

Dryland resources, livelihoods and institutions

**Diversity and dynamics in use and management of gum and resin trees in
Ethiopia**

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Thesis

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Preface and acknowledgements

I have known some non-timber forest products since early days even before I realize they are products associated with forests. My interest towards non-timber forest products (NTFPs) was born when I met staff member from Natural Gums Processing and Marketing Enterprise as a class and dorm mate during my undergraduate study. This opportunity exposed me to gum and resin products in the drylands of Ethiopia even before I had an idea on NTFPs from the high forests. It was only in the final year of my study that I came across with variety of non-timber forest products of the highlands. In that class year the opportunity I had to visit the virgin forests helped me know varieties of NTFPs from the highlands. Specifically, forest coffee and cardamom in southwest Ethiopia highly impressed me and made my interest on them alive. Since then I was very passionate that one day I may study some aspects of this NTFPs though I was not sure about the specific issues to be addressed. In the past one and half decades I also realized that the contribution of the forestry sector to the economy has been underestimated and the sector has been overlooked. This has further motivated me to study the contribution of the forestry sector in general and the NTFPs in particular. Then at the initial stages of this PhD research I was intended to investigate the economic contribution of the gums and resins in the drylands of Ethiopia. However, the explorative survey I made at the beginning on gums and resins use and management signalled different directions than I intended to focus. The fact that the gum and resin trees species have been degrading even in cases where they greatly contribute to the livelihoods of the households instigated me to know beyond their economic role. Hence this research investigates majorly how gum and resin use and management is carried out and show that the importance of the NTFPs to rural livelihoods is not enough to sustainably utilize and manage them; rather how access to resources and market is crucial.

Before going further I should go back and say few words about the four years journey. In this journey I experienced a mixture of challenges and inspirations. There were several periods of labor accompanied by abundant joys of birth. The journey destined not only into an academic degree. Besides the knowledge and skills I gained during data collection, analysis, and writing, it exposed me to lots of new experiences. The fact that the research locations were dispersed in three different administrative regions in Ethiopia has given me lots of opportunities to know beyond the issues of gums and resins. Ultimately, the experience have lent me courage and confidence for my future career as well.

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Teshale Woldeamanuel, Wageningen, October 2011

Dedicated

to

My late brother

Honelign Woldeamanuel

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Chapter 1
Introduction



DRY WOODLAND FORESTS AND THEIR LIVELIHOOD IMPORTANCE

The dry woodlands in Africa comprise of 406 million hectares (FAO, 2006) and are inhabited by 505 million people (Chidumayo and Gumbo, 2010). They occur in regions that are predominantly inhabited by nomadic pastoralists. The vegetations in the drylands supply the dominant part of the fodder requirements of their livestock (Kuchar, 1995). They are a major source of traditional medicines for treating various human and animal diseases as well. The economic importance of dryland forests is therefore being recognized recently (Lemenih et al, 2003; Worku, 2006; Shackleton, 2008; Paumgarten and Shackleton, 2009). Households earn a significant amount of income from the dryland forests for their livelihoods (Lemenih et al, 2003; Shackleton, 2008). The local people also get considerable employment opportunities from them (Gebremedhin, 1997; Eshete et al., 2005). They significantly contribute to the economy of nations (Lemenih and Teketay, 2003, Suderland and Ndoye, 2004; Chikamai *et al.*, 2009).

Despite their multiple roles, dry woodlands have been seriously undervalued. In many countries their importance is still overlooked in national policy and forest management mostly focused on the more humid forests. This may be associated with the historical preoccupation with the management of the much more bio-diverse tropical humid forests (Petheram et al., 2006). The assumption that forests have little economic value unless they are logged or farmed also contributed to this ignorance (Godoy et al., 1993). Only a few forest products were valued, mostly timber, little attention was given to the multiple benefits that forests provide. As a result, dry woodlands with high value non-timber forest products (NTFPs) have been degraded (Campbell *et al.* 2002). The pervasive misconception that rated dry land resources as less productive and less attractive for development further contributed to their degradation (Lemenih and Teketay, 2004).

A broad range of strong ecological, economic, and cultural reasons exist for keeping the dry forests and woodlands intact (Chidumayo and Gumbo, 2011). First, the harsh climatic conditions they are situated in means that their conversion to agriculture needs large economic and technical investments (Steen, 1994). Second, the dominant economic activities in the drylands are often threatened by frequent droughts. This makes livelihoods diversification related to the available vegetation resources of the drylands both imperative and a viable option (Kuchar, 1995). Third, dryland resources have the ability to produce non-timber forest products during dry seasons when forage and grains are scarce (Chickamai and Gachathi, 1994) and thus allow the people to be occupied in a meaningful economic activity in this season. Fourth, the production of NTFPs in the drylands often does not compete with labor for other economic activities, as they can often be harvested when other economic activities are less important. In addition, the non-destructive extraction of the NTFPs from the drylands adds a conservation benefit for the ecosystems (Lemenih et al., 2003).

However, despite their importance for both national economies and local households, the dry woodlands of Africa are often prone to degradation (Bongers and Tennigkeit, 2010). This has

often been attributed to the nature of the institutional arrangements that regulate the use and management of the resources (Chidumayo and Gumbo 2011). To verify this claim and deepen our understanding of this phenomenon, this study assesses the interactions between the production of non-timber forest products, rural livelihoods, and institutional arrangements in dry woodlands. It will specifically focus on gum and resin production in Ethiopia.

SIGNIFICANCE OF THE STUDY

Dry woodlands comprise the largest forest resources in Ethiopia. An important feature of Ethiopia's dry forests is their richness in *Acacia*, *Boswellia* and *Commiphora* (ABC) species (Lemenih et al, 2003; Chikamai and Tchatat, 2004; Lemenih and Teketay, 2004; Chikamai et al., 2009). Gums and resins, hardened resinous plant exudates, are obtained from several ABC species in the lowlands of Ethiopia (Wickens 1995; Lemenih et al., 2003). Currently, about 35 ABC species have been identified as potential producers of commercial gums/resins. But gums and resins are currently collected from only a few species (Lemenih and Kassa, 2011). The products contribute significantly to both rural livelihoods, the national economy and ecosystem stability. They contribute to local livelihoods in terms of both cash income, gained by selling products to buyers, and of subsistence local use. Locally, the products are used as herbal medicines, insecticides and hygienic and sanitation detergents. The products have also been traded for centuries both on the international and domestic markets. Claims of myrrh and frankincense production and trade in Ethiopia go back to the Aksumite Empire that reigned around the first millennium A.D (Butzer, 1981, Gebremedhin, 1997, Bard et al., 2000). Recorded accounts of commercial gum and resin production, however, is only available since the 1940s (Taib, 1982). Currently, an estimated 10000 metric tonnes per annum (estimated value of US\$12 million) is consumed locally, 60% of which is used in religious establishments (Lemenih and Kassa 2011). Another part of the production is exported. During the past decade, the total export volume and foreign currency earnings from gums and gum resins have increased (Lemenih and Kassa, 2011). In the period between 1998 and 2007 Ethiopia exported annually an average of 2500 tons of natural gum and resin and earned US\$ 34.1 million (Lemenih and Kassa, 2010). During the 2007/08 fiscal year, Ethiopia exported 4612 tonnes of gums and resins and earned about US\$7.7 million (Lemenih and Kassa, 2011).

Gum and resin production in several regions of Ethiopia is an important component of the household economies providing up to one-third of annual household income (Lemenih et al., 2003; Worku, 2006). The production is often a component of a multi-enterprise household strategy. In south Ethiopia, gum and resin is integrated in a pastoral land-use system, but in north Ethiopia it is part of a mixed farming system. In the south, they are collected as natural ooze from the wild vegetation, but in the north they are mostly produced by tapping trees. Hence, as a result of their economic importance in Ethiopia several gums/resin production and management systems are present with different intensities in management (Lemenih, 2005; Lemenih and Kassa, 2010). Still little information is available on the variety in production systems for the gum and resin resources, how they evolve, and how they are related to different livelihood systems in Ethiopia. The first problem to be addressed in this study is the

need to identify the variety in gum and resin production systems in relation to their management intensity and assess the role of these different systems in the local livelihoods.

Notwithstanding their economic importance, the woodlands and the ABC species at present are under intense pressure (Anonymous, 2007). Although several regulations exist that govern the use and management of the ABC species, historically these regulations focused on gum and resin production on public forests in the form of a concession system for commercial firms. More recently, the regulations favour a cooperative system for their exploitation (Anonymous, 2007; Anonymous 2006). However, these regulations have often not been very effective in conserving the forests (Lemenih and Kassa, 2010; 2011). Despite their economic value, the dry woodlands are often labelled as less productive and less attractive for a forest-based development. This implies the potential of the gum and resin resources is overlooked. The woodlands that host them are also objects of competition between local people and national entrepreneurs. As a result, the ABC woodlands are increasingly being converted into farmlands (Lemenih et al., 2007; Dejene, 2008). The second problem to be addressed in this study is why the ABC resources in the dry woodlands of Ethiopia are under intense pressure despite the presence of specific institutions for their use and management. This requires a better understanding of the nature of these institutions in how they shape the use and management of gum and resin resources in Ethiopia.

NTFPs use is characterized by a diversity of institutional arrangements regarding access to the resources and markets at both local and national level (Laird et al., 2011). Many studies on the institutional factors impacting on sustained use and management of forest resources focus on local community issues. Theories such as the Common Pool Resources (CPR) theory (Ostrom, 1990) focus on the institutional characteristics of locally developed, and often informal, systems for the use and management of natural resource and their internal dynamics. This approach has been criticized as giving too little attention to external factors such as markets, technology, state and population pressures (Agrawal, 2002) as well as on institutional dynamics (Agrawal, 2002; McCay, 2002). Other studies on NTFP governance focus predominantly on national, or even international level. For instance, a recent textbook on NTFP governance (Laird et al., 2011), while recognizing the multi-level institutions involved in NTFP governance, is mainly focused on formal government policies and laws. The multi-scalar character of major environmental problems (Lemos and Agrawal, 2006) justifies a more integrated approach in environmental governance. They indicated that environmental problems are spatially, socio-politically, and temporally interlinked. Socio-politically, environmental problems affect and are affected by institutionalized decision making at local, sub-national, national, and transnational levels. However, studies that address the coexistence and interaction of local and external institutions with respect to NTFP use and management are still rare. Most analyses tend to focus on either local or policy level without adequately considering multi-level institutional interactions and their consequences. Nonetheless, several studies on community institutions in natural resource management indicate that only macro level rules may not bring the intended management outcomes

(Gibson et al, 2000; Larson and Ribot, 2007; Mwangi, 2009) and may even compete with local institutional arrangements (e.g. Van de Berg et al., 2007; Benneker, 2008). In order to understand how gum and resin use and management is carried out in the drylands of Ethiopia, it is therefore necessary to consider how it is shaped by multi-level institutional arrangements. This study will therefore assess the different kinds of formal state and informal local institutions related to gum and resin production and investigate how the interaction and dynamics of the multi-level institutions affect the use and management of gum and resin resources in Ethiopia.

OBJECTIVES AND RESEARCH QUESTIONS

In this dissertation I investigate how formal and informal institutions shape the use and management of gum and resin resources in the dry woodlands of Ethiopia. The following questions are addressed:

- (i) What types of gum and resin woodland management and production systems are present in Ethiopia and how are they related to the land-use and socio-political conditions?
- (ii) How do multi-level formal and informal institutions interact and affect gum and resin production and management?
- (iii) How does gum and resin utilization fits into the livelihoods strategies of households in the study areas?
- (iv) What dynamic processes in institutional arrangements for gum and resin production and management have occurred in various regions of Ethiopia and how did these influence the intensity of gum and resin use and management?

THEORETICAL ORIENTATION

In order to address the various research questions, in this study a multi-theoretical approach was used. Such an approach will enable to assess the different types of institutional arrangements from both a policy point-of-view and a household point-of-view. The main theoretical orientations used in this study are introduced below. They will be further elaborated in the following chapters.

NTFPs and the livelihoods strategies of households

It is often considered that NTFPs are of special relevance for local communities for providing subsistence and daily needs of local households. A number of cases reviewed by Neumann and Hirsch (2000) indicate that sale of NTFPs often tends to provide a basic level of income for the poorest section of communities and the level of cash income received is often very low. However, the importance of NTFPs goes beyond meeting basic needs. Some NTFPs have been traded for more than 2000 years (Butzer, 1981, Bard et al., 2000). Nowadays, many NTFPs are being commercialized and are being traded in a rapidly growing market sector. Over the last years the NTFP market has shown an annual growth of nearly 20% (Hammet,

1999). The estimated total value of world trade in NTFPs is approximately US \$1.1 Billion (Iqabel cited in Laird et al., 2010). The growing demand for the non-timber forest products and services by non-local traders played a big role in their widespread commercialization (Ndoye and Chupeze, 2009). Traditionally NTFP exchange used to be often carried out in a patron-client relationship in which the NTFP producers work for a creditor until they pay the patron's debit. Currently, most NTFP producers entered into a monetised exchange. The development of urban centres, roads, state extension institutions, and local peoples' socio-economic development contributed to the emergence of a monetised economy. In some countries government marketing enterprises are major buyers of NTFPs. Currently, NTFP trade by local producer cooperatives is growing (Neumann and Hirsch, 2000; Sunderland and Ndoye, 2004; Marshall et al., 2006). Fair trade organizations working with producer cooperatives have started to influence NTFP markets in favour of the producers in the source country as well (Sunderland and Ndoye, 2004). Whether the producers sell the NTFPs to local or non-local traders partly depends on the resource. Even the structure of trading networks for the same products can vary geographically. A single marketing arrangement may dominate in one situation and not in another. In areas with relatively well-developed infrastructure, non-local traders are the most important customers of the producers (Neumann and Hirsch, 2000). In some cases, multiple trading networks can operate simultaneously in a region (Neumann and Hirsch, 2000).

As NTFPs cover a large variety of products used for a range of purposes ranging from subsistence use to international trade, the role of these products in the livelihoods of rural producers is quite variable. Livelihoods comprise the assets (natural, physical, human, financial, and social capital), the activities, and the access to these assets mediated by institutions and social relations that together determine the living gained by the individual or household (Ellis, 2000). Livelihoods diversification is the process by which rural households construct an increasingly diverse portfolio of activities and assets in order to improve their standards of living (Ellis, 2000). Households diversify their livelihoods strategies not only as a response for risk but also to accumulate wealth at different points in their life cycle. Such diversification can either involve an increasing multiplicity of activities or a shift away from traditional rural sectors such as agriculture to non-traditional activities. Currently, there is an increasing recognition of forest based rural livelihoods in general and NTFPs in particular. The World Bank (2003) indicated that 90 percent of the world's 1.2 billion extremely poor people depend on forest products for their livelihood. Whether these people diversify away from or towards forest based livelihoods strategies is location specific. Due to the opening up of forests and expanding economic networks, in many places the traditional forest-based livelihoods such as hunting and gathering have been replaced by agricultural cultivation. However, many forest-dependent people were not merely hunters and gatherers, but also managed forest resources. And many farmers are no longer exclusively farmers. People at the forest fringe live from a combination of natural resource exploitation and farming, off-farm employment, and labor migration to cities or even abroad. Within such economically and spatially diversified livelihoods, natural resource exploitation such as the collection of NTFPs

still may play an important role (Belcher et al., 2005). Consequently, NTFPs often play a significant role in a household economy (Hegde and Enters, 2000; Lemenih et al., 2003; Elmqvist et al., 2005; Viet Quang and Nam Anh, 2006; Petheram et al., 2006; Ros-Tonen and Wiersum, 2005). The diverse role is reflected by different livelihoods strategies of households for incorporating NTFPs in their livelihood systems. These strategies range from subsistence strategies to specialization strategies (Belcher et al., 2005; Shackleton et al., 2008). While some households utilize NTFPs as a coping strategy in times of economic hardship, others diversify them to generate (additional) income or wealth. In a specialization strategy the NTFPs are produced as the main sources of household income. Most NTFP studies have focused on rainforest areas, but NTFPs do not only have a significant livelihood role in rain forest areas, but also in dry woodland regions. In the African dry forest regions, the role of NTFPs for mitigation of extreme poverty is high (Campbell *et al.*, 2002; Lemenih et al., 2003; Shackleton and Shackleton, 2004; Petheram et al., 2006).

Diversity and dynamics in NTFPs production, management and trade

In view of their role in local livelihoods, NTFPs are often not just collected from wild vegetations, but actively managed. Many local communities are not mere gatherers of NTFPs, but are actively managing the forests in order to increase the production of valuable NTFPs (Wiersum, 1997; Belcher and Ruiz-Perez, 2001). The management of NTFPs may consist of a variety of practices ranging from the implementation of social and physical controls to prevent overexploitation, the protective tending of existing trees and natural regeneration, and the cultivation of trees through artificial regeneration (Wiersum, 1997). It is often assumed that the production of NTFPs takes place either in natural forests or in commercial tree crop plantations. However, conceiving the NTFPs production systems as either a natural ecosystem or as a man-made cultivation system does not reflect reality as NTFPs may also be harvested from a large variety of human-influenced forest types and plantations. Hence, NTFP exploitation takes place from either 'managed population' in natural forest environments or from 'domesticated population' in forest-analogue environments (Homma, 1992; Wiersum, 1997; Neumann and Hirsch, 2000; Belcher et al., 2005).

This diversity in NTFP production systems is reflected in the diversity in management practices. Several categories of management practices may be distinguished for the conservation and production of NTFPs (Wiersum, 1997): maintenance of the resource through controlled utilisation and protection, stimulation of the production of required products within existing vegetation, stimulation of regeneration of valued species through protection of natural regeneration, stimulation of root sprouting, planting of cuttings, transplanting of seedlings, and seeding. Also for gum and resin producing tree species diverse management practices may be employed. Local communities have consciously protected them in protected enclosures (Ghebremussie, 1997) or enhanced their productive capacity by (semi) domestication in agroforestry parklands (Boffa, 1999). These 'farmed parklands' in which tree production is combined with agricultural cropping (in the rainy season) and grazing (in the dry season) can be considered as a climate-specific representative of a 'forest analogue'

production system (Van Noordwijk & Ong, 1999). In Sudan, the production of gum arabic in 'gum gardens' is a common production system (Wickens, 1995), but in Ethiopia local efforts to conserve the *Acacia*, *Boswellia* and *Commiphora* (ABC) species and improve production management are mostly restricted to enclosures.

