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

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INTRODUCTION

In Africa, common pool resources (CPRs) 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). 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 & Townsend 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. 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 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,

### Table 1

<table>
<thead>
<tr>
<th>Aspects</th>
<th>Informal institutions</th>
<th>Formal institutions</th>
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</thead>
<tbody>
<tr>
<td>Nature of evolution</td>
<td>Endogenous</td>
<td>Exogenous</td>
</tr>
<tr>
<td>Functional and structural arrangements</td>
<td>Site specific</td>
<td>Common at district or national level</td>
</tr>
<tr>
<td>External input and material support</td>
<td>Low</td>
<td>High</td>
</tr>
<tr>
<td>Consideration of social and cultural embeddedness</td>
<td>High</td>
<td>Low</td>
</tr>
<tr>
<td>Ownership</td>
<td>Local community</td>
<td>State</td>
</tr>
<tr>
<td>Enforcement and monitoring</td>
<td>Based on agreement of community</td>
<td>Legally by state</td>
</tr>
</tbody>
</table>
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 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, social capital theories 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 (Tynnelä & 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...
informal institutions within the ‘target environment’ (Watson 2007). This had turned the attention of the development agencies to the importance of the already existing informal institutions within the ‘target environment’ (Watson 2007). 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-Oppoku 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 (Zealealem & 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 policies that do not give specific roles to informal institutions in sustainable CPR management (Antinori &

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 &
Furtheremore, 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**

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

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

*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 council’s 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.

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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).

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