Comparing the Effectiveness of Informal and Formal Institutions in Sustainable Common Pool Resources Management in Sub-Saharan Africa

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Abstract

This article compares the effectiveness of informal and formal institutions for sustainable common pool resources (CPRs) management in Sub-Saharan Africa and investigates the social, political and demographic conditions that influence the institutions' effectiveness. By focusing on publications addressing micro-level CPR management, a comprehensive literature review was conducted. Articles were grouped, based on the main themes of the study, including types of institutions and conditions that influence their effectiveness. A qualitative meta-analysis was conducted using a deductive coding approach. The results revealed that informal institutions have contributed to sustainable CPR management by creating a suitable environment for joint decision-making, enabling exclusion at low cost for CPR users and using locally agreed sanctions. Although the published evidence suggested less support to formal institutions under decentralised governmental reforms, they played an important role in implementing technologies for sustainable CPR management. Conditions that influence the effectiveness of both types of institutions include high population growth on limited CPRs, the growing scarcity of CPRs due to land use change and the lack of human and financial capacities. Improving the conditions that hinder the contributions of both types of institutions is crucial to enhance the institutions' effectiveness in sustainable CPR management. Moreover, policies and development interventions should strengthen the involvement of well-functioning informal institutions in decision-making so that sustainable CPR management can be achieved.

Keywords: common pool resources, formal, informal, institutions, Sub-Saharan Africa

INTRODUCTION

In Africa, common pool resources (CPRs)[1] management plays a crucial role in livelihood security and conservation of natural resources. Recent estimates indicated that 98 per cent of the forests (Barrow *et al.* 2009), and almost all the pastures in Africa (that account for 28 per cent of the global pastures) are owned by the public (Lambin *et al.* 2003). When managed in a sustainable manner, CPRs can be a key factor in poverty reduction and livelihood improvements of the rural poor (Beck & Nesmith 2001).[2] However, Berhanu and Swinton (2002), among others, pointed out that degradation of CPRs is among the major threats to sustainable rural development in Sub-Saharan Africa (SSA).

Although diversity in terms of agro-ecological zones, culture and resource endowment makes wide global and continental generalisations difficult (FAO 1999; Berry & Anderson 2004), degradation of agricultural land, degradation of permanent pastures and degradation of the area covered by forests and woodland was estimated to be 38 per cent, 21 per cent, and 18 per cent for the world and 65 per cent, 31 per cent, and 19 per cent for SSA, consecutively (Scherr 1999). As frequently mentioned in the literature, the main causes of CPR degradation in SSA include high population growth on limited CPRs, heavy dependence of communities on CPRs for their living (Arnold & Townson 1998), frequent droughts (Berhanu & Swinton 2002), insecurity of land tenure (Bereket 2002), lack of conducive land use policies (Williams 1998) and armed conflicts (Clover 2003). Accordingly, the degradation of CPRs is aggravated by low agricultural productivity and ill-functioning input and

output markets that threaten food and income security in SSA (Menghestab 2005).

Past efforts to reverse CPR degradation in SSA have often focused on technological interventions that neglected the social and cultural dimensions of technological adaptation (UNRISD 2004). According to Esenjoraf (2004), most governments and development agencies have underrated the capacity of local communities to participate effectively in CPR management programmes for decades. Some observers noted that even those projects that relied on community participation have not been particularly effective in targeting the poor (Mansuri & Rao 2004). Development projects on CPR management were implemented without an adequate basis of knowledge on the strengths and weaknesses of the existing institutional arrangements (Leach *et al.* 1999). This has led to the undermining of important institutions which are involved in sustainable CPR management and then to the inefficient use of financial resources (Bremner & Lu 2006).

Attention towards understanding institutional arrangements for sustainable CPR management arose from the coming to light of failures of the past isolated efforts of governments and development agencies to solve CPR management challenges in different parts of the world (Ostrom 1990; Agrawal 2001; Gibson *et al.* 2004; Topp-Jorgensen *et al.* 2005; German *et al.* 2007). Recently, efforts have been made in different SSA countries towards achieving sustainable CPR management, based on a much more active involvement of the CPR users. In doing so, it is crucial to understand the internal differences among community members in terms of assets, needs, capabilities and aspirations, the existing efforts of the community to manage CPRs, the relationship of the community with the external public and private bodies and the institutional arrangements which govern human behaviour towards sustainable CPR management (Agrawal & Gibson 1999). The evidence so far suggested that there is a need to better understand the roles that institutions could take part in for successful CPR management interventions.

The term institution is conceptualised by different authors in different ways. Most definitions, however, translate the term by referring to structures, mechanisms and processes as well as rules and norms that govern human behaviour and social order. In this article, the definition by Douglas North (1990) is used as the main point of reference, because it emphasises the differences between the informal and formal natures that institutions could have[3]. Informal institutions are systems of rules and decision-making procedures which have evolved from endogenous sociocultural codes and give rise to social practises, assign roles to participants and guide interactions among CPR users (Appiah-Opoku & Mulamoottil 1997). Formal institutions refer to the rules that guide access, control and management of CPRs, and which are backed up and enforced by the state (Leach *et al.* 1997). This article compares informal and formal institutions, because both types, with their remarkable differences (Table 1), could have distinct influences on human behaviour towards sustainable CPR management.

The crucial role played by institutions in sustainable CPR

Table 1
Overview of differences between informal and formal institutions

Aspects	Informal institutions	Formal institutions
Nature of evolution	Endogenous	Exogenous
Functional and structural arrangements	Site specific	Common at district or national level
External input and material support	Low	High
Consideration of social and cultural embeddedness	High	Low
Ownership	Local community	State
Enforcement and monitoring	Based on agreement of community	Legally by state

management is being increasingly recognised in development studies (Ghate & Nagendra 2005). Since the mid 1980s, the discourse among scholars has emphasised on the effectiveness of different types of institutional arrangements for sustainable CPR management. Scholars from different disciplines, including political science, environmental science, rural sociology, anthropology, and economics have contributed to the development of literature on institutions and their roles in sustainable CPR management (Agrawal 2001). Studying institutions that govern CPR management in SSA is important, as CPRs are vital assets for the rural poor. Moreover, most of the biodiversity in SSA resides in the CPRs, especially under systems of low intensity management (Lovett *et al.* 2006). Among other CPRs, forests and grazing lands are means of livelihoods for many rural households (Benin *et al.* 2003; Bedru 2007; Frost *et al.* 2007; Appiah *et al.* 2009) and rural poverty reduction in SSA requires the sustainable management of these CPRs (Clover 2003; Girmay 2006).

However, compared to the intense CPR degradation in SSA, there is lack of analytically synthesised empirical evidence on the effectiveness of institutions in sustainable CPR management. This literature review will therefore contribute to overcome this lack of synthesised evidence by comparing the effectiveness of informal and formal institutions for sustainable CPR management. This is done by investigating the conditions that influence the effectiveness of informal and formal institutions in different CPR management contexts across SSA. In the next section, the various opinions and debates on the roles of institutions in sustainable CPR management are presented followed by a description of the methods of literature review applied in this article. The theoretical inputs have led to an analysis that considers practical cases and examples on the roles of informal institutions and formal institutions under decentralised governmental reforms to achieve sustainable CPR management. This in turn has been directed towards an analysis of the prominent social, political and demographic conditions which positively or negatively influence the institutions' effectiveness in preventing CPR degradation,

enabling equal benefit sharing among CPR users, and also in allowing active participation of CPR users in the decision-making processes. Finally, recommendations are given, which could help the further improvement of CPR management policies, by shaping the various institutional arrangements.