The NTFP production systems and their management practices are also dynamic (Homma, 1992; Ruiz-Perez and Arnold, 1996; Ros-Tonen and Wiersum, 2005). Homma (1992) identified four developmental phases in NTFP utilization: expansion, stabilization, decline and domestication. In the expansion phase, tradable NTFPs are harvested from the wild and production expands as collectors harvest more from available natural supplies to meet the growing market demand. This continues until an equilibrium is reached between supply and demand. This is called the stabilisation phase: some farmers begin to manage and cultivate the product and a proportion of the supply is met from cultivated sources. Prices begin to rise in the stabilization phase and policies to stimulate or protect the species may be adopted. The decline phase, caused by shrinkage of the resource base due to overexploitation and the increased cost of harvest, leads to the gradual decline of extraction from the wild. This decline may be offset by domestication in the form of conscious cultivation of valuable NTFP species. Such domestication can take place provided that technology for cultivation is available, substitutes do not yet exist and prices remain high. Wiersum (1997) proposes that domestication does not only involve conscious cultivation, but a greater array of human practices for controlled use of valuable tree species. He distinguished four phases in domestication of trees: controlled procurement of products from natural forests, conscious management of useful trees, cultivation of selected wild trees in plantations, and cultivation of genetically improved trees. Several examples illustrate this process of gradual intensification in the management of the NTFPs (Gilmour, 1990; Shepherd, 1992; Den Hertog and Wiersum, 2000; Paudel and Wiersum, 2002). However, Leakey and Iszac (1996) argue that only few species of trees have progressed beyond the second phase of domestication characterized by the protection of desired species in their natural environment or retention of them in farm lands.

Definition and role of institutions

In developing countries deforestation, forest degradation, biodiversity loss and rural poverty have long been important concerns in forest governance. The search for effective forest governance¹ arrangements that meet the challenges of sustainable forest use remains an important issue (Weiland and Dedeurwaerdere. 2010), and is central to improved forest cover

¹ Forest governance refers to the regulatory and institutional frameworks for the conservation, use and trade of forest resources and the principles that guide the interactions between those taking part in the design and implementation of different kinds of arrangements. It encompasses decisions on how and to what ends forests are managed, who are involved in these decisions, and what is done to enforce forest laws and policies on the ground (Ros-Tonen et al. 2008). Governance includes not only the actions of the state but also encompasses the actions of actors such as communities, businesses, and NGOs (Lemos and Agrawal, 2006).

and change outcomes (Agrawal et al., 2008). In the past it was understood that a centralized form of governance based on the market or the state would best fit natural resource management (Hardin, 1969). At present, however, forest governance at a world-wide scale is changing from centrally administered, top-down regulatory policies that characterized much of the 19th and 20th centuries to so-called new modes of governance. Now many government-owned forests are managed by local communities and community-based organizations and considered common property. Many other forests classified under public ownership are effectively governed as private timber concessions by logging companies (Lemos and Agrawal, 2006; Agrawal et al., 2008).

Good forest governance presumes the existence of effective institutions at various levels of government. Institutions are the “rules of the game,” or “humanly-devised constraints that shape human interaction” (North, 1990). They are all structures and practices that influence who has access to and control over which resources, and arbitrate contested resource claims, and shape the use made of the resources and the timing of use (cf. Leach et al., 1999). They encompass sets of enduring ideas, rules (formal and informal) and practices (*de jure and de facto*), their enforcement characteristics, as well as organizations and decision-making groups (Watson, 2003). Enforcement is crucial in social interaction and carried out by third parties (law enforcement, social ostracism), second parties (retaliation), or by the first party (self-imposed codes of conduct) (North, 1994).

Institutions may be differentiated as internal and external depending upon how they come about. Internal institutions are those that evolve within a group in the light of local practices and experiences (Kasper and Streit, 1998). Indigenous institutions as a specific category of internal institutions that are emerged in a particular situation or practiced or constituted by people who have had a degree of continuity of living in and using the resources of an area are dealt in this study (Watson 2003). Most indigenous institutions are developed by people having been marginalized in the past from dominant forms of governance and knowledge. Traditional institutions in this paper refer to the *gada* system of Borana, an indigenous institution existed for generations and embedded in the ‘shared memory’ of the Borana people. External institutions are rules that are designed externally and imposed on a local society from above by a political action. They are made explicit in a legislation and in regulations, and formally enforced by authorities outside the local society, such as a national government (Kasper and Streit, 1998). They also include interventions by non-governmental organizations (NGOs) and market actors (compare De Koning, 2010 and Benneker, 2008).

Institutions may also be differentiated in respect to the degree of their formality. Formal institutions are written rules and procedures that are created, communicated, and enforced through channels that are widely accepted as ‘official’. They are written rules designed and made explicit in government legislation and/or regulations and enforced by formal authorities. They comprise of state-enforced rules such as constitutions, laws, regulations, property rights, bylaws, statutes, and common laws and are enforced by third party organizations, such as

courts, legislatures, judges, police and bureaucracies. The enforcement characteristics include official sanctions such as criminal punishment, fines and imprisonment (Kasper and Streit, 1998; Jütting, 2003; Helmke and Levitsky, 2004). In other words, formal institutions require exogenous enforcement by a third party organization or official entities (Kasper and Streit, 1998). In this study local cooperatives are also recognized as externally initiated institutions. According to the International Cooperative Alliance (ICA, 1995), cooperatives are autonomous associations of persons united voluntarily to meet their common economic, social, and cultural needs and aspirations through jointly owned and democratically controlled enterprises. Even though their formation is externally initiated, they are legal entities owned and democratically controlled by its members.

In contrast, informal institutions are socially shared rules and norms, usually unwritten, that are created, communicated, and enforced outside officially sanctioned channels (Helmke and Levitsky, 2004). They include (a) socially sanctioned norms of behaviour (attitudes, customs, customary practice, taboos, beliefs, conventions, traditions and self-imposed codes of conduct); and (b) extensions, elaborations, and modifications of formal rules outside the official framework. While informal rules are generally not codified, they are normally widely accepted as legitimate and they are therefore ‘rules-in-use’ rather than just ‘rules from the books’. Informal institutions are endogenously enforced by mutual agreement among the social actors involved or by relations of power and authority between them. The enforcement mechanisms include self-enforcement mechanisms of obligation, expectations of reciprocity, internalized norm adherence, gossip, shunning, ostracism, boycotting, shaming, threats and the use of violence (Jütting et al., 2007). In this study two types of informal institutions are distinguished: customary and informal-bureaucratic institutions. Customary institutions are the rules, norms and practices generated by a society or community in a certain area that govern the cultural, social and political aspects of their life. The informal-bureaucratic institutions are the rules designed and applied by sub-national and local administrators and/or NRM experts. These rules are neither codified nor formally endorsed by national authorities and these may be even contrary to the provisions the macro-level institutions offer to forest users.

Institutions in Natural Resources Management

Natural resources management (NRM) is characterized by institutional diversity (Ostrom, 2005). The institutions that govern the management of natural resources originate from different sources (Kirsten et al, 2009) and include international laws, national state (statutory) laws, religious laws and accepted religious practices, customary laws, project (or donor) procedures, and organizational laws. NRM institutions not only coexist but also interact. Young et al (1999) distinguish institutional interaction between institutions at the similar (‘horizontal’) or different (‘vertical’) levels of social organizations. Horizontal interaction often involves institutional interaction across sectors, whereas vertical interaction exist

between institutions at macro, meso and local levels. These interactions may be formal or informal; and planned or unplanned; and complementary, conflictual or competing in nature (Arnhe, 1994). Hence each institution may exert a different level of influence over another, which can vary over space and time (Meinzen-Dick and Pradhan 2002). In a community near the capital city, statutory law may be strong and customary law weak; but in remote areas customary law might be much stronger than state law. Macro-level laws granted by the state may not be strongly enforced in remote areas.

In forest management the concept of institutional diversity is clearly observed (Gibson et al., 2000; Gibson, 2001; Tucker, 2007; Benneker, 2008). Local people or state agencies at different levels may generate different types of norms and regulations on how to control forest use and how to manage them (Ostrom, 1990; Agrawal and Gibson, 1999). Although a clear relationship with certain sets of institutional arrangements and forest management outcomes does not exist, a clearly defined user groups and boundaries at local level as well as consistent monitoring and enforcement mechanisms have emerged as significantly associated with better resource management outcomes (Gibson et al., 2005). When such rules are absent, or inadequately enforced, then “weak” institutions exist. The quality of the institutions is stronger related to the outcomes of forest management rather than whether they are subject to private, communal, and public property right regimes. All regimes may have similar potential for successful forest management outcomes as long as the rules for use and management are designed and enforced appropriately (Gibson et al., 2002). And any property rights regime with weak or inappropriate institutional arrangements may lead to resource degradation (Gibson et al., 2002; Gibson et al., 2005; Tucker et al., 2007). Hence effective institutions need to be related to the characteristics of the appropriators and the resources as well as to political and economic policies, and biophysical factors (Agrawal, 2001; Dietz et al., 2003; Tucker et al., 2007).

Utilization of NTFPs to create win-win options for forest conservation and improvement of local livelihoods depends upon how they are managed and governed in respect to both access to resources and access to the markets (Laird et al., 2010). Effective governance of NTFPs is important throughout the management, harvesting, trade and use phases of most NTFPs. However, the governance of NTFPs was overlooked and poorly regulated in past years (Laird, et al., 2010). And recent efforts to improve this have not always been effective. Also measures to institutionalize effective forest governance have been criticized for being tagged into timber-centric forest laws, that were neither strategic for nor well-informed on NTFPs. In many cases, statutory control over NTFPs have undermined customary laws and local institutions that are better suited to regulate NTFP producing species. Moreover, most NTFPs policies and laws have been enacted as ad hoc responses to natural resource crises. Currently, the growing importance of the NTFPs - both locally and for the economy at large - needs ensuring they are not harvested on the scale that adversely affects them. Hence many governments today are revisiting their laws and policies for effective NTFPs governance (Laird et al, 2010). In this study the role and characteristics of the various types of institutions

and their interaction with respect to gum and resin production and marketing is investigated. We particularly emphasize the institutions that impact access to the ABC resources and gum and resin products market.

THESIS OUTLINE

This thesis deals with how gum and resin utilization and management is organized in different dryland regions of Ethiopia and how it is related to a complex system of institutional arrangements and dynamics as well as local livelihoods. It consists of seven chapters (Figure 1) including this introduction chapter (chapter 1), five empirical chapters (chapters 2 to 6), and the summary and synthesis (chapter 7)².

Chapter 2 identifies the diversity in gum and resin management and production systems in the three study areas. Also the various phases of domestication of the gum and resin producing trees and how they correspond with different production systems is presented. This chapter provides a comparative characterization of different systems for gum and resin production. In the following chapters this information is further elaborated and detailed.

Chapter 3 and 4 further detail the characteristics of the exploitation arrangements that exist in north and south Ethiopia respectively. Both chapters provide insights in how gum and resin production is affected by a diversity of formal and informal institutions and their interaction. Chapter 3 describes the coexistence and interaction of traditional and external institutions in the Borana region in south Ethiopia and its impact on gum and resin utilization and management. Chapter 4 describes how in two regions in north Ethiopia gum and resin production and management is affected by the coexistence and interaction between formal and informal institutions.

Chapter 5 presents the livelihood strategies of households in relation to gum and resin utilization in both north and south Ethiopia. It also assesses how the household role of gum and resin is related to the exploitation arrangements. Chapter 6 brings the information from the previous chapters together. It specifies the diversity and dynamics of the institutions governing the exploitation. It also discusses how the role of gum and resin in the livelihoods strategies of households, the exploitation arrangements, and other socio-political factors are associated with the limited domestication of gum and resin producing trees in the drylands of Ethiopia.

² As the chapters have been written in the form of journal manuscripts, there is some overlap in content between chapters

Finally, chapter 7 summarizes the main findings of the study and presents a synthesis in which the results of the various chapters are integrated and reflected upon with respect to the scientific relevance of the research findings. It also provides recommendations on options for further regional diversification and region-specific regulation of gum and resin production in Ethiopia.

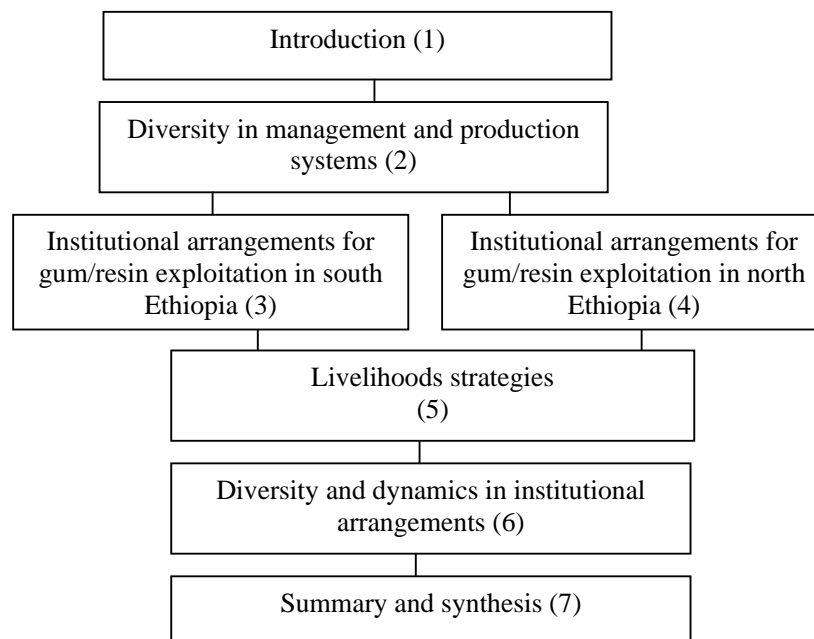


Figure 1. Structure of the thesis

STUDY SITES

This study employed a comparative approach in three locations, representing climate and socioeconomic differences, selected in accordance with the overall FRAME program³ criteria for selection of research sites. The three are Abergelle in the North, Metema and Quara in the northwest, and Borana in the South of Ethiopia. All three sites are known for woodlands vegetations. Peculiar about the vegetation types in dry woodlands is their richness in the species of the family Fabaceae and Burseraceae (Vollesen, 1989; Kuchar, 1995). The ABC species in both family contribute to some of the world oldest and most acknowledged forest products, such as gum arabic, frankincense and myrrh (Lemenih and Teketay, 2004). Some difference in the woodland types and ABC species compositions occur in the three regions. The *Combretum-Terminalia* woodlands prevailing in Abergelle and Metema are dominated by *Boswellia papyrifera*, which is the source of most widely marketed type of incense (FAO,

³ FRAME stands for **F**rankincense, **M**yrroh and gum Aarabic: sustainable use of dry woodlands resources in **E**thiopia. It is an integrated research program largely funded by the Netherlands Foundation for the advancement of Scientific Research in the tropics (NWO-WOTRO).

1995; Lemenih, 2005). The *Acacia-Commiphora* woodlands dominating in Borana are composed of a variety of gum and resin producing species, including *Acacia senegal* and *Acacia seyal* for Arabic gum, *B. neglecta* and *B. rivae* for frankincense and *Commiphora myrrha* and *C. guidotti* for myrrh and oppoponax production (Lemenih, 2005).



Figure 2. Map of the study areas in Ethiopia. The three areas are Abergelle in the north, Metema and Quara in the northwest and Borana in the south.

Research design and methods

We employed a combination of household surveys and participatory approaches for data collection. Ellis (2000) indicated that neither sample surveys nor participatory methods, as separate packages, provide a complete approach. A combination of the two approaches is required, each serving different but complementary roles within the overall research design. It is recommended that a follow up, semi structured group enquiry can give clear insights into the results of a pre-planned sample survey; in other cases an exploratory rapid appraisal has been found to offer the best method to ensure appropriateness in the design of a sample survey. Since collection of institutional data is a sensitive matter that requires the building of trust between researchers and respondents, preceding formal data collection by a PRA exercise is recommended as one way of achieving this. Chambers and Blackburn (1996) defined Participatory Rural Appraisal(PRA) as a family of approaches that enable people to express and analyze the realities of their lives and conditions, to plan themselves what action to take and to monitor and evaluate the results. The most common PRA methods include

group discussions, key informant interviews, drawing maps, transect walks, time lines and trend analysis, seasonal calendars, wealth ranking, matrix scoring and ranking, Venn diagrams, and many others (Thomson and Freudenberg 1997; Ellis, 2000).

Within each location, a base-line survey to ascertain the local socio-economic, institutional and land-use conditions were conducted first using a combination of participatory methods: open interviews with groups and key informants, participatory land-use maps, traditional administrative units and organizational maps, transect walks, and historical/trend lines (village histories, histories of vegetation, crops cultivation, and gum and resin utilization). The information from the base-line survey was used in formulating a questionnaire for a household survey. In the systematic household survey, data were collected on socio-economic characteristics and livelihood strategies of households, types of use and management practices of the gum and resin producing trees, gum and resin utilization arrangements, involvement in trade and gum and resin commercialisation, and conditions of land tenure. The sampling intensity was decided on the basis of information on the degree of socio-economic heterogeneity as ascertained by the base-line survey. The household data were further validated by another round of focus groups discussions and key informants interviews on additional details of the history and institutional basis of gum and resin production and the livelihoods strategies of the households. These focus groups discussions and key informant interviews served to check issues emerging from a household survey. The quantitative data from the household survey were analyzed using SPSS. The results were compared with respect to differences in research locations, livelihoods activities, wealth categories, production systems and exploitation arrangements. In addition, systematic relations between qualitative data were traced.

