels (e))

other hand is not direct. The drivers of land degradation ('d' in Fig. 3.1) are mediated and altered by the institutional environment ('e' in Fig. 3.1). Land improvement and mitigation of land degradation can come about through behavioural change of land users and following their re-allocation of resources (money, time, etc.) to land-improving practices. The land users' decision regarding their resource allocation will depend on contextual factors such as incentives, knowledge, capabilities or access to resources. These are partly a function of their socio-economic characteristics ('c' in Fig. 3.1), and partly the outcome of the institutional environment which enables and constrains their actions.[3] Analysis of land degradation and measures against it should thus consider these three dimensions.

Text box 3.1: Definitions

Institutions, defined here as "the formal and informal rules governing economic production and exchange" (North 1990), play a mediating role between the society and socio-economic and environmental drivers of land degradation and land improvement (Fig. 3.1).

Organisations are the groups of people bound by a common purpose to achieve objectives. They include political bodies such as city councils or ministries, economic bodies such as firms or trade unions, and social bodies such as associations or churches (North 1990). To reach this common

[3]Some socio-economic characteristics of a land user, as well as some plot-level characteristics can be considered exogenous (such as age of the user or slope of the plot), while others can be considered the result of the surrounding institutional environment or endogenous. Depending on the focus and time span of analysis, some characteristics can be considered exogenous or endogenous. For instance the level of education of a land user is not likely to change in the short term, but its changes throughout generations can be considered the outcome of education policies.

purpose, a mutual understanding of this purpose has to be developed, which makes decision by other members not only acceptable but also predictable (Ostrom 1976). In that sense, perception, understanding and aspiration of group members play a role.

We assume that organisations act as one body, whose economic, social and political choices are constrained by the institutions in which it functions. However, these organizations or bodies also influence the institutional structure, for example by issuing laws or regulation (political bodies), community rules (social bodies) or contractual arrangements between business partners (economic bodies).

Analyses of land degradation often focus exclusively on characteristics at household level (indicated as 'c' in Fig. 3.1), including the socio-economic characteristics of the farmers (age, gender, level of education, etc.), characteristics of the plot and the natural conditions (farm size, plot size, slope), farm management practices, and institutional aspects (support programs, access to credits, etc.) to explain land degradation (Tenge et al. 2004; Bravo-Ureta et al. 2006). Following a quantitative logic, data is often obtained through surveys and objectified in econometric analyses.

However, the socio-economic characteristics obtained at household level do not always fully explain land degradation. For instance, age or level of education are ambiguous characteristics and their role in the adoption of SLM practices is not straightforward. Pender and Kerr (1998) and Tenge et al. (2004) identified a positive influence of education on investment in indigenous conservation measures. To the contrary, Scherr and Hazell (1994) found a negative link between education and the adoption of labour-intensive land management practices, due to the higher opportunity cost of labour for farmers with a higher education. Asfaw and Ademassie (2004) found that education was positively related to the application of fertiliser. The inverse farm-size-productivity relationship (Lamb 2003; Lipton 2009) has shown that small-scale farmers invest more in labour intensive land management than large-scale farmers. However, the adoption of SLM measures increases with an increasing farm size (Norris and Batie 1987; Pender 1992; Bravo-Ureta et al. 2006; Amsalu and de Graaf 2007). This positive relationship is due to the ability of large-scale farmers to purchase inputs such as fertilizer or use labour-saving technologies. Some land management practices, such as tree planting, could take away some land area and are therefore less desirable to small-scale farmers (Bekele and Drake 2003). Livelihood strategies and the mix of income sources matter as well: Hopkins et al. (1999) and Pender and Kerr (1998) showed that non-farm income has a positive effect on the adoption of SLM, whereas Amsalu and de Graaf (2007) found that non-farm income had a significantly negative impact on the continued use of stone terraces.

However, all the studies referred to above have found that the impacts of these biophysical and socio-economic factors are context-specific. In other words, the household level characteristics ('c') explain part of the story, but the broader

institutional environment ('e') plays a major role, too. To understand the role of institutions it might be helpful to see that similar drivers of land degradations ('d'), such as population growth, can lead to opposite outcomes, depending on the surrounding context (Fig. 3.1). We give four case studies of the adoption or non-adoption of sustainable land management practices from around the world, with a focus on the institutional environment ('e' in Fig. 3.1). The subsequent analysis of the four examples will illustrate the multiple dimensions of these two broad categories.