THEORETICAL DEBATE

For some time in the past, the debate about sustainable CPR management has been rather pessimistic. Garrett Hardin's article '*Tragedy of the Commons*' published in 1968 has been influential in the debate of sustainable CPR management (Baland & Plateau 1996). Hardin (1968) argued that CPRs have been overexploited due to their maximised usage by individual users, and this tragedy can be solved only by privatisation or state regulation of CPRs. Since then, a conceptual debate on the nature of CPRs has come up due to Hardin's use of the term 'commons' to describe an open access grazing land situation (Steins & Edwards 1998). Hardin's work was criticised for overlooking the fact that many user groups have successfully managed CPRs by developing and maintaining self-governing[4] institutions (Ostrom 1990; McKean 1992; Dietz *et al*. 2003). This critic has led to the development of theories about institutions from various disciplines (e.g., common property theory, theory of collective action[5], social capital theories[6] and game theory). Today, there is no single widely accepted or unified theory on the relevant institutions for CPR management (Agrawal 2001).

An optimistic alternative to the '*Tragedy of the Commons*' postulate, the new institutionalism theory (North 1990), has suggested placing more emphasis on the conditions under which local communities would be able to manage CPRs in a sustainable manner (Azuela 2006). The core argument of the theory is that institutional arrangements provide mechanisms to manage CPRs in a sustainable manner (Nemarundwe 2003). Moreover, the theory looked at notable changes in the institutions and at the bargaining power of individuals or groups in the CPR management (Agrawal & Gibson 1999; Haller 2002b). These institutional perspectives have further shaped and modified the investigations of CPRs and their management (Hotimsky *et al*. 2006). For instance, several studies have found that in some situations, high levels of social capital among CPR users and collective action arrangements can solve CPR management problems, such as free riding and divergence from a set of rules set for CPR management (Ostrom 1990; Rudd 2000; Pretty 2003). Although the new institutionalism theory has got great acceptance among scholars, there is also criticism in relation to the emphasis given to the dynamism of institutions. For instance, Carruthers (2007) argued that North's definition of institutions is too restrictive and it overlooks the connections among different institutions. Hira & Hira (2000) added that the theory fails to explain the sources and avenues of modifications of the rules and it was unable to provide a satisfactory explanation of change. In line with this, Von Benda-Beckmann *et al*. (2006) criticised this by stating that there is a need to pay attention

to the systemic nature of property and the contexts in which property relationships and practices are embedded, rather than putting too much emphasis on the rules of the game.

On the other hand, Pretty (2003) and others have given much weight to the importance of social capital in sustainable CPR management. Steins & Edwards (1999) elaborated that when CPRs evolve from relatively simple, single-use into complex, multiple-use resources, user rights have to be re-negotiated. This is to balance the interdependent uses of different user groups and to transcend adverse impacts associated with increased access of new users to the CPRs. All the above-mentioned arguments support the idea that institutional roles and responsibilities have to change, if new patterns of social involvement should result in more sustainable CPR management (Bass *et al*. 2005).

In the past few decades, theorists and practitioners have investigated the different nature of institutions that influence human behaviour and hence the sustainability of CPR management (Agrawal 2003). However, different opinions are found in prioritising the importance of informal and formal institutions. Some scholars support the idea of North (1990) that both informal and formal institutions are important to achieve sustainable CPR management, although the mechanism of rule enforcement is the most important factor that influences the institutions' effectiveness (Koku & Gustafsson 2003). Colding & Folke (2001) have found that long-standing informal institutions, for example, social taboos, have functions similar to those of formal institutions. However, the erosion of informal institutions has increased due to the growing diversity in religious beliefs among users and development interventions' overriding the local values and norms associated with the existing practises in CPR management. The erosion of informal institutions, aggravated by the heavy dependence of the users on CPRs for their livelihoods, has resulted in a further degradation of the CPRs (Tyynelä & Niskanen 2000; Anoliefo *et al*. 2003). On the other hand, Ribot *et al*. (2008) argued that the presence of democratic formal institutions is important for sustainable CPR management to be achieved. Others noted that the collaboration of stakeholders in the decision-making of sustainable CPR management matters more than the type of institutional structure (Bryan 2004). The presence of informal and formal institutions at the micro-level CPR management, in various rural African communities, was reported (Agrawal & Gibson 1999; Leach *et al*. 1999; Tilahun *et al*. 2007). Such institutions ensure the rights of CPR users and prevent outsiders from benefiting from the group's management activities (Pagdee *et al*. 2006). The success of institutions in the CPR management depends on the ability of the user groups to devise rules for access to and maintenance of the CPRs (Stern *et al*. 2002; Marothia 2003). A strong system of authority within the group of CPR users and external support in the enforcement of rules helps to stabilise institutions that manage CPRs in a sustainable manner (Chakraborty 2001). Based on the above-mentioned theoretical backgrounds, this article contributes to the theoretical debate by comparing the effectiveness of informal and formal institutions to sustainable

CPR management. Subsequently, the social, political and demographic conditions which influence the effectiveness of both types of institutions are also investigated.

METHODS OF LITERATURE REVIEW

For this study, secondary data was collected by computerised searches of databases (in particular, Scopus, Science direct, CAB abstracts and Digital library of the commons). During the period between November 2007 and June 2008, recent publications on institutions relevant to micro-level CPR management were reviewed by using the guidelines recommended by Hart (1999, 2001), to search for literature, to organise the articles in themes and to conduct a detailed examination on the relationships among the variables. The main key words that were used separately and in combination included 'CPRs', 'formal institutions', 'informal institutions', 'norms', 'rules', 'sustainable CPR management', and 'Sub-Saharan Africa'. The criteria used for inclusion were the articles that investigated the institutional mechanisms and conditions which influenced the sustainability of communal forest or communal grazing land management in SSA, as also the articles that had conceptual and theoretical significance to justify the argument in the paper. Primary attention was given to publications which fulfilled the above criteria, in peer reviewed journals, project reports and working articles. Deductive coding of texts was conducted as explained by Bernard (2006), using key codes like 'type of institution', 'type of CPRs' and 'drivers' influencing effectiveness of institutions to sustainable CPR management.

The various research findings on informal and formal institutions governing the management of CPRs were integrated and interpreted using the main themes that emerged from descriptive texts, such as, types of outcomes of CPR management, elements of institutional mechanisms and conditions which influenced the institutional mechanisms to achieve sustainable CPR management. Next, the qualitative meta-analysis method, which was also referred to as qualitative meta-synthesis, was used as explained by Sandelowski & Barroso (2007), to explore the relationships among the variables. In the review, a total number of 129 articles, including 74 journal articles and 21 books, were used. The cases and examples mentioned in the article were selected based on their relevance to the discussion and without any specific procedure.

RESULTS AND DISCUSSION

Informal Institutions and Sustainable CPR Management

The past attempts by donors and governments to import practices, rules and values of sustainable CPR management from one environmental and cultural context to another had limited success. This had turned the attention of the development agencies to the importance of the already existing informal institutions within the 'target environment' (Watson

2003). Informal institutions are established on different grounds and for various reasons, such as economic reasons (i.e., groups run common economic activities such as labour sharing during harvest seasons, informal healing and hunting (Appiah-Opoku 1999), and religious reasons (i.e., groups have common religions and beliefs such as taboos and sacredness (Bhagwat & Rutte 2006; Alemayehu 2007).