Chapter 2

Diversity and dynamics of management of gum and resin resources in Ethiopia: a trade-off between degradation and domestication

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(Land Degradation and Development, in press)



ABSTRACT

Although the human domestication of forest and tree resources is often considered to result in resource degradation, it may also lead to improved resource potentials. This paper assesses the nature and dynamics of gum and resin focused woodland exploitation and management systems in Ethiopia in the context of degradation and domestication processes. In three sites with commercial gum resin producing woodlands and production history, we studied variation in (i) woodland management and gum resin production systems and (ii) socio-economic and biophysical factors that condition the management and production systems. On the basis of their organizational features, we formulated nine production models and related them to different phases of domestication and different degrees of ecosystem degradation. The production systems gradually evolved from the extraction of wild trees to production in an adapted forest system. However, domesticated woodlands with an adapted forest structure and composition and increased provisioning services are still little developed despite decades of production history. Many of these woodlands are undergoing serious degradation due to low quality management practices. This is mainly attributable to existing land use practices and the social arrangements for the production of and trade in the gums and resins. The findings illustrate that domestication involves not only a change in ecological and production systems, but also the development of social arrangements for production and trade. We conclude that the status of domestication in a social sense determines whether forests and/or specific forest resources are degraded or aggraded in the sense of resource enrichment.

Keywords: Abergelle, access right, Borana, dry woodlands, frankincense, land use dynamics, Metema.

INTRODUCTION

When considering forest–people interaction, two major processes can be distinguished, namely domestication and degradation. Conservation ecologists often maintain that the human domestication of forest and tree resources results in resource degradation (e.g. Diaz et al., 2007), whereas production ecologists believe that it may also lead to improved resource potential (Kareiva et al., 2007, Wiersum, 2010). Thus, domestication and degradation should not be equated. Degradation refers in its most elementary sense to a ‘reduction to a lower rank’; it hence implies human scaling of a certain phenomenon (Blaikie and Brookfield, 1987). In relation to forest and tree resources, such scaling often involves a ranking of the negative human impacts on ecosystems by taking natural ecosystems as a hallmark. Degradation may be related to the loss of quality of ecosystem structure and composition (e.g. loss of biodiversity), or to the loss of ecological services in the form of either provisioning, regulatory or supporting functions (MEA, 2005, Diaz et al., 2007, Brook et al., 2008, Naeem et al., 2010). Both the degradation of provisioning functions (e.g. loss of useful species) and regulatory functions (e.g. decreased soil and water conservation features) lead to a loss of production potential. Degradation thus concerns a decrease in both ecosystem quality and production potential.

In contrast, domestication usually leads to an increase in the biological production potential of natural resources (Kareiva et al., 2007, Wiersum, 1997, Wiersum, 2008). Domestication is a multidimensional process, involving biological, ecological and social processes in the form of an acculturation process characterized by increasing human–plant interactions and the adaptation of species to a human-controlled environment (Wiersum 1997, Simons and Leakey, 2004, Kareiva et al., 2007). Domestication is then seen as transforming a natural environment into an anthropogenically adapted environment that has an enhanced production capacity for biological objects valued by people. In this co-evolutionary view, four domestication phases may be distinguished, each characterized by a specific intensity of management of biological, social and ecological characteristics (Wiersum, 1997, Wiersum, 2008). These phases are:

1. Controlled procurement of products from natural forests; essentially social controls on access and harvesting intensity.
2. Conscious management of useful trees through protection of productive trees, stimulation of production capacity by tree tending activities (e.g. coppicing, removal of competing trees) and protection of natural regeneration.
3. Cultivation of selected wild trees in plantations.
4. Cultivation of genetically selected or improved tree crops in intensively managed plantations.

In view of present environmental concerns, a further phase of domestication can be hypothesized:

5. 'Back-to-nature' or 'natural products' type cultivation that involves a combination of eco-friendly management (e.g. organic farming, reduced tillage/conservation tillage) and the use of specifically selected cultivars adjusted to more natural forest conditions, or even the introduction of genetically modified species in natural ecosystems (e.g. Stanhill, 1990, Watson et al., 2002).

These phases differ not only in management intensity, but also in the social organization of access to the tree resources.

The domestication of agricultural crops may involve ecological degradation, as it generally results in a loss of genetic variation and the artificialization of growing conditions. However, when considering trees, most of the phases of domestication (except phases three and four) do not necessarily result in degradation in the sense of a loss of ecological integrity and functioning. It has been suggested that intermediate phases in the process of the domestication of forest resources form a good example of how to adapt the natural environment to suit human needs, and how to balance conservation and development needs. Michon (2005) and Michon and colleagues (2007) even argued that the intermediate phases of tree domestication should be considered truly domesticated forests serving both production needs and ecological concerns.

Domestication may also involve the conscious conservation and restoration of essential ecosystem properties, and may increase ecosystem services. Such restorative management can take several forms, for example, the creation of positive conditions for natural succession, the reforestation of degraded areas and/or the application of soil and water conservation measures (Clewell and Aronson, 2007, Bainbridge, 2007, Hobbs and Suding, 2009). Some of such restorative management practices are directed at ecosystems (Cramer and Hobbs, 2007, Hobbs and Cramer, 2008), while others focus on increasing production capacity (Lamb, 1998). Thus, degradation should not be considered the outcome of a unidirectional process of lowering of ecological ranking due to domestication, but as the outcome of degrading and aggrading forces, both of which can be human influenced (Blaikie and Brookfield, 1987, Johnson and Lewis, 1995).

These two processes – degradation and domestication – are often juxtaposed as referring to either negative or positive human impacts. In reality, however, the processes are often interactive and should be analysed as two separate factors, whereby various pathways of degradation – or its inverse, aggradation – may occur along a domestication axis. The assessment of resource dynamics as involving the co-occurrence of degradation and domestication processes is increasingly receiving attention (Lamb et al., 2005, Wiersum 2010). It is the trade-offs between ecological conservation and human development that should be focused on (Lamb et al., 2005, Kareiva et al., 2007). This requires a balanced assessment of the processes of degradation due to human exploitation or over-exploitation, and the processes of resource enrichment through human creativity in adapting ecosystems to evolving human needs. The multivariate dimensions of these processes need to be assessed in a comprehensive framework.

Most studies on forest domestication and its impact on forest structure and composition have focused on the humid tropics (Schroth et al., 2004, Michon, 2005, Perfecto and Vandermeer, 2008, Wiersum, 2008, Wiersum, 2010), while interactive processes in the drier tropics have received far less attention. This paper assesses the nature and dynamics of gum and resin focused woodland exploitation and management systems in Ethiopia. It aims to contribute to a better understanding of the multivariate relations regarding forest–people interactions in drier regions and the interplay between degradation and domestication processes.

The dry woodlands in Ethiopia offer a good example of the variable impacts of human activities on forest resources. These woodlands are estimated to cover over 55 million ha of the country (WBISPP, 2004, Teketay et al., 2010). They occur in drier regions that are predominantly inhabited by nomadic pastoralists and agro-pastoralists (Friis et al., 2010). For these communities, the woodlands are essential economic and cultural endowments that provide a wide array of products and services. They also host diverse species of the genera *Acacia*, *Boswellia* and *Commiphora* (hereafter the ‘ABC species’), which are renowned for their commercial gum and resin products, such as gum arabic, frankincense, myrrh and opoponax (Lemenih et al., 2003, Eshete et al., 2005). As a result of regional differences in historical developments, different systems for gum and resin production exist in Ethiopia. In some regions it is an established and formal practice that gradually changed in response to government policies, while in other regions it is a relatively new and/or informal activity. In some areas initial efforts at the domestication of the ABC species have been undertaken, notably aiming at developing more effective access rights and improved exploitation practices. Notwithstanding the economic importance of the ABC woodlands, in several places they are degraded as a result of improper harvesting and over-harvesting of the gums and resins, overgrazing by livestock, excessive wood harvesting and conversions to other forms of land use (Gebrehiwot et al., 2003, Ogbazghi et al., 2006, Abiyu et al., 2010).

In this paper we address the following three questions:

- Which woodland management and gum resin production systems are present in the three regions?
- How are the different systems related to the land use and socio-political conditions in the three regions?
- What are the characteristics of the different systems in relation to degradation and domestication processes?

RESEARCH SITES AND METHODS

Three regions with contrasting ABC production and marketing conditions that represent the variety in regional conditions of gum and resin production in Ethiopia were selected, namely Abergelle in the north, Metema in the north-west and Borana in the south (Figure 1). All three

study sites host woodlands that are rich in ABC species (Kuchar, 1995, Vollesen, 1989; Lemenih and Teketay, 2004). However, there are several differences in the woodland types, ABC species compositions, socio-economic and livelihood conditions, and the organization of the gum and resin production (Table 1). *Boswellia papyrifera*, which is the source of the most widely marketed type of incense – Tigray type (white) frankincense – is the important commercial species in Abergelle and Metema (Lemenih, 2005; Lemenih et al., 2007). In Borana there are a variety of gum resin producing species, including *Acacia senegal* and *Acacia seyal* for gum arabic production, *B. neglecta* and *B. rivae* for frankincense and *Commiphora myrrha*, and *C. guidotti* for myrrh and opoponax (Lemenih, 2005) (Table 1). The production, sale and export of the gums and resins means that the woodlands are not only an important local resource for income earning, but also an important resource for national revenue earning.

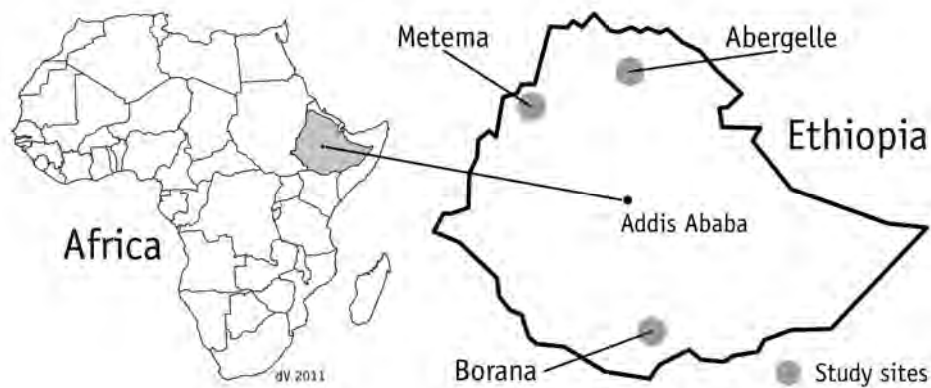


Figure 1. Location of the three case study locations in the drylands of Ethiopia

Within the framework of a larger integrated research project on development options for increased gum and resin production contributing towards sustainable woodland management, in all regions a synthesis was made of information generated by various previous studies. This synthesis was complemented by extra baseline surveys of the general status and trends of the woodlands (declining, stable or aggrading), the nature and institutional setting of the gum and resin production and marketing systems, the livelihood activities of the local producers and impacts on woodlands from current production systems. Data were obtained from observations supported by open-ended questionnaire interviews of community groups and key informants (elders, office representatives, cooperative representatives, non-governmental organization delegates and traditional historians). In the three regions, a total of 21 group discussions were held and 30 key informants were interviewed. Groups and key informants were selected from various sites within the regions in order to obtain a broad representation of the areas. The key informants were selected on the recommendations of field guides.

Table 1. Major biophysical and socio-economic land-use conditions in the three regions.

Site attribute	Abergelle	Metema	Borana
Approx. area and population	3000 km ² , Population 113526	3995 km ² , population 83,193 (18.5 persons/km ²)	50,000 km ² , population 350,000 (7 persons/km ²)
Climate conditions	Semi-arid; rainfall is uni-modal and very erratic, mean annual rainfall ca. 800 mm. mean annual temperature of 22 °C; altitude range 1400-1650 m a.s.l.	Semi-arid to sub-humid; rainfall is unimodal with Mean Annual Rainfall of ca. 965mm; Mean Temperature 28 °C; altitude range 549–600 m a.s.l.	Arid (70% of the area) and semiarid (30%). Rainfall bimodal and Mean Annual Rainfall is 550 mm; Temperature range 19-24°C. Altitude range 1000-1600 m a.s.l.
Ethnic composition	Homogenous, Tigre ethnic group	Heterogeneous, Amhara (80%), Tigre (10%), Oromo (5%) and Gumuz (2%). Increasing importance of immigrants	Predominantly Borana Oromo ethnic group, also others like Digodi, Marihan, Gurri, Gabra and Konso
Main livelihoods	Mixed subsistence farming. Prevalent food insecurity stimulates alternative income earning	Traditional hunting-gathering being replaced by mixed subsistence farming. Rapid expansion of commercial farming of oilseed and cotton.	58% pure pastoralists, 41% predominantly pastoralists, the rest involve in non-farm related income-generating activities,
Original natural vegetation	<i>Combretum-Terminalia</i> woodlands and wooded grasslands. <i>B. papyrifera</i> and some acacia spp. predominate; Woodlands cover only small portion of the district	<i>Combretum-Terminalia</i> woodlands and wooded grassland. More diverse and higher in stature than in Abergelle. <i>B. papyrifera</i> is the main species. Woodland cover large part of the district	<i>Acacia - Commiphora</i> woodlands and bush land proper. Different <i>Acacia</i> , <i>Boswellia</i> and <i>Commiphora</i> species co-exist
Major ABC species	<i>B. papyrifera</i>	<i>B. papyrifera</i>	Diverse <i>Acacia</i> , <i>Boswellia</i> and <i>Commiphora</i> species co-exist.
History of gum and resin production	Probably the oldest commercial production region in Ethiopia (since 1940s). Systematic resin production through tapping mainly in concession areas allotted to commercial firms	Systematic commercial production started in 1980s and has gradually intensified	Ad-hoc extraction of gums and resins through collection of natural exudates by local people. More organized extraction has recently emerged

ABC WOODLAND MANAGEMENT AND GUM RESIN PRODUCTION SYSTEMS

The use and the management of gum and resin resources in the three sites are usually integrated with or supplementary to other land use activities. The existing land use and livelihood conditions (Table 2) form an important factor shaping the use and management of

the ABC woodlands; consequently, the gum and resin production and management systems in the three regions differ considerably (Table 3). In the following, we present site-specific use and management characteristics, and then analyse the inter-sites differences and similarities. Finally, we analyse the prevailing use and management practices against the five phases of domestication presented in the introduction.

Site-specific management and production characteristics

Abergelle

Abergelle is both one of the oldest and one of the main gum and resin production areas in Ethiopia, especially for white frankincense (Gebremedhin, 1997, Brad, 2000; Gebrehiwot, 2003). The production of this resource forms an important means for cash earning by local communities. This cash earning supplements the mainly subsistence oriented mixed farming practices, namely smallholder crop cultivation (mostly sorghum, teff and maize) and livestock keeping.

The woodlands are formally public resources, but communally used. They form an important component of the local land use system. They are equally valued for frankincense production and for livestock rangeland use. Crop cultivation is also prevalent. Long years of human habitation and the intensive extraction of wood and production of frankincense have significantly shrunk the woodlands. Various initiatives to enrich the frankincense resource have been started by both individual farmers and the state. The efforts by individual farmers involve the preservation of naturally regenerated trees as on-farm private trees (parkland agroforestry). State-supported efforts involve restoring degraded areas with exclosure establishment as well as tree planting (Gebrehiwot, 2003, Tilahun et al., 2007, Negussie et al., 2009, Yayneshet et al., 2009). These measures are complemented by the strict protection of the remnant forests, including control over forest product transport and marketing (Gebrehiwot, 2003, Aynekulu et al., 2009).

In Abergelle, only white frankincense (Tigray type) is produced (from *B. papyrifera*). Production of this frankincense involves tapping that is, wounding tree stems with a sharp knife to stimulate the flow of incense tears. Individual stems are tapped for nine months each year (i.e. throughout the dry season) in 10 to 12 rounds of stubbing and collecting incense tears. Tree stems are wounded at several spots (the number is determined by the size of the stem). Until 10 or 15 years ago, frankincense was produced by NGPME (National Gum and Resin Production Company of Ethiopia), a state-based enterprise that hired local people as day laborers (concession production system). Today, three types of incense production models prevail in Abergelle.

Table 2. Main use and management characteristics of ABC woodlands at the three sites of Abergelle, Metema and Borana

Management characteristics	Abergelle	Metema	Borana
Status of the woodlands	Area of woodland more or less stable. Major changes in species composition is taking place. Ageing of ABC species with little natural regeneration.	Rapid decrease in woodland area. Expansion of commercial agricultural cultivation. Ageing of ABC species with little natural regeneration.	Limited local losses in woodlands. Mostly stable population of ABC trees with good regeneration. But cropland expansion is increasing.
Predominant land-use system	Agro-silvopastoral system including engagement with gum and resin production	Agro-silvopastoral system. Gum and resin production mainly activity of external people.	Silvopastoral system with gum and resin extraction as subsidiary activity
Level of competition from other land-use activities	High level of livestock grazing	Strong land competition from cash cropping (sesame, cotton)	Regulated grazing system and also low competition from subsistence crop cultivation
System of access to ABC resources	Concessions to locally organized cooperatives and/or commercial firms employing local laborers. Recent decentralization with regulation by ABC cooperatives.	Mostly concessions to commercial firms employing external laborers/limited access to gum cooperatives still employing external labor	No explicit controlling rules for ABC resources. Access rights to woodlands embedded in local Gada institutions for rangeland management
Gum and resin extraction techniques	Tapping	Tapping	Collection on natural exudates
Woodland regeneration techniques	Increasing attention to stimulation of natural regeneration in grazing exclosures.	Unmanaged natural regeneration but seriously hampered due to overgrazing, conversion and fire	Natural regeneration abundant, but problem of overgrazing and cropland expansion are emerging.
Development of specific ABC management systems	Initial efforts at ABC planting. Initial development of ABC agroforestry parklands	No	No

The first and most common production model is the cooperative model (Table 3). Households and individuals above the age of 14 may join cooperatives. The cooperatives in Abergelle are all general-purpose cooperatives, that is, they accomplish diverse purposes besides being involved in gum resin production. Their formation is facilitated by government agencies, such as district cooperative offices. Cooperative members are granted a license to tap frankincense

Table 3. Regional comparison of prevailing organisation of gum/resin production system, their domestication phase status , effects on the ecosystem and trend in production

#	Production model and their characteristics	Case study sites			Phase of domestication	Ecosystem effect *	Trend in production
		Abergelle	Metema	Borana			
1	Gum resin exploitation by individual on casual/part-time base	Not present	Not present	Established	Early phase 1	Low	More or less stable
2	Gum resin exploitation by individuals on full time base	Established	Not present	Emerging	Phase 1	Low	Slow increase
3	Gum-resin production by cooperatives (restricted access of members)	Established	Not present	Not present	Phase 2	High	Strong increase
4	Gum-resin exploitation by cooperatives from communal woodlands (unrestricted access of members)	Not present	Emerging	Emerging	Phase 2	Low	Slow increase
5	Gum resin production by concessionaires with local labour force	Established	Not present	Not present	Phase 2	Medium	Slow decrease
6	Gum resin production by concessionaires with external labour force	Not present	Established	Not present	Phase 2	High	Slow decrease
7	Gum resin exploitation by individual farmers from on-farmland/homestead trees	Emerging	Not present	Not present	Started to evolve from phase 2 to 3	Low	Slight increase
8	Concessions with long lease time and management**	Not present	Not present	Not present	?	?	?
9	Concessions with long term management and with planting and tending**	Not present	Not present	Not present	?	?	?