Case 1: Different factors explain adoption of organic fertilizer in China (Xu et al. 2014)

Soil salinity is a severe problem in China, as in many other parts of the world. Application of organic fertiliser, especially in combination with chemical fertiliser can reduce the negative impact of saline soils on crop land's productivity in a cost efficient way (Liu et al. 2010). While for the last half century the use of chemical fertilizer has risen dramatically, the use of organic fertiliser[4] decreased, which led to augmented risk of secondary soil salinization. In that regard, farmers' fertiliser choice impacts strongly on saline soil farmland's productivity. Xu et al. (2014) made a comparative study of eight villages in three saline soil areas in China, exploring the relative importance of household characteristics, land policy measures and contextual elements in mitigating soil salinity. The three locations (Kenli, Jilin; Zhenlai, Shandong; and Chabuacher, Xinjiang) are characterised by different levels of socio-economic development, different types of agricultural land use and different soil conditions. In each village 20–50 farm households were interviewed to gather information on household and plot characteristics, the tenure of the saline farmland, and agricultural policy and social service system. Monoculture prevailed and farming was the main income for most of the households. Education levels were low and the labour force was middle-aged. Income structures were similar across the three areas and comparable to other areas of rural China. Overall, organic fertiliser application was higher in the poorer areas and decreased with raising average income of the area. However, an econometric analysis revealed that the decision to apply organic fertiliser—which has high input cost in the form of labour and shows results only in the medium term—depends much on the land tenure arrangement. Farmers were much more likely to apply organic fertiliser on land they had directly contracted, rather than subcontracted with shorter lease duration. Also the stability of the tenure arrangement and the willingness of farmers to mortgage the land played a role. Farmers mortgaged their land to get additional funding, which they then invested to increase the plot's productivity and to expand the scale of agricultural production. Finally, policies had an effect as well: subsidies

[4]Organic fertiliser use is understood as returning crop residue and crashed stalks to the ground, mulching, application of biogas slurry, livestock manure as well as oil cake and green manure (Xu et al. 2014).

for organic fertiliser and the level of technological extension services affected farmers response.

The most interesting aspect of the study by Xu et al. (2014) is that across the three Chinese counties, different variables seemed to explain the farmers' decision to apply organic fertiliser or not. In the most developed of the three locations (KenLi), on the eastern coastal area, land tenure (i.e. institutions) played the biggest role in the households' decisions. In the north-western county (Zhenlai), with average household incomes, the household characteristics were most significant. In the western location (Chabuachaer), which is the poorest of the three locations, subsidies for organic fertilisers explained the high rates of adoption.

Case 2: Political context drives land degradation in Jocotán, Guatemala (Warren 2005; as cited in FAO 2006)

The Jocotán municipality, located in southeast Guatemala, is dominated by five rivers and has a very hilly landscape whose altitude ranges from 300 to 1800 m. The natural vegetation is subtropical rain forest in the valleys, acacia forest on the hillsides, and pinewoods in the dryer and chillier highlands. When the Spanish colonisers arrived in Jocotán in the 16th century, they started exploiting the fertile valley for the intensive cultivation of cocoa, tobacco, sugarcane, sarsaparilla, indigo and cattle. The indigenous Ch'orti' communities of the area were not employed on these colonial farms and were forced to move uphill and continue their subsistence farming—based on maize—on the dryer and more fragile hillsides. As this land was poorer, it required more frequent rotation, which induced them to clear part of the acacia forests. In the 19th century, the Spanish colonists took further control of the arable land by transferring all communal land titles of the indigenous communities' territories to the municipality while coffee plantations were created in the highlands. As the plantations in the valleys and the highlands attracted migrant workers to the municipality, the pressure on the land further increased and the Ch'orti' moved further towards less accessible and less productive land. Their subsistence farming on the shrinking and increasingly poor land was no longer sustainable and needed to be complemented with the sale of handicrafts or wage labour on the plantations. This situation persisted throughout the 20th century. As of the 1970s, adverse conditions on the global food market, local population growth and further fragmentation of the arable plots have plummeted the small-holder farmers into deeper poverty, making it impossible to invest in soil conservation or water harvesting. The few remaining patches of pinewood on highlands are being used for small-scale timber activities and the collection of firewood. The vegetation cover in the municipality is now completely insufficient to retain rainfall, humidity and soil—aggravating even further the land degradation in the area. The story of the Jocotán shows how a changing political context at global and national level can cause land degradation at local level. Today the local people and institutions realise the need to identify sustainable development alternatives in order to combat land degradation.