Even though it is not explicitly mentioned in the reviewed studies, this motivation of setting rules as part of an informal institutional arrangement could arise from the increasing recognition of the critical roles CPRs play in sustaining the livelihoods of various rural communities. There is a general consensus among studies that successful informal institutions served as mechanisms to achieve outcomes of sustainability by regulating access to and control over CPRs, managing CPRs use conflicts (Watson 2001), sharing benefits equally among CPR users (Tefera *et al*. 2005) and mobilising social capital for sustainable CPR management (Chisholm 1998). Moreover, as informal institutions are embedded in communal structures, they allow the incorporation of the communities' mechanisms and knowledge about the sustainable management and utilisation of CPRs into the CPRs management (Zelealem & Leader-Williams 2005). A common pattern in all these cases points to the fact that informal institutions have evolved internally from the society and acted in the interest of the community, which has created a sense of commitment, ownership and responsiveness among the CPR users. This in turn contributes to the achievement of sustainability outcomes, particularly prevention of CPR degradation and improvement of the CPR conditions, in terms of quantity and quality.

In many cases, rural communities in SSA have respected the institutions that are attached to their historical and cultural lives more than those introduced by external bodies, such as governments. Besides, a case study by Boku & Irwin (2003) in Borana, Ethiopia, pointed out that at the core of *Gadaa,* an informal institution based on a generation-grade system, there are traditionally selected elders who formulate rules of access and control over communal grazing lands, administer rule enforcements and ensure implementation of sanctions. Therefore, in the presence of well-established village structures, prevention of CPR degradation, exclusion of non-CPR users, and equal benefit sharing among CPR users can be achieved by informal institutions.

Additionally, religious and traditional spiritual values in Ghana (Sarfo-Mensah & Oduro 2007), Tanzania (Mgumia & Oba 2003) and Zimbabwe (Byers *et al*. 2001) played an important role in preventing forest loss by protecting trees around religious places. Based on religious beliefs and supernatural sanctions to their protection, rural communities in Mozambique have also managed sacred forests that were found on burial grounds, places where spirits could reside, and places for rituals (Virtanen 2002). Likewise, a study by Alemayehu (2002) in the northern highlands of Ethiopia found that rural communities were highly committed to managing forests in and around the Ethiopian Orthodox Churches. Such commitment came from theological and biblical thoughts that

churches were holy places and houses of God, where cutting of trees is considered an immoral deed. As a result, churches have a remarkable impact in protecting the remaining patches of natural forests in northern Ethiopia. However, the same community members were less interested to participate in tree plantation and other forest development initiatives of governmental and non-governmental organisations, due to the top–down nature of these initiatives. The above-mentioned cases revealed that under conditions of high acceptance of the spiritual and religious beliefs by the majority of the rural community in the area, forest loss had been prevented, which in turn contributed to communal forest occurrence and its quality. Based on their own sanctions, which were site-specific and not easily transferred to other situations, informal religious institutions could be important entry points to mobilise the community and support interventions towards sustainable CPR management.

Although the literature reviewed for this article underlined the important value of informal institutions, there are authors who highlighted several limitations of such arrangements of local governance. For example, Campbell *et al.* (2001) observed that informal institutions in the rural settings of Zimbabwe have left many communal forest management problems unaddressed. In line with this, the breakdown of informal institutions and their failure to comply with the principle of exclusivity resulted in an increased level of CPR degradation at some places of SSA (Masangano *et al.* 2003). As can be seen in other studies, this could arise from the absence of appropriate human, social and financial capacity to enforce rules effectively (Owubah 2001; Girma 2005). For instance, under post-conflict conditions in some parts of Ethiopia, neither the informal religious institutions nor the informal burial institutions were able to manage the CPR use conflicts (Pankhurst 2001). Based on the reviewed literature, one could argue that informal institutions in SSA did not in themselves offer a long-lasting solution to problems of sustainable CPR management, particularly in rapidly and dramatically changing environments (Tyynelä & Niskanen 2000; Banana *et al.* 2007; Gessesse 2007).

Contributions of informal institutions to sustainable CPR management have been affected by conditions such as high population growth on limited CPRs (Dore 2001; Berhanu *et al.* 2004), chronic poverty which can force the rural poor to free ride on CPRs (Banana *et al.* 2007), lack of empowerment of CPR users (Average & Desmond 2007), increase in modernisation that can dissolve traditionally developed values (Appiah-Opoku 1999), change in land tenure affecting the access to CPRs (Zelealem & Leader-Williams 2005), policies that do not give specific roles to informal institutions in sustainable CPR management (Brown 1999) and unclear boundaries of communal forests and grazing lands (Kamara *et al.* 2004). Additionally, the socioeconomic characteristics of the CPR users influence the effectiveness of informal institutions, although the influence can be site-specific and varied among localities. For instance, heterogeneity in income among CPR users affected the level of social

capital in respect to the informal institutions (Campbell *et al.* 2001; Berhanu *et al.* 2004; Bongers *et al.* 2006) and ethnic differences resulted in conflicts among CPR users (Amoako-Atta 1998; Beck & Nesmith 2001). In summary, the literature analysis implied that informal institutions contribute to sustainable CPR management by regulating access to CPRs at a low cost for CPR users, developing and mobilising social capital, acknowledging incorporation of local knowledge and mechanisms of the community in CPRs management and enhancing collective action among CPR users at low transaction costs. These contributions are enhanced mainly under conditions of active community participation in CPRs management, high social capital and shared beliefs among CPR users and the presence of well-established village structures. On the contrary, conflicts in the use of CPR, high population growth on limited CPRs and the growing scarcity of CPRs due to land use change, hindered the effectiveness of informal institutions in sustainable CPR management.

Formal Institutions and Sustainable CPR Management under Decentralised Conditions

In SSA, governments were criticised for establishing highly centralised and bureaucratised formal institutions instead of building upon local and decentralised decision-making mechanisms for sustainable CPR management (Platteau 1992). Recent literature, however, underlined that decentralisation of formal institutions, that is, the deliberate and planned transfer of the responsibilities of CPR management away from the central state institutions to peripheral institutions, has acquired considerable popularity since the 1990s (Olowu 2001; Nhantumbo *et al.* 2003). According to the World Resource Institute, at least 60 developing countries have undertaken measures to decentralise CPR management (Ribot 2002). In relation to this, Cocks *et al.* (2001) pointed out that the policy reform, which takes different forms in different countries, has largely come about due to an increasing recognition of the ineffectiveness of the states to manage CPRs in a sustainable manner. Moreover, interest in decentralised CPR management has arisen among many bilateral and multilateral donors in SSA due to their increased belief that donor interventions in sustainable CPR management at the local government level could empower CPR users and be more effective and efficient than at the centralised state level (Chakraborty 2001). However, further decentralisation of power and responsibilities to the lower government and community levels is problematic because formal institutions at the higher levels of government also have essential functions to play in sustainable CPR management (Nathan *et al.* 2007).

In the vast literature on CPRs, considerable attention is given to formal institutions in SSA due to decentralisation of the formerly centralised, top–down approaches towards CPR management, which was unsustainable (Benjaminsen 1997). Accordingly, with devolution of power, governments allow CPR users to participate more fully in shaping the rules of access, maintenance and allocation of CPRs (Antinori &

Rausser 2003). Furthermore, formal institutions are suitable for the implementation of new CPR management strategies, because of their ability to build on the existing bureaucratic structures and because of the authority often vested in state organisations (Shyamsundar *et al.* 2005). Thus, local governments can reach the community at the grass root level. For instance, there is a general consensus between studies that in the northern highlands of Ethiopia, a local government structure at the community level known as *Baito,* partly built on informal institutions was successful in mobilising users through collective action arrangements, rule making and conflict resolution over communal forests and grazing lands (Chisholm 1998; Girmay 2006).

