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# **How Informal Institutions Strengthen Sustainable Management of Common Pool Resources in Tigray, Ethiopia?**

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Agricultural Sciences

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**Declaration**

I declare that no material in this thesis has previously been submitted for a degree at this or any other University.

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## **Dedication**

This work is dedicated to my parents, Yami Degefa and Yalemwork Berhane, who taught me the values of dreaming big and hard work.

## **Summary**

Common pool resources (CPRs) such as forests and grazing lands are important means of rural livelihoods in Sub Saharan Africa (SSA) and in particular for more than 80 % of the population in Ethiopia. The contributions of such resources to reduce rural poverty and food insecurity, however, were hindered by the intense CPR degradation. The efforts of the Governmental and Non-Governmental Organizations to deal with the problem were not successful due to the top-down approaches followed in the interventions and the little attention given to the local institutional context of CPR management. Despite this concern, in-depth studies that explore the effectiveness of the institutional arrangements to achieve sustainable CPR management are lacking considering the diverse socio-economic and cultural settings. This doctoral study compares the effectiveness of informal and formal institutions in sustainable CPR management in SSA, and investigates the contributions of informal institutions in strengthening the sustainable management of CPRs in Tigray, Ethiopia. A qualitative meta-analysis was conducted to synthesize the literature on CPR management across SSA. Moreover, during July and November 2008, data was collected from users of communal grazing lands and exclosures in Tigray using methods including in-depth interviews and focus group discussions.

Results showed that informal institutions in SSA 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. Conditions that hinder effectiveness of both types of institutions include high population growth on limited CPRs, the growing scarcity of CPRs due to land use change, and lack of human and financial capacities in rule enforcement. In Tigray, informal institutions were crucial in reversing the shortage of grazing land by regulating access to the communal grazing land and enhancing

controlled use of grass. However, they did not contribute in resolving the conflicts that arose from unequal allocation of benefits in the village far from the market and Wereda (district) town. Incorporating zero-grazing practices in the informal institutions was hindered by disagreements among users and the top-down approach used by development agents when introducing zero-grazing. Village bylaws mitigated the forest degradation by mobilizing users towards common goals in the management of exclosures and resolved the conflicts among users by using monetary sanctions. In the village closer to the market and district town, the enforcement of village bylaws was weak. This arose from the existing high social capital among users that increased the negligence among users in exposing free riders that were their relatives and neighbours. In order to overcome the negative consequences of the existing high social capital among users on rule enforcement in the village, the village committee shall focus on developing sense of responsibility among users rather than focusing on penalties. Furthermore, to enhance the effectiveness of informal institutions in managing communal grazing lands and exclosures, the increasing grazing pressure and shortage of wood should be addressed by using more efficient schemes of grass and wood harvesting. This can be achieved through understanding the socio-cultural context and identifying the choices of users with active involvement of users in the decision-making. Improving the conditions that hinder the contributions of both types of institutions is crucial to enhance the institutions' effectiveness in sustainable CPR management in SSA. Consideration of well-performing informal institutions in policy and development interventions is essential to maximize the benefits of communal grazing lands and exclosures for improving livelihoods of users.

## **Zusammenfassung**

Allmendegüter (Common pool resources, CPRs) wie Wald und Weideland sind eine bedeutende Lebensgrundlage im ruralen Sub-Sahara Afrika (SSA), insbesondere für mehr als 80 % der Bevölkerung Äthiopiens. Eine ausgeprägte Degradation der CPR jedoch schränkt den Beitrag dieser Ressourcen zur Reduktion von ländlicher Armut und zur Verbesserung von Ernährungssicherheit ein. Die Anstrengungen von Regierungs- und Nicht-Regierungsorganisation zur Lösung dieses Problems waren nicht erfolgreich, da die Interventionen auf Top-Down-Ansätzen basierten und wenig Rücksicht auf den lokalen institutionellen Kontext und die Organisation der CPR genommen wurde.

Trotz der genannten Bedenken wird in Studien über die Effektivität institutioneller Organisationen zum Erreichen nachhaltiger Bewirtschaftung von CPRs den sozio-ökonomischen sowie kulturellen Hintergründen keine Beachtung geschenkt. Diese Arbeit vergleicht die Effektivität von formellen und informellen Institutionen zur nachhaltigen Bewirtschaftung von CPRs in Sub-Sahara Afrika, und untersucht den Beitrag informeller Institutionen zur Stärkung nachhaltiger Bewirtschaftung von CPRs in Tigray, Äthiopien. Hierfür wurde eine qualitative Meta-Analyse der vorliegenden Literatur zur Bewirtschaftung von CPRs in Sub-Sahara Afrika durchgeführt. Weiterhin wurden in Juli und November 2008 Methoden wie Tiefeninterviews und Fokusgruppen angewendet, um primäre Daten in Tigray zu erheben. InterviewpartnerInnen waren NutzerInnen von kommunalem Weideland und geschlossenen Gebieten, deren Nutzung explizit geregelt ist.

Die Resultate zeigen, dass informelle Institutionen in SSA zur nachhaltigen Bewirtschaftung von CPRs beitragen, indem sie den Rahmen für gemeinschaftliche Entscheidungsfindung schaffen, die Sicherung exklusiver Nutzung von CPRs bei niedrigen Kosten ermöglichen sowie lokal akzeptierte Sanktionen durchsetzen.

Die Effektivität formeller wie auch informeller Institutionen wird durch folgende Faktoren eingeschränkt: starkes Bevölkerungswachstum gegenüber einer begrenzten Fläche von CPRs, Verknappung von CPRs durch Veränderungen in der Landnutzung sowie Mangel von finanziellen und personellen Mitteln zur Durchsetzung von Regeln.

In Tigray leisten informelle Institutionen einen äußerst wichtigen Beitrag um den Mangel an Weideland zu lindern, indem sie den Zugang zu kommunalem Weideland regulieren und die kontrollierte Nutzung von Weidegras fördern. Zur Lösung von Konflikten jedoch, welche sich aus der ungleichen Verteilung von Nutzen ergeben, leisten informelle Institutionen im vom Markt- und Bezirkshauptort weit entfernten Dorf keinen Beitrag. Die Einführung reiner Stallhaltung durch informelle Institutionen wurde durch Meinungsverschiedenheiten unter den NutzerInnen sowie den von Entwicklungsbeauftragten vertretenen Top-Down-Ansätzen behindert. Andererseits halfen Dorfstatuten, CPR NutzerInnen für gemeinsame Ziele in der Bewirtschaftung von kontrolliert genutzten Waldgebieten zu mobilisieren und monetäre Sanktionen durchzusetzen. Dies trug zur Entschärfung der Degradation von Waldgebieten bei.

Im Dorf, welches näher am Markt- und Bezirkshauptort liegt, war die Durchsetzung von Dorfstatuten gering. Das hohe Sozialkapital der NutzerInnen schwächte die Bereitschaft, Trittbrettfahrer (wie Verwandte und Nachbarn) anzuzeigen. Um diese negativen Effekte hohen Sozialkapitals auf die Durchsetzung von Regeln im Dorf zu überwinden, sollte das Dorfkomitee mehr Gewicht auf die Entwicklung eines gemeinsamen Verantwortungsbewusstseins der NutzerInnen legen, als auf Strafen.

In Zukunft sollte die Effektivität informeller Institutionen zur Bewirtschaftung kommunalen Weidelands und geschlossener Gebiete verbessert werden. Dies kann durch effizientere Strategien zur Einbringung von Weidegras und Holz erreicht werden, um den steigenden Druck auf Weideland und den Mangel an Holz abzuschwächen. Von besonderer Bedeutung



ist hierbei, den sozio-kulturellen Kontext zu verstehen und Entscheidungen von NutzerInnen durch aktives Einbeziehen zu verstehen und umzusetzen.

Um die Effektivität von formellen und informellen Institutionen für die nachhaltige Bewirtschaftung von CPRs in SSA zu erhöhen, ist es von äußerster Wichtigkeit, negativ wirkende Rahmenbedingungen zu verbessern. Weiterhin sollte der Beitrag funktionierender informeller Institutionen in der Konzeption von Entwicklungsmaßnahmen berücksichtigt werden, um den Nutzen kommunalen Weidelands und geschlossener Gebiete zur Sicherung des Lebensunterhalts von NutzerInnen zu maximieren.

## **Acronyms**

BoANRD	Bureau of Agriculture and Natural Resources Development
BoARD	Bureau of Agriculture and Rural Development
BOKU	Universität für Bodenkultur Wien
CPRs	Common Pool Resources
CSA	Central Statistical Agency of Ethiopia
EFAP	Ethiopian Forestry Action Plan
ETB	Ethiopian Birr
ERSS	Ethiopian Rural Smallholder Survey
FAO	Food and Agriculture Organization of the United Nations
FDRE	Federal Democratic Republic of Ethiopia
ILRI	International Livestock Research Institute
m. a. s. l.	meter above sea level
MoFED	Ministry of Finance and Economic Development
REST	Relief Society of Tigray
RLUPD	Tigray Regional Land Use Planning Division
SSA	Sub Saharan Africa
TIC	Triangular Institutional Cooperation
UNRISD	United Nations Research Institute for Social Development
US \$	US Dollar

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## **Thesis Structure**

This thesis comprises three parts. Part A presents the theories, insights, practices, and overall context of the study including the background, rationale of the study, and a conceptual overview on informal institutions and common pool resources management. Part B comprises the three research papers. Paper I compares the effectiveness of informal and formal institutions in sustainable common pool resources management in Sub Saharan Africa. Paper II investigates how informal institutions contribute to address challenges in communal grazing land management in Tigray, Ethiopia. Paper III analyses how village bylaws strengthen the sustainable management of exclosures in the drylands of Northern Ethiopia. Finally, part C presents a general discussion that includes implications of the study, recommendations that will support the BoARD, village committees, and policy makers in decision-making, and the conclusions. Moreover, additional tasks that were accomplished during the study period are attached in the annex.

# **Part A. Overview of Theories, Insights, Practices, and Background to the Study**

## 1. Informal Institutions and Sustainable Common Pool Resources Management

### 1.1. The “Tragedy of the Commons” Model

Garrett Hardin’s article on “*The Tragedy of the Commons*” was based on an observation on what could happen when a hypothetical open access pasture is open for all people. He stressed that people are selfish by nature and the pasture will be overexploited due to the maximization of benefits by individual users over several users (Hardin, 1968). Stern et al. (2002) evaluated the consequences of Hardin’s work: (1) in regard to public policy, it has lent intellectual support to approaches based on his idea that natural resources can be sustained only if management responsibilities lie in a single space. This has led to the privatization or state control of resources in developing countries. Among others, Steins and Edwards (1998) highlighted that the thesis has been applied to a variety of resource management issues and policy decisions, most notably in fisheries, forestry, and watershed management, (2) the work also spurred widespread efforts to test his formulation against the experiences of human groups managing communal resources. For instance, Basurto (2005) illustrated the case of the Seri people, a small-scale fishing community in Mexico that have devised a set of rules<sup>1</sup> to allow access to the outsiders that were eager to gain access to the fishing grounds. The Seri people created alternative entry mechanisms, such as contracts of recruitment among the local community and non-Seri fishermen. In this way, the Seri people diverted all the economic benefits that the government officials could generate from granting the access to the outsiders to themselves. Under “*The Tragedy of the Commons*” model, this situation would eventually lead to the overexploitation of the fishing grounds. However, the local communities were able to simultaneously maintain access and use controls for the continuing sustainability of their fishing grounds.

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<sup>1</sup> Rules refer to any social conventions on what is acceptable or normal behaviour commonly adhered to in a society (Pretty, 2007).

Feeny et al. (1990) rejected Hardin's simple one-to-one relationship between property rights regime and outcome because the postulate overlooks the important role of institutional arrangements that provide for exclusion and regulation of use and cultural factors. Although the dependence on communal resources was seen by some researches as an important cause of the tragedy, Young (2007) argued that "*The Tragedy of the Commons*" is not fundamentally a consequence of reliance on common pool resources (CPRs). Rather the problem to which this concept applies occurs in situations featuring resources that are scarce in the sense that demand exceeds supply and that do not lend themselves to the introduction of affordable exclusion mechanisms or other restrictions on human use.

In addressing the problem of "*The Tragedy of the Commons*" by achieving exclusion, there is an ongoing debate on whether the solution could be private or state ownership of the common pool resources. Here, proponents of private ownership argue that private ownership of natural resources will ensure that users have incentives to manage their resources well (Demsetz, 1967; Raymond, 2003). At the same time, proponents who advocate for state ownership of the CPRs argue that governments are appropriate custodians of natural resources (Hardin, 1968). Yet Gibson et al. (2002) argued that the management of forests as communal property was more important than private ownership in Guatemala. Such arguments are opposed by Acheson (2006) who emphasized that there is no universal solution to the problems of resource management as private owners, governments, and communal resources management. All can be effective in managing natural resources or they can also fail due to a number of circumstances. For instance, even under conditions of secure rights and efficient markets, private property can lead to overexploitation due to poverty, economic competition, and problems associated with slow-growing resources. Young (2007) added that private ownership can lead to outcomes that are grossly unfair, and states often lack the will and

capacity to manage the public property well. For instance, in a country like India, it is not possible to close the forest for the use of the state alone because many people depend on the forest for basic needs such as fuel wood, timber, fodder, and medicines. In this case, unless the people's dependence on the forest is reduced by devising strategies that enhance agricultural production, it could not be possible to manage forests as a state property regime. The only path to sustainable communal resources management is then by seeking people's participation and devising resource management approaches according to the local socio-cultural settings (Lise, 2007).

## **1.2. The Common Property Theory**

The term "Common pool resource" refers to natural or people-made resource systems that share two important characteristics: excludability and subtractability (Ostrom, 1990). The first attribute-difficulty of exclusion-arises from several factors including the cost of parcelling or fencing the resource and the cost of designing and enforcing property rights to control access to the resource. The second attribute "subtractability" creates rivalry between different users. The resource units (e.g. bundles of firewood or fodder) that one user extracts from a CPR are not available to others. Each user is thus capable of subtracting from the benefits that others derive from a CPR. Because of these characteristics, CPRs are potentially subject to over-exploitation, depletion or degradation. A broad challenge in the management of CPRs is how to co-ordinate the use of the CPRs by individuals as population grows in order to prevent overexploitation (Williams, 1998). In line with this, different frameworks and designs were proposed by authors to describe a situation in which CPRs can be managed in a co-ordinated manner.

In Oakerson's framework, a CPR can be described with four types of attributes or variables:

(1) the physical attributes of the specific resource or facility and the technology used to



appropriate its yield, (2) the decision-making arrangements (organization and rules) that govern relationships among users (and relevant others), (3) the mutual choice of strategies and consequent patterns of interaction among decision makers, and (4) outcomes or consequences (Figure 1). Here, Oakerson (1990) pointed out that a better understanding of the dynamic relationships among the four variables with a multi-level framework is crucial. This view was supported by Mehta et al. (1999) who argued that a failure to appreciate the dynamic nature of institutions often leads to the proliferation of simplistic interventions in communal resources management that undermine the dynamic nature of people's responses to livelihood uncertainty.

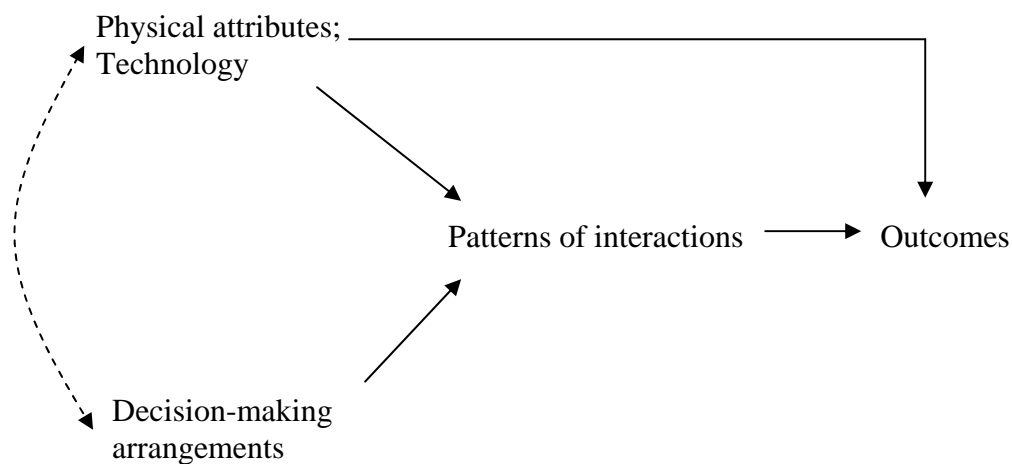


Figure 1 A Framework for analysing the commons (Source: Oakerson, 1990)

Ostrom (1990) also found that groups that are able to organize and govern their behaviour successfully are marked by the following principles: (1) group boundaries are clearly defined, (2) rules governing the use of collective goods are well matched to local needs and conditions, (3) most individuals affected by these rules can participate in modifying the rules, (4) the rights of community members to devise their own rules are respected by external authorities, (5) a system for monitoring behaviour of group members exists and the members themselves undertake the monitoring, (6) a graduated system of sanctions is used, (7) community members have access to low-cost conflict resolution mechanisms, and (8)

appropriation, provision, monitoring, enforcement, conflict resolution, and governance activities are organized in multiple layers of nested institutions. These principles facilitate better performance of CPR management over time. However, having a closer examination of the principles, Agrawal (2001) argued that Ostrom (1990) should be seen as considering 10 factors and not 8 because her first principle refers to clearly defined boundaries of the CPRs and membership in a group. Similarly, her second principle is an amalgam of two elements: a match between level of restrictions and local conditions, and between appropriation and provision rules. The past few decades witnessed a number of case studies that analysed the effectiveness of institutional settings using the eight design principles (e.g. Becker and Ostrom, 1995; Shivakoti and Bastakoti, 2006). The institutions that govern the management of CPRs have been analysed according to the eight design principles, and could be considered as ‘Robust institutions’ when they are characterized by most of the design principles that enable CPR users to manage their resources in a sustainable manner. Among others, Sarker and Itoh (2001) found that the design principles “monitoring” and “graduated sanctions” were quite implicit in the managements of irrigation as CPR in Japan. This is because of the fact that the irrigators usually obeyed the rules and did not discuss openly the problems associated with rule violation.