Case 3: Fragmentation of tenure contributes to land degradation in Nyando River basin, Kenya
(Swallow et al. 2005; as cited in FAO 2006)

The Nyando River basin, which covers around 3500 km^2 in western Kenya, is one of the poorest and most degraded areas of the country. The basin is home to about 750,000 people from principally two ethnic groups: the Luo in the lower and middle parts of the basin and the Kalenjin upstream. The land uses vary considerably along the river. The Kalenjin area is covered by protected forests, by small-scale farms in zones that over the past 40 years have been "degazzetted" as forests, and large-scale commercial tea plantations in the highlands. The middle part presents a mixture of land uses, including both smallholder farms (maize and beans and some cash crops as coffee and banana) and large-scale commercial farms (mostly sugar cane). The flood-prone shores of lake Victoria, in which the river drains, are used by the Luo for subsistence farming of maize, beans and sorghum, and by commercial farmers for the production of sugar cane and rice. The tenure systems that regulate the access to land and water equally vary along the river. There are three types of private tenure on government land (former 'crown land')—large agricultural leaseholds, subdivided agricultural leaseholds and non-agricultural leaseholds—and four types of private tenure on trust land—freehold land in adjudication areas,[5] freehold land in settlement schemes, non-agricultural leaseholds, and group ranches. There are also five types of public land in the Nyando basis, including native reserves. Land degradation and soil erosion in the Nyando river basin varies according to the tenure system that governs the land and water resources in the different areas. It is most severe in the subdivided agricultural leaseholds and in freehold land in adjudication areas, due to poor land-use planning during the 1960s and early 1970s when large farms were subdivided and sold to communities or smaller companies. Also the native reserves on public land suffer from severe land degradation, due to the natural growth of the populations living in these reserves and the fragmentation of the plots.

Case 4: Participatory land conservation policies reduce land degradation in Tunisia
(De Graaff et al. 2013)

Tunisia is a country strongly affected by land degradation and desertification. Measures to conserve soil and water sources were already undertaken before the Roman period. After independence, the government put a strong focus on tree planting, contour ploughing and limited grazing in erosion prone zones. In the 1960s, focus was put on large scale conservation efforts, mainly through the construction of huge earth bunds (banquettes). An area of about 700,000 ha was covered and costs for these measure reached USD55 million. However, in 1976 only 23 % of these bunds were still intact. While technicians indicated that the

[5]Adjudication is the process of authoritatively ascertaining existing land rights. This process is used in the conversion of land held under customary tenure into individual holdings.

measures had not been effective for the given conditions, others indicated that a lack of farmer involvement in planning of the bunds resulted in low acceptance. Especially since in the 1960s a land reform and policy of collectivisation had created high resistance among farmers and scepticism with regard to central level land policies. In the 1970s not much policy effort focused on soil and water conservation or sustainable land management. However, the Institute for Arid Regions (IRA) was established in the Southern part of the country in 1976, which since then played a major role in improving rangeland management, as well as water harvesting practices in the arid hillside area. In addition, the construction of new dams in Central Tunisia led to increased focus on reduction of sedimentation further upstream. In the 1980s, contour-ridged terraces on an area of 25,000 ha were built. Large-scale dam building programmes in the 1970s and 1980s did not alter the farmers' cropping or herding practices in the hillside areas (De Graaf et al. 2013). In the mid-1980s a Soil and Water Conservation department was established in the Ministry of agriculture and policy formulation became more participatory. The first 10 year National Soil and Water Conservation Strategy was launched in 1990, and a second followed in 2001. Indigenous measures have increasingly received more attention (De Graaff and Ouessar 2002). Finally, in the 2000s, community based approaches and Conservation Agriculture, especially direct seeding, were promoted by donors and the government, with so far very positive results (De Graaff et al. 2013).

Analysis of the Cases

In all four cases the drivers of land degradation are the same: anthropogenic drivers such as population growth and poverty combined with natural drivers such as background soil erosion and climate change. However, the characteristics of the land users alone do not explain the action/inaction to combat the drivers. A whole set of structural—or 'institutional'—layers modify, alter, or even determine how the drivers translate in actual land degradation. The case of China shows that every context has different determinants, which can be situated at household, institutional, or governmental level. The Guatemala case highlights that historical events, such as the settlement of colonisers in the fertile areas, and economic structures, such as the need for labour force, have triggered or aggravated the process of land degradation. In the Kenya case it is the type of land and water tenure, and especially the fragmentation of land and water tenure, that explain how drivers such as population growth and failing institutions determine where land degradation is more or less severe. The Tunisian case show that well-conceived policies can be effective in changing the land users' behaviour, but the case also shows that the participatory policies of the 1990s were much more effective than the top-down policies of the 1970s and 1980s.

These many different institutional layers can help explain why some land user undertake action against land degradation and invest in soil productivity, while others do not. Household and plot characteristics ('c' in Fig. 3.1) partly explain this, but other environmental factors ('e' in Fig. 3.1) play the role of modifying interface between drivers ('d' in Fig. 3.1), farm level characteristics ('c' in Fig. 3.1) and action/inaction. In the next section we make a fine-grained analysis of this institutional interface ('e' in Fig. 3.1).