Among the various studies, Lund (2006) demonstrated that decentralised formal institutions constitute an environment for local politics with important local players within it, a structure of opportunities for the negotiation of the distribution of CPRs and a significant space for stakeholders to negotiate arrangements of CPR management. Besides, decentralisation changed the institutional infrastructure for local CPR management. In some cases, this created an institutional basis for more popular and participatory management and use of CPRs (Ribot 2002, 2004b). This could be done by devolving the responsibilities of CPR management to local communities, or by decentralising the formal powers of government to its own subunits (Andersson *et al.* 2004). Successful decentralised formal institutions contributed to sustainable CPR management mainly by restricting access to CPRs, enforcing sanctions based on state laws and enforcing land tenure policies. At this point, the willingness and motivation of governments to devolve power at the grass root level was a requirement for effective decentralisation of formal institutions. Nevertheless, with the exception of the communal forest management in Tanzania, many SSA countries failed to achieve effective decentralised formal institutions for sustainable CPR management. The effective decentralisation in Tanzania's communal forest management was achieved under conditions of appropriate forest and land tenure policies, statutes, and the willingness of the government to devolve power (Barrow *et al.* 2002). A critical examination of various cases in Africa by Ribot (2003) verified that the decentralisation was challenged by improper power relations:

'The meaning of power transfers in one place could be completely different in another place depending on the nature of local authority and the central state. If the authorities are democratic, then powers transferred can support democratic relations along lower government structures; if they are despotic, then despotic authorities will be strengthened'.

As a result, the degree and form of power transfers in most SSA countries do not necessarily establish conditions for more efficient, equitable and sustainable management of CPRs. For instance, the lack of an effective or consistent devolution of power over CPRs to formal institutions at the lower governmental level in Uganda (Bazaara 2003; Turyahabwe *et al.* 2006) and lack of legitimacy at the lower governmental level in Mali (Becker 2001) have negatively affected the

functioning of formal institutions in their ability to govern the management of CPRs in a sustainable manner. The mentioned cases reveal that the contributions of formal institutions to CPR management have been influenced by the unclear responsibility and power transfers in the decentralisation reforms. These findings support the argument of this article in that formal institutions of CPRs management in SSA can be easily influenced by political conditions and interventions.

Furthermore, decentralised CPR management in SSA is confronted with challenges related to lack of human and financial capacity to manage the access to and control over CPRs (Nkonya *et al.* 2008). In some situations, this could lead to the overexploitation of CPRs. On top of this, Farrington and Boyd (1997) pointed out that a positive change in sustainable CPR management depends on endogenous social, cultural and economic conditions, which could not be easily influenced by external interventions. As a result, simplistic government and donor interventions based on the idea that formal institutions could easily be created, modified, transferred, or influenced by government declaration would not achieve the desired outcomes (Heltberg 2002). For instance, a study by Maponga & Muzirambi (2007) in Zimbabwe disclosed that communal forest management through formal institutions in the wake of declining fiscal and human capital resulted in the further degradation of CPRs, because the institutions had not encouraged active community participation in CPR management. In summary, the literature analysis highlighted that formal institutions play an important role in implementing technologies in sustainable CPR management, although CPR scarcity caused by land use change, high population growth on limited CPRs and inadequate human and financial capacities reduced their effectiveness to achieve sustainable CPR management.

Conditions that Influence Effectiveness of Informal and Formal Institutions in Sustainable CPR Management

The institutional arrangements in rural SSA have determined the success or failure of efforts towards sustainable CPR management (Bandstein 2005; Skoog 2005). This review has disclosed six main sustainability outcomes in CPR management in SSA, namely, enforcement of rules with mutual agreement among CPR users, regulated use of CPRs, equal benefit sharing among CPR users, improved CPR conditions in terms of quantity and quality, meeting the economic needs of CPR users and prevention of CPR degradation. Moreover, the main conditions that influence the effectiveness of informal and formal institutions to achieve the specific sustainability outcomes are summarised in Table 2.

The published evidence so far supported the argument that informal institutions in many rural settings of SSA have contributed to sustainable CPR management by mobilising social capital, solving collective action problems and serving as entry points for interventions in sustainable CPR management. Additionally, when compared to formal institutions, informal institutions have a higher potential to survive, regardless of

Table 2
Conditions which influence institutional mechanisms to achieve sustainable CPR management

Sustainability outcomes*	Institutional elements affecting sustainability outcomes	Enhancing conditions in place	No. of cases	Example key sources
Enforcement of rules with mutual agreement among CPR users	Creating a suitable environment for joint decision-making**	Active community participation	29	Haro *et al.* (2004); Tefera *et al.* (2005)
Regulated use of CPRs	Enabling exclusion at low cost for CPR users**, restricting access to CPRs‡	High social capital among CPR users enabled successful rule enforcement	21	Berhanu *et al.* (2004); Zelealem & Leader-Williams (2005)
Equal benefit sharing among CPR users	Locally agreed sanctions**, imposing sanctions and punishments using state laws‡	Regular monitoring and sanctioning of rules	19	Leach *et al.* (1999); Gibson *et al.* (2004)
Equal benefit sharing among CPR users	Locally agreed sanctions**, imposing sanctions and punishments using state laws‡	Resolving CPRs use conflicts and collective action problems	17	Appiah-Opoku & Mulamoottil (1997); Makepe (2006)
Improved CPR conditions in terms of quantity and quality	Acknowledging local knowledge of CPR management**	Incorporation of communities' knowledge and mechanisms	11	Appiah-Opoku (1999); Ouinsavi *et al.* (2005)
Meeting the economic needs of CPR users	Acknowledging local knowledge of CPR management**, enforcing land tenure policies‡	Modification of rules to meet the needs of users	8	Dore (2001); Anoliefo *et al.* (2003)
Prevention of CPRs degradation	Motivating users to manage CPRs**, enforcing land tenure policies‡	Reinforcement of CPR users to future benefits	4	Alemayehu (2002); Average & Desmond (2007)

Sustainability outcomes	Institutional elements affecting sustainability outcomes	Hindering conditions in place	No. of cases	Example Key sources
Equal benefit sharing among CPR users	Creating a suitable environment for joint decision-making**	CPR use conflicts	31	Bazaara (2003); Masangano *et al.* (2003)
Improved CPRs conditions in terms of quantity and quality	Acknowledging local knowledge of CPR management**, enforcing land tenure policies‡	Change in land use for crop cultivation causing CPR scarcity	27	Byers *et al.* (2001); Bedru (2007)
Prevention of CPR degradation	Enabling exclusion at low cost for CPR users**, restricting access to CPRs‡	High population growth on limited CPRs	25	Dore (2001); Wardell & Lund (2006)
Prevention of CPR degradation	Acknowledging local knowledge of CPR management**, based on technical and financial capacity‡	Lack of human and financial capacities	24	Olowu (2001); Ribot (2003)
Regulated use of CPRs	Acknowledging local knowledge of CPR management**, restricting access to CPRs‡	Lack of legitimacy	20	Becker (2001); Nhantumbo *et al.* (2003)
Meeting the economic needs of CPR users	Enforcing land tenure policies‡	Lack of feasible policies	18	Cocks *et al.* (2001); Rohde *et al.* (2006)
Meeting the economic needs of CPR users	Enforcing land tenure policies‡	Insecure land rights	15	Bereket (2002); Koku & Gustafsson (2003)
Enforcement of rules with mutual agreement of CPR users	Imposing sanctions and punishments using state laws‡	Lack of empowerment	14	Rohde *et al.* (2006)
Regulated use of CPRs	Creating a suitable environment for joint decision-making **, imposing sanctions and punishments using state laws‡	Unclear responsibility and power sharing	12	Bazaara (2003); Esenjoraf (2004)
Prevention of CPR degradation	Enabling exclusion at low cost for CPR users**, restricting access to CPRs‡	Political unrest	11	Benjaminsen (1997); Watson (2001)
Enforcement of rules with mutual agreement of CPR users	Motivating users to manage CPRs**	Growing heterogeneity in beliefs among CPR users	10	Campbell *et al.* (2001); Anoliefo *et al.* (2003)
Improved CPRs conditions in terms of quantity and quality	Acknowledging local knowledge of CPR management**, enforcing land tenure policies‡	Lack of technological interventions	8	Byers *et al.* (2001); Mgumia & Oba (2003)
Meeting the economic needs of CPR users	Enforcing land tenure policies‡	Privatisation of CPRs causing CPR scarcity	7	Beck & Nesmith (2001)
Enforcement of rules with mutual agreement of CPR users	Enforcing land tenure policies‡, restricting access to CPRs‡	Mistrust of community on state intervention in CPR management	7	Ngawa & Fonjong (2003); Girmay (2006)