* Effect on ecosystem is assessed based on local perceptions as obtained from key informants and community groups during field survey (see section 2). **

These two production models are not yet existing in the three sites but have recently been embedded in regional policies as an attempt to improve the long-term sustainability of the resources

in a certain area of the woodland for a certain period of time, subject to the requirement that the frankincense is sold solely to their respective cooperatives. Each year, cooperatives sell the produce to gum companies, which further process the frankincense and then export it or sell it on domestic markets. Due to the limited resource base, members of the cooperatives receive production permission only once every two or three years (rotational access arrangement).

The second production model is the private/individual model, whereby production is from own on-farm or homestead trees (agroforestry trees) (Table 3). This mode of production is gradually increasing as a result of two forces: the significant shrinkage of the woodlands coupled with the increasing scarcity of the natural tree stands, and the growing importance of incense income in the local livelihoods. At the moment, all these parkland trees are naturally grown remnants preserved in the process of conversion or homestead establishment. Several tree planting initiatives have recently been launched. Plantation trials with seedlings raised in nurseries mostly failed, but regeneration using cuttings is becoming promising. Haile and colleagues (2011) showed that the survival of planted cuttings mainly depends on their size and the collection period. Negussie and colleagues (2009) reported that the application of *Euphorbia abyssinica* latex to *Boswellia* cuttings promotes rooting. Farmers mainly propagate *Boswellia* trees in the form of live fences.

The third system of production involves concessionary (gum company) based production (Table 3). In this model, gum companies lease woodland from the regional government and then employ one of two production subsystems: (i) contracting out the production to an experienced person who may hire daily laborers himself and organize the production to deliver the produce at the end of the production season to the company (re-leasing or contracting out), or (ii) direct hiring of piece rate workers for the production season and follow-up the whole production by the companies themselves.

Metema

This region was traditionally sparsely populated. The land was mostly used for hunting and gathering by the native Gumuz people, and for sporadic shifting cultivation (Mekonnen, 2004). Over years, the range use of the woodlands has begun to predominate. The range use of the woodlands is an ‘open access’ type: they are used by resettled local people for grazing and by seasonally migrating cattle herders from the surrounding highlands (transhumance). According to a study by Tegegne and colleagues (2009), 60.3% of the total cattle population in three nearby highland districts (Chilga, Dembia and Gondar Zuria) trekked to Metema for six to eight months each year while the highlands were used for cultivating food crops. The traditional food crop cultivation in Metema was in the form of shifting – cultivation with hoe and human labor (Mekonnen, 2004). However, the climate and the soil conditions are suitable for the intensive cultivation of various crops, such as cotton, sesame, sorghum, finger millet, maize and teff, and the area has recently been opened up for the cultivation of most of these cash crops. Migration to Metema from the highlands has intensified since the late 1960s/early

1970s, and it has changed significantly the demographic and ethnic composition of the district (Lemenih et al., 2007). The earliest inhabitants – the Gumuz – make up less than 2% of the human population and are restricted to few localities (see also Anonymous, 2005, Dejene, 2008). The majority of the inhabitants are now migrant highlanders from strong agricultural backgrounds. Sesame and cotton have become important cash crops, and are cultivated both by smallholders and agro-entrepreneurs. The environmental suitability of Metema for crop cultivation coupled with the agricultural background of the inhabitants means that the chief interest in the woodlands is related to their cropland value (see also Lemenih et al., 2007). Local people may refer to a traditional system called ‘Mate Qedem’ and ‘Mofer Zemet’ for claiming lands for crop cultivation in the woodlands. Mate Qedem means ‘marked first’. It is a system of marking a territory within the woodlands as a sign of claim for croplands that will sooner or later be cleared and converted. Once a woodland area has been marked, the user-right of whoever marked it will not be disputed by others. Mofer Zemet means ‘campaign with plough’. It is a system whereby highlanders who do not permanently dwell in the district come down in the summer and clear and cultivate as much land as they can, and then harvest their crops and leave the area. As a result of the intensifying clearance for crop cultivation in the district, pasture woodlands are rapidly declining (Eshete et al., 2005, Lemenih et al., 2007, Dejene, 2008). The woodlands still provide the major grazing areas for livestock, and yield a variety of wood and non-wood (e.g. herbal medicines, frankincense, honey and other) products. The local people are not engaged in frankincense production.

Due to its historical remoteness (which is mainly due to a lack of infrastructure), Metema still has major resources of frankincense and is thus one of the districts with the largest production in Ethiopia. Only white frankincense (Tigray type, from *B. papyrifera*) is produced. The production is almost entirely organized by state and private gum companies: a concessionary system provides gum companies with the right to extract frankincense from the woodlands (Table 3). Companies acquire concession rights or lease woodlands on short terms, usually one to two years. Local farmers are not involved in production as hired laborers (Eshete et al., 2005, Lemenih et al., 2007); the companies mainly rely on outside labor forces for the production, and employ also one of the two subsystems described above for Abergelle.

Borana

The people of Borana are traditionally predominantly pastoralists. They use the woodlands mainly for cattle ranging; thus, woodland use primarily focuses on the fodder resources from herbs, grasses and trees. Herbs and grasses are directly grazed, while trees provide leaf fodder and fruits, for example acacia pods (Scholte 1992). The rangeland as a whole is managed and utilized communally. It is governed by an indigenous institution called *Gada*, which regulates rangeland access and herd mobility (Coppock, 1994; Watson, 2003; Homann et al., 2008). In fact, the *Gada* system is often cited as a model of customary natural resource management institutions for pastoralists throughout sub-Saharan Africa (e.g. Hogg, 1997; Kamara et al., 2004). The system comprises a complex network of decentralized institutions that enforce decisions on the allocation of range and water resources (Coppock, 1994; Watson, 2003;

Homann et al., 2008). Adherence to local regulations is strictly controlled by the elders, and the use of the rangelands by outsiders is permitted only if the guests abide by the regulations of the Gada system. The presence of the Gada institutions, although these primarily focus on pastoral uses, has contributed to the preservation of the woodlands. Although crop cultivation is still limited, it is gradually expanding as a result of a formal drought-relief strategy (Kamara et al., 2004; Homann et al., 2008; Tache and Oba, 2010). This has resulted in scattered, small-scale and opportunistic crop cultivation, particularly in valley pockets covered by black cotton soils, which are frequently flooded. Hence, there is little pressure on the woodlands for alternative forms of land use.

Trees in the woodlands (rangelands) yield the wood and non-wood forest products (NWFPs) that are needed for subsistence and sale. Gums and resins are the main NWFPs that are collected. The organization of the gum and resin production is mostly informal. The production was historically only small and marketed through informal channels. Due to the relatively low production level (as compared to the traditional main gum and resin production regions in northern Ethiopia) and the isolated location of the area, government monopoly in gum and resin production and marketing did not prevail, and extraction has not yet been influenced by any formal arrangement. Despite the absence of specific arrangements regarding extraction for gums and resins, the collection is embedded in the local system for rangeland use described above. As clear local norms on access to natural resources exist through the Gada institutions, the gum and resin resources are de facto communal property, and there are few conflicts over their extraction. Moreover, the prevailing low-intensive extraction methods do not result in over-exploitation (Lemenih et al., 2003, Worku, 2006).

Various types of gum resins (frankincense, gum arabic and myrrh) are produced in Borana. Over the years, the importance of the income from gum resin is increasing in the livelihoods of the local people. In the past, gum and resin production was intermittent and was carried out mainly by herders as a part-time activity (Lemenih et al., 2003, Worku, 2006). Collection is now either a coping strategy to deal with shortfalls during extended droughts, or a diversification strategy for generating cash income for households (Worku, 2006). In the first case, collection is perceived as an important fallback option during hard times. In the second case, it may form a dominant source of cash income for women and schoolchildren, who have no right to sell livestock even when cash is needed for the household. The average annual household income generated by selling gum ranges from USD 279 to USD 310, depending on the level of engagement in the collection (Worku, 2006). Our surveys also indicate that gum and resin collection is the second most important means of livelihoods after livestock (Lemenih et al., 2003).

Three different production systems can be distinguished in Borana (Table 3). The pastoralist part-time mode of production system is still dominant. The cooperative production system is a result of initiatives facilitated by government agencies and NGOs. These cooperatives are solely gum and resin producing and trading cooperatives; they are not general-purpose cooperatives, as is the case in Abergelle. Gum and resin production is entirely from

communally owned woodlands on naturally regenerating trees that are accessed freely by any member of the community at any time and place. Production in Borana involves the collection of naturally oozed gum and resin tears. There is no stubbing (tapping) of trees to stimulate oozing, and the local people have no intention of starting the practice.

Impact of land use and socio-political factors on the management and production systems

As demonstrated by the regional profiles, the three sites differ considerably in land use conditions and the status of gum resin production systems and woodland management (Table 2 and 3). In Abergelle and Metema, land use is dominated by farming using agro-silvopastoral practices, whereas in Borana silvopastoral practice predominates. In Abergelle, the integrated land use system involving crop, livestock and forest production still prevails, but in Metema the cultivation of cash crops (e.g. sesame and cotton) is gaining prominence and is expanding rapidly at the expense of the woodlands due to its conducive biophysical conditions. This is further encouraged by booming prices and government policy supports for market oriented crop production (PASDEP, 2005). A recent study (Emrie and Tarekegn, 2010) estimated the annual rate of cropland expansion in Metema at 0.49% or 1855.3 ha/yr between 1972 and 2007. The cultivation of cash crops also provides far better income than frankincense production. This is already instigating a widespread conversion of the woodlands in Metema (see also Lemenih et al., 2007, Dejene, 2008). The lucrative income from these cash crops is also driving large-scale spontaneous migration and commercial agro-business entrepreneurs to the district. Together with the government supported resettlement, the human pressure on the woodland in Metema is very intense. Competition for land in the district stimulated informal institutional arrangements for land grabbing (Woldeamanuel, 2011); there is consequently a high rate of woodland degradation (Table 3).

There is some small-scale conversion of woodland to crop cultivation in Borana, while the impact of livestock grazing is (and always has been) well managed through the Gada institutions (Coppock, 1994; Watson, 2003; Kamara et al., 2004; Homann et al., 2008; Tache and Oba, 2010). In Abergelle, woodland conversion is currently minimal due to the strict formal control. In Abergelle and Borana, gum and resin production are incorporated in the local livelihood systems, but this role is much greater in Abergelle than in Borana. In Metema, the production is predominantly done by external concessionaires. There is strong competition for land between these concessionaires and the farmers, who want land to cultivate sesame and cotton cash crops.

Formal institutions related to woodland production systems have been initiated in both Abergelle and Metema. The gum and resin trees are formally state-controlled, with production being subject to a concession system (in Metema) and/or community cooperatives (in Abergelle) (Table 3). In these regions, gum and resin trees were traditionally a common property. In Abergelle, however, gum and resin trees are gradually becoming privatized in the form of parkland trees; this is not yet the case in the other two regions. Due to the economic importance of gum and resin in Abergelle, the formal regulatory arrangements are strictly

enforced by various government bodies, such as the Bureau of Cooperative Promotion and/or the Bureau of Agriculture and Rural Development. In Abergelle and Metema, trade was originally a state monopoly, but it is now becoming liberalized (Woldeamanuel, 2011). In contrast, in Borana formal institutions are still incipient. The resources are predominantly communally controlled, but both formal and informal arrangements for gum and resin extraction are weakly developed (Woldeamanuel, 2011). However, the woodland management in general is governed by the informal arrangements that are embedded in a (formerly) strong traditional institution for regulating the silvopastoral land use. The gum trade in Borana used to be informal, but initial efforts to formalize trade cooperatives have recently been initiated. Overall, local peoples' interest and participation in gum and resin production is very low to inexistent in Metema, intermediate in Borana and very high in Abergelle.

The woodland conditions and gum and resin production systems are determined not only by institutional arrangements for woodland use, but also by the biophysical conditions and on policies in other sectors. For instance, in Metema the increasing human pressure due to resettlement of highland people from agricultural backgrounds significantly influenced the interest in using the woodlands for crop rather than gum and resin production (Lemenih et al., 2007). This was influenced by the suitability of the biophysical environment of Metema for the cultivation of cash crops, such as sesame and cotton. In contrast, in Abergelle and Borana there are no resettlement schemes and their biophysical conditions are not suitable for intensive crop/cash crop cultivation.

Domestication and degradation status of the various gum resin production systems

The seven production models that are present in the research areas for gums and resins differ in respect to both their domestication and degradation statuses (Table 3). The different phases of domestication are reflected in differences in management intensity and organization, while their degradation impacts are reflected in the amount of damage they do to the ecosystem and the ABC tree population as perceived by the locals. In terms of domestication, the variation essentially reflects a gradual evolution from a communal, free access, naturally regenerating and small-scale production system to a more artificialized and privately owned production and management system. It also reflects the dynamics of the production process, restructuring from casual or part-time collection to a full-time production system, and from an individual based collection or production system to an organized cooperative form of production. The identified gum and resin production systems have not reached all categories of the five phases in domestication addressed in the introduction (Figure 2). Here, we elaborate on the domestication phases of the gum and resin resources of the three sites.

1. *Phase 1. Controlled procurement of products from natural forests.* The regions differ in controlled procurement systems. In Borana, the access rights and harvesting intensities are still predominantly controlled under the indigenous Gada system for rangeland management. In Abergelle and Metema, the procurement controls are much more formalized and are implemented by state authorities. The state control is not always

effective, however, leading to forest loss and/or degradation. Forest loss is a result of the active transformation of the forest ecosystems into a more financially rewarding cash-cropping system. Forest degradation may result from insufficient state control, leading to low-level extraction management and loss of production capacity. In order to counter such processes of ecosystem or resource degradation, new organizational forms for control are being stimulated. The Abergelle cooperative case shows that these developments may involve the transfer of at least part of the control to local community organizations.

2. *Phase 2. Conscious management of useful trees.* In Borana, there is still little conscious management of the gum and resin production, which takes the form of *collection of natural exudates. In Abergelle and Metema, the extraction methods have been intensified by employing tapping techniques to increase production levels. Especially in Abergelle, the long-established use of this production technology has resulted in over-tapping and the loss of production capacity. In this region, conscious efforts are also undertaken to protect the regeneration of trees by establishing exclosures where grazing is not allowed.
3. *Phase 3. Cultivation of selected wild trees in plantations.* Although in Sudan gum production in gum gardens is a common practice (Fagg and Allison, 2004), in Ethiopia this phase in the domestication of gum and resin production is not common. Only in Abergelle have cultivation trials recently been started.
4. *Phase 4. Cultivation of genetically selected or improved tree crops in intensively managed plantations.* This phase of domestication is not yet present in the gum and resin production in Ethiopia.
5. *Phase 5. 'Back-to-nature' or 'natural products' type cultivation that involves a combination of eco-friendly management (e.g. organic farming, reduced tillage/conservation tillage) and the use of specifically selected cultivars adjusted to more natural forest conditions, or even the extraction of products from natural landscapes, rather than from cultivated landscapes.* This phase of domestication is also not yet present in the gum and resin production in Ethiopia.

Within each domestication phase, several production models can be distinguished (Table 3, Figure 2). Most of the systems are in the domestication phase 2. Depending on the form of social organization, the production systems are either declining, stable or recovering. Some of the organizational settings, particularly those with characteristically high production targets (e.g. concessionaires with external or local labor force and cooperatives), are generally associated with medium to high ecosystem degradation, without affecting the phase of domestication. This indicates that in many cases, the organizational setting is not very conducive to sustaining production, as the main goal is to maximize extraction rather than support sustainable resource base management. Notably the system of formal state control over gum and resin trees coupled with concession rights for commercial firms for short production periods (short lease) has in several places resulted in a lack of maintenance of the tree resources. This has obstructed local efforts to advance the domestication of the gum trees.