Analytical Framework: Layered Approach of Institutional Economic Analysis

Institutions define the structure within which (economic) actors make decisions and shape their choices for action and exchange. Williamson (2000) distinguished four levels of institutional analysis (see Fig. 3.2) depending on their velocity of change. The top level is the level of *social embeddedness*, which comprises customs, traditions and social norms (L1). This level is taken as a given by most institutional

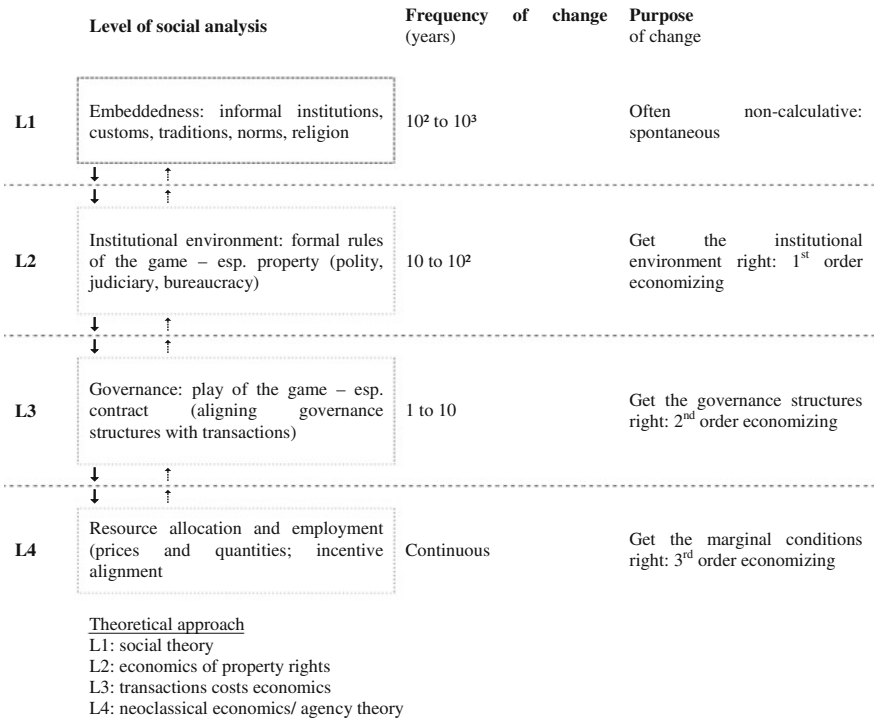

Fig. 3.2 *Analytical framework* Layered approach to institutional economic analysis of land degradation. *Source* Adopted from Williamson (2000)

economists, because changes in this layer are extremely slow and are the result of a collective, social process rather than of an orchestrated action by a group of actors. Translated in terms of land use, this level includes the norms and traditions that govern people's attitude towards their natural environment and the use of natural resources.

The second level is the *institutional* level. The social-institutional structures at this level are in part the product of evolutionary processes and in part designed (L2). Influenced by both old and recent history, this layer includes the judicative, legislative, and executive structures of government, as well as their share of power (for example, the degree of federalism). The structure and enforcement of property rights are part and parcel of this level.[6] The importance of this level is shown in the example of Kenya, where the type of land tenure played an important role in land degradation.

At the third level are the institutions of *governance* located (L3). The focus of this level lies on the contractual arrangements between interacting parties—that is, to the organization of economic transaction. Every time a contract is renewed, a reorganisation of the governance structures is possible (for example in firms). The frequency of rearrangements at this level is somewhere between one and ten years. The importance of this level is shown by the Guatemalan and Tunisian example, where respectively colonial powers and governmental policies periodically changed the rules of economic transactions.

These three levels of discrete analysis of governance structures must be distinguished from the fourth layer, which is the level where *neoclassical* economic analysis and *agency* theory explain the allocation of resources (such as wages, employment, or prices). At this level, firms and farms are typically depicted as production functions and analysed as an "optimality apparatus," whereby prices and outputs are adjusted continuously. The example from China showed how the characteristics of the farms and land users themselves determined the adoption or non-adoption of sustainable land practices. The four levels of institutions are illustrated in Fig. 3.2. The conclusion is that the root drivers of land degradation—to wit, population growth and poverty—have different effects in different places in the world, because they are mediated, altered or aggravated by a number of institutional layers.