Moreover, Ostrom et al. (1994) developed the Institutional Analysis and Development (IAD) framework that focused on individuals that make decisions over the course of action. The framework introduced the context in which local actors interact to create the institutional arrangements that shape their collective decisions and individual actions (Andersson, 2006). In this framework, policy processes and outcomes could be affected by four variables: (1) attributes of the physical world, (2) attributes of the community within which actors are embedded, (3) rule that create incentives and constraints for certain actions, and (4)

interactions with other individuals. The relationships among the variables are illustrated in figure 2 (Koontz, 2005). The framework has become an important approach in understanding institutional settings in CPR management under the context of developing and developed countries. The relevance of analysing the institutions of fisheries management in the US using the IAD framework was recommended by Imperial and Yandle (2005). Moreover, Clement and Amezaga (2008) analysed the reforestation policies in northern Vietnam using the IAD framework and found that the implementation of national policies was in conflict with the local reality in upland areas and has led to unpredictable outcomes.

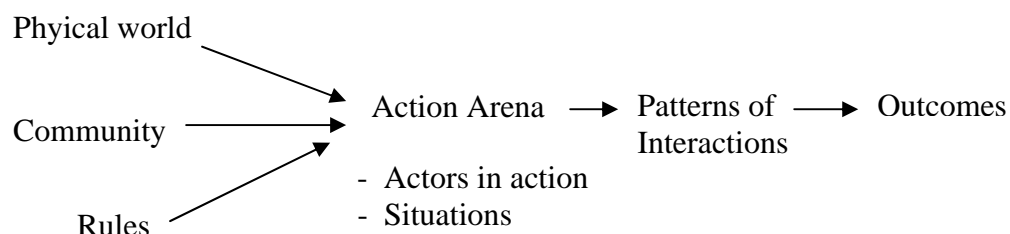


Figure 2 The Institutional Analysis and Development Framework (Source: Ostrom et al., 1994 adapted by Koontz, 2005)

Yet, Steins and Edwards (1999) criticized the ‘Common Property Theory’ in that the theory is too limited to explain either the persistence or the failure of collective action processes because: (1) it is based on the assumption that CPRs are single-use resources, (2) it tends to focus on ‘internal’ factors contributing to collective management, thereby disregarding external factors influencing users’ decisions, and (3) it draws heavily on post positivist ontology in assuming that outcomes of collective action processes are determined by a number of predefined design principles, taking attention away from the process through which collective action is constructed (and reconstructed) by the users. In line with this, the “multiple-use resources framework” that bases itself in social constructivist school was used to study CPR systems. For instance, a case study by Meinzen-Dick and Bakker (1999) in

Kirindi Oya, Sri Lanka emphasized the importance of developing platforms for negotiation among users on the management of irrigation systems as CPRs, both as agricultural and non-agricultural uses for improving livelihoods of users. Regardless of this and passing through different designs and frameworks, the Common Property Theory has got wide recognition among scholars for its potential to explain the local contextual factors and institutional arrangements of CPR management.

### **1.3. The Entitlements Approach**

In contrast to the collective action school, an entitlement literature spearheaded by Sen (1981), is centrally concerned with the problem of inequality, and with the ways in which formal and informal rules create and reinforce unequal access to CPRs (Johnson, 2004). Most importantly, Leach et al. (1999) formulated an “environmental entitlement framework” that considers the heterogeneity among community and categorizes institutions at macro, meso, and micro levels. The relationships among these institutions and between scale levels influences which social actors that gain access to and control over local resources. The work of Leach et al. (1999) is extremely useful for two reasons. Firstly, it keeps an eye on conflicting interests in organizing livelihoods. Communities are not treated as static or undifferentiated, and multiple identities and conflicting values and claims over the natural environment occur. Secondly, it shows how this political arena of livelihoods should be analysed through the working of institutions (de Haan and Zoomers, 2005). Among others, Nygren (2005) applied the framework in analysing the institutional context of communal forest management in Honduras and found that the sustainability of communal forest management depends on many macro scale forces including land tenure legislation, loan conditions, and national and global forest markets. Furthermore, the framework contributes for the analysis of livelihoods as it emphasized the economic attributes of livelihoods as mediated by social-institutional processes (Scoones, 2009).

In sum, the “*The Tragedy of the Commons*” scenario constitutes the basis for the study of CPRs. The theories that were developed after this model, regardless of their differences in special focus on collective action, design, or entitlements, emphasized on more optimistic approaches towards users’ ability to achieve sustainable CPR management. Above all, the recent trend highlights the dynamic nature of CPR systems and the heterogeneity among users, and the ultimate impacts of the interactions of users under complex socio-cultural contexts on the livelihood improvements. This process based view has guided the insights and practices of the CPR management in the past few decades.

## **2. Background**

### **2.1. The Problem of CPR Degradation in Sub Saharan Africa**

Recent estimates revealed that 80 % of the global forests (FAO, 2010), and much of the global pastures are publicly owned. Common pool resources are important sources of food, timber, fuel wood, and grazing land in developing countries (Berhanu et al., 2006). CPRs also serve as a form of insurance for the rural poor (TIC, 2000) and contribute for much of the income generated by the rural households in developing countries. For instance, CPRs contribute US \$5 billion a year for the total household income in India (Beck and Nesmith, 2001), 35 to 40 % of total household income in Southern Zimbabwe (Cavendish, 1998, 2000), and communal forests contribute 27 % of the total household income in Northern Ethiopia (Bedru et al., 2009). As a result, the management of CPRs by the local community has gained momentum in many developing countries owing to the positive contributions of CPRs to rural livelihoods, biodiversity conservation, and economic development (Adhikari and Falco, 2009).

However, the degradation of CPRs is one of the fundamental problems confronting the efforts to increase agricultural production, and to reduce poverty and food insecurity (Berhanu and Swinton, 2002). The Millennium Ecosystem Assessment estimated that 10-20 % of all grass lands is degraded mainly due to overgrazing. Moreover, there was a decline in forest cover in low-income countries and dry land regions (MEA, 2005). The main causes of CPR degradation in Africa are deforestation, overgrazing, and expansion of agricultural lands over CPRs (Betru et al., 2005). The lack of policy and institutional arrangements also hindered the prevention of overexploitation and depletion of CPRs such as grazing lands, forests, groundwater, and fisheries (Bekele et al., 2009).

The negative consequences of unsustainable CPR management include: the loss of biodiversity that would have crucial importance in reducing rural poverty by managing tradeoffs in ways that maintain and/ or restore the capacity of ecosystems to provide the full range of services to human-beings, and the threat to livelihoods of the CPR users (Berhanu and Swinton, 2002). Moreover, the degradation of CPRs threatens the value of CPRs as insurance against risk and also aggravates the pressure on the remaining CPRs, and resulted in conflicts among users. For instance, Chabwela and Haller (2008) indicated that communal pastures in the Kafue flats of Zambia faced degradation due to poor flooding regime and loss of habitat caused by the proliferation of weeds. This resulted in declining range capacity and the consequent shortage of feed for livestock.

## **2.2. The Problem of CPR Degradation and the Need of Sustainable CPR**

### **Management in Ethiopia**

In Ethiopia, 85 % of the population is supported by the agricultural economy that is entirely based on natural resources including croplands, forests and grazing lands (CSA, 2008).

However, the productivity of that economy is being seriously eroded by unsustainable land

management practices both in areas of food crops and in grazing lands. Managing agricultural resources communally has been a common practice in rural areas of Ethiopia although information is lacking on the extent of CPRs in the country. The CPRs have crucial importance to the livelihoods of rural communities serving as the main source of water, feed for livestock, and fuel wood among others.

However, the CPRs are relatively primitive and most of the CPRs are in a state of either exhaustion or stress, reflecting the low level of agricultural development (Bereket, 2002). Factors that contributed to the preservation of the remaining CPRs in Ethiopia include the attributes of the CPRs, such as the importance in meeting the local food, feed, or energy needs and being located on land that is less suitable for crop production, the very nature of the rules that govern the CPR management in being evolving from traditional practices, and the attributes of the local communities such as homogeneity in terms of occupation and wealth (Yeraswork, 2001). However, the above factors become progressively weakened following the virtual collapse of traditionally devised CPR management systems in the country.

Besides, the encroachment in the expansion of crop cultivation resulted in diminishing the communally managed grazing lands (Mengistu, 2005). With steady growth in population, clearing of woodlands for agriculture has been a continuous process at an estimated rate of 150,000 ha per year in the past decades (EFAP, 1994). The forest cover has reduced from the original 65 % to 2.2 % (Berry, 2003). For instance, the degradation of communal grazing lands has led to ethnic conflicts and a decline in total livestock numbers in Borana, Ethiopia (Boku, 2008). Moreover, the growing scarcity of fuel wood resulted in the further over

exploitation of communal forests (Bereket, 2002). Thus, addressing the problem of CPR degradation becomes crucial in the efforts of rural poverty reduction.

Recently, there has been a strong revival of informal institutions to assume a self-help and development roles (Zealelem and Leader-Williams, 2005). Moreover, Watson (2003) stressed that development agencies in Borana, Ethiopia have seen the informal institutions of natural resources management as a means to address the needs of people and the environment in a way that is also participatory. Almost 40 % of the smallholder farmers in Ethiopia are members of at least one informal institution (ERSS, 2005). Many of the informal institutions can be strengthened and transformed to assume various development roles (Berry, 2003). Church, mosque, '*iqub*' (informal rotational savings), and '*idir*' (informal burial institutions) are some of the most common informal institutions in Ethiopia, with varied influences on CPR management (Pankhurst, 2003).

In line with this, various informal institutions such as the rules, norms<sup>2</sup>, and taboos were also involved in addressing the CPR degradation problem in Ethiopia. From a social perspective, this renewed interest is partly due to a new-found pride in informal values and institutions, and their value as a tool for conserving natural resources (Zealelem and Leader-Williams, 2005). Members of village committees, village judicial, and religious leaders also establish themselves as important stakeholders in community-level undertakings. The assumption by local experts behind the various informal institutions is that they will facilitate active involvement of communities in managing CPRs (Personal communication with local agricultural experts in Tigray). Such institutions should also help to minimize transaction

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<sup>2</sup> Norms are patterns of behaviour expected within a particular society in a given situation, and taboos are strong social prohibition relating to any area of human activity or social custom declared as sacred and forbidden (Boesen et al., 1999; Colding and Folke, 2001).



costs, control the opportunistic behaviour of some members of the community, and enhance the capacity of farmers to adapt to major drivers of change such as population pressure, climatic change, and market signals (Jagger et al., 2005; Tilahun et al., 2007).

There has not been sufficient debate about the formal and informal institutions in Ethiopia. Yet, there is a general consensus among the national scientific community that the informal institutions have a resilient nature in connection with CPR management and play an important role in enabling individual users to establish solidarity with their neighbours towards achieving common goals in CPR management (Zealelem and Leader-Williams, 2005; Spielman et al., 2009). Dessalegn (2004) pointed out that informal institutions have so far been examined from a functional point of view, and hence there has been little discussion about the internal arrangements, their ability to transcend their narrow goals and articulate the demands of the community.

Informal institutions operate and co-exist with the formal institutions throughout Ethiopia (Spielman et al., 2009). However, the interplay between formal and informal institutions is complex in the country. For instance, when conflicts arise among residents, conflict resolution processes are managed by both formal and informal institutions. In such instances, the adjudication process could be done by the village judicial or the district administrative bodies and forwarded to the village elders for review or consultation before final decisions are made. Maconachie et al. (2009) highlighted that there are concerns that informal institutions in Ethiopia are breaking down due to a lack of support from local administrative structures, despite the process of decentralization. This has major implications for the sustainable use of CPRs and food security throughout the country. Desalegn et al. (2007) supported the loose collaboration between the government and the *Gadda* system, an

informal institution that contributes in resolving intra and inter ethnic conflicts over natural resources in Southern Ethiopia. This limited understanding of the role played by the *Gadda* system by the state has diminished the efficacy and relevance of this informal institution in conflict resolution. In support of this, Homann et al. (2008) elaborated that several development interventions interfered with informal institutions in managing the communal grazing lands, notably by establishing watering ponds, the imposition of a formal administration, and the alienation of valuable grazing and water resources. Such partnerships dissolve when they fail the preconceptions of the developers. This in turn contributed for the degradation of rangelands and weakened the resilience of pastoralists to drought in the area. Similarly, Yohannes and Waters-Bayer (2007) observed the failure of development agencies in recognizing the informal institutions that enjoyed local legitimacy in Tigray, Northern Ethiopia.

### **2.3. CPR Management in Tigray**

Tigray, the northernmost region of the country, is considered as one of the most extreme cases of CPR degradation. The lag in agricultural productivity advancement behind population growth has caused intense land use conflicts, particularly between the agricultural and forestry sectors (Betru et al., 2005). Due to the high population pressure, almost all grass lands in Tigray have been converted to crop cultivation areas. The only remaining grass lands are the Aiba and Hashenge in the southern zone. These grass lands are even shrinking from year to year. Practically, no woody species are observed in these grass lands (RLUPD, 2000). Deforestation for arable land expansion has been the principal land use conversion employed in Tigray for centuries, as compensation to the low agricultural productivity (Tekle, 1999). There are several repercussions of such land use conversion, the most important ones in Tigray being accelerated soil erosion and the consequent low productivity of CPRs (Berhanu et al., 2004).

Thus, considering the intense degradation of the natural resource base, the sustainable management of CPRs in Tigray becomes crucial for policy and development interventions. The sustainability of CPR management depends on internal factors such as rules of access and enforcement mechanisms, and external factors such as policies of land tenure, impacts of drought, and the influences of development interventions (Chisholm, 2004). The development challenge is therefore identification of the proper institutional arrangements that will prevent overexploitation of CPRs by enhancing wise utilization of CPRs.

### **3. Rationale of the Study**

In the efforts to reduce the negative impacts of land degradation, rural communities in Tigray made efforts in rehabilitating the degraded lands. Especially users of communal resources mobilized collective action towards achieving sustainable management of resources, such as forests and grazing lands. For instance, rural communities made concerted efforts in constructing stone terraces and soil bunds, establishing exclosures and in participating in tree planting programs since last few decades (Mitiku and Kindeya, 1998; Fitsum et al., 1999). However, remedial measures in the past have focused on physical structures of land rehabilitation. Policy, institutional and participation issues were usually not highlighted in the remedial measures (Berry, 2003).

Informal institutions govern the access, use and management of CPRs by using enforcement mechanisms that arose from historical and cultural customs and norms (Mbereketo et al., 2007). The management of the CPRs with informal institutions focused on excluding outsiders, preventing inappropriate use and giving time for regeneration (Bereket, 2002). However, less emphasis is given in past policy and development interventions in empowering the informal institutions. This has limited the contributions of informal institutions for achieving sustainable CPR management (Melaku, 2003; Tilahun et al., 2007). This is

unfortunate as informal institutions could play an important role in regulating the use and management of CPRs, prevent overexploitation and contribute for improvement of rural livelihoods. Despite the presence of many informal institutions in Tigray, there are relatively few studies in the region that investigated the role of informal institutions in sustainable CPR management (TIC, 2000; Benin et al., 2003; Berhanu et al., 2003, 2004; Benin and Pender, 2006).