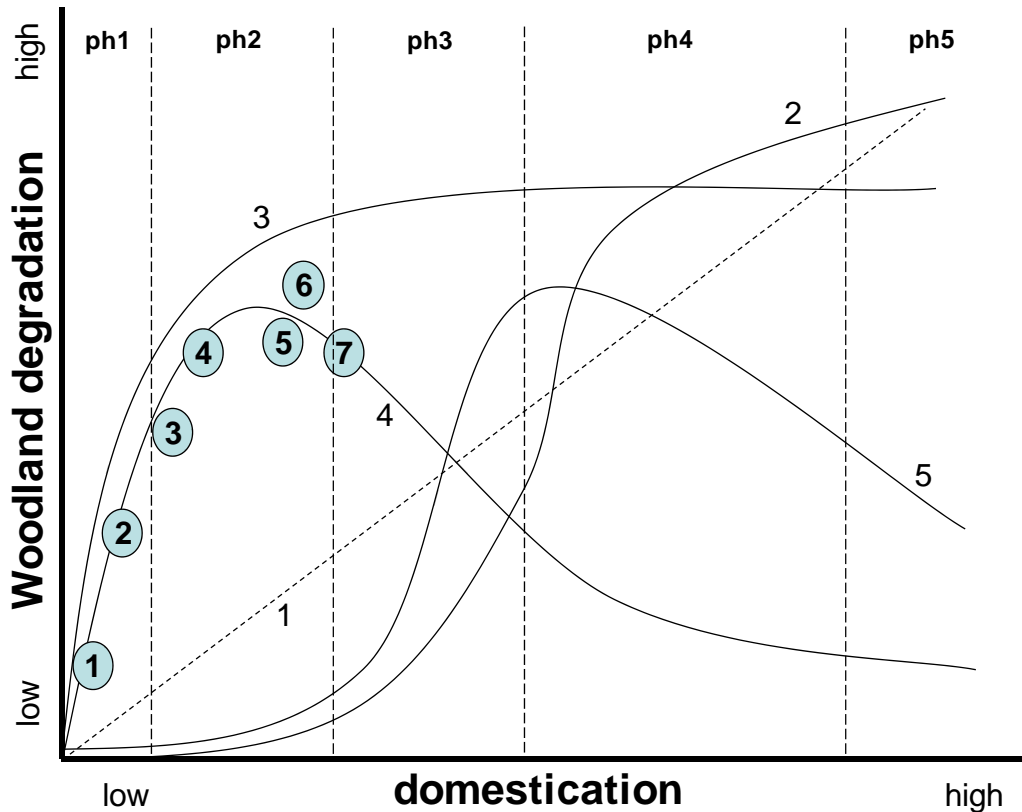


Figure 2. Alternative pathways of the relation between domestication and degradation (ph = phase). The five lines show the conceptual pathways. The circled numbers show the position of the seven gum and resin production systems found in the three study regions of Ethiopia (see Table 3 for details of each of the systems). The general gum and resin domestication process seems to follow pathway 4. Additionally the five phases of domestication are indicated. The five conceptual pathways are: 1 domestication equals degradation, 2 at low levels of domestication degradation is very low, but at a certain levels of domestication the degradation increases sharply, after which it increases slowly, 3 high degradation is caused by low levels of domestication, while an increase in domestication does not add to degradation, 4 sharp increase in degradation at first but at increased domestication the degradation level diminishes strongly if domestication measures include environmental control, 5 as 4 but at higher levels of domestication/control

However, as a result of recent changes in the organizational arrangements, the process of biological domestication is gradually progressing, notably in Abergelle. This case shows that organizational arrangements and provisions for private ownership of the trees and the production of incense from *Boswellia* trees on farmland, encourage advances in domestication. At the same time, however, some degradation of the woodland does ecosystems occur. In contrast, in Metema the legal system prohibits ownership of the trees regardless of their location. In this region, the woodlands are prone to serious degradation. These data demonstrate that the dynamics in production of gum and resin are the result of both domestication and degradation processes, and that within each phase of domestication specific types of degradation may occur (Figure 2).

The general pathway of the gum and resin systems, particularly in the case of Abergelle and Borana, follows alternative 4 (Figure 2). Thus, from an ecological and tree biology point of view, the process of the domestication of gum and resin production is still in an early phase in the three regions. In Abergelle, where commercial incense production has a long history, it is further advanced than in Metema and Borana. However, from a social point of view, the trees have clearly entered the human domain, especially in Abergelle where the social controls over access to the resources and the distribution of benefits are well advanced. In Borana, this process of acculturation has just started.

DISCUSSION

The results of the three case studies show that the management and production systems of frankincense and other gum and resin resources in Ethiopia are influenced by multiple biophysical and socio-economic factors that vary across sites. In Borana and Abergelle, there are diverse production systems, while in Metema one system predominates. In Abergelle and Borana, predominantly local people are involved in the production systems, but in Metema only external actors exploit the local resources. This differentiated evolution of the production systems for related natural resources in different regions, indicates that local resource exploitation arrangements are related not only to the nature of the resources, but also to the fabric of sociocultural, economic, organizational and environmental factors.

The woodlands in the three regions are managed differently based on (i) the presence of rules and the strength of rule enforcement (be it local or state), (ii) the significance of financial incentives generated by conserving the woodlands from alternative land uses, and (iii) demographic dynamics such as migration that suddenly increase or reduce demand on land and other environmental resources. In two of the locations, the remaining woodlands are more or less conserved: in Abergelle, production is now stabilizing, having declined as a result of more intensive management, and in Borana production is stable.

The case in Metema reflects how culture, the presence of alternative livelihoods options and poverty affect the relationship between people and the production of non-timber forest products (NTFPs). The residents of Metema are predominantly settlers from the highlands, where mixed farming (crop and livestock) is the traditional cultural vocation. The region offers good biophysical conditions for the production of both cash and staple crops. Incense production provides a much lower return to labor. The people of Metema consequently regard incense production as a ‘poor man’s’ job, and look down on those involved in it (Lemenih et al., 2007, Dejene, 2008). The Metema case illustrates that in the case of competition with more lucrative land use options, the production of NTFPs such as gums/resins cannot compete with the prevalent local market forces (Angelsen and Kaimowitz, 1999). As a result, the exploitation is mostly in the hands of external parties that have no interest in investing in resource enrichment on publicly controlled lands.

In the other two regions, land use is much more constrained by the biophysical conditions, and the production of frankincense and gums provides a good support to household livelihoods. The growing importance of incense production in Borana is partly a result of the declining importance of livestock production, which is due to frequent droughts (Worku, 2006). As a result of climatic conditions, crop cultivation in this region, although on the rise, is very risky (Tache and Oba, 2010). This creates scope for alternative household activities in the form of gum and resin production. These observations of the importance of NTFPs under marginal land use conditions and related poverty confirm the results of several studies that show a strong connection between the production of NTFPs and poverty (e.g. Neumann and Hirsch, 2000, Angelsen and Wunder, 2003, Belcher et al., 2005). The contrast between Metema on the one hand and Abergelle and Borana on the other is consistent with the labor resource allocation theory, whereby in a cash based economy, households have the opportunity to specialize in those activities that offer the best economic opportunities. In such an economy, the production of NTFPs may become a specialized livelihood strategy only for certain people. In contrast, in a subsistence economy, households diversify their livelihoods to reduce risk. Under such conditions, NTFPs may be used either as a means of diversification (as in Abergelle) or as a ‘safety net’ in a coping strategy (as in the case of Borana) (Belcher et al., 2005, Ros-Tonen and Wiersum, 2005). Furthermore, as demonstrated by the Abergelle case, the likelihood of a gradual domestication of NTFP production is higher in the case of a diversification strategy than a coping strategy.

Where NTFPs form an important component in a diversified livelihood strategy, this offers a good option for a gradual increase in intensity of NTFP management. Such processes have been described by various authors (e.g. Homma, 1992, Ros-Tonen and Wiersum, 2005). As demonstrated by our findings, local strategies for resource enrichment are not just related to the role of NTFPs in livelihood strategies, but also heavily depend on the presence of proper institutional arrangements. Several studies found relations between the process of domestication and the nature of the rights of access and property of trees (Wiersum, 1997, Wiersum, 2008). These relations are also demonstrated in this study. However, the process of domestication is not yet advanced. Moreover, the quality of the management is often insufficient, resulting in degradation of both resources and production conditions. This situation contrasts with the status of domestication of gum arabic in Sudan, where domesticated gum gardens are well established (Wickens, 1995, Fagg and Allison, 2004, Ballal et al., 2005, Mohamed, 2005). The same applies to the domestication of wild forest coffee in the south-western highlands of Ethiopia (Wiersum, 2010). The relatively low degree of domestication of the gum and resin resources in Ethiopia might be a result of the local people’s less favourable right of access to and ownership of the resources, and the former lack of access to the market for these resources. Although efforts have recently been initiated to improve local people’s access to both resources and markets, these initiatives are too recent to have already induced further domestication.

As demonstrated by our findings, the right of access to and ownership of the gum and resin resources may take the form of either formal or informal institutional arrangements. In

Metema, the people–woodland interaction is influenced predominantly by state-sponsored resettlement schemes that alter demographic conditions and land use practices. In Abergelle, the people–woodland interaction is also shaped by the strong state control over access to and use of the woodlands, such as the rotational allocation. In contrast, in Borana the interaction is mainly shaped by the people and their local institutions. In regions with either strong bureaucratic regulations (Abergelle) or indigenous rules (Borana), the state of the woodlands is generally good, even though the stage of domestication is further advanced in Abergelle than in Borana. In Metema, an area with weak indigenous and bureaucratic regulatory arrangements, the woodlands are deteriorating rapidly (Eshete et al., 2005, Lemenih et al., 2007).

In addition to these institutional arrangements, also the competitive roles of the woodland resources in relation to other forms of land use influence the domestication and degradation status. The case of Metema shows that where biophysical conditions instigate woodland conversion in order to establish financially more rewarding alternative livelihoods, woodland degradation is more severe where woodlands form an essential land use component in ecologically fragile environments, such as in Borana. This demonstrates how options for alternative land use practices greatly influence decisions on whether to domesticate or to convert forests. In Metema, the actual conversion is stimulated by demographic changes due to immigration, not only because immigration increases land use pressures, but also because there are informal rules for forest destruction (e.g. Mate Qedem). In Borana, which has more or less stable demographic conditions, local regulatory systems may gradually weaken as a result of multiple biophysical stresses (e.g. climate change) and socio-economic stresses (e.g. political interferences). New social forms of domestication are needed in the form of adapted regulatory systems that combine resilient elements of both informal and bureaucratic organization and control systems. That such new regulatory arrangements can develop is exemplified by Abergelle.

CONCLUSION

The domestication of gum and resin resources in Ethiopia is still at a low level, despite the long history of production engagement and the increasing importance of the sub-sector in the local and the national economy. Rather than gradually becoming domesticated, many gum and resin producing woodlands are gradually becoming degraded, in respect to both composition and production potential. Both the lack of domestication (or resource aggradation) and the prevalence of woodland degradation can be attributed to the lack of proper institutional arrangements not only in respect to access to and ownership of the resources, but also in respect to access to the market for gums and resins. This demonstrates that rather than the phase of domestication in a biological or ecological sense, it is the status of domestication in a social sense that determines whether forests and/or specific forest resources are becoming domesticated or degraded. The prevention of forest degradation and

production decline depends primarily on good quality management in the sense of effective social organizations (Ostrom et al., 1999, Pretty and Ward 2001, Pretty 2003).

Two interrelated processes play an important role at the interface between the degradation and the domestication of natural resources. First, at the macro-level forests are transformed into alternative land uses, such as agricultural lands or forests with less complex structures and less diverse compositions. In most cases, the aim is to increase the ecological-provisioning services of the land. In the short term, these new ecosystems are more financially rewarding and hence economically attractive to humans. Second, a domestication-phase specific process of resource degradation or aggradation takes place, depending on the quality of both the management practices and the controlling organization.

We conclude that (i) a decline in resource availability may induce improved social arrangements for production and advancement in domestication; (ii) increased roles in local livelihoods encourage production and domestication; (iii) better income options from alternative land uses in the absence of rules regulating farm size and forest access, encourage conversion and woodland degradation; (iv) externally introduced regulatory systems for production and trade that do not account for local conditions, are likely to result in resource over-exploitation and the degradation of ecological and production conditions; and (v) appropriate institutional environments that include the local people's right to own trees on farmland and to access markets stimulate the domestication and the control of degradation of production capacity of valuable NTFPs species. As these factors are mostly social by nature, we finally conclude that preventing forest degradation and promoting forest rehabilitation necessitates the increased domestication of forests in a social sense.

Chapter 3

Local processes of gum and resin resource use and management in Borana: the role of traditional and formal institutions

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ABSTRACT

In Ethiopia interest in gum and resin production and trade has increased with the growing international demand for these products and the need for alternative livelihoods in drought-prone pastoralist areas, like Borana. A variety of gum and resin utilization models exist with different arrangements for access to resources and markets. In this paper we evaluate how gum and resin utilization is related to both the well-established Borana *gada* system for natural resource management and to the external institutions introduced to the area. The rangelands in Borana have been well managed for ages by the *gada* system but specific institutions for gum and resin producing species have not been developed. Recently developed formal institutions impacted gum and resin production mainly by creating access to trading. However, neither traditional nor formal institutions control access to the gum and resin production system, hence we observe an institutional vacuum related to access. The formal and traditional institutions do not interact regarding gum and resin production and trade. They do interact, however, at the whole-range-land-management level. But the relation in most cases is conflicting and has diverging outcomes. Although gum and resin collection is done on naturally oozed exudates, the resources are under pressure as non-traditional and non-gum and resin based livelihoods activities are growing in the area. The implication of these changes is that range land management based on traditional Borana natural resources management institutions is not sufficient for sustainable use and management of gum and resin producing species. This situation calls for either revitalizing the traditional range land management system, or generating institutions specific to gum and resin producing trees by integrating the *gada* institutions with the external institutions.

Key words: Drylands, gum and resin, *gada* system, external and internal institutions, interaction.

INTRODUCTION

Gums and resins are important articles of commerce and livelihood support commodities in Ethiopia and the entire Horn of Africa (Gebremedhin, 1997; Lemenih et al, 2003; Eshete et al, 2005; Luvand et al., 2007). They have a long history of production and trade in Ethiopia and are one of the important export products of the country. Oral legend claims that the production and trade of myrrh and frankincense goes back to the Aksumite Empire that flourished around 500 BC and before (Gebremedhin, 1997). In the period between 1998 and 2007 Ethiopia exported annually an average of 2,500 tons of natural gum and resin and earned US\$ 34,138,670 (Lemenih and Kassa, 2010). Over the last decades interest in gum and resin production and trade in Ethiopia has grown with the increasing involvement of local people, the private sector, government, and non-governmental organizations (NGOs) looking for new opportunities for livelihood support, product commercialization and trade (Lemenih, 2005). A variety of gum and resin production models have been developed with different arrangements of access to resources and the market (Lemenih et al. submitted). These are gum and resin exploitation by (a) individual (semi) pastoralists, (b) cooperatives from communal woodlands (unrestricted access of members), (c) cooperatives from communal lands (restricted access of members), (d) individual farmers from on-farmland/homestead trees, (e) concessionaires with local labor force, (f) concessionaires with external labor force, and (g) gum resin exploitation by individuals (farmer/pastoralist) on full time base.

The different gum and resin production systems are spread unevenly in Ethiopia showing different phases of advancement along the domestication continuum (Lemenih et al. submitted, chapter 2). Whereas in northern Ethiopia production has a long history and is relatively intense, it is much less intense in southern Ethiopia. This paper focuses on the Borana area, reputed for its traditional natural resources management institutions (Legesse, 1973; Coppock, 1994; Helland, 1997; Tache, 2000; Tache and Erwin, 2003; Watson, 2003; Kamara et al, 2004; Homann et al, 2008). It is also an area where dependence of pastoralists on *Acacia*, *Boswellia*, and *Commiphora* (ABC) species for cash income has been growing, due to severe droughts and social conflicts, amongst others, that made pastoralism a less viable livelihood option (Lemenih et al. 2003). In the past gum and resin production used to be intermittent in Borana, mostly by herders who traditionally collect it part time with herding as their main activity. Today it is produced by the majority of the pastoralist households employing one of three production models: (a) a pastoralist mode of production, practiced as part time activity with herding, (b) an individual model of production as a full time activity, and (c) a cooperative production model (Lemenih et al, submitted).

Despite the growing importance of the gum and resin products into household livelihoods and the existence of the various production models in the area, little is known about how the production is related to the well-established Borana system for NRM and to the more recently introduced formal institutions. The specific objectives of the present study were to (i) examine the role of the traditional institutions of Borana with respect to gum and resin production and

marketing; (ii) investigate the role of formal institutions regarding gum and resin production and marketing, (iii) analyze how the traditional and formal institutions interact with respect to gum and resin production and marketing. We argue that currently the gum and resin exploitation is more impacted by the formal institutions than by the traditional Borana institutions.

INTERACTION BETWEEN INFORMAL AND FORMAL INSTITUTIONS IN NATURAL RESOURCES MANAGEMENT

Both formal and informal institutions govern resource use and management. The effectiveness of formal institutions in governing resource use and management depends greatly on whether they are complementary to the locally evolved informal institutions: for example whether legislation supports a society's morality, its cultural conventions, customs, and manners (Kasper and Streit, 1998). Pacheco and coworkers (2008) showed that formal and informal rules interact in different ways in affecting the behaviour of social actors for accessing and using forest resources, and in shaping the forms of market engagement that influence income generation and benefits distribution. In some cases, formal rules incorporate informal rules developed by community groups for organizing resource access and use by adopting them or recognizing them (De Koning, 2010). In other cases, they work against existing informal rules and impose new ones, crafted externally.

Formal institutions may compete or complement with the roles the internal institutions play. Many of the informal rules devised by communities for forest resource use and the mechanisms for enforcing such norms are often ignored by forestry regulations and enforcement bodies. Too often externally based formal forest regulations, impose new rules, practices and models over the internally devised and sanctioned rules, while adaptation of such internal rules could have been more appropriate. This can create internal confusion or competition between the 'new' and 'old' organizational structures, lead to a breakdown in control, which can eventually fuel open access behaviour that puts forests at risk and reduces forest benefits for local people in the long term. Indeed, external agencies and resources may play an extremely important role, interacting with internal and local ones (Pokorny and Johnson 2008). But alternatively, informal institutions may serve as a foundation for formal institutions by creating or strengthening norms to comply with formal rules that might otherwise exist merely on paper (Helmke and Levitsky, 2004). Communities may also craft and implement new institutions by imitating and adapting what they see others doing in respect to the formal institutions created and introduced by the government and the NGOs (Agrawal, 2002; McCay, 2002).