It should be noted that depending on the time span considered in the analysis, some of the levels are taken as exogenous or given. Most economists, for example, consider L1 as exogenous, given slow rate of change and difficulty to attribute this change. The shorter the time period considered for analysis the more dimensions of the institutional environment are taken as exogenous, and hence switch to the category of "drivers" in above conceptual figure ('d' in Fig. 3.1). However, to

[6]These first-order choices are, without doubt, important for the outcome of an economy (Coase 1992; Olson 1996). Still, cumulative change of such structures is very difficult to orchestrate, though it occasionally takes place when sudden events introduce a sharp rupture in the established procedures.

understand today's behaviour of land users (L4) it remains important to see this behaviour as framed in an institutional environment (L2 and L3).

Institutional Framework of Action Against Land Degradation

Action against land degradation necessarily depends on a behavioural change of the land users, who should adopt sustainable land management practices. In other words, when policy makers devise policies or programs to prevent or revert land degradation, whether at local, national or regional level, they are actually adjusting the institutional environment ('e' in Fig. 3.1) in order to provoke the desired behavioural change at individual level.

In the rest of this section we analyse in a more systematic way the different actions that can be taken at each of the institutional layers (L1–L4), to adjust the institutional environment in such a way that land users adopt sustainable land management practices.[7] Remark, however, that adjustments are usually made at several institutional layers (L1–L4) at the time.

Building on Customs/Traditions, or "L1 Actions"

The cultural embeddedness of norms, customs and traditional institutions makes them very resistant to changes. However, history shows numerous examples of colonial or totalitarian regimes that have tried to alter traditional institutions. Actions at the L1 level often impinge on people's cultural freedom and identity, making these actions extremely controversial.

Yet, this layer of the institutional environment can also be an enabler of sustainable resource management and the reversion of land degradation. We give two examples: one of the artificial creation of new cultural values, and the other of the formal recognition of existing cultural values. In Niger, in 1970, the government relabeled the Independence day as National Tree Day. This helped raise awareness among farmers and land-users to invest in reforestation (Gerber et al. 2014). In Mongolia, the government is experimenting with an innovative form of co-management of pasture land in 54 pastoralist communities, in which the communities sign a contract with the local government for the sustainable use and rotation of the pastures and for the sustainable management of the land (Ykhanbai and Boroowa 2014). This contract is a formalisation of an existing, traditional institution.

[7]The presented examples of actions are a selection of measures that worked in the given contexts. They serve as illustrations. Nothing guarantees that they would equally work in other contexts.

In general, it is impossible to engineer culturally embedded institutions, but interventions can build on these culturally embedded institutions. Such bottom-up approach in policy design and implementation is also discussed at the following two layers.

Reforms of the Institutional Environment, or "L2 Actions"

The level L2 is the institutional environment. It is the level at which the executive, legislative, judicial and bureaucratic functions of the government are organised. This includes the horizontal distribution of power across different agencies (such as different ministries), the vertical distribution across levels (decentralisation), or the set of rules that determine access to and ownership of productive resources (tenure). The L2 provides the infrastructure and the playing field in which actors interact and take decisions. The L2 is often shaped by historic events, such as regime changes, crises or major intervention with large political support. While it is mostly the product of historical processes, opportunities for design exist.

Horizontal linkages across ministries At the national level, countries responded to natural resource and environmental degradation by forming ministries of environment to address degradation. One of the weaknesses of such ministries was their limited interaction with other ministries and departments (Volkery et al. 2006). Initially, responsibility for the promotion of soil and water conservation measures lay with the forestry ministries. This often led to coordination failure and little outreach to farmers and private land user (De Graaff et al. 2013). Promoting sustainable land management beyond boundaries of ministries might be an important pre-condition to reduce conflicting regulations and harmonise national efforts to fight land degradation.

Decentralisation The lack of involvement of local communities in managing natural resources is often identified as one of the major reasons for the failure of centralised governments to effectively manage land resources (Gibson et al. 2005; Robinson et al. 2011). The exclusion of local communities alienates them, which in turn leads to poor cooperation between local communities and natural resource managers. Ostrom and Nagendra (2006) found that locally-managed forests are usually managed more effectively than centrally-managed forests. FAO estimates that around one-quarter of forests in developing countries are in some way managed by local communities (FAO 2011). The share of community-managed forests is increasing, thanks to the promotion of decentralisation and community-based management by non-governmental organisations (NGOs) and international organisations (FAO 2011).

Payment for Ecosystem Services (PES) Somewhere between policy making, the involvement of local users, and the creation of innovative institutions floats the concept of *Payment for Ecosystem Services* (PES). PES is an economic, market-based approach for sustainability: PES schemes try to change the structural economic conditions in a certain area in such a way that the local resources users are incentivised to alter their resource use to maintain or restore certain ecosystem services. PES schemes are increasingly used in developing countries for the conservation of standing forests or wildlife habitat, but they are still in their infancy when it comes to combating land degradation.