Yet, there is limited scientific evidence that enable feasible development and policy interventions that strengthen development using CPRs available at local level. This becomes more critical in the degraded areas of northern Ethiopia considering the complexity in local socio-cultural and political conditions that influence CPR management. To fill this gap, in-depth investigations of the relevant informal institutions for achieving sustainable CPR management are important. Therefore, the main purpose of the present study is to investigate the role of informal institutions in achieving sustainable CPR management.

#### **4. Objectives**

The specific objectives of the study were: (1) to compare the effectiveness of informal and formal institutions in sustainable CPR management in SSA, (2) to investigate the contributions of informal institutions in addressing the challenges in communal grazing land management, and (3) to analyze the effectiveness of the village bylaws for sustainable management of exclosures in Tigray, Ethiopia. The study argues that informal institutions play important roles in strengthening sustainable management of CPRs. In the study, methods including qualitative meta-analysis, in-depth interviews, and focus group discussions were used.

## **5. A Conceptual Overview of Informal Institutions and CPR management in Northern Ethiopia**

Our analysis is based on the theoretical frameworks of New Institutionalism and the Common Property Theory (North, 1990; Ostrom, 1990; Agrawal and Gibson, 1999). Douglas North defined institutions as “rules of the game in society” or “the humanely devised constraints that shape human interaction” (North, 1990). Institutions stabilize the behaviour and interaction of agents, create predictability, and hence resolve conflicts by regularizing rules of engagement (March and Olsen, 1989). Institutions affect how authority is constituted, exercised, controlled, and redistributed by providing a source of constraint, reward, or punishment such as monetary sanctions (Olsen, 2007). As a result of these perspectives, institutions influence the outcomes of collective efforts towards managing communal resources (Moe, 2005).

In New Institutionalism theory, the importance of informal rules, taboos, and norms is emphasized in guiding human behaviour and governing interactions among users towards achieving common goals in communal resources management. The Common Property theory also regards institutions as mechanisms constraining irrational or undesirable practices (Ostrom, 1990). In the past decades, interest has arisen among scholars on the need of relevant institutional arrangements to attain sustainability outcomes in CPR management at low transaction costs. Hence, there is a growing literature from a wide range of disciplines such as anthropology (McCay and Acheson, 1987), economics (e.g. Bromley and Cernea, 1989; North, 1990) and sociology (Carruthers and Ariovich, 2004) that analyzed the suitability of institutional settings to maximize the contributions of CPRs in rural poverty reduction and in enhancing livelihood improvements (Berhanu et al., 2003, 2004; Kayambazinthu et al., 2003; Nkonya et al., 2004).

A common trend of exploring the relevance of village bylaws such as taboos and norms to manage CPRs sustainably was by using criteria set for successful institutional arrangements of CPR management (e.g. Crook and Decker, 2006; Quinn et al., 2007). Though such explorations of cases have importance to understand the enhancing conditions for effective institutions, they did not give answers to the detailed mechanisms of managing CPRs under complex socio-cultural and demographic settings.

The informal institutions are used as mechanisms to manage the communal grazing lands and enclosures, among others in Northern Ethiopia (Figure 3). The informal institutions are locally called '*Serit*', a common name for agreements and rules that are established by the users and used to manage communal resources; rules that are inherited from the past generation and will be transferred to the next generation; sanctions that are enforced by village committees on free riders as penalty; rules that are not established by the government and rules of the village. In the context of rural areas of Ethiopia, formal institutions could be equated with coming from 'outside', whether or not they fulfil formal criteria. Conversely, institutions that are labelled informal and traditionally derived from within the community might have a high degree of formality, for example, written bylaws (Stellmacher, 2007). Therefore, the meaning of informal institutions throughout the thesis is embedded in the above mentioned local meanings.

## Formal institutions

## Informal Institutions

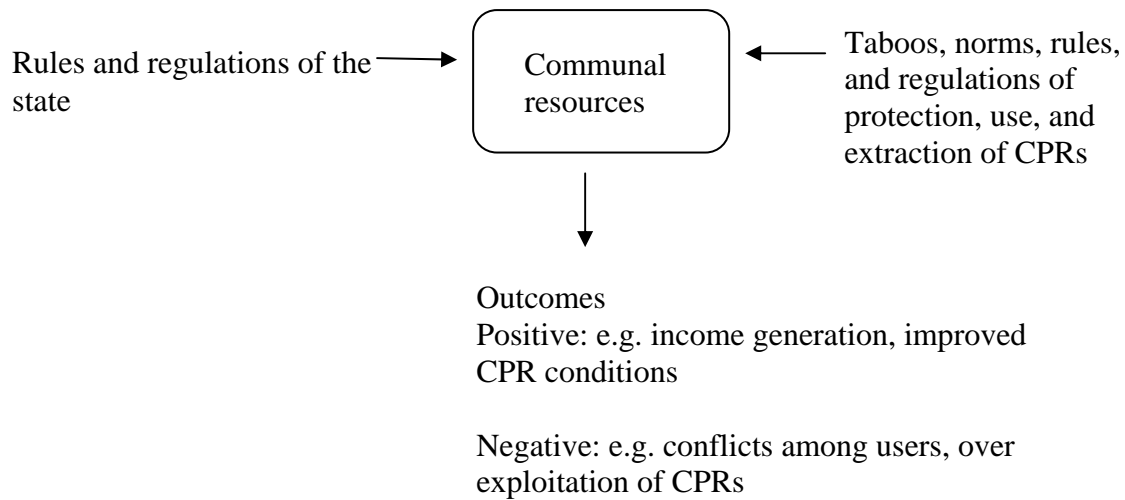


Figure 3 An illustration of the domain in which the concept of informal institutions is used in the study sites

## 6. Study Area

The study was conducted in Tigray, northernmost region of Ethiopia (Figure 4). Tigray is located at 12<sup>0</sup> to 15<sup>0</sup> North latitude and 36<sup>0</sup> 30" to 41<sup>0</sup> 30" East longitude. Currently, the land area of the region is approximately 52,000 Km<sup>2</sup>. The region is bounded in the North by Eritrea, in the East by Afar region, in the West by the Sudan, and in the South by Amhara region (Fitsum et al., 1999). The topography consists of mountain plateau with undulating terrain in the central highlands and plain lowlands in the Eastern and North-Western escarpments, and the elevation ranged from 500 to 3900 m. a. s. l. (TFAP, 1996). The human and cattle population of Tigray increased from 3.14 million in 1998 to 4.31 million in 2008, and from 3.04 million in 1998 to 3.12 million respectively, as reported in a 2007/8 census (BoARND, 1999; CSA, 2008).



Figure 4 Administrative map of Ethiopia, study area indicated by \* (Source: [http://www.catsg.org/cheetah/04\\_country-information/North-African-regions/ethiopia/ethiopia-sat.jpg](http://www.catsg.org/cheetah/04_country-information/North-African-regions/ethiopia/ethiopia-sat.jpg)).

In Tigray, rain-fed crop production is the basis for almost all subsistence farming. Crop production accounts for more than 90 % of the annually cultivated land. *Z. mays* (Maize), *Sorghum bicolor* (Sorghum), *Eragrostis tef* (tef), and *Triticum aestivum* (wheat) are the main cultivated crops. Livestock and livestock products and export crops (such as incense and gum) are also essential components of the production systems in some part of the region (RLUPD, 2000). The rural communities of Tigray depend almost entirely on the use of the region's land resources. Centuries of extensive farming on originally fertile lands, armed conflicts and unsustainable land management practices have severely depleted the natural resource base. Hence, cycles of poverty, overexploitation of land resources, and natural disasters such as drought characterized the rural life in Tigray (REST, 2007).



In the study, three villages in Tigray that differ in distance from market and Wereda town, namely Laelay Ayadim (3 kms), Haikhilet (11 kms), and Aiba (20 kms) were selected to compare the contributions of informal institutions to sustainable CPR management. The main reasons behind taking distance to market and Wereda towns as criteria were: (1) the CPRs users' access to information, technical and financial support from the Governmental and Non-Governmental Organizations could be influenced by the village's distance to the Wereda town, (2) distance to market could influence the revenue from CPR products by influencing the access to timely information on the demand and prices, and (3) the information on the demand and market prices of CPR products, in turn, is an important factor that could influence the harvesting schedules, collective action, and rule enforcement in Tigray (Betru et al., 2005). All the sites are characterized by low agricultural productivity owing to the intense degradation of land resources and erratic rainfall.

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## **Part B. Research Papers**

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

I searched for literature and conducted a qualitative meta-analysis, and produced a first draft of the paper. I revised the draft paper with inputs from Christian Vogl and Michael Hauser.

The paper was published in Conservation and Society Journal in 2009, 7 (3): 153-164.

## **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 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*

## 1. INTRODUCTION

In Africa, common pool resources (CPRs)<sup>1</sup> 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)<sup>2</sup>. However, Berhanu & 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<sup>3</sup>. Informal institutions are systems of rules and decision-making procedures which have evolved from endogenous socio-cultural codes and give rise to social practices, 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.

*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

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 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 decision-making

processes. Finally, recommendations are given, which could help the further improvement of CPR management policies, by shaping the various institutional arrangements.

## **2. 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 make 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<sup>4</sup> 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<sup>5</sup>, social capital theories<sup>6</sup>, and game theory). Today, there is no single widely accepted and unified theory on 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 supported 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 of the local values and norms associated with existing practices 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 for 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.

### **3. 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 article. 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.

## **4. RESULTS AND DISCUSSION**

### **4.1. 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 has 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 CPR management (Zealelem & Leader-Williams 2005). A common pattern in all these cases points to the fact that informal institutions have evolved internally from the society and enacted 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 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, religions 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 has 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 be 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 (Zealelem & 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 socio-economic 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 and 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 CPR management and enhancing collective action among CPR users at low transaction costs. These contributions are enhanced

mainly under conditions of active community participation in CPR management, high social capital and shared beliefs among CPR users and in the presence of well-established village structures. On the contrary, conflicts in the use of CPRs, 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.

#### **4.2. Formal Institutions and Sustainable CPR Management under Decentralised**

##### **Conditions**

In SSA, governments were criticised for establishing highly centralised and bureaucratized 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 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 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 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: 14) verified that the decentralisation was challenged by improper power relations:

‘The meaning of power transfers in one place could be completely different with 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 CPR 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 & 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.

#### **4.3. 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 6 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.

*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 <sup>1</sup>	Active community participation	29	Haro <i>et al.</i> (2004); Tefera <i>et al.</i> (2005)
Regulated use of CPRs	Enabling exclusion at low cost for CPR users <sup>1</sup> , Restricting access to CPRs <sup>2</sup>	High social capital among CPR users enabled successful rule enforcement.	21	Berhanu <i>et al.</i> (2004); Zelealem & Leader-Williams (2005)
Equal benefit sharing among CPR users	Locally agreed sanctions <sup>1</sup> , Imposing sanctions and punishments using state laws <sup>2</sup>	Regular monitoring and sanctioning of rules	19	Leach <i>et al.</i> (1999); Gibson <i>et al.</i> (2004)
Equal benefit sharing among CPR users	Locally agreed sanctions <sup>1</sup> , Imposing sanctions and punishments using state laws <sup>2</sup>	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 <sup>1</sup>	Incorporation of communities' knowledge and mechanisms	11	Appiah-Opoku (1999); Ouinsavi <i>et al.</i> (2005)
Meeting the economic needs of CPR users	Acknowledging local knowledge of CPR management <sup>1</sup> , Enforcing land tenure policies <sup>2</sup>	Modification of rules to meet the needs of users	8	Dore (2001); Anoliefo <i>et al.</i> (2003)
Prevention of CPR degradation	Motivating users to manage CPRs <sup>1</sup> , Enforcing land tenure policies <sup>2</sup>	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 <sup>1</sup>	CPR use conflicts	31	Bazaara (2003); Masangano <i>et al.</i> (2003)
Improved CPR conditions in terms of quantity and quality	Acknowledging local knowledge of CPR management <sup>1</sup> , Enforcing land tenure policies <sup>2</sup>	Change in land use for crop cultivation causing CPRs scarcity	27	Byers <i>et al.</i> (2001); Bedru (2007)



Prevention of CPR degradation	Enabling exclusion at low cost for CPR users <sup>1</sup> , Restricting access to CPRs <sup>2</sup>	High population growth on limited CPRs	25	Dore (2001); Wardell & Lund (2006)
Prevention of CPR degradation	Acknowledging local knowledge of CPR management <sup>1</sup> , Based on technical and financial capacity <sup>2</sup>	Lack of human and financial capacities	24	Olowu (2001); Ribot (2003)
Regulated use of CPRs	Acknowledging local knowledge of CPR management <sup>1</sup> , Restricting access to CPRs <sup>2</sup>	Lack of legitimacy	20	Becker (2001); Nhantumbo <i>et al.</i> (2003)
Meeting the economic needs of CPR users	Enforcing land tenure policies <sup>2</sup>	Lack of feasible policies	18	Cocks <i>et al.</i> (2001); Rohde <i>et al.</i> (2006)
Meeting the economic needs of CPR users	Enforcing land tenure policies <sup>2</sup>	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 <sup>2</sup>	Lack of empowerment	14	Rohde <i>et al.</i> (2006)
Regulated use of CPRs	Creating a suitable environment for joint decision-making <sup>1</sup> , Imposing sanctions and punishments using state laws <sup>2</sup>	Unclear responsibility and power sharing	12	Bazaara (2003); Esenjoraf (2004)
Prevention of CPR degradation	Enabling exclusion at low cost for CPR users <sup>1</sup> , Restricting access to CPRs <sup>2</sup>	Political unrest	11	Benjaminsen (1997); Watson (2001)
Enforcement of rules with mutual agreement of CPR users	Motivating users to manage CPRs <sup>1</sup>	Growing heterogeneity in beliefs among CPR users	10	Campbell <i>et al.</i> (2001); Anoliefo <i>et al.</i> (2003)
Improved CPR conditions in terms of quantity and quality	Acknowledging local knowledge of CPR management <sup>1</sup> , Enforcing land tenure policies <sup>2</sup>	Lack of technological interventions	8	Byers <i>et al.</i> (2001); Mgumia & Oba (2003)
Meeting the economic needs of CPR users	Enforcing land tenure policies <sup>2</sup>	Privatisation of CPRs causing CPRs scarcity	7	Beck & Nesmith (2001)
Enforcement of rules with mutual agreement of CPR users	Enforcing land tenure policies <sup>2</sup> , Restricting access to CPRs <sup>2</sup>	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, <sup>1</sup> Elements of informal institutions, <sup>2</sup> Elements of formal institutions

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 the changing socio-economic 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 socio-economic, 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.

## **5. 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 of 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 6 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 & 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 & van der Blik 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 article 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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**Paper II Informal Institutions as Mechanisms to Address Challenges in Communal  
Grazing Land Management in Tigray, Ethiopia**

I collected data from field, conducted the data analysis, and produced a first draft of the paper. I revised the draft paper with inputs from Christian Vogl and Michael Hauser. The paper was accepted for publication in the International Journal of Sustainable Development and World Ecology on 23<sup>rd</sup> of April 2010 without revisions.

## **Informal Institutions as Mechanisms to Address Challenges in Communal Grazing Land Management in Tigray, Ethiopia**

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### **Abstract**

The role of institutions such as rules, norms, and regulations to address challenges in communal resources management has been a research debate for several decades. This article analyzes the role of informal institutions for addressing shortage of grazing land, conflicts among users of communal grazing land, and the resistance among users to shift from using free-grazing to zero-grazing in Tigray, Ethiopia. We used in-depth interviews and focus group discussions for data collection. We argue that informal institutions are important mechanisms for addressing the challenges in communal grazing land management. The contributions of informal institutions for addressing challenges in communal grazing lands varied with types of challenges and were influenced by distances from markets and Wereda towns. Although the informal institutions were crucial in reversing the shortage of grazing land by regulating access to the communal grazing land and enhancing controlled use of grass, they did not contribute in resolving the conflicts that arose from unequal allocation of benefits in the village far from market and Wereda town. Incorporating zero-grazing practices in the informal institutions was hindered by disagreements among users and the top-down approach used by development agents when introducing zero-grazing. To enhance effectiveness of informal institutions, the increasing grazing pressure should be addressed by using more efficient schemes of harvesting grass. Moreover, creating awareness on the need of fewer but more productive cattle breeds is crucial. Consideration of well-performing informal institutions in policy and development interventions is essential to maximize the benefits of communal grazing lands for improving livelihoods of users.