Agrawal (2002) showed that many existing studies on Common Pool Resources (CPR) lack adequate attention to external factors like markets, technology, state and population pressures. Rather they focused on resource and community characteristics. Also Husain and Bhattacharya (2004) argued that many studies treated communities as islands, isolated from

the influences of the external world and they attributed the success of CPR institutions to the internal dynamics of the resource regime. Even their focus on resource and community characteristics is not substantial, for resources characteristics such as stationarity, storability, and predictability are missing (Agrawal, 2002; McCay, 2002). Most CPR studies also focused on resources that are subject to single extractive use (Edwards and Steins, 1999) and are locally used. The case of commercial CPR products received much less attention.

The integration of a resource to a market can change its institutional status. First the emergent commodity status for the resource may promote its utilization and require that state agents and national and international merchants become engaged in its trade. Second the change in the status of the resource into a commodity may enable the local people to create property rights and restrict access by others (Ribot and Peluso, 2003). Third, the integration of the local people in marketing systems can stimulate individuals to specialize in new types of economic activities that are not considered in the informal local institutions; this may undermine the importance of local institutions. For instance, in case that new market actors have traditional access to a particular common pool resource, they may seek alliances with state actors in efforts to privatize such common resources or defend the primacy of their claims. Indeed, state officials themselves may be involved in privatization and selling of products from resources that were earlier under common property arrangements (Agrawal, 2002).

In this study the case of gum and resin resources is used to assess how traditional informal and newly introduced formal institutions interact and shape access to the ABC resources and the market for gum and resin products. Examining the interaction between the two institutions is worthwhile for two reasons: (i) the growing attention to indigenous institutions in Natural Resources Management (NRM) and (ii) the increasing integration of local people to external institutions and influences.

RESEARCH METHODS

Description of the study sites

This study was conducted in three districts in Borana (Arero, Liben⁴ and Yabello), Oromia Regional State, southern Ethiopia (see Lemenih et al., submitted for detailed description of the area). The Borana region is well-known for its indigenous *gada* system for natural resource management.

⁴ Liben district is now in Guji zone of Oromia Regional state. In this context we classify Liben as one of the locations under the indigenous administrative units of Borana.

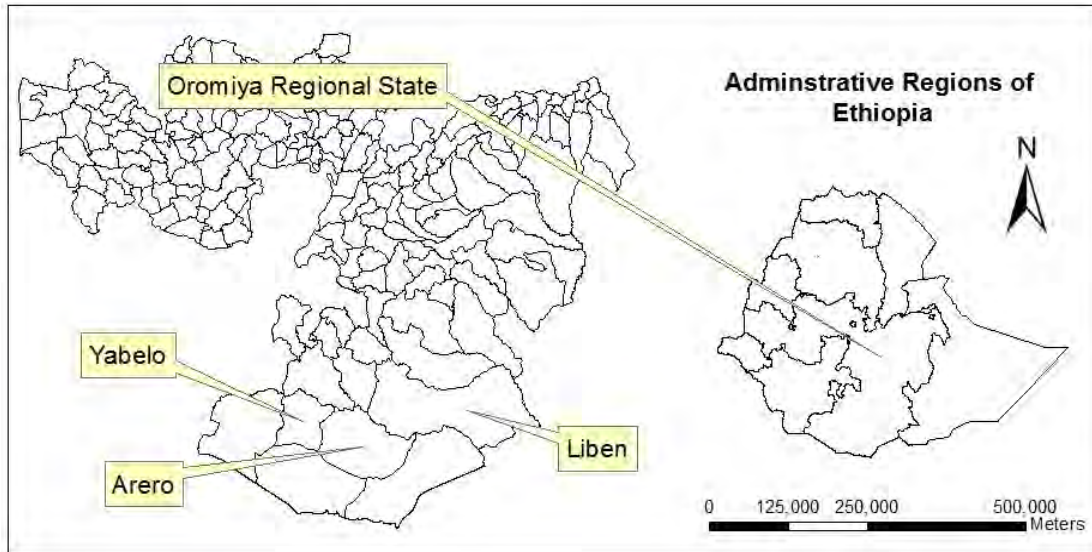


Figure 1. Study area, the districts Yabelo, Arero and Liben in the Oromiya Regional state of Ethiopia.

The *gada* system

The *gada* system is a traditional indigenous system for managing natural resources among Cushitic ethnic groups. It is prominent among the Oromo of Ethiopia. It is a system of governance based on generational classes that succeed each other every eight years and is responsible for political, military, judicial, legislative and ritual matters in the society (Legesse, 1973; 2000). Although it had been common to all Oromo, only the Borana subgroup preserved the intact version of it to date. The Borana claim that the *gada* system was enacted 560 years ago with more than 70 *aba gada*⁵ have assumed power. The general assembly, *gummi gayyo*, is the supreme body that repeals, renews, and makes laws. It also appoints a new *aba gada* every eight years. The laws are enforced via the indigenous organizations at different levels (Huqqa, 1996; Watson, 2003; Elemo, 2005). The Borana are known for generating deep ecological, technological and organizational indigenous knowledge and for their capacity to regulate access to natural resources (Coppock, 1994, Watson, 2003). Access to and use of resources is shaped by a variety of overlapping institutions: regularized practices, social identity, sets of rules, organizations, social norms, values, and traditional mechanisms of sanctioning (Huqqa, 1996; Watson, 2003; Kamara et al, 2004). The *gada* institutions declare land and water as communal resources. Nevertheless, more specific regulations concerning access to land and water exist (see Watson, 2003 for a more detailed examination of these regulations). NRM is not the sole concern of the Borana traditional institutions but is very much part of other aspects of life: the indigenous

⁵ The head of the ruling generation class each with 8 years term.

institutions that have relevance to NRM also have other functions and capacities. They resolve conflicts, perform rituals, and regulate social behavior (Helland, 1997; Watson, 2003).

Data collection and analysis

For data collection four districts were randomly selected. In each district one representative *Kebele*⁶ was selected using the combined criteria of ABC resource base, their species mix, ethnic composition, and presence or absence of community based production associations (Table 1).

Table 1. Characteristics of sample areas

<i>Locality</i>	<i>Major ABC species</i>	<i>Mode of production</i>
Wachile (Arero district)	Acacia, Boswellia	Individual households and cooperatives
Dhas (Arero district)	Acacia, Boswellia	Individual households
Adegelchat (Yabello district)	Acacia, boswellia	Individual households and cooperative
Melka Guba (Liben district)	Acacia, Boswellia, and Commiphora	Individual and cooperative

For this study mainly qualitative data were collected and analyzed at community level. Community level data was crucial, as land and natural resources are communal resources and the decisions regarding resource use and management are predominantly made at community level. Also the emergence of new formal institutions such as cooperatives for gum and resin utilization are reflected at this level. Participatory research approaches (focus groups discussions, key informant interviews, transect walk, and Venn diagram) were employed to collect data at the community level.

The focus groups discussions and key informant interviews were held to investigate whether the traditional institutions of Borana have a role regarding the ABC resources use and management and how do the local producer cooperatives and external institutions influence access to ABC resources and the market for gum and resin. The focus group discussions were held with separate groups of youth, community elders, women, and cooperative members, Kebele leaders. Also we interviewed key informants including traditional historians, retired *aba gada*, representatives and experts of governmental and non-governmental organizations, leaders of the *Kebele* and cooperatives, and development agents. Overall, 14 focus group

⁶ *Kebele* is the lowest formal administrative unit. Several *Kebeles* comprise a district

discussions and 19 key informant interviews were held. Participatory resource mapping was employed to identify the location of the AB resources and user groups, as well as resource locations subject to conflict. Additional field observation were made to investigate how the use and management of gum and resin resources is carried out and what are the threats to them. During the transect walks informal interviews were made. We focused on issues how and by whom resources are used, what trends in land-use and resource use take place, what rules for access and controlled use exist, and whether there are conflicts and why they exist.

Organizations within and outside the villages that may have impact on the use and management of the AB resources were identified using a Venn diagram. Representatives of the main organisations were contacted and interviewed about who makes what decisions with respect to ABC species use and management, how decisions are made, and how conflicts are resolved. Specific attention was given to the role of the traditional Borana institutions and organizations in the use of natural resources in general and gum and resin in particular. In addition, proclamations, regulations, and directives enacted by federal and regional states regarding the use and management of natural resources and ABC resources were examined. The collected qualitative data were transcribed. Next the responses of all the interviewees were sorted under different headings based on the interview-guide topics as well as on categories emerging from the interviews, and further enumerated to identify the recurrence of themes or events. Then the information was further interpreted. The qualitative data were complemented by some additional quantitative data from a household survey on the number of people being involved in specific activities, when these activities started, and constraints to their production and marketing. Further details on the households survey are given in Chapter 5.

RESULTS

Institutions and gum/resin production and marketing

In Borana the use and management of natural resources is influenced by various institutions. The main ones are endogenously developed traditional institutions (the Borana *gada* system), externally introduced local institutions in the form of cooperatives, and variety of external institutions. The following sections describe how gum and resin use and management is affected by these different types of institutions.

Traditional institutions

The traditional NRM institutions in Borana comprise rules, norms, beliefs, regularized practices, organizations, and enforcement mechanisms. Regarding NRM the traditional institutions make their track by (a) identifying the interconnection of the resources with livestock husbandry, and (b) defining where settlements have to be established, how many people and livestock can settle in an area, and how far permanent grazing areas should be from encampments. All resources interconnected with livestock husbandry (e.g. pasture and

water) have specific *gada* institutions (e.g. norms, rules, taboos, values, beliefs, organizations, and enforcement mechanisms) that govern access to them. Whereas specific *gada* institutions exist for pasture and water use and management, institutions that regulate access to forest products and their marketing are hardly present. Forests are mainly influenced by the *gada* system via the dry-wet season rotational grazing pattern for regulating the pressure on pasture resources. The *gada* institutions have only generated norms, rules, and/or beliefs regarding some specific issues of using trees in the range lands:

a) *Trees around water points.* The Borana value trees around water sources for guaranteeing sustainable water flow. It is strictly forbidden to cut them. A person who cuts them is liable for severe penalties. Cutting them is considered as blocking or destroying the water body itself. *Tamarindus indica* and *Ficus sycomorus* are prominent species in this regard. Pastoralists also identify the species as indicators of water sources.

b) *Beliefs towards cutting big trees.* Borana people believe that cutting big trees result in death of a person who cuts them. Indeed, people do not attempt to cut big trees. They cut only branches, twigs or leaves. The belief applies to all species regardless of where they grow, for being a big tree is enough by itself. Death incidences owing to transgressing the beliefs were also reported. Important species of big trees in Borana are *Ficus sycomorus*, *Tamarindus indica*, and *Acacia tortilis*.

c) *Value for shade trees.* Shade trees are highly valued in Borana, for they shelter people and livestock against waves of sun heat. They are also important venues for community meetings. *Acacia tortilis*, *Tamarindus indica*, *Ziziphus mauritiana*, and *Ficus sycomorus* are among the trees valued for shade.

d) *Trees with cultural values.* Several trees are known for their cultural values (e.g. conducting rituals, blessings, and ceremonies for childbirth and naming) and they are not cut. Above all, such trees are considered as society's identity. If they are cut by some one belonging to other ethnic groups, a fierce conflict (including bloodshed) may arise. *Tamarindus indica*, *Ficus sycomorus*, and *Berchemia discolor* are trees with cultural values in Borana. In the hilly areas also patches of *Juniperus procera* forests are protected as appreciated *baddaa sadeen* meaning 'forest with tall trees' and 'a dark green forest' (Bossi and Tache, 2011).

The woodlands and the ABC species they host offer diverse goods and services to the Borana. The major goods provided by the ABC species are fodder (for grazing/browsing), and recently also gum and resin. Gum and resin production started in 1960s, but originally few people were engaged in its production and sale. The number of gum and resin collecting households has gradually increased since the 1990s. At present about 89 percent of the respondents of the household survey collect and sell gum and resin (Figure 2). All respondents (100%) associated the growing number of gum and resin collectors with the frequent droughts that affected livestock production and productivity. In addition the market

liberalization that followed the change of government in 1991 is reported to be a reason for the growing number of the gum and resin collectors.

Despite the growing importance of the gum and resin in the livelihoods of the pastoralists, the Borana *gada* institutions have not yet generated specific rules and norms for the ABC species use and management. The focus group discussions and key informant interviews as well as Venn diagram analysis revealed that no local taboos, beliefs, rules, and/or controlled utilization mechanisms exist for ABC species.

Why traditional institutions did not emerge for gum and resin production and trading?

The lack of traditional *Gada* institutions regarding the ABC resources can be explained by various reasons. First, all respondents claim that the ABC resource base is ample and stable, and there are no scarcity problems that call for specific institutions. They also claim that the density of the ABC trees has increased in the past years as a result of bush encroachment. They consider the ABCs species as invaders. Second it is only recently that gum and resin utilization has become an important livelihood strategy of the pastoralists. Hence local institutionalizing of the ABCs species within the traditional *gada* system may not yet have had time to evolve and may only emerge in the coming years. Third, the traditional NRM institutions give priority to livestock production and its related natural resources, and less to the newly evolving livelihood strategies and related resources. Fourth the incumbent *gada* leaders facilitate rule making, repealing, and renewing laws only a few times during their office term, as they otherwise may be blamed for institutionalizing strange rules. Since the Borana respect cardinal laws more than supplementary rules, the leaders prefer to maintain the existing cardinal⁷ rules rather than establish new supplementary rules, e.g. in respect to ABC species. Finally all respondents (100%) indicated that the political, social, ritual, and NRM roles of the *gada* system has been weakened in the past decades especially after the modern state interventions. As a result of the incorporation of the Borana region in the formal Ethiopian government system, the traditional *gada* system for natural resource management have partly been disrupted in recent decades, and little attention has been given to developing local institutions to address new environmental challenges. All in all, there are no incentives for the Borana to create new ABC specific institutions.

Thus, the Borana traditional institutions for NRM are primarily focused on pastoral resources, and no specific norms and regulations were developed to regulate access to the ABC resources and gum and resin market. As a result of the lack of indigenous institutions, the pressure on the ABC species is gradually increasing. The species are increasingly being utilized for various new types of extractive use of the forest resources: commercial firewood, scent wood, charcoal, and agricultural expansion. For instance, acacia species are not only

⁷ Cardinal laws are the rules constituted when the *gada* system was established. All other rules constituted afterwards over time are called supplementary laws.

used for gum production, but also for commercial fuel wood and charcoal, and the *Boswellia* species are extracted for commercial scent woods production. The species are also threatened by the gradual extension of individualization of the rangelands for cultivation and grazing enclosures. Crop cultivation started in 1960s, but until the 1980s only a very small proportion of local people were engaged in this activity. At present more than two third (71%) of the respondents cultivate different types of crops. On average 1.61 hectares of land per households are under cultivation at present. While 85% of the respondents had obtained the farm plots themselves, only 15% had acquired them via the endorsement by formal *Kebele* councils.

On the expanding croplands the ABC species are often cleared. This process is also occurring on the rangelands that are subject to successive bush clearing to facilitate pasture growth. Particularly branchy trees and shrubs, including ABC trees, are among the victims. Such bush clearing is often stimulated by state agencies and NGOs within the framework of safety net programmes. These programmes give no attention to the multiple production functions of the silvopastoral lands. The pastoral people are paid for these activities and often participate in the programmes as it provides them with a quick cash income.

Externally induced cooperative associations

In contrast to the lack of attention given towards developing institutions for access to the ABC resources, recently focused attention has been given to further developing institutions for access to gum and resin marketing. In response to the recognition of the growing importance of ABC species in local livelihoods, several efforts were undertaken in Borana to establish gum and resin cooperatives to promote gum and resin products marketing. Currently, two types of gum and resin cooperatives have emerged: producer cooperatives and trading cooperatives. Officially, the producer cooperatives are engaged in both production and marketing of the gum and resin, while the trading cooperatives are engaged only in their marketing. In Borana the majority of the gum and resin cooperatives were established as producer cooperatives. In this type of cooperatives members have an obligation to collect gum and resin from the ABC trees on communal range lands and sell to the cooperatives associations in their respective *Kebele*. The cooperatives may not only buy the gum and resin from members, but also from non-members. They sell the products either to local traders or non-local traders.

The gum and resin cooperatives have played important role in stimulating gum and resin production and marketing. But they do not have a role in controlling access to the gum and resin resources. There is no territorial delineation or rotational allocation with respect to ownership and access right to stands of ABC trees. So far the cooperatives do not have their own stands for gum and resin production. Rather both members and non-members of the gum and resin cooperatives can freely access the ABC resources. In the past, the market for gum and resin used to be an oligopoly market dominated by local and non-local private traders, and a government marketing enterprise. In the past 3-5 years, however, the emergence of the

gum and resin cooperatives influenced the existing oligopoly market structure since they buy the gum and resin from both members and non-members as additional market actors. The cooperatives sell the collected gum and resin to any of the traders who can offer an attractive price. The committee of the cooperatives also fix the purchasing as well as the selling price of the gum and resin.

Although the development of the cooperatives in principle could improve access of local producers to markets, the gum and resin cooperatives in Borana are not performing as per their expectations. Several reasons were put forward why they are short of these expectations. First a monopsony market structure (characterized by many sellers and a single buyer) is in place in a Kebele where the individual and cooperative models of gum and resin utilization coexist. This is due to the informal bureaucratic rules developed by the officials of the *Kebele* council that favour the cooperatives over other traders. Also the rules do not allow private traders to buy the gum and resin directly from the producers. This means that selling gum and resin to other traders than the cooperatives is 'illegal'. Hence, the involvement of the gum and resin traders as direct buyers of the gum and resin vary among research locations in Borana depending upon the presence (in Adegelchat and Wachille) or absence (in Dhas and Melka Guba) of the gum and resin production cooperatives (Table 2). In Adegelchat and Wachile the market share is already skewed in favour of the cooperative association. Here the share of local and non-local merchants is very low. In Dhas and Melka Guba the major marketing actors are local and non-local merchants and the share of cooperatives is low (Table 2).