The most notorious example of PES to combat land degradation is China's Sloping Land Conversion Program (SLCP). It was initiated by the central government in 1999 with the goal of reducing water and soil erosion, by converting agricultural land on steeply sloping and marginal lands into forest. Set to reforest or afforest 16 million hectares of sloping land, the SLCP is one of the largest PES schemes in the world (Li et al. 2011). The program is a public scheme, as the compensation of farmers is fully paid for by the central government. However, the economic incentives of PES schemes need to be well designed in order to ensure sustainability and to avoid 'leakage' of the negative effects to other regions. Therefore, besides direct compensation of the farmers, the Chinese government has also created favourable tax conditions for forest products, in order to make the conversion of farmland to forested land economically sustainable.

Tenure Property rights regimes prescribe access to productive resources. For our purpose, access to and control over land is key. Especially in rural societies they are crucial for most people's livelihoods, equity and also productivity of farmland (Deininger 2003; Lipton 2009). The change of a property right regime requires either a change in the political regime, or a high political effort by the existing regime.

Ethiopia constitutes an interesting example. In 1991 the military regime of the *derg* was overthrown and the current political system installed. Initially, tenure security was low, causing low level investments in soil conservation measures despite high degrees of land degradation (Shiferaw and Holden 1998). Poor households even removed soil conservation structures to increase short term yields at the risk of long-term damage on land productivity. Increased tenure security following a land policy reform in the early 2000s led to a behavioural change among smallholders in the densely populated highland. Initially, the tenure reform led to perceived lower security of tenure which caused a decline of land conservation measures (Holden and Otsuka 2014). However, once the new policy was accepted and understood, higher levels of investments were reached. Studies in Amhara and Tigray indicate that a strengthened feeling of tenure security was accompanied by increasing investment in soil conservation (Holden et al. 2009; Deininger et al. 2011).

Reforms of Governance, or "L3 Actions"

The focus of the third layer of social analysis (L3) lies on the governance of transactions between actors. Transactions can involve goods, services and rights over assets (e.g. property rights to land). An important feature of governance is that it should be capable to maintain order and mitigate conflict in the transactions. This can be enforced by means of institutional incentives, such as property rights, or self-imposed, which is often the case in organisations or communities. One important way of influencing or reforming the governance of transactions is through the formulation and enforcement of policies. Another way is by creating or changing the internal structure or organisation of the groups involved in the transactions. Changes of the internal structure can be the outcome of events at a higher level, or result from bottom-up feedback in the group.

Policy measures The Brazilian forest legislation has shown that well-designed policy interventions, such as the certification of sustainable production, can improve sustainable resource use and reduce forest degradation (vertical integration). In the 1990s and early 2000s, deforestation rates were high despite national laws protecting the forests. In 2005 deforestation rates started to decrease from its highest annual rate of 72,000 km^2 in 2003–04 to only over 7000 km^2 in 2008–09. Such a huge decrease was largely due to factors previously unaccounted for, namely international demand. Producers of soy bean and beef received special certifications and economic incentives if they signed and adhered to moratoriums on deforestation. This, as well as international funds for community-based conservation, triggered what may be "the end to deforestation" (Nepstad et al. 2010).

While the sustainability of this policy intervention in Brazil has still to be proven, it has shown that relatively simple measures in a related field (in this case: international marketing of agricultural products) directly led to changes in the contracting between buyers and producers, and indirectly to positive changes in land use.

Creation of local management structures As Robinson et al. (2011) discuss in their review of sustainable forest management, there is increasing evidence that indigenous groups and other communities can be successful at managing forest resources, provided that their land tenure is secured (Nepstad et al. 2006; Sandbrook et al. 2010; Wynberg and Laird 2007; Stevens et al. 2014). Policies that foster and build the capacity of local government and user groups generally enhance the sustainable land management at local level.

A study covering four African countries compared the number of bylaws related to natural resource management and observed a clear relationship between the number of enacted bylaws and the effectiveness of decentralisation (Ndegwa and Levy 2004). In other words, they found a correlation between enforcement of bylaws and *de facto* decentralisation. Ostrom and Nagendra (2006) demonstrated that communities manage better their forest resources than the central government manages protected forests. Similarly, a number of studies showed that timber and firewood theft and poaching were reduced when surrounding communities were

involved in managing and sharing the benefits of forests and wildlife (Magrath et al. 2007; Cooke et al. 2008). The government in Senegal took measures to invest in community-based forest planning, especially through awareness campaigns.[8] In addition, local communities were incentivised through access to forest products. The results are very positive—area under forest cover quadrupled in the past decade, though from a very low initial base (see Chap. 19).