**Keywords:** Bylaws, communal resources management, conflicts, free-grazing, rules, shortage of grazing land, Wereda, and zero-grazing

## 1. Introduction

Garrett Hardin's thesis on "*Tragedy of the commons*" implies that resources held in common are subject to degradation (Hardin 1968). This view of associating communal resource management with degradation has led to the worldwide acceptance of state or private ownership of resources among policy makers in the past decades. However, several researchers from different parts of the world documented success stories where communities managed their resources in a coordinated manner (e.g. Ostrom 1990; Tefera et al. 2005; Nkonya et al. 2008). There is a growing literature on the importance of informal institutions in communal resources management in the rural context of developing countries (e.g. Agrawal 2001; Kajembe et al. 2003; Kayambazinthu et al. 2003; Berhanu et al. 2004). Several theories were developed to explain the various interactions among users in communal resources management (e.g. common property theory and theory of collective action). In this article, we used elements of the new institutionalism theory (e.g. North 1990) that emphasize the importance of informal institutions in regulating users' behavior towards communal resources management. In addition, we used elements of the social capital theory (e.g. Ostrom 1990) that highlight the importance of shared knowledge and understanding among users about the patterns of interactions in communal resources management.

Establishment of informal institutions<sup>3</sup> that govern the use of communal resources is a common practice in rural Africa (Watson 2003; Makepe 2006; Mastewal et al. 2009). Several authors analyzed and interpreted the effectiveness of informal institutions in communal resources management based on the design principles suggested by Ostrom (1990) (e.g. Crook and Decker 2006; Quinn et al. 2007). Yet, there is a need for further exploration of institutional settings in communal resources management in the complex socio-cultural and

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<sup>3</sup> Informal institutions refer to traditional rules and customs that govern human behavior but that are not codified by state law (Joireman 2001).

political contexts of rural areas of Africa (Kayambazinthu et al. 2003). This need becomes particularly important in rural Ethiopia where the majority of the population directly or indirectly depends on communal resources, including grazing lands, forests, and wetlands for their livelihoods (e.g. Tefera et al. 2005; Bedru et al. 2009).

In Ethiopia, livestock is an important component of rain-fed agriculture. Hence, 40% of the land is used for permanent pastures, which makes sustainable management of grazing lands crucial in rural development efforts (Girma 2001; Gemedo-Dalle et al. 2006). In particular, livestock production has been an important component of the crop-livestock mixed farming in Tigray, the Northern most region of the country (Tassew 2002). The cattle population of Tigray region increased from 3.04 million in 1998 to 3.12 million, as reported in a 2007/8 census (BoARND 1999; CSA 2008). In the region, communal grazing lands played a significant role in the ox plough and rain-fed agriculture basically by providing feed for cattle. RLUPD (2000) estimated that communal grazing lands contributed nearly half of the livestock's feed needs in both dry and wet seasons. In light of this, several studies highlighted the tradition of managing communal grazing lands by using rules and regulations established by the users themselves in several pastoral and agro-pastoral areas of Northern Ethiopia (e.g. Benin et al. 2003; Berhanu et al. 2004). However, there is lack of evidence on the specific roles of informal institutions to address the challenges such as conflicts among users in communal grazing lands in the context of rural areas of Tigray. In this context, the main purpose of this study is to investigate the contributions of informal institutions to address the challenges in communal grazing land management.



Previous studies indicated that distances from markets and Wereda<sup>4</sup> towns influenced the communal resources management in the rural areas of Ethiopia (Bereket 2002; Tassew 2002; Girmay 2006). Benin et al. (2003) also emphasized that distances from markets and Wereda towns were important factors that could influence the effectiveness of the informal institutions in communal grazing land management. Particularly, in the context of Tigray, distance from Wereda influences access to agricultural extension services, the follow-up on sustainability of communal grazing land management, and access to technical support from experts in the governmental and non-governmental organizations. Moreover, market access is considered to influence the economic activities of users, effectiveness of informal institutions, and sustainability of communal grazing land management. Distance from market is taken as indicator of market access. The rural market places, which are usually located in Wereda towns, are the main outlets for farmers to make revenue from outputs (e.g. grass and milk products) of communal grazing lands (Berhanu et al. 2004).

In light of this, the research focuses on investigating the roles of informal institutions as mechanisms to address the challenges that are identified by users to affect the communal grazing land management negatively. We argue that informal institutions of communal grazing land management are important mechanisms for addressing the challenges farmers face in communal grazing land management.

## **2. Study Area and Research Methods**

### **2.1. General Overview of the Study Area**

The evidence for this article comes from a study conducted in three villages, namely Aiba, Laelay Ayadim and Haikhilet, located in Eastern and Southern parts of Tigray region,

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<sup>4</sup> Wereda is an administrative region comprising of a number (approximately 20) of villages (locally called Tabias). Wereda is often described as synonym with district (Kindeya 2003).

Northern Ethiopia (Figure 1). The criteria of site selection were differences in market access and distance from Wereda town. All the study sites have a semi-arid climate.

According to the local agro-climatic classification of Ethiopia, Aiba and Laelay Ayadim have Dega agro-ecology (2300-3200 m. a. s. l.) while Haikhilet has Woina Dega agro-ecology (1500-2300 m. a. s. l.) (ILRI 2002). The average yearly rainfall ranged from 384.1 to 797.8mm year<sup>-1</sup> with an average value 578.4 mm year<sup>-1</sup> (Table 2). The rainy season starts in June, peaks in July and August and trails off in September. Mixed crop-livestock farming is the backbone of the livelihoods of households in all the study sites. Major cultivated crops include *Triticum aestivum* (wheat), *Hordeum vulgare* (barley), *Vicia faba* (faba bean), and *Eragrostis tef* (tef). The villages are characterized by low and erratic rainfall, drought, and land degradation, as are most other parts of Tigray. Like more than 85% of the Ethiopian population, the residents of the study area are mainly rural and dependent on land resources including forests and grazing lands for their livelihoods (CSA 2008).

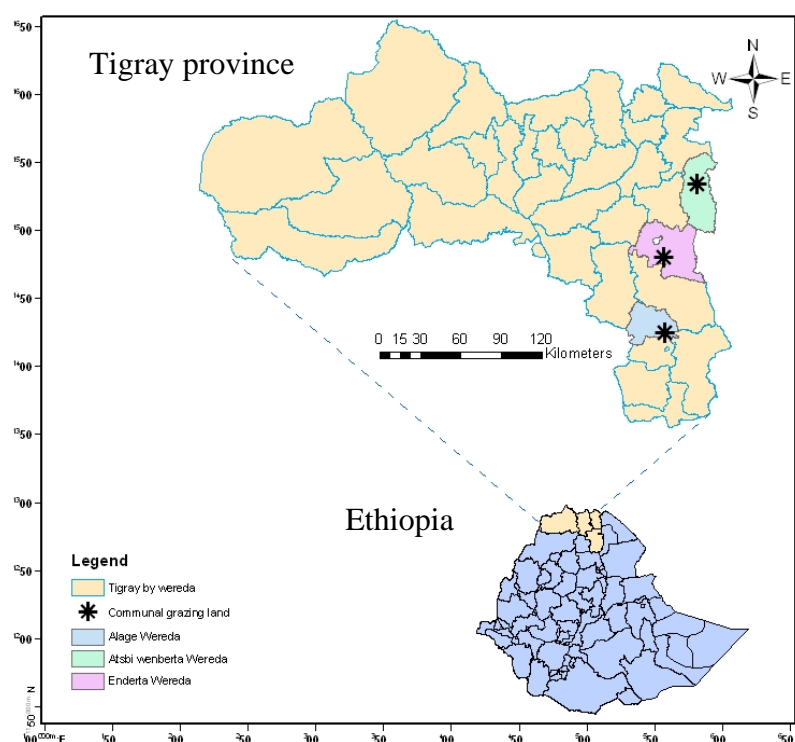


Figure 1 Map showing location of Tigray with specific study sites (indicated by \*)

(Source: Mekelle University, laboratory of Geographic Information System and Remote Sensing)

The communal grazing lands in all the study sites are managed by informal institutions that are locally called ‘*Serit*’. The villagers explained the meaning of informal institutions in different ways: (1) agreements and rules that are established by the users and used to manage communal resources, (2) rules that are inherited from the past generation and will be transferred to the next generation, (3) sanctions that are enforced by village committees on free riders as penalty, (4) rules that are not established by the government, and (5) rules of the village. Therefore, the use of the term ‘informal institutions’ throughout this article was based on the above five definitions provided by the villagers.

## 2.2. Research Methods

Data was collected from July to November 2008 in three villages of Tigray, Ethiopia. The participants of the study were chosen by using purposive sampling technique as suggested by

Patton (2002) to select specific elements of a population that are believed to represent the range of variation expected in a population. For this purpose, three meetings were held with villagers in the three study sites to gather information on the various actors who have first hand information about informal institutions involved in communal grazing land management. In sum, three initial meetings, 32 key informant interviews and 18 focus group discussions with men and women subgroups, ranging in size from four to six participants, were carried out using semi-structured questionnaires. Interviews were conducted by the first author with the help of a translator whose first language is Tigrigna, the local language spoken in the study area. Participants were asked open-ended questions on the establishment, functioning, weaknesses and strengths of informal institutions. Also open-ended questions on the demographic, socio-cultural, and political factors that influence the effectiveness of informal institutions to address challenges in communal grazing lands were asked. Three challenges<sup>5</sup>: (1) shortage of grazing land, (2) conflicts among users of communal grazing land, and (3) the resistance among users to shift from using free-grazing<sup>6</sup> to zero-grazing in communal grazing lands were extracted from the narratives of the initially held focus group discussions. Separate men and women subgroups were organized so that the women could speak freely about their perceptions on the challenges of communal grazing land management and how the informal institutions in their villages addressed the challenges. In addition, transect walks were used to get an impression on the condition of the communal grazing lands. Observations and informal discussions were used to get information on how villagers refer to informal institutions and how villagers manage the communal grazing lands. We used participatory tools including geographical mapping to describe the communal resources in the

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<sup>5</sup> ‘Whether a person travels by air or by land, the food everyone eats is produced by the oxen. (...) a challenge is any problem that makes us (users) unable to get enough feed for our oxen, which are backbones in the ox-plough farming.’ (Focus group discussion of women in Haikhilet, October 2008).

<sup>6</sup> The use of the term ‘free-grazing’ throughout this article refers to letting in cattle to the communal grazing land for grazing while ‘zero-grazing’ refers to using a cut-and-carry approach of harvesting grass to feed cattle around homesteads.

villages, scoring exercises to compare the importance of different communal resources to the livelihoods of villagers, and Venn diagrams to describe how informal institutions and formal institutions work together in communal resources management. Moreover, secondary data on socio-economic settings was collected from literature and local organizations including Bureau of Agriculture and Rural Development (BoARD).

Then, the first author transcribed and translated the interviews and focus group discussions. In total, 53 transcripts were imported into ATLAS.ti program, version 5.0 (Berlin, Germany) for qualitative data analysis. After repeatedly reading the transcriptions, a category system was developed and coding was carried out after reading each transcript line by line. Finally, the data retrieval and interpretations were conducted by including data from observations recorded in the field.

### **3. Results and Discussion**

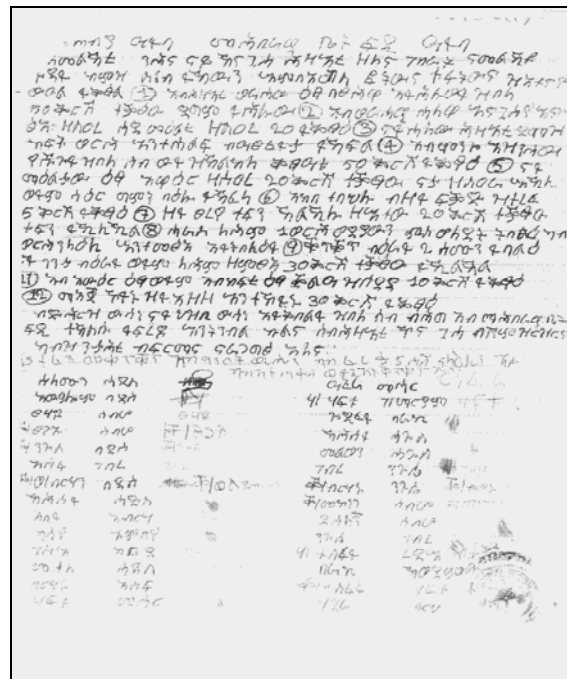
#### **3.1. Informal Institutions and Increasing Shortage of Grazing land**

In the initial sessions of focus group discussions, participants pointed out that shortage of grazing land constrained livestock production in the study sites. The grass produced in the communal grazing lands was an important source of feed for livestock during the dry season. Crop residues and by-products of homemade beer and oil were used as supplementary feeds. The livestock grazing pressure on the communal grazing lands increased as a result of the increasing livestock population and the heavy dependence on the communal grazing lands for feed (Table 1). The size of communally managed grazing land was smaller and the grass production was lower in villages that were closer to market and Wereda town than those at far distance. Moreover, most key informants in all the study sites mentioned that decreasing yearly rainfall in their villages was a major factor influencing grass production. In addition, the increased demand for land to be used for house construction, private investment, bull

fattening and small-scale vegetable production over the communal grazing land has decreased the grass production in villages that were closer to markets and Wereda towns. This finding is similar to the case of communal grazing land in Gimba, South Wello, Ethiopia, in that urbanization and expansion of private investment aggravated the shortage of communal grazing lands (Mengistu et al. 2005). These problems should be addressed because: (1) the local communities largely depend on communal grazing lands as source of feed for livestock, and (2) livestock production is the source of revenue and assets for the local communities.

In all the study sites, key informants recalled that informal institutions were established since the fall of Haileselassie regime in 1974. The main purpose of establishing informal institutions was to reverse the shortage of grazing land that villagers faced with increasing human and livestock population. The informal institutions were established predominantly with the interest of the users. In Aiba and Laelay Ayadim, the informal institutions were written on paper in local language, signed by all users and submitted to the village judicial as evidence in most cases (Picture 1). The reasons for submitting the informal institutions to the village judicial were to disclose that the rules were established with the agreement of all users and to get a legal cover from village judicial if villagers defy the agreements. This approach of establishing informal institutions helped the local communities in Aiba to strengthen the enforcement of the rules and regulations that govern the management of communal grazing lands. In Haikhilet, informal institutions were orally agreed among users but not written on paper. Women participants in a focus group discussion highlighted that lack of written agreement on the informal institutions weakened the rule enforcement as some users interpreted the rules to serve their own interests. However, the presence of written contracts in villages close to market and Wereda towns, as observed in Laelay Ayadim, did not mean

that all goals of informal institutions were met, in particular, in increasing the amount of grass production. This resulted from poor rule enforcement as there was negligence by users with better access to off-farm employment opportunities. Thus, poor rule enforcement obstructed the efforts of the local communities in improving their livelihoods through wise utilization of the available communal grazing lands in the villages.



Picture 1 Contracts signed by users of a grass plot in Aiba (The English translation of the contracts is attached in appendix 1)

Table 1 An overview of informal institutions of restricted grazing in the study sites

Communal grazing land in:	Area (ha)	Distance from Market and Wereda town (Km)	No. of users	No. of oxen	Main grass species	Annual grass harvest <sup>7</sup> (tons year <sup>-1</sup> )	Coverage of feed requirement (%) <sup>8</sup>	Opening months <sup>9</sup>	Closing months	Grazing is allowed for:
Aiba	177.43	20	933	1,305	<i>Melinis repens</i> , <i>Digitaria velutina</i> , (Forssk) P. Beauv. (1812), <i>Scirpus lacustris</i> , <i>Pennisetum sphacelatum</i>	1,128.5	80	6	6	-oxen throughout the opening months -cows that gave birth recently and castrated bulls for 30 consecutive days -broken oxen for 15 consecutive days
Haikhilet	43.48	11	647	800	<i>Bolboschoenus maritimus</i> (L.) Palla, <i>Hyparrhenia hirta</i> , (L.) Stapf., <i>Scirpus lacustris</i>	230.4	53	9	3	-oxen throughout the opening months -a cow or a donkey of non-oxen owners
Laelay Ayadim	21.86	3	180	288	<i>Digitaria velutina</i> , (Forssk) P. Beauv. (1812), <i>Euphorbia scordifolia</i> , <i>Cynodon dactylon</i> , (L.) Pers.)	109.3	35	6	6	- oxen throughout the opening months - cows that gave birth recently, castrated bulls, and broken oxen for 12 consecutive days

<sup>7</sup> The estimation was based on biophysical data on annual grass harvest and extrapolations. The estimate is for the grass product needed by all the oxen in a village during the opening months. The calculations were done as follows:

- Annual grass production (Ton, Mg) = [annual grass harvest (fresh weight)\*0.65/1ha\* total area of communal grazing land (in ha)]/1000
- Total grass needed/total no. of opening days (Ton, Mg) = [No. of opening days\*grass needed/ox/day (in Kg)\*total no. of oxen]/ 1000

<sup>8</sup> Total grass needed/total no. of opening days (Ton, Mg) = [No. of opening days\*grass needed/ox/day (in Kg)\*total no. of oxen]/ 1000

- Assumptions: An ox of 250Kg weight needs 2,200 Kg of dry matter per year i.e. 6 Kg/day; and 2) Dry weight=0.65\*fresh weight
- The coverage of grass requirement of oxen that is covered by the annual grass harvest from the communal grazing land in opening months (%) = [Annual grass production (tons/year)/ Total grass needed by all oxen per total no. of opening days in a year (tons/year)]\*100

<sup>9</sup> Opening months refer to time when grazing is allowed in the communal grazing land. Closing months refer to time grazing is not allowed in the communal grazing land, in this case, the livestock will graze around homesteads.