*The sustainability outcomes are formulated by the authors based on the literature review. **Elements of informal institutions, ‡Elements of formal institutions

the changing socioeconomic and political conditions (Ylhäisi 2006). Under the current conditions, formal institutions have contributed less to sustainable CPR management than the informal institutions. However, formal institutions have important contributions to make towards sustainable CPR management during the implementation of strategies and technologies. Based on this, it is argued that formal institutions may also have a crucial role to play in sustainable CPR management if they are equipped with the appropriate power and legitimacy.

At this point, Carlsson & Berkes (2005) emphasised that negotiation and active participation of CPR users in decision-making, and determining responsibilities and power relations among both types of institutions, are crucial. Such a participatory approach, under the enhancing conditions shown earlier, will contribute to sustainable CPR management in SSA. The findings presented in this article are not so different from similar cases in Asia. For instance, a study in Kumaon, India, revealed that the state and local forest users established 3,000 forest councils, which were formal institutions, after negotiating with the community on specific forest management responsibilities. This sharing of responsibility followed by appropriate empowerment allowed active participation of local communities. In Kumaon, the rural residents not only have the rights to access and use communal forests, but they can also exercise claimant and proprietor rights. The forest councils' ability to harvest fuel wood for commercial purposes and their access to markets for timber are mediated by the Forest Department rather than the councils (Agrawal & Ostrom 2001). In this case, degradation of informal institutions and the lack of satisfaction of forest users in previous formal institutions of communal forest management have led to the establishment of forest councils, which are accountable to the local communities. Although the cases for SSA and the example from India arose from different socioeconomic, political, cultural and demographic conditions, it is worth understanding that negotiation among CPR users, which is the core of participatory development approaches, creates suitable conditions for sustainable CPR management. This view of upgrading the power relations of informal and formal institutions in CPR management from isolated or dual decision-making assumptions to a collaboration, in which both types of institutions have their own specific responsibilities, will result in sustainable CPR management in SSA. In summary, the literature review identified 21 main factors which influenced the effectiveness of informal and formal institutions to govern human behaviour towards sustainable CPR management.

CONCLUSIONS

CPRs have been important productive resources in the livelihoods of rural communities in SSA. This makes improving the livelihoods of CPR-dependent communities with sustainable CPR management an essential component in the intervention of rural poverty reduction. In such efforts, the need for effective institutions to mobilise the community at the grass root level has been highlighted by various donors and development agencies. At this point, the need for synthesised empirical evidence which compares the effectiveness of informal and formal institutions to achieve sustainable CPR management in rural SSA becomes an important research task. The argument of this article is that informal and formal institutions in SSA have different rates of effectiveness to achieve sustainable CPR management under the specified social, political and demographic conditions. The qualitative meta-analysis reveals that informal and formal institutions are targeted to achieve six sustainability outcomes, including enforcement of rules with a mutual agreement among CPR users, regulated use of CPRs and equal benefit sharing among CPR users.

The informal institutions have contributed towards achieving most of the sustainability outcomes because they acknowledge the local knowledge of the community in the CPR management and they can be enforced at a low cost for CPR users. Thus, informal institutions can be key mechanisms to achieve sustainable CPR management under conditions of high acceptance of informal institutions by the community, reinforcement of CPR users to manage CPRs and the presence of high social capital among CPR users.

In relation to formal institutions in SSA, the decentralisation of power and responsibilities from the state to the lower government levels was a remarkable change since the 1990s. The formal institutions in most situations contributed less to sustainable CPR management due to several factors, including unclear responsibility and power sharing in the decentralisation reforms, and their low endurance to change with political conditions. Thus, they had been less effective in achieving the sustainability outcomes in CPR management than the informal institutions. However, they could make important contributions in the implementation of strategies and technologies to sustainable CPR management, if they were equipped with appropriate power and legitimacy. Likewise, the growing heterogeneity in beliefs among users influenced formal institutions less than the informal institutions, because the formal institutions had the ability to build up on the already established bureaucratic systems and had less linkage with the local values and norms in CPR management.

In conclusion, high population growth on limited CPRs and insufficient human and financial capacities are among the many conditions that affected the well-functioning of both types of institutions, to achieve sustainable CPR management. In the future, emphasis should be on enhancing the effectiveness of both types of institutions, by improving the conditions which hinder their contributions to sustainable CPR management. Moreover, policies and development interventions should strengthen the involvement of well-functioning informal institutions in decision-making so that sustainable CPR management can be achieved.

Ika Darnhofer, Wolde Mekuria, Lisa Aigelsperger and Maria Miguel Ribeiro, on the earlier drafts of the article.

Notes

1. Common pool resources (CPRs) include forests, grazing lands, and wetlands that have multiple users and /or user groups. In CPR management, exclusion of individual users is difficult to achieve and joint use involves subtractibility, i.e., the use of a resource by one person will subtract from another persons' enjoyment of the resource (Steins and Edwards 1998).

2. Sustainable CPR management implies that the needs of present generation cannot be the sole basis for deciding on appropriate solutions to CPRs use problems; needs of future generations and society in general need to be considered as well (Muchena and van der Bliek 1997).

3. There are various terminologies which describe types of institutions as a dichotomy, such as formal - informal, indigenous - non-indigenous, local - external, traditional - non-traditional, endogenous-exogenous, and de facto - de jure referring to different aspects of institutions including enforcement characteristics, origins, presence of cultural element, and property rights. Clear-cut distinction of institutions is problematic due to the dynamic nature of institutions. To avoid this confusion, the use of the terms formal and informal institutions in this paper takes into consideration whether the institutions are backed by state law or not in the existing condition.

4. Governance includes the setting of rules, the application of rules, and the enforcement and adjudication of rules (Feeny 1988).

5. Collective action arises when the efforts of two or more individuals are needed to accomplish an outcome (Sandler 1992).

6. Social capital is the shared knowledge, understandings, norms, rules, and expectations about patterns of interactions that groups of individuals bring to a recurrent activity (Ostrom 1999).

REFERENCES

Agrawal, A. 2001. Common property institutions and sustainable governance of resources. *World Development* 29(10): 1649-1672.

Agrawal, A. 2003. Sustainable governance of common pool resources: Context, methods, and politics. *Annual Review of Anthropology* 32: 243-262.

Agrawal, A. and C. Gibson. 1999. Enchantment and disenchantment: The role of community in natural resource conservation. *World Development* 27(4): 629-649.

Agrawal, A. and E. Ostrom. 2001. Collective action, property rights, and decentralisation in resource use in India and Nepal. *Politics and Society* 29(4): 485-514.

Alemayehu, W. 2002. Opportunities, constraints and prospects of Ethiopian orthodox tewahido churches in conserving forest resources: The case of churches in South Gonder, Northern Ethiopia. MSc thesis. University of Agricultural Sciences. Sweden.

Alemayehu, W. 2007. Ethiopian church forests: Opportunities and challenges for restoration. Ph.D. dissertation, Wageningen University, the Netherlands.