The pattern emerges that where local organizations are given the mandate to manage natural resources they are better at preventing and/or mitigating than their central governments (Blaikie 2006; Heltberg 2001; Ostrom 1990). However, an extensive review by Blaikie (2006) showed that strong local organisations are a necessary but not a sufficient condition for sustainable natural resource management. Participatory approaches to natural resources governance usually imply active engagement of local communities and agencies that goes beyond opinion sharing, but extends their engagement to interactive dialogue, collective learning, and joint action. This type of approach values local knowledge—not only scientific and technical knowledge.

Bottom-up organisation Higher degrees of internal organisation can help a group of individuals to pool their resources or knowledge. This can enable the individuals or the group to effectively act against land degradation. For most households in developing countries labour is a major constraint to productivity and has to be allocated across different activities. Especially for labour-intensive conservation measures, membership of a local organization with labour-exchange arrangements can lead to more effective action against land degradation (Lapar and Pandey 1999). Similarly, groups of farmers might pool resources to gain access to new technologies and spread innovations—technical as well as organisational—among them (Fischer and Qaim 2012). Availability of new technologies, such as mechanical mulching of straws, have a strong impact on the adoption of SLM, as the Chinese example indicated (Xu et al. 2014).

Improving Resource Allocation, or "L4 Actions"

A rational farmer may let land degradation happen to the point that the costs of additional degradation equals or exceeds the cost of adopting SLM practices. Each farmer determines her or his own *optimal private rate of land degradation*. Depending on the circumstances, it may be rational for local users to deplete their land up to a certain degree. It may also be rational for farmers to use land degrading practices,

[8]The government initially had to spend substantial amounts in equipment to be distributed to the communities. Eventually the expenditure for maintenance and awareness overtook the expenditures, but led to an overall sharp decrease of expenditure necessary to maintain good adoption rates.

which have high short-term returns in order to finance higher paying enterprises (e.g. non-farm activities) or services (e.g. children' education or health services). This optimal private rate mainly depends on the farmer's perception of costs and benefits—usually the balance between short-term and long-term yield gains or losses. Hence, only those ecosystem services that result in higher or lower production levels are considered in the decision, whereas those services that are not immediately measurable in terms of lost production (off-site effects) are neglected in the decision.

From an economic perspective it may be optimal for farmers to make production choices in which rates of soil depletion exceed what would be socially optimal. As a consequence, the private rate of degradation is not likely to reflect the optimal rate of degradation from society's viewpoint that includes impacts not covered by market forces ("externalities").[9] The optimal private rate of degradation is also determined by time preference and risk behaviour (Nkonya et al. 2011). If farmers are risk averse, they are less likely to adopt practices with high returns but with high risks. Policies for addressing time preference and "high" private optimal rate of land degradation require similar policies and strategies as those discussed above. Additionally sensitisation on the importance of SLM and moral suasion could enhance other incentive-based strategies (e.g. PES). The Senegalese example in this book (Chap. 19) also illustrates this phenomenon: the interviewed communities had partly agreed to improve their natural resource management. Most succeeded with regard to forest and grazing land management. However, the degradation of agricultural land continued, despite significant on-site and off-site costs.

Explaining Actors' Land Use Decision—Actor Oriented Approach

As described above, analyses at the L4 level often consider farms as profit functions (Fig. 3.2; Williamson 2000). Action and inaction regarding land degradation is thus reduced to cost-effectiveness, which is not likely to explain the phenomenon adequately. Farmers and their organisation are not only constrained and incentivised by their institutional environment but can also act as agents and influence the structure. In line with this, Jones (2002) actor-oriented approach can explain different behaviour within similar circumstances, while avoiding deterministic frameworks.[10] Jones identifies four broad variables or a combination which drive decision-makers to invest in maintaining or improving productivity of their land:

[9]This includes environmental impacts such as changes in the value of ecosystem services, sedimentation as well as indirect effects on the economy, government policies and other institutional factors can lead to socially and privately non-optimal rates of land degradation (see Nkonya et al. 2011).

[10]This underlines that the process of a reform might be as important as the content of the reform itself, as the capacity created and linkages touched will be of major importance for the sustainability of the reform.