Table 2. Gum and resin buyers in Borana, according to the respondents (n=130).

Traders	Sellers (%)			
	Adegelchat (n=40)	Dhas(n=30)	Wachile(n=30)	Melka Guba (n=30)
Local merchants	5	43	11	56
Cooperatives	93	3	82	2
Non-local merchants	2	54	7	42

Second the emergence of gum and resin cooperatives in Borana is not an endogenous development, rather the cooperatives were introduced by the NGOs and state agencies as a general tool for development. The majority of the respondents (89 percent) indicated that they were members of the cooperatives as a means to access general benefits such as drought aid. The fear that they might be left out from the benefits provided by NGOs and GOs development and drought relief programmes is the major driving factor for the membership. But still only 11 percent of the respondents are members of the cooperatives. Third although the bylaws of the cooperatives oblige members to sell gum and resin to the cooperatives of which they are a member, only few of the actual members of the cooperatives are engaged in collecting them. Since most members do not collect gum and resin, the cooperatives buy gum and resin from non members. Consequently, the gum and resin cooperatives in Borana are in

reality trading cooperatives rather than producer cooperatives. Fourth the gum and resin cooperatives are also reputed for their inefficient bureaucracy. The shops of the cooperatives are not open regularly and the local people complain that they can not sell the gum and resin whenever they need money to cover households requirements. Rather, they have to await the opening days of the cooperatives shops. This bureaucratic attitude is stimulated by the informal rule that other traders are not allowed to buy directly from the collectors. Fifth the gum and resin cooperatives are also blamed for fixing the gum and resin price and ultimately buying the products at a lower price than the free market price.

Thus, the development of the gum and resin cooperatives shows several limitations. It has not made markets more accessible but has changed the market structure from an oligopoly to a monopsony. Moreover, the gum and resin cooperatives do not play any role in influencing access to the resources and their management. There are no rules and norms that limit access to the gum and resin resources. Despite the regulations for the establishment of the gum and resin cooperatives and the by-laws that require the cooperatives to develop the resources, so far no activities to develop the resource base is carried out by them.

External institutions

Gum and resin production and marketing is also impacted by a variety of external institutions including private and state marketing institutions, state agencies, and Non-Governmental Organizations (NGOs).

Private and state trading institutions

Commercial gum and resin production in Borana started about five decades ago according to the key informants and focus groups discussions. It started in 1960s following the demand from external traders. Major external marketing actors were private traders and the state marketing enterprise NGPME (see below). The external traders contributed to gum and resin commercialization by creating awareness among the pastoralists about the potential of commercial collection. Initially collection was entirely done by children or herders, while parents and adults were responsible for the selling. But this situation has gradually changed. In this section the present role of private and state trading institutions regarding access to gum and resin production and trading is further explored.

(a) *Private traders.* Commercial gum and resin production are still the major market actors in Borana. Both licensed and non-licensed traders are engaged in buying the locally-produced gum and resins; they employ a variety of trade arrangements. The first arrangement is buying gum and resin directly from producers/collectors. This means the traders request the pastoralists to collect gum and resin and the pastoralists in turn agree to supply by the date the traders promise to buy. The second is involving local merchants as their delegates to buy gum and resin from collectors on their behalf. It involves an advanced contractual arrangement compared with the first. In this case the traders provide money for their delegates to purchase the gum and resin. They also provide bags for storage. The delegates agree to buy gum and

resin from local merchants and/or collectors and sell them to the external traders at an agreed fixed price. The third arrangement is buying gum and resin from local small merchants. Here the exchange is done without making any prior contract with the local merchants as in the second arrangement. In all the arrangements sales are made either in cash or in kind. Selling gum and resin in kind involves the exchange of gum/resins against commodities such as sugar, salt, pasta, or macaroni.

(b) State marketing enterprise. The Natural Gum Processing and Marketing Enterprise (NGPME) is the sole state marketing institution that buys gum and resin in the area. It employs four major exchange arrangements simultaneously. The first three are similar to the arrangements of private traders described above, i.e. (a) direct sales by NGPME from local people without prior contract; (b) sales from private people and small local traders to local agents of NGPME, and c) NGPME buys gum and resin directly from other local merchants without making any deal in advance. The fourth arrangements concerns a contract between NGPME and local people to regularly buy gum and resin. In this case NGPME provides bags and promises to buy the products. The NGPME fixes the price before the collection begins. In all cases the sales can be either in cash or in kind.

The market organizations were a major initiators and promoters of increased gum/resin production in Borana. They created a regular market for gum and resin by directly buying gum and resin from collectors, small merchants, or by appointing local agents for such tasks in different villages. External traders not only created access to gum and resin trading but also to commodities needed by the pastoralists. The in-kind gum and resin exchange arrangement were instrumental in providing local people with access to commercial foods. Pastoralists needed otherwise to travel up to 200 kilo meters to towns to buy such commodities. Hence the gum and resin exchange arrangement saves them time, money, and energy.

The gum and resin exchange arrangement is top-down and the ability of the collectors to benefit from gum and resin trading greatly depends on the sales organisations. In places where no cooperatives were formed yet, the market is characterized by many producers and few buyers. The resulting market structure is called oligopoly. The majority of the respondents (89 %) indicated that in the oligopoly market sales cannot be regular. Although individual pastoralists often want to regularly sell gum and resin as a means to cope with their financial burdens, non-local merchants may not regularly come to the area for buying⁸. The ability of the pastoralists to benefit from gum and resin trading is constrained by the oligopoly market structure. The pastoralists complain that the buyers fix grades and prices of the products. All in all gum and resin market in Borana is subject to the influences of the buyers.

⁸ The external traders do not regularly come to buy gum/resin because the amount the pastoralists supply daily is low and do not attract the them.

Although no standardized grading mechanisms for gum and resin exist, the gum/resin prices are based on broad grading categories based on colour. The products are sorted into black and white colour categories. The collectors, however, complain that such grade assignment is subjective, as only the store man of the cooperatives or the delegates of the big traders apply them. 91 percent of the respondents of a household survey mentioned that private traders and state enterprises apply grading standards, and only 9 percent of the respondents indicated that they could negotiate grades with the buyers. The collectors indicate that they have limited information on gum and resin price. It is fully withheld by the buyers. Price is fixed solely by the buyers and the producers hardly negotiate. Every year at the beginning of the production season, the external traders announce the price they will offer throughout the season. In the case of NGPME, for instance, the price is fixed at the head office and sent to the salesmen at branch offices to execute purchases. Above all, price adjustment in the course of time is hardly possible and the same price is made to last for the whole year. The same price even may be used in consequent years. Although it created a regular market, the involvement of the local traders as delegates of the external traders is criticized for pushing the producer price downward. The delegates fix a price that results in a substantial profit margin for them but is unattractive for the collectors. 91 percent of the respondents collect gum and resin owing to the crises in livestock based livelihood strategy. As a result, they do not have a capacity to negotiate on current or future market prices. Rather, they receive whatever price the buyers fix.

State agencies

Although state intervention in Borana dates back to the regime of the Emperor Menelik II (1889-1913), massive intervention with new administrative structures and organizations occurred during the socialist regime (1974-1991). The traditional territories were structured into several *Kebeles* and districts that did not fit into the traditional ones. The *Kebeles* and districts introduced during the socialist regime are further subdivided. The main government agencies at Kebele and district levels responsible for political and NRM affairs are the administration council and offices of pastoralist and agriculture development. They have also impacted gum and resin production and trading in two diverging ways. These are by promoting gum and resin cooperatives, and endorsing individualized enclosures for farming and grazing.

State agencies contributed to gum and resin production and marketing by promoting the establishment of gum and resin cooperatives. The desk of cooperatives of the Bureau of Agriculture and Pastoralist Development played a big role in this regard. They trained the local people in the essence of cooperatives that are based on natural resources utilization especially gum and resin in the area and facilitated all the formal procedures in establishment of cooperatives that qualify for legal personality.

Although not directly related with gum and resin production and marketing, state agencies in Borana are involved in formalizing individualized farming plots and grazing enclosures

contrary to the customary land tenure exercised for more than half a millennium in the area. The Borana *gada* system declare that land and natural resources are the common properties of Borana. But currently the woodlands hosting the ABCs species are individualized for cultivation and grazing enclosures. As a result, the gum and resin producing trees have become cleared in the enclosures individualized for cultivation and grazing. The Borana blames the local level state agencies for formalizing the individualized plots. The local administrators justify their actions by referring to the Constitution of the Federal Democratic Republic of Ethiopia that declares land and natural resources to be state and public properties. This is contrary to communal ownership of land and natural resources declared by the *gada* system.

The non-governmental organizations

In Borana a variety of NGOs have been working to reverse the livelihood crises instigated by recurrent droughts. Currently, they have diversified their intervention approach from aid to strategies that bring long term livelihood impacts. Some NGOs are already working on improving the productivity of the gum and resin trees, trading access, and value addition. They are Action For Development (AFD), German Technical Cooperation (GTZ in German), and SOS SAHEL.

The AFD has already launched a program to improve the productivity of the ABC trees and access to trading. Tapping as a strategy to improve the productivity of the trees is introduced and collectors are trained how to tap⁹. AFD is also engaged in capacity building including (a) training on the essence of gum and resin cooperatives, book keeping, and maintaining products quality, (b) acquainting collectors with main gum and resin trading centres (e.g Negelle, Dubluk, and Yabello), (c) offices and a warehouse construction, (d) seed money provision. Similarly the SOS SAHEL is promoting livelihood strategies based on gum and resin production and trade. It has explored the potential of gum, incense, and aloe for value addition process and found the resources have a promising potential. Sample products of soaps and aloe are already tested and currently the organization is in preparation to establish a manufacturing factory for soaps and perfumes. Exploration is also done on production and marketing potential of scent woods from *Boswellia neglecta* and *Combretum molle* species. The participatory forest management project is the main area of intervention by GTZ though its focus was on highland forests. Regarding dry forest management and utilization notably gum and resin, the GTZ has introduced tapping techniques for production. They trained the collectors how to tape and provided tapping tools for them.

Interaction between traditional and formal institutions

⁹ It is reported that there was a boom in production following tapping. However, tapping was no longer practiced following the death of trees after 2-3 years tapping.

The discussions held with elders, retired *aba gadas*, traditional historians and the household interviews made clear that at the range land management level, the traditional institutions are no more performing their roles independently. The traditional institutions are often not adapted to new socio-economic and governmental conditions, but rather overtaken by new rules, regulations, and organizations that have been introduced by state agencies. This is demonstrated, amongst others, by complaints of local people that the government agencies and officials at lower administrative levels, mostly *Kebele*, have become ‘refuges’ and give an official waiver in case people are accused of transgressing the traditional norms, rules and values. Moreover, some of traditional rules enforcement mechanisms (death sentence, ostracism) are no longer implemented as the *gada* organizations are controlled by state agencies not to enforce such rules any more. State agencies are also involved in endorsing the privatization of communal lands for farming and grazing enclosures. Development interventions have resulted in permanent settlements and increased integration to the external environment and agencies beyond the traditional territory of Borana. Water and road developments, for instance, have disrupted the traditional NRM based on seasonal grazing patterns. The recurrent referendums held to facilitate ethnic based regionalism is also criticized by the Borana people for transferring some areas of the rangelands together with the traditional wells to other ethnic groups, where the *gada* institutions are no longer exercised. Also such boundaries are being considered as political boundaries, rather than administrative. Explaining how the frequently held referendum affected the Borana, the elders in all locations spoke with anger that the Borana people were forced to vote on the fate of their land and resources, which they consider as voting on the fate of their wives, children, and identity.

As discussed above, regarding gum and resin production no indigenous rules, norms and believes exist that govern access to the resource system and trading. The new external institutions focus only on marketing, but not on sustainable use of the resources (Table 3).

Table 3. Institutions that govern access to ABC resources and gum and resin market in Borana

Institutions	Access to resources	Access to trading
i. Traditional institutions	No	No
ii. Cooperatives	No	Yes
iii. External institutions	No	Yes
- <i>Marketing institutions</i>	No	Yes
- <i>NGOs</i>	No	Yes
- <i>State agencies</i>	No	Yes

No & Yes stand for the absence and presence of institutions, respectively

Therefore, the traditional and external institutions neither compete nor complement with each other regarding gum and resin production. But as a result of the government policy, the relations between the marketing institutions have become more complex. The newly emerging cooperatives involve new institutional arrangements for access to markets. The interaction of the local cooperatives and external market institutions is manifested in complementary and competing ways. The fact that the external traders are important sales actors and the cooperatives are important suppliers would seem to indicate a complementary relationship. However, this is not always the case. The gum and resin cooperatives sometimes claim to be the sole buyers of gum and resin from the producers and do not allow the external traders to buy the gum and resin directly from the producers. The cooperatives associations do not interact with the traditional institutions since the traditional institutions neither have a role in affecting access to the ABC resource base nor the market for gum and resin.

DISCUSSION

The non-emergence of traditional institutions for gum/resin production

Despite the strong traditional institutions (*gada* system) of the Borana for managing their natural pastoral systems, they did not develop specific local institutions for governing the management and exploitation for ABCs species. Only few tree species featured in the *gada* system: trees having a crucial cultural role and trees directly associated with pastoral livestock production (e.g. shade trees and trees around water points). Dry forests in general and the useful ABC trees in particular were not subject to any specific protection and utilization rules, norms, or traditions. There were also no institutions regulating access to markets for the tree products. This means that in case the ABCs trees are subject to specific types of use that are not directly related to the pastoral land-use practices, the *gada* institutions play no specific role for their protection and controlled use. These findings are in line with Tache and Erwin (2003) who showed that the Borana did not distinguish forests from pasture. Also Watson (2003) argued that the *gada* system should not be considered as a natural resource management institution, but rather as a cultural institution regulating social relations amongst pastoral people.

The lack of traditional institutions for ABCs in Borana provides evidence to the assertion of Gibson et al. (2000) that the existence of strong traditional institutions in an area does not always guarantee they include specific rules for specific natural resources. Rather the emergence of institutions for a resource depends on several stepwise situations (McCay, 2002). First, resource users have to recognize the seriousness of a problem; they have to know what is happening; and distinguish transient and local from persistent and large-scale problems (McCay, 2002, Husain and Bhattacharya, 2004). Second, they have to see and accept any cause-and-effect relationship between their behaviour and the environmental issue at hand and view the situation as something that can be corrected. Third, they have to choose

what to do and whether it is worth doing. The non-emergence of institutions can be associated with the difficulties at the level of problem recognition and placement on an “agenda” (McCay, 2002). Based on the arguments above, we claim that despite the growing importance of gum and resin in livelihoods strategies of households in recent decades on one hand and the increasing expansion of commercial extractive uses on ABC species and individualization of communal lands for cultivation and grazing on the other hand, the need for institutionalization of access to gum and resin resources is still not mature in Borana. In other words, Borana people have not yet recognized that the resource base is shrinking. Alternatively it is possible that Borana indigenous institutions just change very slowly (cf Williamson, 2000; Ronald, 2004).

Although some studies (Huqqa, 1996; Elemo, 2005; Homann et al., 2008) mentioned that the traditional Borana institutions are dynamic in terms of enacting, renewing, and repealing rules if necessary, this study counter argues this assertion and shows that the dynamism is not fast enough compared to the environmental, institutional, and socio-economic changes surrounding them, particularly since recent decades. The pan Borana general assembly that has a mandate to enact, renew, and repeal laws is held only once every eight years and this period may be too long to cope with problems or crises by existing *gada* laws.

Unbalanced role of the formal institutions in gum and resin production and marketing

The local void in traditional institutional arrangements on gum/resin production is not solved by the presence of formal institutions, even though two types of formal institutions with respect to gum and resin production and marketing are present in Borana, i.e. local cooperatives and external institutions. The gum and resin cooperatives do not play any role in shaping access to the ABC resources. However, they have impacted access to the market for gum and resin. Although the cooperatives were believed to improve the oligopoly market structure in favour of the gum and resin producers, they worked against that and changed the market structure into monopsony. This is the market in which the cooperatives monopolized the purchase of the gum and resin and made the other traders not buy from the producers. This market structure has limited the benefit the gum and resin collectors get, and non-members of cooperatives are not allowed to sell the products at markets of their preference. The case of gum and resin cooperatives in Borana is contrary to the notions guiding the establishment of cooperatives in general and gum and resin cooperatives in particular. The gum and resin cooperatives do not contribute towards the combined goals of socio-economic development and improved land-use. Instead of counteracting monopoly and monopsony (cf. Normark, 1996; Belcher and Schreckenber, 2007), the cooperatives have become monopsonists and did not benefit the producers. Moreover, the tendency of cooperatives to develop into bureaucracies overshadows the role of cooperatives as a tool for strengthening the position of the weaker actors in the markets (Normark, 1996).

Similarly, the external institutions (state agencies, NGOs, and trading enterprises) has impacted gum and resin trading by creating as well as facilitating market access. This is in

line with the argument we made that gum and resin utilization is impacted more by external institutions than the traditional institutions of Borana. Nevertheless, the external institutions tend to focus on promoting gum and resin utilization rather than on governing access to the resources. Thus, the formal institutions (cooperatives and external institutions) only play a partial role in gum and resin production and marketing. They have only promoted the utilization of the resources but do not have a role in governing access to the resources and conserving and developing the resource base. The implication is that unless institutions emerge that balance arrangements for access to the resource system and for their utilization, there is no assurance on sustainable management of the ABC resources. Rather, the exclusive focus on marketing may lead to over-exploitation of the resources in the long run. In this respect it can be noted that the introduction of the cooperatives was not in response to concerns of local people on the depletion of the resources (cf. McCay, 2002). Rather they were introduced by NGOs and State agencies as part of the national program to increase the number of basic cooperatives by 71% (from 14423 basic cooperatives in 2004/2006 to 24677 in 2009/10) in Ethiopia. The gum and resin cooperatives are part of this program aiming at improving the livelihoods of the local people in drought prone areas (PASDEP, 2006) and have not been integrated into programmes for forest conservation.