Amoako-Atta, B. 1998. Preservation of sacred groves in Ghana: Esukawkaw forest reserve and its anweam sacred grove. South-South Co-operation programme on environmentally sound socio-economic development in the humid tropics. Working Article No. 26.

Andersson, K., C. Gibson and F. Lehoucq. 2004. The politics of decentralised natural resource governance. *Political Science and Politics* 37(3): 421-426.

Anoliefo, G., O. Isikhuemhen and N. Ochije. 2003. Environmental Implications of the erosion of cultural taboo practises in Awka-South local government area of Anambra State, Nigeria: Forests, trees, and water resource preservation. *Journal of Agricultural and Environmental Ethics* 16: 281-296.

Antinori, C. and G. Rausser. 2003. Does community involvement matter? How collective choice affects forests in Mexico. Berkeley: Department of Agricultural and Resource Economics, UC Berkeley. Working Article Series 939.

Appiah, M., D. Blay, L. Damnyag, F. Dwomoh, A. Pappinen, and O. Luukkanen. 2009. Dependence on forest resources and tropical deforestation in Ghana. *Environment, Development and Sustainability* 11(3): 471-487.

Appiah-Opoku, S. 1999. Indigenous economic institutions and ecological knowledge: A Ghanian case study. *The Environmentalist* 19: 217-227.

Appiah-Opoku, S. and G. Mulamoottil. 1997. Indigenous institutions and environmental assessment: The case of Ghana. *Environmental Management* 21(2): 159-171.

Arnold, M. and I. Townson. 1998. Assessing the potential of forest product activities to contribute to rural incomes in Africa. Natural Resource Perspective No. 37. London: ODI Overseas Development Institute.

Average, C. and M. Desmond. 2007. The history of natural resource management in Zimbabwe: A chronicle of how sustainable resource management has remained an elusive concept. *Journal of Sustainable Development in Africa* 9(2): 102-115.

Azuela, A. 2006. Illegal logging and local democracy: Between communitarianism and legal fetishism. *Ambient Soc* 9(1).

Baland, J. and J. Plateau. 1996. Halting degradation of natural resources: Is there a role for rural communities? Oxford: Clarendon Press.

Banana, A., N. Vogt, J. Bahati and W. Gombya-Ssembajjwe. 2007. Decentralised governance and ecological health: Why local institutions fail to moderate deforestation in MPIGI district of Uganda. *Scientific Research and Essays* 2 (10): 434-445.

Bandstein, S. 2005. Donor approaches to the development of institutions – Formal and informal rules: A partial overview. UTV Working Articles no 4. Swedish International Development Cooperation Agency (SIDA). Department for Evaluation and Internal Audit.

Barrow, E., J. Clarke, I. Grundy, K. Jones and Y. Tessema. 2002. Analysis of stakeholder power and responsibilities in community involvement in forest management in Eastern and Southern Africa. Forest and Social Perspectives in Conservation no. 9, International Union for Conservation of Nature and Natural Resources.

Barrow, E., K. Ruhombe, I. Nhantumbo, R. Oyono, and M. Savadogo. 2009. Customary practises and forest tenure reforms in Africa-status, issues and lessons. Washington: Rights and Resources Initiative.

Bass, S., B. Dalal-Clayton and J. Pretty. 2005. Participation in strategies for sustainable development. *Environmental Planning Issues* 7: 155.

Bazaara, N. 2003. Environmental governance in Africa: Decentralisation, politics, and environment in Uganda. Working Articles no 7. World Resources Institute.

Beck, T. and C. Nesmith. 2001. Building on poor people's capacities: The case of common property resources in India and West Africa. *World Development* 29(1): 119-133.

Becker, L. 2001. Seeing green in Mali's woods: Colonial legacy, forest use, and local control. *Annals of the Association of American Geographers* 91(3): 504-526.

Bedru, B. 2007. Economic valuation and management of common-pool resources: The case of exclosures in the highlands of Tigray, Northern Ethiopia. Ph.D. dissertation. Department Landbeheer en-Economie, Katholieke Universiteit, Leuven: Belgium.

Benin, S., S. Ehui and J. Pender. 2003. Policies for livestock development in the Ethiopian highlands. *Environment, Development and Sustainability* 5: 491-510.

Benjaminsen, T. 1997. Natural resource management, paradigm shifts, and the decentralisation reform in Mali. *Human Ecology* 25(1): 121-143.

Bereket, K. 2002. Land tenure and common pool resources in rural Ethiopia: A study based on fifteen sites. *African Development Bank* 14(1): 113-149.

Berhanu, G. and S. Swinton. 2002. Sustainable management of private and communal lands in Northern Ethiopia. In *Natural resources management in African agriculture: Understanding and improving current practises* (eds. Barrett, C., F. Place and A. Aboud). Pp. 77-90. Cabi Publishing.

Berhanu, G., J. Pender and T. Girmay. 2004. Collective action for grazing land management in mixed crop-livestock systems in the highlands of Northern Ethiopia. *Agricultural Systems* 82(3): 273-290.

Bernard, R. 2006. Research methods in anthropology: Qualitative and quantitative approaches. USA: AltaMira Press.

Berry, L. and T. Andersen. 2004. Operationalizing GEF's new GEF OP 15 on sustainable land management within World Bank instruments Sub-Saharan Africa. Pp. 24.

Bhagwat, S. and C. Rutte. 2006. Sacred groves: Potential for biodiversity management. *Frontiers in Ecology and the Environment* 10: 519-552.

Boku, T. and B. Irwin. 2003. Traditional institutions, multiple stakeholders and modern perspectives in common property: Accompanying change within Borana pastoral systems. Securing the Commons No. 4.

Bongers, F., W. Alemayehu, F. Sterck, B. Tesfaye and T. Demel. 2006. Ecological restoration and church forests in Northern Ethiopia. *Journal of the Drylands* 1(1): 35-44.

Bremner, J. and F. Lu. 2006. Common property among indigenous peoples of the Ecuadorian Amazon. *Conservation and Society* 4(4): 499-521.

Brown, D. 1999. Principles and practise of forest co-management: Evidence from west-central Africa. European Union Tropical Forestry Article no 2. London, Belgium: European Commission, Brussels.

Bryan, T. 2004. Tragedy averted: The promise of collaboration. *Society and Natural Resources* 17: 881-896.

Byers, B., R. Cunliffe and A. Hudak. 2001. Linking the conservation of culture and nature: A case study of sacred forests in Zimbabwe. *Human Ecology* 29(2): 187-218.

Campbell, B., A. Mandondo, N. Nemarundwe and B. Sithole. 2001. Challenges to proponents of common property resource systems: Despairing voices from the social forests of Zimbabwe. *World Development* 29(4): 589-600.

Carlsson, L. and F. Berkes. 2005. Co-management: Concepts and methodological implications. *Journal of Environmental Management* 75: 65-76.

Carruthers, B. 2007. Rules, institutions, and North's institutionalism: State and market in early modern England. *European Management Review* 4: 40-53.

Chakraborty, R. 2001. Stability and outcomes of common property institutions in forestry: Evidence from the Terai region of Nepal. *Ecological Economics* 36(2): 341-353.

Chisholm, N. 1998. Community-based natural resource management in Tigray, Northern Ethiopia. The World Bank/WBI's CBNRM Initiative.

Clover, J. 2003. Food security in Sub-Saharan Africa. *African Security Review* 12(1): 1-15.

Cocks, M., A. Dold and I. Grundy. 2001. Challenges facing a community structure to implement CBNRM in the eastern Cape, South Africa. *African Studies Quarterly* 5(3). http://web.africa.ufl.edu/asq/v5/v5i3a4.htm. Accessed on 23 June, 2008.

Colding, J. and C. Folke. 2001. Social taboos: 'Invisible' systems of local resource management and biological conservation. *Ecological Application* 11: 584-600.