1. **Perception of the problem**: Land users will only take action to protect or invest into their land if they perceive[11] a threat to its productivity or are aware of broader economic, social or environmental costs of the phenomenon.
2. **Knowledge** about potential mitigation strategies and how to apply them: Understanding or knowledge of techniques to remedy the loss of productivity is prerequisite for actions to be taken to prevent further loss. Boserup (1965) described that in many cases populations faced with increasing density were without any knowledge of fertilization techniques. However, though soil and water conservation are often key component of indigenous farming, non-indigenous observers might not "see" those techniques (Pawluk et al. 1992). In many cases, local users may be aware of certain new technologies, e.g. water harvesting or mulching, but might lack incentives or the financial means necessary to apply them.
3. **Incentives to invest** in productivity of land (or lack thereof): Without the perspective to get some future return from investing in the land, owners/users are not likely to bear the accompanied costs and will not take action. The most notable factors affecting incentives might be the security of tenure. Those may take the form of private land titles but also informal institutions such as customary or communal titles can meet this requirement (Ostrom 1990; Migot-Adholla et al. 1991; Besley 1995; Gavian and Ehui 1999). Other factors also matter: relative priority accorded to land productivity maintenance compared with, for example, off-farm activities that might yield higher returns to labor can play a big role (Jones 2002; Woelcke 2006).[12] Thus, the more off-farm activities contribute to the livelihood, the less incentives to maintain land productivity. Disincentives may include feelings of exploitation, e.g. through extraction of surplus from landlords or the state, high production risk through price volatility, or other external factors. This already indicates that several reasons for unsustainable land management might be found off-farm and corrections will have to tackle those in order to reach lasting improvements.
4. **Capability to invest**: This can be seen as a function of available resources (conservation or improvement often requires additional land, labour or capital) and the social relations determining access and control (Jones 2002). For example, the capability to manage common property resources without degradation signifies an effective system of social organisation (Ostrom 1990). At the individual and household level, capability implies the power to make decisions and effect action (*ibid.*). Access to economic resources (capital, credit, labour and land) play an important role, but institutional settings strongly matter as well.

[11]Interpretation of environmental changes is culturally constructed and need to be appreciated for thoroughly understanding of farmers' behaviour.

[12]The application of manure is another example for conflicting use of limited resources. While most farmers in arid and semi-arid areas are aware that manure will increase fertility of their plots, they are using dried manure for cooking and do not have adequate substitutes for this use. Again, policies might have to address this problem from a rather indirect side—maybe subsidizing stoves or other sources of energy, will keep manure on the field.

Conclusions

In this chapter, it is argued that neither the root drivers of land degradation nor farm characteristics can entirely explain land users' action or inaction with respect to land degradation. We argue that a meaningful analysis of action/inaction has to unwrap the black box of institutions and understand how they influence the impacts of the root drivers. By means of four examples of land degradation from around the world, the reader is made aware of the many forces at work. The chapter then proposes an analytical framework, consisting of four different institutional layers, to explain the action/inaction of land users against land degradation.

The analytical framework is as follows. At individual level (level L4), the way actors allocate resources depending on farm characteristics but also on the incentives created by the institutional surrounding. The institutional surrounding is the ensemble of cultural values regarding natural resources management (level L1), formal institutions for natural resources management (level L2), and policies and governance structures for natural resources management (level L3). The second half of the chapter shows how actors and organisation can shape the different layers of the institutional environment, in order to create the right incentives for the adoption of sustainable land management methods, through interventions at any of the four institutional layers.

Implications for policy making Not one institutional measure is the silver bullet to mitigate land degradation. However, some measures stand out as generally more effective. Decentralisation of competencies and the involvement of local communities are often associated with improvements in management of natural resources, in particular pastures and forests. Nonetheless, participatory or community action alone is not sufficient to revert back land degradation; public policies and public investment that support land management are also needed (Koning and Smaling 2005). Policies could target the poor through investments that increase their off-farm employment opportunities and thus reduce dependency on natural resources (Barbier 2010). While this is likely to reduce pressure on collectively owned or managed natural resources, such as forest, watersheds or range land, it is not clear if it will increase investment in protection of agricultural land against soil/land degradation. Several authors indicate that decreasing dependence on agricultural land also came about with decreasing investment in land conservation (Holden et al. 2004; Woelcke 2006). Policy actions have to take into consideration at which level of the institutional environment they are aiming to change the setting and how those are interlinked with other levels (Fig. 3.2). The probability of successful policy implementation and related costs depend on such analysis as well as on the consideration of actors involved and how they are positioned with regard to the new design (Norton et al. 2008).

Implications for data generation and analysis Institutions are complex and diverse. Analysis of institutions should therefore adopt a certain pluralism of approaches (Williamson 2000). One approach is to look for similarities and

differences in institutional environments, in order to understand how similar drivers can have different outcomes, depending on the institutional setting. The example of the study in China (Xu et al. 2014) applied such a strategy. Another approach is to look at institutional change over time and see how different institutional arrangements and governance affected outcomes. The discussion on land conservation policies since the 1960s in De Graaff et al. (2013) illustrates this. When gathering and analysing data, it is important to conceptualise the institutional environment together with the speed and purpose of its changes and to think beyond the household or plot-level characteristics, in order to capture all dimensions of action/inaction against land degradation.

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