Restricted grazing in dry seasons and the selective allowance of livestock were commonly used mechanisms to reduce the livestock grazing pressure on the limited sizes of communal grazing lands (Table 1). The amount and duration of yearly rainfall was an important factor that determined the duration of opening and closing periods of the communal grazing lands. There was a trend of using the onset and amount of yearly rainfall as the main reference to decide on timings for grazing although there was some variation across the sites. The number of opening months increased where the amount of yearly rainfall was lower and the duration of the rainy season was shorter (Table 2). In Haikhilet, the number of opening months was the highest as the site had the least amount of yearly rainfall among the others and the duration of the rainfall lasted three months. Most key informants in the study sites elaborated that grazing in the rainy season was not allowed because livestock grazing in the rainy season could reduce the grass harvest by increasing the wastage of grass product due to trampling by oxen. Our results showed that distance from Wereda town and market was not directly related to the establishment of restricted grazing. In contrast, a study in Amhara region, Ethiopia revealed that the establishment of restricted grazing areas was associated with better market access of villagers (Benin and Pender 2006). This difference in practicing restricted grazing could result from the variations in the socio-demographic conditions, availability of grazing lands, and yearly rainfall, as these were the main factors influencing the institutional arrangements of communal grazing land management. In addition to reducing the livestock grazing pressure, the restricted grazing in dry seasons enhanced grass regeneration in wet season, contributed to economical use of grass and, prevented degradation of the communal grazing land that could result from overexploitation. Thus, restricted grazing was critical for the sustainable management of communal grazing lands.

Table 2 Average monthly and average yearly rainfall (mm year<sup>-1</sup>) of the study sites (for the years 2001- 2006)

Site	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Average Yearly rainfall
Lelay Ayadim	3.0	2.8	16.0	56.2	30.9	12.8	140.0	200.5	65.6	13.8	11.3	0.8	553.4
Aiba	21.2	8.0	65.6	90.1	39.6	27.2	158.2	264.5	57.0	28.9	7.6	29.8	797.8
Haikhilet	1.5	3.2	11.9	15.5	8.4	24.7	137.5	159.5	18.4	0.0	0.0	3.5	384.1

Source: Data on Rainfall was taken from the Tigray Regional Bureau of Agriculture and

Rural Development, \*The shaded cells indicate the closing months while the cells that are not shaded indicate opening months.

Moreover, the study revealed that the number of closing months and number of days allowed for grazing cattle with special conditions<sup>10</sup> by the informal institutions were highest for Aiba where the grass production was also the highest (Table 1). The strength in rule enforcement, which could be explained by the amount of annual grass production, the amount of contribution by individual users for collective action, and the revenues from the communal grazing land increased with increasing distance from market and Wereda town. Bennett and Barrett (2007) also found similar results in the Central Eastern province of South Africa that differing levels of resource demand, availability, and control among villages influenced the strategies of communal grazing land management.

Furthermore, villagers in Aiba and Lelay Ayadim divided the communal grazing lands into grass plots managed by smaller groups following the fall of the Derg regime in 1991 as a

<sup>10</sup> “We (the village committee) use our local knowledge in enforcing the informal institutions properly. If a user claims that his/her bull has grown to be ox, we will check if it can plough in the presence of other 3 farmers as witnesses. You can examine the bull that is said to start ploughing easily. If it can plough in a straight way, it will be allowed to graze with other oxen. But if it moves in a zigzag when examined to plough, the request will be rejected because it did not start ploughing in the past farming season ...” (Interview with a village committee member in Aiba, July 2008).

mechanism to reverse the shortage of grazing land. In a focus group discussion of men in Laelay Ayadim, participants underlined that the size of grass plots depends on the soil depth, which is a proxy to productivity of the communal grazing lands, in that plots on deep soil are smaller than the ones on shallow soil. The division considered the number of farmers and oxen in a sub village in Aiba while the communal grazing land was further divided into grass plots of average size 0.15ha per user in Laelay Ayadim. Still village elders and development agents in Laelay Ayadim and Aiba confirmed that interest has arisen among poorer villagers to manage the grass plots at an individual level. As a result, dissatisfaction arose among less favored villagers in Aiba and Laelay Ayadim because there was no rotational use of grass plots once they were allocated grass plots in a lottery system. In addition, participants of a women focus group discussion highlighted the influence of power relations as:

“... Whenever there are arguments on the communal grazing land, one must have political power to convince the other users. If you argue a lot and you have less or no political power, the village committee will put too much pressure on you. There are also conflicts among villagers and the guard about letting in cattle in the closing season. But if a villager has political power and or is a good orator, he could request to let in oxen in the closing season by mentioning he ran out of feed for cattle because of drought ...” (Focus group discussion in Laelay Ayadim, August 2008).

This indicates that although all users have equal rights to participate in making decisions concerning communal grazing lands, the various power relations among users in terms of gender and political power could reduce the effectiveness of rule enforcement.

In sum, the informal institutions were crucial in reversing the shortage of grazing land by regulating access to the communal grazing land and enhancing controlled use of grass in villages that were far from markets and Wereda towns. As the distance of a village from market and Wereda town became shorter, the informal institutions were not performing well due to the poor rule enforcement that resulted from negligence by users with better access to off-farm employment opportunities. In the three villages, the informal institutions failed to play a key role in limiting the number of oxen that villagers could let into the communal grazing land at a time. Reducing grazing pressure could have enhanced the grass production and then reversed the shortage of grazing land.

### **3.2. Informal Institutions and Conflicts among Users of Communal Grazing Lands**

In all the study sites, elderly key informants recalled that the *Rist*<sup>11</sup> system during the Haileselassie regime deprived poor villagers and villagers who did not have lineage with village headmen from using the communal grazing lands. Since the abolishment of the *Rist* system by the Derg regime in 1974, all villagers now have the right to access<sup>12</sup> the communal grazing lands regardless of their lineage or wealth. Although villagers have equal access to the communal grazing lands, conflicts arose among users. In Aiba, the most frequently mentioned conflicts by participants of focus group discussions were: (1) expansion of farm plots by crossing the boundaries of the communal grazing land, and (2) unequal allocation of benefits of the communal grazing land among poor and rich villagers. In Laelay Ayadim, trespassing on grass plots was the most frequently mentioned conflict. In Haikhilet, theft of grass was the most important conflict in the communal grazing land (Picture 2). The conflicts among users were also aggravated with the increasing human and

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<sup>11</sup> *Rist* system refers to one of the oldest and most common forms of usufructuary tenures that characterized the land tenure system of Northern Ethiopia where the community held the ultimate reversionary rights over land. *Rist* was a right, that a holder could claim a portion of lands from his or her ancestors who originally held the land (Ahmed et al. 2002).

<sup>12</sup> Access to communal grazing land in the study sites implies that every villager can use the communal grazing land and can make short-term management decisions while non-villagers do not have this right.

livestock pressure in the study sites. Consequently, the efforts to improve rural livelihoods with equal allocation of benefits among users were challenged by the conflicts among users. This indicates that resolving conflicts over communal grazing lands played crucial role to achieve sustainability outcomes and improve livelihoods of users (Mastewal et al. 2009). A study in Northern Ethiopia also verified that conflicts over using communal grazing land and the uncertainty among users about their potential benefits negatively influenced the communal grazing land management (Benin and Pender 2006). Additionally livestock raiding was the principal cause of conflicts among users in the communal grazing lands of pastoralist and agro-pastoralist communities in Mieso, Eastern Ethiopia (Fekadu 2009). In particular, the conflicts among users of communal grazing lands were severe in the dry season as feed availability for livestock becomes low in all the study sites. Free riding by some users to maximize individual benefits over the communal grazing lands was extensive in villages closer to market, as in Laelay Ayadim and Haikhilet.



Picture 2 Grass cut at night by free riders in the communal grazing land of Haikhilet (Photo by first author)

The villagers in the study sites established informal institutions as mechanisms in resolving the conflicts among users of the communal grazing lands. The informal institutions were established with the purpose of mediating access, enabling equal allocation of benefits among users, determining the contributions for collective action in protection and

maintenance works, and enforcing sanctions on free riders. Accordingly, collective action to prevent free riding and over-exploitation of the communal grazing lands by guarding was the most commonly used mechanism to resolve the conflicts among users. At this point, the mutually agreed sanctions were enforced by the *Baito* (village council), village judicial, and guard<sup>13</sup> of the communal grazing land. Similarly a study by Berhanu et al. (2004) in other parts of Tigray disclosed that rule enforcement by the formal *Baito* system has been common whenever users of communal grazing lands refuse to accept decisions of the village committee members. Hence, the presence of collaboration in rule enforcement brought positive outcome in reducing free riding. This in turn contributed for the protection of the communal grazing lands by preventing overexploitation.

On one hand, the presence of high social capital, which was developed through family lineages and neighborhood, was an important asset in establishing informal institutions. In connection with this, a case study in South Wello, Ethiopia, proved that informal religious and burial institutions were effective in resolving conflicts among users of communal grazing lands by cursing and threatening social exclusion (Pankhurst 2003). On the other hand, high social capital among users for instance having several informal religious, economic, and burial institutions in a village also weakened the collective action and rule enforcement in communal grazing land management in areas closer to Wereda and market. Berhanu et al. (2004) also found similar relationship between high social capital, rule enforcement and collective action in communal grazing lands in villages closer to market. Likewise there is higher interference of technical experts to initiate collective action in villages at close distance from Wereda towns.

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<sup>13</sup> Protection of the communal grazing lands by rotational guarding or with salary is a common practice in Tigray. The salary of the guard could be in cash or in kind e.g. by letting in a pair of oxen to the communal grazing lands throughout the year. The salary in cash depends on the size and grass production of the communal grazing land and the average monthly salary ranged from 200 to 1000 ETB/month (Average exchange rate in 2008 was 1USD = 9ETB).

In the village closer to market and Wereda town, informal institutions could not resolve conflicts among users of communal grazing lands due to the tolerance to expose free riders and mistrust among users, which resulted from lack of transparency in administering the collected fines. Most importantly, disagreement arose among users because of the failure to compromise the fines<sup>14</sup> among the poor and rich villagers as highlighted by the guard of communal grazing land:

“Low fines favor rich villagers in that they can easily afford the fine after feeding their cattle in the communal grazing land. With the increasing price of grass in the market, feeding cattle and paying a little money could be used as a good strategy by the rich. However, the poor also want to keep the fines low because if they have cattle, they might break the informal rules and be obliged to pay higher fines...”

(Interview in Haikhilet, July 2008).

Fines played an important role in preventing free riding and resolving conflicts that arose in using communal grazing lands. However, the heterogeneity in oxen ownership among users reduced the effectiveness of fines.

In Aiba, the informal institutions did not enable villagers who do not own oxen to benefit from grass harvest until they own oxen. This resulted in dissatisfaction among users and unequal allocation of benefits among poor and rich villagers. But the informal institutions in Laelay Ayadim allowed poorer members to rent their grass plots to rich villagers or outsiders for grazing purposes. Also the informal institutions in Haikhilet allowed allocation of the revenue from the sell of reed among villagers who did not own cattle (Picture 3). The informal institutions contributed to balance the allocation of benefits among users who

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<sup>14</sup>The collected fines will serve as insurance for bad times when group members are unable to contribute for salary of the guard, for instance, in case of drought. Otherwise, the money will be spent to support the church services especially to pay salaries of priests for that every villager was supposed to contribute 50 ETB annually.

owned oxen and those who did not own oxen in villages closer to market and Wereda town than those at a far distance. Hence, the informal institutions served as important mechanisms to achieve equal benefit sharing among users, which was one of the sustainability outcomes in communal grazing land management.



Picture 3 Reed harvested for sell from the communal grazing land in Haikhilet

(Photo by first author)

Furthermore, the informal institutions in Aiba could not achieve the principle of exclusivity in the communal grazing lands because of interference of the regional government. In a men focus group discussion, participants put the issue forward as:

“... The decision to give our land to non-users was made by the government because those people have severe shortage of land in their village. We believe that we should have the right to decide on who can use our communal grazing land. The interference of the government was against our right. The decision was made by the higher government officials. We do not oppose helping of other people. But decisions must consider the increased human and livestock population in our village.” (Focus group discussion in Aiba, October 2008).

Participants of the focus group discussion supported the tradition of sharing the available resources with outsiders in bad times. However, the villagers in Aiba viewed the interference of the government in allowing the non-users to access the communal grazing



land without consent of users as an imposition. The interference prevented the users from achieving the principle of exclusivity that they strived for through their informal institutions.

In summary, conflicts among users including free riding and unequal allocation of benefits hindered the efforts to achieve sustainability outcomes in communal grazing land management. To reverse the trend, informal institutions created opportunities for poor villagers to get revenues from the communal grazing land management in villages closer to markets and Wereda towns. The mobilization of collective action for protection of communal grazing land and the enforcement of informal institutions were better in the village that was far from the market and Wereda town. However, informal institutions did not contribute to resolve the conflicts that arose from unequal allocation of benefits in the village far from market and Wereda town. Factors including high population pressure, bias in rule enforcement, heterogeneity in oxen ownership, and interference of the government in decision-making negatively influenced the ability of informal institutions to resolve conflicts among users of the communal grazing lands across the villages.

### **3.3. Informal Institutions and Resistance to Shift from Free-grazing to Zero-grazing**

Participants of focus group discussions reflected that free-grazing reduced the grass harvest due to trampling by oxen. Additionally, there was wastage of energy in using free-grazing as oxen travelled long distances to reach the communal grazing lands. The village administrators in the three villages also explained that there was resistance among users to shift from using free-grazing to zero-grazing though users accepted other initiatives of the government including planting fodder and improved varieties of grasses. Young participants of a focus group discussion in Aiba elaborated that the tradition of considering oxen ownership as expression of wealth has constantly challenged the use of zero-grazing in the

communal grazing lands. Moreover, the revenue from products, the number of oxen in the village, the size and productivity of the communal grazing lands were frequently mentioned factors that influenced the acceptability of zero-grazing in communal grazing lands. For instance, farmers who had unproductive grass plots or a large number of oxen responded negatively to using zero-grazing as there was shortage of space to keep cattle around homesteads. A member of village committee explained the situation as:

“In the current shortage of grazing land, it is preferable to have fewer cattle that are fed well than having large number of cattle. (...). It is not easy to compromise the interests of farmers with few and large number of oxen. Usually the opponents of zero-grazing are those villagers who are rich and have large number of sheep, goats, oxen, and donkeys.” (Interview in Laelay Ayadim, July 2008).

So far the restricted grazing remained an important mechanism to increase grass production. However, efficient use of the communal grazing lands became important with the increasing number of users and number of oxen. Additional oxen will be brought to the communal grazing lands with the establishment of new families by young members. An important finding by German et al. (2008) pointed out that backing up the local level agreements with practices that perform well under local conditions was crucial to enhance production in communal grazing lands in East Africa. Since 1991, the Bureau of Agriculture and Rural Development took the initiative to introduce zero-grazing in the communal grazing lands and worked in convincing farmers to incorporate it in the informal institutions. The development agent in Aiba also confirmed that the shift to zero-grazing needs longer time to be incorporated in the informal institutions although there was a change in behavior among villagers when considering the negative consequences of using free-grazing. The villagers

refused to incorporate zero-grazing in the informal institutions of communal grazing land management because consensus was not reached. A village elder explained the situation as:

“...for instance, the government told us to plant grass on a degraded communal grazing land for rehabilitation, and to cut grass and feed cattle in our homesteads. I raised this issue in a public meeting. But villagers did not agree with my idea. They preferred to use free-grazing until the soil of the communal grazing land becomes bare (...). Lack of listening to new ideas has been a problem in our community (Interview with a religious leader in Laelay Ayadim, August 2008).”

Hence, the aspiration of those users who wanted the incorporation of zero-grazing in the informal institutions of the communal grazing lands was not shared among all users. This could arise from the inherent difficulty of local rules and norms to change and the use of a top-down approach by the development agents when introducing zero-grazing technique. The failure of informal institutions for addressing the challenge in incorporating zero-grazing was also highlighted in both crop-livestock and pastoral systems of Ethiopia (e.g. Berhanu et al. 2004; Girmay 2006; Homann et al. 2007, and Fekadu et al. 2009). Thus the users failed to efficiently use the communal grazing land and to maximize the benefits from the management.