Dietz, T., E. Ostrom and P. Stern. 2003. The struggle to govern the commons. *Science* 302: 1907-1912.

Dore, D. 2001. Transforming traditional institutions for sustainable natural resource management: History, narratives and evidence from Zimbabwe. *African Quarterly* 5(3). http://web.africa.ufl.edu/asq/v5/v5i3a1.htm, Accessed on 23 June, 2008.

Esenjoraf, A. 2004. A community-based conservation programme for the management and conservation of land resources in Lesotho. Ph.D. dissertation, Department of Sociology of the Faculty of Humanities,

University of the Free State Bloemfontein, Republic of South Africa.

FAO. 1999. State of the world's forests. Rome: Food and Agriculture Organisation of the United Nations.

Farrington, J. and C. Boyd. 1997. Scaling up the participatory management of common pool resources. *Development Policy Review* 15: 371-391.

Feeny, D. 1988. The demand for and supply of institutional arrangements. In *Rethinking institutional analysis and development* (eds. Ostrom, V., D. Feeny and H. Picht). San Francisco: ICS Press.

Frost, P., B. Campbell, M. Luckert, M. Mutamba, A. Mandondo, and W. Kozanayi. 2007. In search of improved rural livelihoods in semi-arid regions through local management of natural resources: Lessons from case studies in Zimbabwe. *World Development* 35(11): 1961-1974.

German, L., M. Waga, A. Shenkut, W. Tirwomwe, J. Tanui, T. Hailemichael, B. Leulseged, S. Nyangas, A. Chemangeni, W. Cheptegei, T. Mesfin, A. Zenebe, F. Alinyo, M. Ashenafi, A. Kassahun, T. Tessema, J. Zewdie, and B. Kiflu. 2007. Enabling equitable collective action and policy change for poverty reduction and improved natural resource management in Ethiopia and Uganda. AHI Working Article No. 25.

Gessesse, D. 2007. Forest decline in south central Ethiopia: Extent, history and process. Ph.D. dissertation, Department of Physical Geography and Quaternary Geology, Stockholm: Stockholm University. Sweden.

Ghate, R. and H. Nagendra. 2005. Role of monitoring in institutional performance: Forest management in Maharashtra, India. *Conservation and Society* 3(2): 509-532.

Gibson, C., J. Williams and E. Ostrom. 2004. Local enforcement and better forests. *World Development* 33(2): 273-284.

Girma, A. 2005. Rehabilitation and sustainable use of degraded community forests in the Bale mountains of Ethiopia. Ph.D. dissertation, Faculty of Forest and Environmental Sciences, Albert-Ludwigs-University, Freiburg im Breisgau, Germany.

Girmay, T. 2006. Agriculture, resource management and institutions: A socio economic analysis of households in Tigray, Ethiopia. Ph.D. Dissertation, Wageningen University, Netherlands.

Haller, T. 2002b. The understanding of institutions and their link to resource management from a new institutionalism perspective. Working Article no 1, IP 6 Institutional Change and Livelihood Strategies.

Hardin, G. 1968. The tragedy of the commons. *Science* 162: 1243-1248.

Haro, G., G. Doyo and J. McPeak. 2004. Linkages between community, environmental, and conflict management: Experiences from northern Kenya. *World Development* 33(2): 285-299.

Hart, C. 1999. Doing a literature review: Releasing the social science research imagination. London: SAGE Publications Ltd.

Hart, C. 2001. Doing a literature search: A comprehensive guide for the social sciences. London: SAGE Publications Ltd.

Heltberg, R. 2002. Property rights and natural resource management in developing countries. *Journal of Economic Surveys* 16(2): 189-214.

Hira, A. and R. Hira. 2000. The new institutionalism: Contradictory notions of change. *American Journal of Economics and Sociology* 59(2): 267-282.

Hotimsky, S., R. Cobb and A. Bond. 2006. Contracts or scripts? A critical review of the application of institutional theories to the study of environmental change. *Ecology and Society* 11(1): 41.

Kamara, A., B. Swallow and M. Kirk. 2004. Policies, interventions and institutional change in pastoral resource management in Borana, Southern Ethiopia. *Development Policy Review* 22(4): 381-403.

Koku, E. and J. Gustafsson. 2003. Local institutions and natural resource management in the South Tongu District of Ghana: A case study. *Sustainable Development* 11: 17-35.

Lambin, E., H. Geist and E. Lepers. 2003. Dynamics of land-use and land-cover change in tropical regions. *Annual Review of Environmental Resources* 28: 205-241.

Leach, M., R. Mearns and I. Scoones. 1997. Environmental entitlements: A framework for understanding the institutional dynamics of environmental change. IDS Discussion Article 359, Sussex.

Leach, M., R. Mearns and I. Scoones. 1999. Environmental entitlements: Dynamics and institutions in community-based natural resource management. *World Development* 7(2): 225-247.

Lovett, C., H. Quinn, G. Ockwell and R. Gregorowski. 2006. Two cultures and tragedy of the commons. *African Journal of Ecology* 44: 1-5.

Lund, C. 2006. Twilight institutions: An introduction. *Development and Change* 37(4): 673-684.

Makepe, P. 2006. The evolution of institutions and rules governing communal grazing lands in Botswana. *Eastern Africa Social Science Research Review* 22(1): 39-61.

Mansuri, G. and V. Rao. 2004. Community-based and -driven development: A critical review. *The World Bank Research Observer* 19(1): 1-39.

Maponga, R. and J. Muzirambi. 2007. Indigenous knowledge in conservation of forestry and land resources in Musana communal areas, Bindura. *Journal of Sustainable Development in Africa* 9(2): 1-14.

Marothia, D. 2003. Institutions for common pool resources. In*: Institutional change in Indian agriculture* (eds. Mruthyunjaya, S., P. Joshi and R. Saxena). Pp. 61-81. Delhi: Chandu Press.

Masangano, C., D. Kayambazinthu and L. Mwabumba. 2003. Conflicts over the Miombo Woodlands: The case of Blantyre, Lilongwe and Kasungu, in Malawi. In: *Policies and governance structures in woodlands of Southern Africa* (eds. Kowero, G., B. Campbell and U. Sumaila). Pp. 65-79. Centre for International Forestry Research.

McKean, M. 1992. Success on the commons: A comparative examination of institutions for common property resource management. *Journal of Theoretical Politics* 4(2): 256-268.

Menghestab, H. 2005. Weather patterns, food security and humanitarian response in sub-Saharan Africa. *Philosophical Transactions of the Royal Society* 360: 2169-2182.

Mgumia, F. and G. Oba. 2003. Potential role of sacred groves in biodiversity conservation in Tanzania. *Environmental Conservation* 30: 259-265.

Muchena, F. and J. van der Bliek. 1997. Planning sustainable land management: Finding a balance between user needs and possibilities. *ITC Journal* 3(4): 229-234.

Nathan, I., J. Lund, Q. Gausset and S. Andersen. 2007. On the promises of devolution: Overcoming the constraints of natural resource management in a village in Tanzania. *The Journal of Trans disciplinary Environmental Studies* 6(1): 1-20.

Nemarundwe, N. 2003. Negotiating resource access: Institutional arrangements for woodlands and water use in southern Zimbabwe. Ph.D. dissertation, Swedish University of Agricultural Sciences, Uppsala.

Ngwa, N. and L. Fonjong. 2003. Actors, options and the challenges of forest management in anglophone cameroon. *Geo Journal* 57: 95-111.

Nhantumbo, I., S. Norfolk and J. Pereira. 2003. Community based natural resources management in Mozambique: A theoretical or practical strategy for local sustainable development? The case study of Derre forest reserve. Research Articles no 10. Sustainable Livelihoods in Southern Africa.

Nkonya, E., J. Pender and E. Kato. 2008. Who knows, who cares? Determinants of enactment, awareness and compliance with community natural resource management bylaws in Uganda. *Environment and Development Economics* 13: 79-101.

North, D. 1990. Institutions, institutional change and economic performance. Cambridge: Cambridge University Press.

Olowu, D. 2001. Decentralisation policies and practises under structural adjustment and democratisation in Africa. United Nations Research Institute for Social Development Programme Article No. 4.

Ostrom, E. 1990. Governing the commons: The evolution of institutions for collective action. Cambridge: Cambridge University Press.

Ostrom, E. 1999. Social capital: A fad or a fundamental concept. In: *Social capital: A multifaceted perspective* (eds. Dasgupta, P. and I. Serageldin). Washington DC: World Bank.

Ouinsavi, C., N. Sokpon and O. Bada. 2005. Utilisation and traditional strategies of *in situ* conservation of iroko (*Milicia excelsa* Welw. C.C. Berg) in Benin. *Forest Ecology and Management* 207: 341-350.

Owubah, C., D. Le Master, J. Bowker and J. Lee. 2001. Forest tenure systems and sustainable forest management. *Forest Ecology and Management* 149: 253-264.

Pagdee, A., Y. Kim and P. Daugherty. 2006. What makes community forest management successful: A meta-study from community forests throughout the world. *Society and Natural Resources* 19: 33-52.

Pankhurst, A. 2001. Natural resource management institutions in post-conflict situations: State and community forests in Yegof, South Wello, Ethiopia. Marena Research Project Working Article No. 6.

Platteau, J. 1992. Land reform and structural adjustment in Sub-Saharan Africa: Controversies and guidelines. FAO Economic and Social Development Article No. 107. FAO.

Pretty, J. 2003. Social capital and the collective management of resources. *Science* 302: 1912-1915.

Ribot, J. 2002. Democratic decentralisation of natural resources: Institutionalising popular participation. Washington, DC: World Resources Institute.

Ribot, J. 2003. Democratic decentralisation of natural resources: Institutional choice and discretionary power transfers in sub-saharan Africa. *Public Administration and Development* 23(1): 12.

Ribot, J. 2004b. Waiting for democracy: The politics of choice in natural resource management. Washington, DC: World Resources Institute.

Ribot, J., A. Chhatre and T. Lankina. 2008. Institutional choice and recognition in the formation and consolidation of local democracy representation, Equity and Environment. Working Article No. 35. World Resources Institute.

Rohde, F., M. Moleele, M. Mphale, N. Allsopp, R. Chanda, T. Hoffman, L. Magole, and E. Young. 2006. Dynamics of grazing policy and practise: Environmental and social impacts in three communal areas of southern Africa. *Environmental Science and Policy* 9: 302-316.

Rudd, M. 2000. Live long and prosper: Collective action, social capital and social vision. *Ecological Economics* 34(234): 131-144.

Sandelowski, M. and J. Barroso. 2007. Handbook for synthesising qualitative research. New York: Springer Publishing Company, Inc.

Sandler, T. 1992. Collective action: Theory and applications. Michigan: University of Michigan Press.

Sarfo-Mensah, P. and W. Oduro. 2007. Traditional natural resources management practises and biodiversity conservation in Ghana: A review of local concepts and issues on change and sustainability. Nota Di Lavoro 90. Fondazione Eni Enrico Mattei.

Scherr, S. 1999. Soil degradation: A threat to developing-country food security by 2020. Food, agriculture, and the environment discussion article no 27. Washington, DC: International Food Policy Research Institute.

Shyamsundar, P., E. Araral and S. Weeraratne. 2005. Devolution of resource rights, poverty, and natural resource management: A review. Environmental Economics Series Article no 104. The International Bank for Reconstruction and Development. USA: The World Bank.

Skoog, G. 2005. Supporting the development of institutions – Formal and informal rules: An evaluation theme, basic concepts. UTV Working Articles no 3. Swedish International Development Cooperation Agency (SIDA). Department for Evaluation and Internal Audit.

Steins, N. and V. Edwards. 1998. Harbour resource management in Cowes, Isle of Wight: An analytical framework for multiple-use. *Journal of Environmental Management* 54(1): 67-81.

Steins, N. and V. Edwards. 1999. Platforms for collective action in multiple-use common-pool resources. *Agriculture and Human Values* 16: 241-255.

Stern, P., T. Dietz, N. Dolšak, E. Ostrom and S. Stonich. 2002. Knowledge and questions after 15 years of research. In: *The drama of the commons* (ed. National Resource Council). Pp. 445-489. Washington, DC: National Academy Press.

Tefera, M., T. Demel, H. Hultén and Y. Yonas. 2005. The role of communities

in closed area management in Ethiopia. *Journal of Mountain Research and Development* 25(1): 44-50.

Tilahun, A., K. Habtemariam, Z. Gete, S. Abebe, S. Kismu, T. Melese. 2007. Working with communities and building local institutions for sustainable land management in the Ethiopian highlands. *Mountain Research and Development* 27(1): 15-19.

Topp-Jorgensen, E., M. Poulsen, J. Lund and J. Massao. 2005. Community-based monitoring of natural resource use and forest quality in Montane forests and Miombo Woodlands of Tanzania. *Biodiversity Conservation* 14: 2653-2677.

Turyahabwe, N., C. Geldenhuys, S. Watts and A. Banana. 2006. Technical and institutional capacity in local organisations to manage decentralised forest resources in Uganda. *Southern African Forestry Journal* 208: 63-78.

Tyynelä, T. and A. Niskanen. 2000. Communal management and social benefits of Woodland resources in Mukarakate, North-Eastern Zimbabwe. In: *Forests, chiefs and peasants in Africa: Local management of natural resources in Tanzania, Zimbabwe and Mozambique* (eds. Virtanen, P. and M. Nummelin). Pp. 65-85. Silva Carelica 34: University of Joensuu.

UNRISD. 1994. Environmental degradation and social integration. Briefing Article No 3. United Nations Research Institute for Social Development (UNRISD). World Summit for Social Development.

Virtanen, P. 2002. The role of customary institutions in the conservation of biodiversity: Sacred forests in Mozambique. *Environmental Values* 11: 227-241.

Von Benda-Beckmann, F., K. Von Benda-Beckman and M.G. Wiber. 2006. The properties of property. In: *Changing properties of property* (eds. Von Benda-Beckmann, F., K. Von Benda-Beckmann and M.G. Wiber). Pp. 1-39. New York / Oxford.

Wardell, D. and C. Lund. 2006. Governing Access to forests in northern Ghana: Micro-politics and the rents of non-enforcement. *World Development* 34(11): 1887-1906.

Watson, E. 2001. Inter institutional alliances and conflicts in natural resource management: Preliminary research findings from Borana, Oromia Region, Ethiopia. Working Article No. 4. Marena Research Project.

Watson, E. 2003. Examining the potential of indigenous institutions for development: A perspective from Borana, Ethiopia. *Development and Change* 34(2): 287-309.

Williams, T. 1998. Multiple uses of common pool resources in semi-arid West Africa: A survey of existing practises and options for sustainable resource management. London: Natural Resources Perspective No. 38.

Ylhäisi, J. 2006. Traditionally protected forests and sacred forests of Zigua and Gweno ethnic groups in Tanzania. Ph.D. Dissertation, Department of Geography Faculty of Science, Helsingin Yliopiston Maantieteen Laitoksen Julkaisuja, Finland.

Zelealem T. and N. Leader-Williams. 2005. Indigenous common property resource management in the central highlands of Ethiopia. *Human Ecology* 33(4): 539-563.