Moreover, free-grazing was predominantly used across the study sites regardless of the variation in distance from markets and Wereda towns. Participants of men subgroup discussion in Haikhilet highlighted that managing grass plots at an individual level could allow farmers to make quick decisions on managing grass plots, for instance in using zero-grazing. Benin et al. (2003) also found that the shift to zero-grazing in the Ethiopian highlands was associated with areas where land redistribution resulted in a reduction in size

of grass plots. However, we observed that only few farmers started practicing zero-grazing in Laelay Ayadim under conditions where grass plots of some users groups were further divided to smaller parcels managed by individual households yet still governed by informal institutions of the village. A recent study in Umbulo Wacho watershed, Southern Ethiopia has shown that zero-grazing has become a common practice in the rainy season under the shrinking of communal and private grazing lands (Funte et al. 2010).

As explained above, the informal institutions failed to serve as important mechanisms to shift from using free-grazing to zero-grazing. The lack of consensus among users in decision-making and the top-down approach used by the development agents when introducing zero-grazing to users hindered the informal institutions from achieving efficient use of communal grazing lands. The inherent difficulty of local rules and norms to change was also a challenge to incorporate zero-grazing in communal grazing lands.

#### **4. Conclusions**

The debate on the more relevant institutions for communal resources management has led to extreme views that undermine or romanticize the contributions of informal institutions. Neither of these extreme views solved the challenges in communal grazing land management on its own under the rural context of Ethiopia. We argue that informal institutions are important mechanisms for addressing the challenges farmers face in communal grazing land management. Results revealed that the contributions of informal institutions for addressing challenges in communal grazing lands varied with types of challenges and were influenced by distances from markets and Wereda towns. The informal institutions contributed to reverse the shortage of grazing lands by enabling restricted grazing in villages far from market and Wereda town. However, the absence of limit on the number of oxen allowed to graze at a time in the communal grazing lands limited the

contributions of informal institutions. The amount and duration of rainfall, human and livestock pressure, the size and productivity of the communal grazing lands were the main factors that influenced the contributions of informal institutions. The mobilization of collective action for protection of communal grazing land and the enforcement of informal institutions were better in the village far from the market and Wereda town. However, informal institutions did not contribute to resolve the conflicts that arose from unequal allocation of benefits in the village far from market and Wereda town. The initiatives of the Bureau of Agriculture and Rural Development to enhance the grass production in communal grazing lands by switching from using free-grazing to zero-grazing failed due to the lack of consensus among users in decision-making and the top-down approach used by development agents when introducing zero-grazing. To enhance effectiveness of informal institutions, the increasing grazing pressure should be addressed by enhancing more efficient schemes of harvesting grass. Moreover, creating awareness on the need of fewer but more productive breeds is crucial. In the future, consideration of well-performing informal institutions in policy and development interventions is essential to maximize the benefits of communal grazing lands for improving livelihoods of users.

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## Appendix 1 The English translation of contracts signed by users of a grass plot in Aiba

From the group of users of a grass plot in Aiba to village judicial of Aiba,

Subject: presentation of the rules and regulations agreed by all users

We whose names are listed below have discussed on how to manage our grass plot. Then we established the rules and regulations to manage our grass plot and to avoid any conflicts that can arise while using the grass plot. We declare that the rules and regulations listed below are agreed by all members of the users of our grass plot. (1) We agree to serve as a guard for the protection of our grass plot on a rotation basis. Each member of our group should serve as a guard one day per month. If a member of this group does not abide by this rule, he/she will be fined 50 ETB and will have to keep the grass plot for a month, (2) If oxen are seen in the grass plot during the closing months, the assigned guard in that day will be fined 20 ETB and he/she will be asked to pay money based on the amount of grass eaten, (3) If we employ a guard on permanent basis to protect our grass plot with monthly salary and if the guard fails to protect our grass plot from free riders, he will pay 20 ETB fine per day, (4) If we (the users of the grass plot) fail to pay the monthly salary of the guard at the specified date, we agree to pay him double salary, (5) If any member of our group refuses to contribute money for the monthly salary of the guard on time, he/she will be fined 50 ETB, (6) Any member of the group who does not attend a meeting without getting permission of the village committee will be fined 5 ETB, (7) A cow that recently gave birth will be allowed to graze for a month, (8) A castrated bull is allowed to graze for 15 consecutive days, (9) Any member of the group who let a cow, sheep or goat into the grass plot will be fined 10 ETB per day. If this is done in the closing months, the fine will be 30 ETB per day. From now onwards, if any member of the group does not obey the decisions made by all users of the grass plot, he (she) will be reported to the village judicial and punished based on the above rules and regulations. We confirm our agreement on all the above points with our signatures.

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**Paper III Village Bylaws Strengthen the Sustainable Management of Exclosures in the  
Drylands of Northern Ethiopia**

I collected data from field, conducted the data analysis, and produced a first draft of the paper. I revised the draft paper with inputs from Wolde Mekuria and Michael Hauser. The paper is under review in the Journal of Land Degradation and Development.

## **Village Bylaws Strengthen the Sustainable Management of Exclosures in the Drylands of Northern Ethiopia**

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### **Abstract**

Communities in Tigray have established exclosures on formerly degraded grazing lands to promote natural regeneration of plants and devised village bylaws to manage the exclosures. We analysed the contribution of village bylaws for addressing forest degradation, resolving conflicts among users over natural resource use, and meeting high expectations of users to get economic benefits from exclosures through enhancing revenue making. During July and November 2008, we used qualitative methods including in-depth interviews and focus group discussions for data collection in two villages of Tigray that differ in distance from market and district town. The village bylaws mitigated the forest degradation by mobilising users towards common goals in the management of exclosures and resolved the conflicts among users by using monetary sanctions. The village bylaws were not effective in meeting the high expectations of users to get economic benefits from exclosures. In the village closer to market and district town, the enforcement of village bylaws was constrained by high social capital, which resulted in the negligence among users in exposing free riders. This indicates that high social capital does not always enhance communal resources management. Recurrent drought, shortage of fuel wood, and the growing number of landless youths in both villages constrained the effectiveness of village bylaws and the further expansion of exclosures. The village committee shall focus on addressing the low rule enforcement and work to minimize the negative consequences of the existing high social capital among users through developing sense of responsibility among users rather than focusing on penalties.

**Keywords:** Communal forests, conflicts among users, exclosures, forest degradation, village bylaws

## 1. Introduction

Natural resources, such as forests are one of the primary sources of livelihoods for the poor by providing food, fodder and fuel wood. However, the forest resources in many developing countries have been deteriorating over time (Sunderlin *et al.*, 2005). The efforts to rehabilitate them could become a potential mechanism for livelihood improvements (Shylendra, 2002). Similar to other developing countries, forest resources are major sources of livelihoods in the drylands<sup>15</sup> of Northern Ethiopia, and comprise 27 % of the total household income (Bedru *et al.*, 2009). Yet, deforestation and overexploitation of forests result in reductions in forest and food products and aggravated poverty and malnutrition (Stocking and Murnaghan, 2001; Mulugeta *et al.*, 2005). This in turn has compromised the efforts of village administration, Bureau of Agriculture and Rural Development (BoARD), and the Non-Governmental organisations in reducing rural poverty and improving livelihoods of the poor. Understanding the problems of deforestation and seeking long-lasting solutions to the problem is one of the central concerns of countries such as Ethiopia (Girma, 2001; Kebrom, 2001). This is due to the fact that the high rate of deforestation, estimated to be 150,000 to 200,000 ha per year, threatens to eliminate the remaining natural forests within a period of thirty years (FAO, 1988; Desta, 2001). To this end, communities in Tigray, the northernmost region of Ethiopia have established exclosures as a mechanism to combat forest degradation about two decades ago.

Exclosures are areas closed from wood cutting and grazing by livestock with the goal of promoting natural regeneration of plants and hence rehabilitating the degraded lands (Kindeya, 2003). Within exclosures, grazing and other agricultural activities are not allowed. In Tigray, exclosures are usually established on steep, eroded and degraded areas that have

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<sup>15</sup> Drylands refer to ecosystems in which agricultural productivity is constrained by low and erratic rainfall (Lyaruu, 1998).

been used for livestock grazing in the past (Descheemaeker *et al.*, 2006). The inception of exclosures dated back in 1980's and coincided with the large scale land rehabilitation and soil and water conservation programs in Ethiopia (Betru *et al.*, 2005). The area covered by exclosures in Tigray increased from 143,000 ha in 1996 to 262,000 ha in 2005, and the size of an exclosure ranges from as small as 1ha to 700 ha (TFAP, 1996; RLUPD, 2000; Betru *et al.*, 2005). The priority areas for establishing exclosures are normally identified as joint initiative of local communities, Governmental and Non-Governmental Organisations (Descheemaeker *et al.*, 2006). Guards are hired on a food-for-work basis for protecting and maintaining the exclosures, because the exclosures are not fenced (Yayneshet *et al.*, 2009). Exclosures are usually found within the boundaries of the village, and they are managed communally by the local community (TIC, 2000).

Several case studies in Northern and Central highlands of Ethiopia indicated that exclosures can be effective: (1) in enhancing vegetation cover and in conserving biodiversity (Tefera *et al.*, 2005; Mastewal *et al.*, 2006, 2007; Emiru *et al.*, 2007), and (2) in improving ecological and economic benefits (Tilahun *et al.*, 2007; Bedru *et al.*, 2009; Wolde *et al.*, 2007, 2009, 2010). Most of these studies documented positive environmental and socio-economic outcomes in exclosures. We suppose that such positive outcomes could result from the village bylaws<sup>16</sup> that are used in managing the exclosures. The establishment of village bylaws that govern management of exclosures in the study areas was usually associated with the change in regime in 1991. The trend was similar for most other exclosures in Tigray with some exceptions in Central Tigray where exclosures of more than 35 years of protection existed (Mastewal *et al.*, 2006). However, studies are lacking on the relevant institutional arrangements that ensure the sustainable management of exclosures. This lack of evidence

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<sup>16</sup> Village bylaws are subsidiary laws that are enacted at local level by elected or executive bodies (Nkonya *et al.*, 2008).

exists despite the fact that two decades have passed since the establishment of most of the exclosures in Tigray. Particularly, the contribution of village bylaws with the goal of promoting sustainable management of exclosures was ignored and not explored well because most of the researchers were emphasising on the biophysical impacts of exclosures. This information is, however, critical for finding solutions to problems in managing exclosures in Tigray. For that reason, we carried out the present study to analyse the contribution of village bylaws for the sustainable management of exclosures. We argue that village bylaws strengthen the sustainable management of exclosures in the drylands of Northern Ethiopia.

## **2. New Institutionalism and Management of Exclosures in Ethiopia**

In developing countries, researches and practices of communal resources management have favoured formal institutions over informal institutions in the past decades (Cleaver, 2001; Watson, 2003). Informal institutions are often considered as inherently weak and there is a common assumption that formal arrangements can make good the deficiencies of the informal institutions (Seabright, 1993). Yet, optimism has developed as studies conducted in several socio-cultural and ecological contexts demonstrated success in the management of communal resources such as fisheries, forests, and grazing lands by the collective efforts of the communities (Ostrom, 1990; Ostrom *et al.*, 1994; Agrawal, 2001). Among others, Mastewal *et al.* (2009) stated that informal institutions contributed for the sustainable management of communal resources than the formal institutions in Sub Saharan Africa.

On the vastly degraded drylands of Northern Ethiopia, exclosures are among the relics of natural forests seen as the remaining “greening spots” (Tefera *et al.*, 2005). At the same time, the exclosures are exemplar of communal resources, characterised by the difficulty of excluding others from using the resource, and the use of the resource by one user deprives use by others (Ostrom *et al.*, 1994). There is an ongoing debate in the literature of communal

resources management regarding the more relevant institutional arrangements for improving rural livelihoods using the available communal resources. The debate encompasses views that romanticise the contributions of village bylaws and considering village bylaws as solutions to most problems in managing communal resources at low transaction costs. On the contrary, there are views that undermine the important contributions of village bylaws in mobilising users towards managing communal resources in a sustainable manner (Campbell *et al.*, 2001; Makepe, 2006). Neither of these extreme views could contribute in solving the challenges<sup>17</sup> in the management of exclosures on its own under the rural context of Tigray, Ethiopia. Here, there is a general consensus among researchers on the need of effective village bylaws such as taboos<sup>18</sup> to manage forest resources and to enhance socio-ecological benefits (TIC, 2000; Betru *et al.*, 2005). This need becomes so critical, because of the built up weakness of village bylaws in Tigray owing to a long history of war, political uncertainty, and government interventions (Yohannes and Waters-Bayer, 2007). Consequently, in-depth analysis of the contributions of village bylaws in managing exclosures becomes crucial for reinforcing sustainability outcomes such as preventing forest degradation and achieving equal benefit sharing among users. Therefore, this paper shall contribute for policy and development interventions that support the village bylaws.

In light of this, we based our analysis of the contributions of village bylaws to address challenges in managing exclosures in the theoretical framework of New Institutionalism spearheaded by North (1990) and Ostrom (1990), among others. In this theory, village bylaws are conceptualised as agreements and taboos that are based on cultural norms and enforced by the users as constraining mechanisms to free riding by some users, and in this way govern the

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<sup>17</sup> A challenge in managing exclosure is defined by villagers in the study areas as a constraint such as deforestation that will result in erratic and insufficient rainfall and that aggravates shortage of fuel wood (Informal discussions in Laelay Ayadim and Haikhilet, July 2008).

<sup>18</sup> Taboos are prohibiting mechanisms imposed by social custom on users for managing resources at local level (Colding and Folke, 2001).



management of communal resources (McKean, 1992; Olsen, 2007). We considered forest degradation, conflicts among users over natural resource use, and meeting high expectations of users to get economic benefits from exclosures as important challenges in the management of exclosures. The meaning of village bylaws in the study areas embeds social controls such as taboos and agreements among users on who has the right to access the communal resources and the mechanisms of resource harvesting. Moreover, village bylaws are enforced by the users and transferred among generations to protect and enable fair use of communal resources.

### **3. Study Area and Research Methods**

#### **3.1. General Overview of the Study Area**

The evidence for this article comes from a study conducted in two villages, namely Laelay Ayadim and Haikhilet, located in Eastern and Southern parts of Tigray region, Northern Ethiopia, respectively (Figure 1). The criterion of site selection was difference in distance from market and Wereda<sup>19</sup> town. Previous studies indicated that distance from markets and Wereda towns could influence the management of exclosures in Tigray. Better access to market increases the value of forest resources and could encourage villagers to work together in managing the exclosures (Betru *et al.*, 2005). Distance from Wereda influences access to agricultural extension services, the follow-up on sustainability of communal resources management, and access to technical support from experts in the Governmental and Non-Governmental organisations (Mastewal *et al.*, 2010). Furthermore, market access is considered to influence the economic activities of users and the effectiveness of village bylaws in managing exclosures. Distance from market is taken as indicator of market access. The rural market places, which are usually located in Wereda towns, are the main outlets for farmers to make revenue from forest products. Accordingly, we selected Laelay Ayadim, a

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<sup>19</sup> Wereda is an administrative region comprising of a number (approximately 20) of villages (locally called Tabias). Wereda is often described as synonym with district (Kindeya, 2003).

village close to the next market and Wereda town, and Haikhilet, a village relatively far from the next market and Wereda town (Table 1).

Both study sites have a tropical semi-arid climate. The mean annual rainfall (for the years 2001-2006) varied between 384.1 and 797.8 mm year<sup>-1</sup> with an average value of 578.4 mm year<sup>-1</sup> (Ethiopian Metrological Service Agency, 2007). The rainy season usually occurs between June and September, which is also the growing season (varying between 80 and 120 days). Mixed crop-livestock farming is the backbone of the livelihoods of households in both the study sites. Major cultivated crops include *Triticum aestivum* (wheat), *Hordeum vulgare* (barley), *Vicia faba* (faba bean), and *Eragrostis tef* (tef). The villages are characterised by low and erratic rainfall, drought, and land degradation, as are most other parts of Tigray. Like more than 85% of the Ethiopian population, the residents of the study area live in rural areas and depend on land resources including forests and grazing lands for their livelihoods (CSA, 2008).

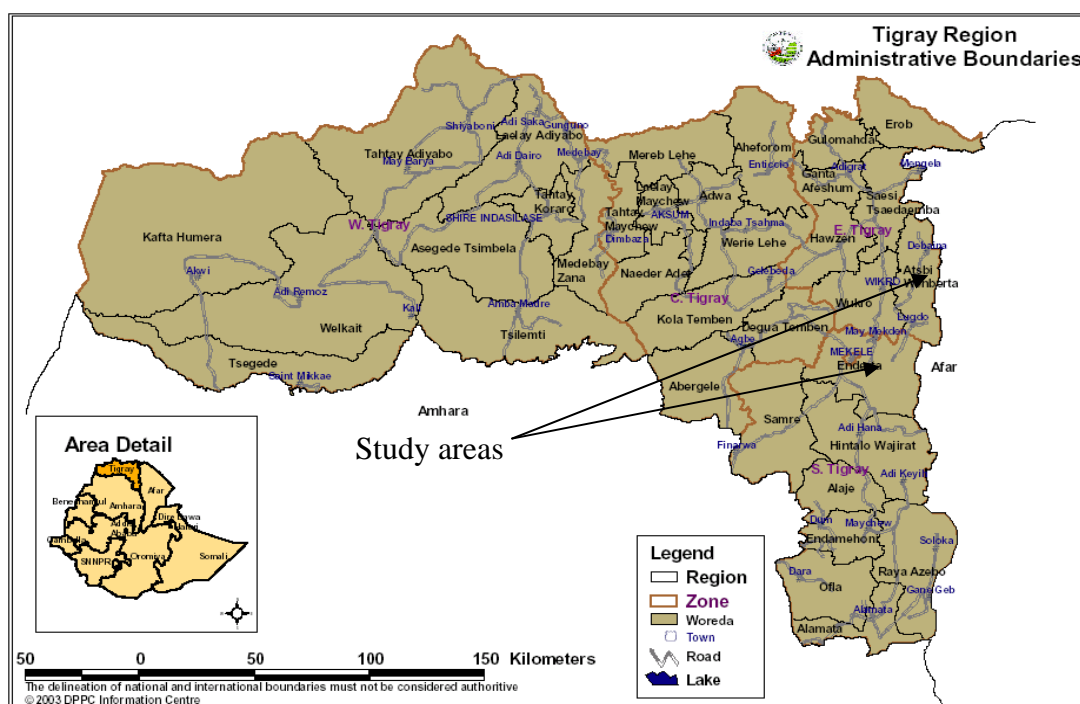


Figure 1 Location of the study areas (Source: Disaster Prevention and Preparedness Program, 2003)

### 3.2. Research Methods

Data was collected in two villages of Tigray from July to November 2008. The respondents of the study were chosen by using purposive sampling technique, as suggested by Patton (2002), in order to select specific elements of a population that are believed to represent the range of variation expected in a population. For this purpose, two meetings were held with villagers in both study sites to gather information on the various actors who have first hand information about village bylaws involved in the management of exclosures (Picture 1). Two initial meetings, 22 in-depth interviews and 12 focus group discussions with men and women subgroups, ranging in size from four to six participants, were carried out using semi-structured questionnaires. Interviews were conducted by the first author with the help of a translator whose first language is Tigrigna, the local language spoken in the study areas. Participants were asked open-ended questions on the establishment, functioning, weaknesses and strengths of village bylaws that govern the management of exclosures. Also open-ended

questions on the demographic, socio-cultural, and political factors that influence the contributions of village bylaws to address: (1) forest degradation, (2) conflicts among users over natural resource use, and (3) meeting high expectations of users to get economic benefits from exclosures were extracted from the narratives of the initially held focus group discussions. Separate men and women subgroups were organised so that the women could speak freely about their perceptions on the management of exclosures and how the village bylaws addressed the three challenges in management of exclosures. In addition, transect walks following the altitudinal gradients of the sites were used to get an impression on the conditions of the exclosures. Observations and informal discussions were used to get information on how villagers refer to village bylaws and challenges, and how villagers manage the exclosures. We used participatory appraisal tools, including geographical mapping to describe the communal resources in the villages, scoring exercises to compare the importance of different communal resources to the livelihoods of villagers, and Venn diagrams to explore how village bylaws and formal institutions work together in the management of exclosures. Moreover, secondary data on socio-economic settings was collected from literature and local organisations including BoARD.



Picture 1 Exclosure managed by village bylaws in Laelay Ayadim (Photo by first author)

Following the data collection, the first author transcribed and translated the interviews and focus group discussions. In total, 36 transcripts were imported into ATLAS.ti program, version 5.0 (Berlin, Germany) for qualitative data analysis. After repeatedly reading the transcriptions, a category system was developed and coding was carried out after reading each transcript line by line (Strauss and Corbin, 1990). Finally, the data retrieval and interpretations were conducted by including data from observations recorded in the field.

## **4. Results and Discussion**

### **4.1. Village Bylaws and Forest Degradation**

The sustainable management of exclosures was challenged by continued forest degradation, which in turn increased the shortage of fuel wood and construction materials according to participants of the focus group discussions. The intense degradation of natural forests and the absence of tree planting tradition in place of the cut ones aggravated the problem in the study areas. A village elder in Haikhilet narrated the decline in forest cover in the past decades as:

“I lived in this village since I was born. The village was green, covered by all big and indigenous trees like “Awlie” (*Olea europea* subsp. *Africana*) and “Sareda” (*Juniperus procera*). We (the villagers) had abundant trees and shrubs for fuel wood and house construction. But with increasing need of cropland and grazing land, most of the trees were cut to satisfy the needs of the increasing human and livestock population. Accordingly, we experienced a problem of forest degradation.”

(Interview, July 2008).

In Central Tigray, Shylendra (2002) also found that the rapid forest degradation affected the livelihoods of the households adversely. The study underlined that the negative effects of forest degradation on the livelihoods of households were related to the heavy dependence of the households on forest resources to meet their biomass needs, such as fuel wood and construction materials. Most of all, forest degradation should be addressed considering the

high contribution of forests to livelihoods (Bedru *et al.*, 2009). The growing need of conserving the remaining biodiversity in the drylands also stressed the importance of addressing forest degradation.

In response to the forest degradation, the local communities in Laelay Ayadim and Haikhilet established exclosures on formerly degraded grazing lands for promoting natural regeneration of plants. In the “Derg” regime, the users did not have power in decision-making due to top-down approaches of forest management and did not pay attention to the village bylaws for managing exclosures. Following the fall of “Derg” regime in 1991, the “*Baito*”<sup>20</sup> system of village administration encouraged the users to devise village bylaws to manage communal forests on their own. Then, users established village bylaws to sustain exclosure management that define the uses, protection, and collective action in managing exclosures (Table 1). In both villages, the village bylaws were set up in a public meeting organised by “*Baito*” of “*Tabia*”, the lowest administrative level in Tigray. In line with this, the importance of establishing village bylaws for managing exclosures was highlighted in a focus group discussion in Laelay Ayadim as:

“If the forest degradation continues this way, our land will turn to desert. To prevent this, we need to use the remaining forests wisely. You know, leaving a forest without rules is like leaving your door open at night for thieves to take all your belongings without mercy. Therefore, we established rules to manage our exclosure.” (September 2008).

This shows that the users in both villages were motivated towards addressing the forest degradation by devising village bylaws. The initiative of the users in taking the responsibility in devising and enforcing village bylaws can be an important input for policy and

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<sup>20</sup> *Baito* refers to a system of political leadership and administration at the *Tabia* or Wereda level (TIC, 2000).

development interventions towards the protection and use of exclosures. Moreover, village bylaws could also obtain the respect of users compared to the state laws that would need well-established governance structures (Mastewal *et al.*, 2009).

Participants of focus group discussions in both villages highlighted that the village bylaws prevented overexploitation of forest resources by mobilising users towards common goals in the management of exclosures and defining users who have access to the exclosures. The degree of regeneration of vegetation and the prevention of further deforestation in the exclosures were frequently mentioned indicators of effective village bylaws. Moreover, some key informants in Haikhilet emphasised the importance of village bylaws in defining the physical boundaries of the exclosures and the protection of the exclosures by guarding. This indicates that village bylaws strengthen the management of exclosures through reducing the problems related to demarcation of exclosures. However, recurrent drought and shortage of fuel wood constrained the contributions of village bylaws to address the forest degradation problem. Furthermore, Shylendra (2002) pointed out that though the protection by guarding and prevention of overexploitation of forest products resulted in regeneration of vegetation, the growing concern of users on shortage of livestock feed sources needs consideration to sustain exclosure management. Such emerging issues on exclosures should get attention to enhance the contributions of village bylaws, especially in village that was closer to market and Wereda town, as the problem was widespread in the village.

In both villages, the users with facilitation of the “*Baito*” assigned a village committee of five members that were believed to be representatives of the users (comprised of a head of village committee, a secretary, a cashier, and two model farmers) and a guard for enforcing the village bylaws that govern management of exclosures. The criteria to be a guard of an

exclosure were: (1) to be a villager and to have good interaction with other villagers, (2) to be a young man that is strong to move around the exclosure and to keep it from cutting or burning, (3) to be committed to his job and enforcing the village bylaws, and (4) to live close to the exclosure. Women were excluded from being guards of exclosures due to sexual division of labour that considers guarding as a men job in the study areas, as it is the case in other rural villages of Tigray. In Haikhilet, the villagers remunerated guarding services with grass. Later on, during a public meeting, this village bylaw was changed, because the users insisted in using the grass and paying the guard a reasonable amount of money instead. Each villager contributed 1 ETB<sup>21</sup> per month for handling expenses in managing exclosures, and the guard got 40 ETB every month. In Laelay Ayadim, users allowed the guard to cut and carry the grass in the exclosure as salary. This difference in contributing for collective action could result from the higher cost of labour on the market and the low grass production of the exclosure in Laelay Ayadim than in Haikhilet (Table 1). Betru *et al.* (2005) also confirmed that closeness to market could offer job opportunities for income generation, increase the cost of labour, and consequently reduced the contribution of users for collective action.

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<sup>21</sup> Average exchange rate in 2008 was 1ETB = 0.11 USD



Table 1 Description of exclosures and the village bylaws in the study areas

Description of exclosures	Haikhilet	Laelay Ayadim
Distance from market and Wereda town (km)	11	3
Area (ha)	8.4	14.1
Years since establishment	5	8
Common woody species	<i>Becium grandiflorum</i> , (Lam.) <i>Pichi-Serm.</i> , <i>Acacia etbaica</i> , Schweinf, <i>Echinops macrochaetus</i> , Fresen.	<i>Acacia seyal</i> , <i>Becium grandiflorum</i> , (Lam.) <i>Pichi-Serm.</i> , <i>Juniperus procera</i> , <i>Hochst.ex Endl. Syn. Conif.</i> , <i>Combretum aculeatum Vent.</i> , and <i>Maytenus arbutifolia</i> , (Hochst. ex A. Rich.) <i>Wilczek</i>
Number of users	647	180
Importance of exclosure to livelihoods (total sum of scores)*	FGM: 10, FGW: 7	FGM: 12, FGW: 13
Short-term goals of the village bylaws	<ul style="list-style-type: none"> <li>To prevent free-riding</li> </ul>	<ul style="list-style-type: none"> <li>To punish villages who cut wood or grass</li> </ul>
Long-term goals of the village bylaws	<ul style="list-style-type: none"> <li>To get equal benefits</li> <li>To prevent overexploitation</li> <li>To rehabilitate the degraded lands</li> </ul>	<ul style="list-style-type: none"> <li>To prevent deforestation</li> <li>To rehabilitate degraded land and get good rain.</li> <li>To pass the forest for the coming generation</li> </ul>
Village bylaws to manage exclosures <ul style="list-style-type: none"> <li>Cutting wood and grass, collecting dry wood</li> <li>Entrance of cattle, sheep, goat, camel, donkey, horses</li> <li>Crop cultivation</li> <li>Collecting seeds</li> <li>Guarding</li> <li>Sharing dry/fell wood</li> <li>Taking leaf for house thatching</li> <li>Seed collection</li> <li>Hunting birds/collecting eggs</li> <li>Honey production</li> </ul>	X  X X X In cash X X X X X	Some plant species like <i>Rumex nervosus</i> , Buying dry wood in a bid for fuel wood, Branch of <i>Juniperus procera</i> for pillar of house, <i>Hyparrhenia hirta</i> , (L.) <i>Stapf</i> for thatching, and fixing farm tool if broken while tilling**. X X X In kind: allowing to use the grass product X With permission from village committee** X X X
Sanctions for breaking village bylaws that govern the management of exclosures	<ul style="list-style-type: none"> <li>Fine for letting in a sheep or a goat is 1 ETB, for ox or cow is 5 ETB, and for a camel, a donkey, and a horse is 10 ETB</li> <li>Fine for cutting 1 tree is 50 ETB</li> <li>Fine for stealing seed 5 ETB</li> </ul>	<ul style="list-style-type: none"> <li>Fine for letting in a sheep or a goat is 0.25 ETB, for one ox, cow, donkey, horse, or camel is 1 ETB.</li> <li>Fine for cutting wood from the exclosure to make farm tools will be sentenced 500 ETB.</li> <li>If a guard did not enforce village bylaws properly, the fine could be 20 to 100 ETB</li> </ul>

\*Maximum score was five, FGM = sum from three focus group discussions of men, FGW= sum from three focus group discussions of women, X shows activities not allowed, and \*\* refers to activities that need permission after users establish their genuine need for wood to village committee, leaves, or grass.

#### 4.2. Village Bylaws and Conflicts among Users

In Haikhilet and Laelay Ayadim, all the villagers were entitled to have equal access to the exclosures in the village bylaws regardless of their lineages, age, or sex. Moreover, the “*Baito*” and the village committees in collaboration with the BoARD for technical advises, identified species that could be harvested such as *Acacia etbaica* and the ones to be protected such as *Olea europea* subsp. *Africana*. However, problems arose in enforcing the village bylaws due to free riding. Cutting trees and collecting dry wood for fuel wood without permission, and the encroachment of boundaries of exclosures for expansion of croplands were mentioned as very frequent conflicts among users in both villages. In particular, the free riding by some villagers resulted in disagreements among the users and the village committee in Laelay Ayadim. The negligence among users in exposing free riders that were their relatives and neighbours who broke the rules in the absence of the guard, for instance, by taking leaves for house thatching without permission weakened the effective rule enforcement (Picture 2). This in turn threatened the equal benefit sharing among users and lowered the interest of users towards collective action.

“Free riders aimed at getting more benefits from exclosures than others while all users are expecting to get equal benefits for their contribution in the management. Free riding ruins all the efforts made by users to achieve short- and long-term goals and dishonour the trust of those who wait for equal benefits.” (Focus group discussion of men in Laelay Ayadim, September 2008).

In Central Tigray, Bedru *et al.* (2009) found similar results in that the village bylaws were violated by users mainly due to the need of users to supplement their subsistence income by harvesting forest products from exclosures without consent with all users.



Picture 2 Thatched house in Laelay Ayadim with leaves and grasses from exclosure

(Photo by the first author)

Monetary sanctions in a form of paying fines were devised for punishing users that broke the village bylaws depending on the level of guilt. The main reason in setting fines as monetary sanctions was to “teach” the community by punishing those breaking the rules and to prevent open access situation in the exclosures. For instance, a person who cut wood from the exclosure to make farm tools in Haikhilet will be transferred to be judged in the court and the punishment could reach to five years in jail. The decisions on the amount of fines were made based on a level that majority of the community can afford if found guilty of breaking the rules. We found a variation between the two sites in the level of punishment (Table 1). Most importantly, the users set different levels of punishment for different types of livestock in the village bylaws by taking into account the amount of grass/leaves eaten, or the damage that can be caused to the exclosures as a result of trampling. Furthermore, the guard will be punished if he was found guilty in an evaluation by all users and the village committee in a public meeting. If the offence committed by the guard was considered as serious, for instance, if he did not keep the exclosure according to the agreement and free riders cut wood or grass in a meanwhile, the decision could reach up to quitting the guarding contract. The

collected fines were usually spent to support social religious ceremonies in the villages and also as contribution to the salary of the guard when the users failed to contribute money such as in times of drought. The lesser amount of fines in Laelay Ayadim compared to Haikhilet for similar types of guilt could contribute for the weakness in rule enforcement (Table 1). This idea is also supported by a development agent in Laelay Ayadim as:

“If a user has 20 sheep and he/she lets in the sheep for grazing in the enclosure, he/she will be punished 5 ETB for 20 sheep with a rate of 25 cents per one sheep. This means a free rider pays only 5 ETB to feed 20 sheep, a very cheap expense when compared to the price of grass in the current market conditions<sup>22</sup>. Thus, I strongly believe that our village bylaws are weak.” (Interview August, 2008).

In line with this, TIC (2000) added that there was a tradition of linking village bylaws with punitive responses for disobedience to the rules in Central Tigray. However, we observed that users considered setting higher fines as an expression of strong village bylaws. This difference could arise from the high importance of enclosures for the livelihoods of users in the study areas as explained by the high scores (Table 1).

In contrast to the better access to market and technical support from agricultural experts, the enforcement of village bylaws was weaker in Laelay Ayadim than in Haikhilet. This could be explained by the lower amount of fines and frequent free riding in Laelay Ayadim. Betru *et al.* (2005) also suggested that closeness to market could undermine the users’ motivation to cooperate because some users could choose to steal products from the enclosure by violating

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<sup>22</sup> In 2008, the price for 1 “*shekim*” of grass (equivalent to 25 Kg on average) was 70 to 80 ETB. The average weight of a goat/sheep in the study area was 20 kg (Yaynesht *et al.*, 2008), The daily forage requirement of a goat/sheep is calculated using the Average Animal Weight method (AAW) as: Average Animal Weight \* 0.02667 (Pratt and Rasmussen, 2001), Daily forage requirement = 20 kg \* 0.02667 = 0.5334 Kg Therefore, 25 Kg of grass was roughly estimated to cover the forage intake of 20 sheep/goats for only two days. This indicated that a free rider that let in 20 sheep/goats spent only 12.5 % of the market price of the grass, demonstrating the weakness of setting low fines in village bylaws.

the village bylaws and sell it in the market, as the case of Laelay Ayadim. In addition, the high social capital among users was expressed by the presence of several religious and social informal institutions in the village such as informal burial institutions and informal rotational savings. The high social capital among users resulted in negligence of rule breaking and influenced the practical implementation of village bylaws negatively, as shown in Laelay Ayadim. The case of Laelay Ayadim is different from the common understanding that high social capital among users results in better rule enforcement. This indicates that high social capital does not always enhance communal resources management (Ishihara and Pascual, 2009). This could arise from negligence among users in exposing free riders that were their relatives and neighbours (Mastewal *et al.*, 2010). In addition, poor economic conditions of the users and the low agricultural production and shortage of feed for livestock due to drought could also force users to cut wood or grass or let in oxen to the exclosures by breaking the village bylaws established by them. Gibson *et al.* (2005) also underlined that monitoring of whether all users were conforming to their own agreements about how to manage the communal forest and sanction those who did not could be important for effectiveness of village bylaws regardless of the level of social capital among users.

For strengthening rule enforcement on free riders that refuse to obey the decisions of the village committee and to enhance legitimacy of the village bylaws, contracts were signed up by users and submitted to the village judicial in both villages. In the decision-making process, every member of the village including elders, youth, women, and men were involved. Ideas and opinions were raised by some members who were good orators. Decisions will be made after all the members of the community discussed about the issue. In particular, when there was case of free riding, the village committee would receive a written report from the guard with all details and witnesses. Then the village committee would announce the case to all

users in a public meeting. Finally, all the users and the village committee members discussed about the case and passed decisions based on the village bylaws. However, when the suspected free rider denied breaking the village bylaws, the village committee could accuse the suspect to the village judicial after gathering evidences and presenting witnesses. At this level, the village bylaws could entirely be enforced by the village judicial. The users have also evaluated the guard in every two to three months. A village committee member in Haikhilet elaborated the decision-making as:

“If a person pays fines without denying the guilt, the community will be informed and the money will be given to the cashier. If a person refuses to pay, the case will be transferred to the “*Baito*”. We punish villagers who are reported to free ride by the guard, we do not punish based on information from other villagers. Always, we accept information directly from the guard. The reason is in the village bylaws, the main responsibility of protecting the enclosure is given to the guard.” (Interview, September 2008).

In both villages, the village bylaws resolved conflicts among users by punishing free riders, defining users who have the right to access the enclosures, and empowering the villagers to manage the enclosures in their villages. For instance, participants in a focus group discussion in Laelay Ayadim stated that:

“Punishing everyone that breaks the rules wittingly or unwittingly develops trust among users in that rules serve all the users equally. Thus, rules strengthen our (users) communal efforts and lessen the occurrence of conflicts among users of the enclosure.” (October, 2008).

Furthermore, the active involvement of all users in decision-making enhanced the effectiveness of the village bylaws. In contrast, Shylendra (2002) pointed out that the

participation of women in making decisions about the management issues of exclosures was very limited in Central Tigray because of their less representation in the village administration.

#### **4.3. Village Bylaws and Meeting High Expectations of Users to Get Economic Benefits**

We found that users evaluated the effectiveness of village bylaws by looking at the abundance of the woody species like *Acacia etbaica* and by considering the economic benefits of exclosures to users. The abundance of these species revealed the success of the village bylaws basically through guarding, restricting grazing in the exclosures, and preventing wood cutting for fuel wood and construction materials. Here, the high expectations of long-term benefits of users, for instance, to take wood and make farm tools and to produce charcoal, to harvest grass for feed, to use the leaves of *Acacia etbaica* in the exclosures as feed for cattle strengthened the rule enforcement. In a focus group discussion of men in Haikhilet, participants elaborated their expectations on future economic benefits as:

“In future, we plan to get benefit from the grass in the exclosure. We are not sharing the grass in the exclosure now because it is insurance for bad years such as in times of drought. When such problems arise, the community will discuss and agree to let in oxen to the exclosure for specified time. This is done with great care so that we solve our current problems without destroying the long-term benefits we expect from the exclosure. In a recent public meeting, we agreed on using cut and carry system rather than letting in cattle to the exclosure so that we prevent soil erosion.”(Interview, August 2008).

Similarly, TIC (2000) found in Central Tigray that the users' high expectations about economic benefits from exclosures represented a major challenge in terms of technical inputs and village bylaws that govern management of exclosures.

We observed higher scores for the importance of exclosures to livelihoods of villagers in Laelay Ayadim, a village close to market and Wereda town, than in Haikhilet in both the men and women subgroup discussions (Table 1). This difference could arise from the higher demand of wood products in the nearest market in Laelay Ayadim and hence could influence the extent of expectations among users in making revenue from exclosures. Besides, there was a difference in setting clear time frame for extracting products from exclosures to meet the economic needs of users in the village bylaws of both villages.

In Laelay Adayim, the village bylaws were enforced with flexibility considering the economic needs that users claim. For instance, the users allowed cattle to graze in the exclosure for three days in response to the low feed availability that arose from drought in 2008. When villagers were in need of wood to construct or maintain houses, they could ask permission of the committee by establishing their genuine need of wood. However, in Haikhilet solving such economic problems by using resources from the exclosure was not allowed. A study by Tefera *et al.* (2005) in Central and Northern Ethiopia also disclosed that there was lack of clear guidelines on sharing the economic benefits from exclosures. This is a paradox as meeting the expectations of users to get economic benefits from exclosures was the basis for developing a sense of security for ownership and hence the success of managing exclosures. Although the users devised rules that prevented overexploitation, and rehabilitated degraded lands, the rules were weakened as a result of lack of clear guidelines on sharing benefits through time. Wolde *et al.* (2010) also indicated that local communities in Tigray will hardly support and initiate managing exclosures unless they get economic benefits.



The village bylaws were not effective in meeting the high expectations of users to get economic benefits from exclosures and improve their livelihoods regardless of distance from market and district town. A possible reason for this could be the poor grass and wood production due to few years after establishment of the exclosures. Recurrent drought, shortage of fuel wood, and the growing number of landless youths in the rural villages constrained the effectiveness of village bylaws and the further expansion of exclosures. Betru *et al.* (2005) also found that exclosures on relatively good soil conditions regenerated quickly than the ones on poor soil conditions. Thus, difference in productivity of exclosures could influence the time of harvesting and the amount of grass and wood products.

In future, it will be crucial to expand exclosures on degraded hills in the village. Besides, enriching the exclosures with economically important fruit trees like papaya and orange is very important. This will enhance the effectiveness of the village bylaws as the economic benefits of the exclosures will increase. With such economic benefits, the users would use the exclosures to improve their livelihoods and be motivated towards achieving long-term benefits. Moreover, the initiatives of landless youths in villages in planting trees on degraded hills and mountains should be strengthened and supported by the BoARD.

## **5. Conclusions**

In conclusion, knowledge and understanding of the village bylaws that govern the management of exclosures is essential for strengthening the policy and development interventions on rehabilitation of degraded forests in Tigray. In the present study, we analysed the contributions of village bylaws in addressing the challenges in managing exclosures, namely forest degradation, conflicts among users over natural resource use, and meeting high expectations of users to get economic benefits from exclosures. We found that the village bylaws mitigated the forest degradation by mobilising users towards common

goals in the management of exclosures and resolved the conflicts among users by using monetary sanctions. In the village closer to market and district town, the enforcement of village bylaws was constrained by high social capital, which resulted in negligence among users in exposing free riders that were their relatives and neighbours. The village bylaws were not effective in meeting the high expectations of users to get economic benefits from exclosures and improve their livelihoods regardless of distance from market and district town. Recurrent drought, shortage of fuel wood, and the growing number of landless youths in the rural villages constrained the effectiveness of village bylaws and the further expansion of exclosures. The negative consequences of high social capital among users on rule enforcement in the village close to the nearest market implies that high social capital does not always enhance communal resources management. Hence, the village committee shall focus on addressing the low rule enforcement and work to minimize the negative consequences of the existing high social capital through developing sense of responsibility among users rather than focusing on penalties. This in turn enhances the effectiveness of village bylaws in achieving equal benefit sharing among the users. Development interventions in the study areas shall also encourage users towards devising clear guidelines on the timings of harvesting benefits from exclosures in the short- and long-term. Enrichment plantation of indigenous trees that could grow fast will be essential for enhancing fuel wood production. Furthermore, planting economically important fruit trees such as papaya and orange in exclosures will be crucial for meeting the high expectations of users to get economic benefits from the exclosures.

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## **Part C. General Discussion**



## **1. Consequences for Interventions in Sustainable CPR Management**

To implement successful development interventions in support of CPR management, it is necessary to understand the existing institutional arrangements that govern the management of CPRs, which are typically lacking in countries like Ethiopia. In the present study, I explored the most important challenges in managing communal grazing lands and exclosures, and investigated how the informal institutions address the challenges. The main demographic and socio-cultural factors that influence the effectiveness of informal institutions in achieving sustainable management of communal resources were also assessed. Such investigations have been commonly applied in several developing countries, for instance in Asia (Agrawal and Ostrom, 2001; Anthwal et al., 2010), Latin America (Klooster, 2000; Wittman and Geisler, 2005; Gibson et al., 2007), and SSA (Kajembe et al., 2003; Kayambazinthu et al., 2003; Makepe, 2006; Haller and Merten, 2008). Although few studies that analyze institutions of CPR management exist in Ethiopia, most of them were concentrated in central and southern parts of the country (Pankhurst, 2003; Watson, 2003; Tefera, 2005; Dixon, 2008; Funte et al., 2010). Moreover, the few studies on institutional settings of communal resource management in Tigray primarily focused on the economics aspects (Berhanu et al., 2003, 2004; Bedru et al., 2009). This lack of scientific evidence from in-depth investigation of institutional settings has contributed to the limited improvements in policy and development interventions towards sustainable CPR management in Tigray.

In response, I highlighted some of the entry points that could strengthen the informal institutional arrangements towards achieving sustainable CPR management through identification of the weaknesses and strengths of the informal institutions. This will support future policy and development interventions. Moreover, I contributed for the theoretical debate on the following two points: (1) with comprehensive literature review and qualitative

meta-analysis, I contributed for the theoretical debate on the relevance of institutions by comparing the effectiveness of informal and formal institutions to sustainable CPR management under specific social, political, and demographic conditions. The contributions of informal institutions for sustainable CPR management in SSA were more than the contributions of formal institutions. The findings suggest that the power relations between informal and formal institutions in SSA have to be upgraded from isolated or dual decision-making assumptions to a collaboration in that both types of institutions have their own specific responsibilities to achieve sustainable CPR management, (2) I found that high social capital among CPR users resulted in less rule enforcement in the village closer to market and district town. This finding differs from the general belief that high social capital among users enhances rule enforcement (e.g. Sano, 2008), and shows that social capital could have varied outcomes on rule enforcement depending on the specific socio-cultural settings. The observed variation about the consequences of high social capital depending on the access to the nearest market shows that drawing conclusions about rule enforcement at large scale and implementing similar measures is problematic. The working guidelines, extension reports and other important documents used by the BoARD regarding the managements of forests and grazing lands encompassed blanket recommendations that ignored the specific needs of users (Howard and Smith, 2006). This has led to wastage of time and resources (Yohannes and Waters-Bayer, 2007). Hence, this study opens up possibilities to develop guidelines for policy and development interventions that utilize information at local level.

In the end, the burden on development agents to serve the interests and the political views of the Governmental and Non-Governmental Organizations, which oppose each other sometimes, triggers the development agents to impose the recommendations of non-local agents on CPR users (Harrison, 2002). This in turn undermines the development agents'

understanding of the rules and norms of CPR users. For instance, the past top-down approaches used by the BoARD in introducing technical measures such as zero-grazing and enrichment plantation were not successful because they failed to consider the local interest and knowledge of CPR management among users. The information generated in this study can initiate the involvement of CPR users in the decision-making process.

## **2. Recommendations to Village Committees, BoARD, and Policy Makers**

The following recommendations are forwarded based on the findings of the study:

1. Emphasis should be given to enhance the effectiveness of both types of institutions by improving the conditions that 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.
2. The increasing grazing pressure should be addressed by using more efficient schemes of harvesting grass to enhance effectiveness of informal institutions. Moreover, creating awareness on the need of fewer but more productive cattle breeds is crucial.
3. The village committee should overcome the poor enforcement of village bylaws that are used to manage exclosures by working to minimize the negative consequences of the existing high social capital through developing sense of responsibility among users rather than focusing on penalties. This in turn enhances the effectiveness of village bylaws in achieving equal benefit sharing among the users.
4. Development interventions in the study areas shall also encourage users towards devising clear guidelines on the timings of harvesting benefits from exclosures in the short- and long-term.
5. Enrichment plantation of fast growing tree species that enhance wood and grass production will be crucial to enhance the contribution of exclosures to rural poverty

reduction. Besides, planting economically important fruit trees such as papaya and orange in exclosures will be crucial for meeting the high expectations of users to get economic benefits from the exclosures.

### **3. Conclusions**

CPRs have been important productive resources for livelihoods of rural communities in SSA. This makes improving the livelihoods of CPR-dependent communities with sustainable CPR management an essential component of efforts towards rural poverty reduction. In such efforts, the need of effective institutions to mobilize community at grass root level has been highlighted by various donors and development agencies. Hence, in-depth analysis of the institutional arrangements becomes important in Tigray where majority of the rural population directly or indirectly depends on CPRs as means of livelihoods. The study compared the effectiveness of informal and formal institutions in sustainable CPR management in SSA and analyzed the role of informal institutions in achieving sustainable CPR management in Tigray, Ethiopia. The main argument of the study is that informal institutions played key roles in the sustainable management of CPRs under specified social, political, and demographic conditions.

Results showed that informal institutions in SSA 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. Conditions that influence effectiveness of both types of institutions include high population growth on limited CPRs, the growing scarcity of CPRs due to land use change, and lack of human and financial capacities.

Although the informal institutions in Tigray were crucial in reversing the shortage of grazing land by regulating access to the communal grazing land and enhancing controlled use of grass, they did not contribute in resolving the conflicts that arose from unequal allocation of benefits in the village far from market and Wereda town. Incorporating zero-grazing practices in the informal institutions was hindered by disagreements among users and the top-down approach used by development agents when introducing zero-grazing.

Village bylaws mitigated the forest degradation by mobilizing users towards common goals in the management of exclosures and resolved the conflicts among users by using monetary sanctions. In the village closer to market and district town, the enforcement of village bylaws was weak under condition of high social capital among users that increased the negligence among users in exposing free riders that were their relatives and neighbours. Recurrent drought, shortage of fuel wood, and the growing number of landless youths in the rural villages constrained the effectiveness of village bylaws and the further expansion of exclosures.

In conclusion, the above findings supported the argument of the study in that the informal institutions played important roles in mobilizing the CPR users for collective action in CPR management. Shortage of resources, lack of efficient means of harvesting CPR products, and poor rule enforcement, among others, constrained the contributions of informal institutions to achieve sustainability outcomes such as preventing CPR degradation and enabling equal benefit sharing among users.

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### **Annex: Other Tasks Accomplished During the Study Period**

1. A poster entitled “Comparing the Effectiveness of Informal and Formal Institutions in Sustainable Common Pool Resources Management in Sub Saharan Africa” was presented in Tropentag 2009 conference, 6<sup>th</sup>-8<sup>th</sup> Oct., Hamburg, Germany. I used the feedback I got during the conference to elaborate the research paper for a journal publication.
2. A conference paper entitled “Village Bylaws Strengthen the Sustainable Management of Exclosures in the Drylands of Northern Ethiopia” was presented in the 8<sup>th</sup> Development Dialogue 2010, 21<sup>st</sup>- 22<sup>nd</sup> June, The Hague, The Netherlands. The feedback on theoretical aspects, in particular, the constructive comments on the consequences of social capital on CPR management enabled the further development of the conference paper for a journal publication.