Notwithstanding the efforts by the external institutions to promote cooperatives, the trade in gum and resin in Borana is still characterized by poor access to markets, infrastructure, capital, and information. The informal bureaucratic rules that allow only the cooperatives buy gum and resin from the producers have excluded other traders and the products are sold in a non-competitive market. Consequently, the benefits from gum and resin production is not fully earned by the producers. This is in line with several studies that claim that the ability to commercially benefit from a resource depends more on whether structures and processes that guarantee access to markets are in place than having a property right on the resource (Ribot, 1998; Ribot and Peluso, 2003; Kepe, 2008; Sekor and Lund, 2009). For instance, Larson and Ribot (2007) show that in Honduras and Senegal the pressure the experts, government administrators, and merchants place on local communities did not allow them get the benefits from the forests that is granted to them by the law.

Gum and resin exploitation in the absence of traditional and formal institutions that regulate access to the ABC resource base

In Borana the production and marketing of gum and resin is carried out by both individual households and members of local producer cooperatives. In both cases access to the ABC resources for gum and resin production is open and whoever is interested in collection can do so without restriction. There is neither restriction to the number of individuals collecting in a particular area and/or time nor a limit to a territory where specific people can collect. This open-access nature of collecting tree products stands in contrast to the traditional common property arrangements for managing livestock grazing on silvopastoral lands. However, these traditional arrangements for pastoral management are under pressure from new government land-use policies. These have also a detrimental impact on the ABC resources. This finding is

in agreement with other studies in Borana that showed the traditional institutions of Borana can no longer meet the challenges of natural resources management because they are already weakened by the interference of the formal institutions (Tache, 2000; Watson, 2003; Tache and Erwin, 2003; Kamara et al., 2004; Homann et al., 2008). Moreover, the traditional organizations and state agencies often suspect each other with regard to their political ambitions (Kamara et al., 2004). This conforms other studies in Ethiopia and elsewhere regarding the imposition of external institutions on traditional ones. Gebre (2001) showed that the formal institutions have removed all the decision making power of the traditional institutions of Karrayu (another Oromo sub group of Ethiopia) and restricted it to performing rituals. In Amazon Pokorny and Johnson (2008) find that the competition between the imposed state regulations and the existing local institutions led open-access situation in community managed forests. Thus, the coexistence of formal and informal institutions as claimed by Kasper and Streit (1998) does not always hold true regarding the range land management in Borana and other cases mentioned above. All in all, the current situation of the traditional institutions of Borana implies that managing the gum and resin resources as part of the rangelands resources is not enough. Hence revitalizing the traditional institutions or generating specific institutions for ABC making use of the ethos of the traditional range land management is essential.

CONCLUSIONS

This study show that the integration of gum and resin resources into market so far has not enabled the locals as well as state agencies to generate specific norms and rules and restrict access by others (cf. Ribot and Peluso, 2003). We found that the role of the NGOs, state and market actors in promoting gum and resin utilization in the drylands of southeast Ethiopia is crucial. This is in line with Agrawal (2002) who showed that common pool resources (CPR) and the community are no longer immune to the influences of external factors (e.g. markets, technology, state and population), and that most CPR studies tend to focus on internal dynamics of the community for generating strong institutions for them. Our findings contribute to this argument by demonstrating how the external institutions affected gum and resin use and management in the drylands of Ethiopia.

The traditional institutions of Borana have generated strong cardinal rules for livestock, pasture, and water. However, they have not generated laws that regulate access to the ABC resources and their markets despite the increasing importance of the gum and resin production and trade on the one hand and the mounting pressure on ABC woodlands on the other hand from non-traditional uses such as commercial charcoal, fire-and scent-woods, and individualizing for farming and grazing enclosures. Local producer cooperatives and external institutions impact gum and resin utilization, however, they have only partial role. They influenced only access to the gum and resin market, not to the ABC resources. Thus, gums and resins are utilized in the absence of the traditional and formal institutions that regulate access to the ABCs resources. The traditional range land management system existing in

Borana for more than half a millennium have been changing from being strong indigenous institutions to gradually weakening ones. Thus, it is not sufficient to conserve the ABC species as part of the range land owing to the growing pressure from non-traditional and non-gum and resin uses. The findings imply that when a resource is commoditized, subject to the influences of external institutions, and non-traditional uses, utilizing it under the existing institutional arrangement may not be enough. This calls for generation of specific rules and norms that shape the use and management of a resource in question. Thus, for sustainable use of the ABC species and the woodlands they grow in, interventions geared towards either revitalizing the position of traditional institutions or supplying new ones, in both cases specific to ABC, is crucial.

Chapter 4

Local processes of gum and resin resources use and management in northern Ethiopia: the dominant role of informal institutions

Teshale Woldeamanuel, Mulugeta Lemenih and Frans Bongers



ABSTRACT

Drylands in north Ethiopia host vast *Combretum-Terminalia* woodlands dominated by several gum and incense producing species of *Acacia* and *Boswellia*. These species are the sources of the renowned products gum Arabic and frankincense, which are of historical and contemporary economic significance. Nevertheless, the species and the woodlands are under intense pressure showing a decline over recent years. In this paper we examine the nature and interactions of formal and informal institutions concerning the use and management of *Acacia* and *Boswellia* species in three districts. Provisions in the existing government regulations favour gum and resin production and marketing by smallholders, cooperatives, and companies. Practices however show that in all the districts production and marketing of gum and resin is restricted for smallholders. These restrictions differ among the districts. In Metema and Quara both production and trade is completely dominated by cooperatives and companies. In Abergelle individual households can produce gum and resin, but they can only sell these products to cooperatives shops. Our findings show that informal bureaucratic institutions developed by administrators and professionals at district and *Kebele* levels provide the rules-in-use regarding gum and resin production and marketing, regardless of how much they contradict with the regulations of federal and regional states. Moreover, the local customary rules and practices and the government regulations in related sectors (e.g. agriculture) compete with the regulations enacted by the regional states for gum and resin use and management. The interaction between federal/regional states regulations and informal institutions is generally competing; this often results in indiscriminate tree cutting and woodland conversion. The sustainable use and management of the gum and resin woodlands, requires harmonization of the formal and informal institutions and coordination of sectoral policies and local practices.

Key words: NTFPs, gum and resin, formal institutions, informal institutions, institutional interaction

INTRODUCTION

Gum arabic, frankincense and myrrh are prominent commercial tree products of arid and semi-arid lands. The drylands in the Horn of Africa are the major source of these products since time immemorial (Wickens 1995). These products have a wide range of local and global industrial applications (Chikamai and Tchatat, 2004; Lemenih and Teketay, 2004). They also contribute significantly to the economy of the nations (Suderland and Ndoye, 2004; Chikamai *et al.*, 2009). The production and trade of gum and resin has a long history in Ethiopia and claims of myrrh and frankincense production and trade go back to the Aksumite Empire that reigned around the first millennium A.D. (Gebremedhin, 1997). Organized production and trade for gum and resin, however, is recorded only since the 1940s. Production and trade of these commodities is expanding over recent years, and today over 34 private companies are involved in contrast to only one state company in the 1970s and 1980s (Lemenih, 2005; Lemenih *et al.* accepted, chapter 2).

The gum and resin production is mostly concentrated in northern Ethiopia, where it significantly contributes to the regional and national economy. It also significantly contributes to local people's income. This local importance is related to their supplementary role to agriculture: they are produced in the dry season when other economic activities are low (Gebremedhin, 1997; Lemenih *et al.*, 2003; Eshete *et al.*, 2005; Luvand *et al.*, 2007). The role of gum and resin in the livelihoods of the local people increased only recently, as historically the production was dominated by non-local producers (Lemenih *et al.*, submitted). After the fall of the socialist regime in 1991, the new government introduced a free market economy in the country. Major changes occurred in gum and resin production and trade. Notably, specific formal regulations that promote gum and resin utilization and management are enacted and allowed the local people to produce gum and resin via individually or as a member in a local cooperative associations (Lemenih, 2005; PASDEP, 2006; Anonymous, 2007).

The gum and resin producing woodlands are however under pressure and in many places subject to degradation and conversion to agricultural lands. This indicates that the government rules and provisions designed to use the resources more sustainably may not be practiced as intended. There may be several reasons for the lack of effectiveness of these regulations. For instance, local administrators may implement the formal regulations in different ways than intended by the policy makers. The formal laws enacted by central governments can be filtered at the local level and it is ultimately this local interpretation that goes into practice (Gibson *et al.*, 2000; Larson and Ribot, 2007; Mwangi, 2009). Also the lack of sufficient personnel and/or logistics at local level may constrain adequate enforcement (Gibson *et al.*, 2000). Alternatively, local communities may ignore central government rules in case that they contradict with their daily pattern of resource use (Gibson *et al.*, 2000; Mwangi, 2009; De Koning, 2011). Consequently, macro-level institutions might remain more an intent than a direct cause for improved forest management.

To be able to better understand this gap between policy and practice, this study assesses how the formal government institutions regarding gum and resin production are practiced at local level, and what interplay occurs between the macro-level and local level institutions. The following questions are addressed:

- What are the characteristics of formal institutions facilitating gum and resin production and marketing?
- What types of informal institutions regarding gum and resin production exist and what are their characteristics?
- How do the local-level informal institutions interact with the macro-level formal institutions and to what extent do they complement or contradict each other?

INTERACTION BETWEEN FORMAL AND INFORMAL INSTITUTIONS

It is often assumed that formal rules shape actors' incentives and expectations. However, good institutional analysis requires rigorous attention to both formal and informal rules. For further details on formal and informal institutions see chapter 1. Careful attention to informal institutions is critical to understanding the incentives that enable and constrain people behaviour. Actors respond to a mix of formal and informal incentives and a strict analysis of the formal rules would be insufficient, for informal incentives trump the formal ones. Informal institutions shape the performance of formal ones in important and often unexpected ways (Helmke and Levitsky, 2004). It is becoming more evident that socially embedded institutions play a crucial role in shaping people behaviour. In some cases they often become a barrier for formal institutions. On the other hand, the introduction of new bureaucratic institutions to a new situation may result in inadequate institutional solutions as they fail to recognize the depth of social and cultural embeddedness of decision-making and co-operative relations (Cleaver, 2002; De Koning, 2011). Understanding where the informal institutions come from and how they affect the formal ones and the desirable outcomes is important. The relationship between formal and informal institutions tends to fall into one of two sharply contrasting categories. One view treats informal institutions as functional in providing solutions to problems of social interaction and coordination, which enhances the performance of formal institutions. A second view treats them as dysfunctional, or problem creating. There is however a more complex picture than envisioned by either view, in which informal institutions at times reinforce or substitute for the formal institutions they appear to undermine. Helmke and Levitsky (2004) developed a typology aimed at capturing these relationships (Table 1). The distinction here is whether following informal rules produces a substantively similar or different result from that expected from a strict and exclusive adherence to formal rules. Where following the informal rule leads to a substantively different outcome, formal and informal institutions diverge. Where the two outcomes are not substantively different, formal and informal institutions converge. The second dimension is the effectiveness of the relevant formal institutions (e.g. the extent to which rules and procedures that exist on paper are enforced and complied with in practice).

Table 1. Typology of relations between formal and informal institutions

Outcomes	Effective formal institutions	Ineffective formal institutions
Convergence between formal and informal institutions	Complementary informal institutions	Substitutive informal institutions
Divergence between formal and informal institutions	Accommodating informal institutions	Competing informal institutions

Source. Helmke and Levitsky (2004)

Based on the outcome vs. effectiveness variables four types of informal institutions can be identified: complementary, accommodating, competing, and substituting (Table 1). First, informal institutions are complementary with formal ones when they converge and the formal institutions are effective. In this case the informal institutions “fill- in gaps” either by addressing contingencies not dealt with by formal rules or by facilitating the pursuit of individual goals within the formal institutional framework. Also they may serve as a foundation for formal institutions, creating or strengthening incentives to comply with formal rules that might otherwise exist merely on paper. Second, the informal institutions may accommodate the formal ones when they diverge and the formal institutions are effective. In other words, they coexist with the formal institution and drive the outcome that is not entirely intended by the formal rules.

Third, informal institutions compete with formal ones when the latter are ineffective and the two diverge. This is true where formal law is poorly enforced, or simply ignored by authorities. This situation exists because states do not feel the need to enforce the laws or they do not necessarily have the capacity to enforce them. These informal institutions structure incentives in ways that are incompatible with the formal rules: to follow one rule, actors must violate another. Finally, informal institutions can substitute for the lack of effectiveness of formal institutions. Like complementary institutions, these informal institutions are designed to achieve what formal institutions should be doing but is ineffective or ignored by official sources. Informal credit markets and insurance schemes might very well be thought of as substitutions for formalized market or state organs. Like complementary institutions, substitutive informal institutions are employed by actors who seek outcomes compatible with formal rules and procedures. Like competing institutions, however, they exist in environments where formal rules are not routinely enforced (Helmke and Levitsky, 2004; Jütting et al., 2007).

Interaction between formal and informal institutions in forest management

The use and management of natural resources are subject to not just one single, coherent and generally known body of rules but to multiple institutions (international, national, religious,

customary, project, and organizational laws). These institutions do not simply coexist but interact in different ways. This coexistence and interaction of multiple types of institutions is referred to as 'legal pluralism' (Merry, 1988; Benda-Beckmann, 1991; Mwangi and Meinzen-Dick, 2009).

Young et al (1999) distinguished institutional interaction between institutions at the same and different levels of social organizations. The former type of interaction is termed as horizontal and the latter is vertical. Horizontal interaction often comprises institutional interaction across sectors. A wide variety of institutions across sectors have unexpected and often unwanted consequences (or externalities) that were not taken into account in the process of policy-making. Notably, the outcomes of forest management are liable to the policies and programmes of the sectors outside the forestry. The root causes of forest degradation are often found outside the forestry sector (De Montalembert, 1992). Kowero et al (2003) also underlined that forest use and development are the fundamental consequences of the wider configuration of national policy and economic development. In this situation reconciliation of the policies and programmes of different sectors-intersectoral integration-is crucial. However, successful co-ordination within sectors may not be taken for granted (Hogl, 2002).

Vertical interaction between institutions at macro and local levels is important. In terms of forest use and management, for instance, formal laws enacted at macro level by central governments can be reshaped at the local level by community institutions. They may ignore central government rules that contradict with their daily pattern of resource use and it is ultimately the local interpretation that goes into practice (Gibson et al, 2000; Larson and Ribot, 2007; Mwangi and Meinzen-Dick, 2009). At the same time, when local people discuss new state laws or appeal to them, local custom is also likely to change (Mwangi and Meinzen-Dick, 2009). Formal and informal institutions for forest use and management often interact in disparate ways (Pacheco et al., 2008). In some cases, formal forest regulations incorporate informal rules developed by the community for organizing access and use. This may mean (i) adopting them or recognizing them with or without specifically codifying them into law; or (ii) producing a new set of formal rules by blending or combining them with existing formal regulations. In contrast, formal laws might work against existing informal rules and impose new ones, likely generating a new set of informal institutions to get around them. This implies understanding the formal-informal institutions interaction as well as the working rules that ultimately matter most. Working rules are rules that individuals use in making decisions or make reference to if asked to explain and justify their actions (Pacheco et al., 2008). Working rules have different sources ranging from informal agreements on traditional practices of communities to written rules created by governments (Thomson and Freudenberger, 1997; Ostrom, 1999).

Formal forest regulations often tend to impose new rules, practices, and models over communal institutions rather than building upon them. In such situations, overlooking the informal institutions often creates internal confusion or competition between the formal and informal organizational structures, and leads to a breakdown in control, which can eventually

fuel open access behaviour that puts forests at risk. It also reduces forest benefits for local people in the long term (Pacheco et al., 2008; Pokorny and Johnson, 2008). Moreover, the imposition of homogeneous legal frameworks by the state does not take into account the diversity of local realities and often neglects the existing working rules for forest resources use adopted by locals that in practice results in contradictory outcomes. For instance, formal rules tend to favour the powerful and politically connected forest actors with greater assets and far greater bargaining power in the market. But individuals with limited resources and greater difficulty meeting formal requirements may instead opt for illegal practices such as informal markets. The outcomes of forest management depend less on the content of the formal rules and more on the modes of implementation. Implementation to a large extent leads to the emergence of new sets of informal rules to evade the new formal ones (Pacheco et al., 2008). At present most common pool resources are widely integrated into the external environment (Agrawal, 2002; McCay, 2002). Particularly, 86% of the world's forests and wooded areas are owned by central governments (FAO, 2006; Agrawal et al., 2008). In these situations introducing formal rules that govern forest use and management is invariable and these macro-level institutions enacted by central governments may affect community rules and practices. They may also be shaped by community rules and practices (cf. Gibson et al. 2000; Mwangi, 2009; De Koning, 2011). Hence studying the working rules and practices at local level that affect resource management outcomes is essential.

RESEARCH METHODS

Description of the study areas

This study was carried out in three districts in northern Ethiopia covered by *Combretum-Terminalia* woodlands hosting *Boswellia papyrifera* and several Acacia species that produce gum and incense. The three selected districts Abergelle, Metema and Quara (Figure 1) are known for their gum and resin production, but differ in respect to production arrangements (for a full description of the research locations see Lemenih et al., submitted). Abergelle is located in Tigray region, northern Ethiopia. It is included in this study because of the importance of gum and resin production in the locals' livelihoods, the existence of formal institutions specifically developed for ABC resources utilization and management, the scarce and declining ABC resource base, and the co-existence of smallholders and cooperative models of gum and resin production. Metema and Quara districts are located in Amhara Regional State and selected for the study because of their abundant but rapidly deteriorating boswellia resource base, the presence of specific ABC institutions, the lack of smallholder gum and resin production, and the ethnic diversity. Also a contrast is made between the presence (in Quara) and absence (in Metema) of the cooperative model of gum and resin production and trade.

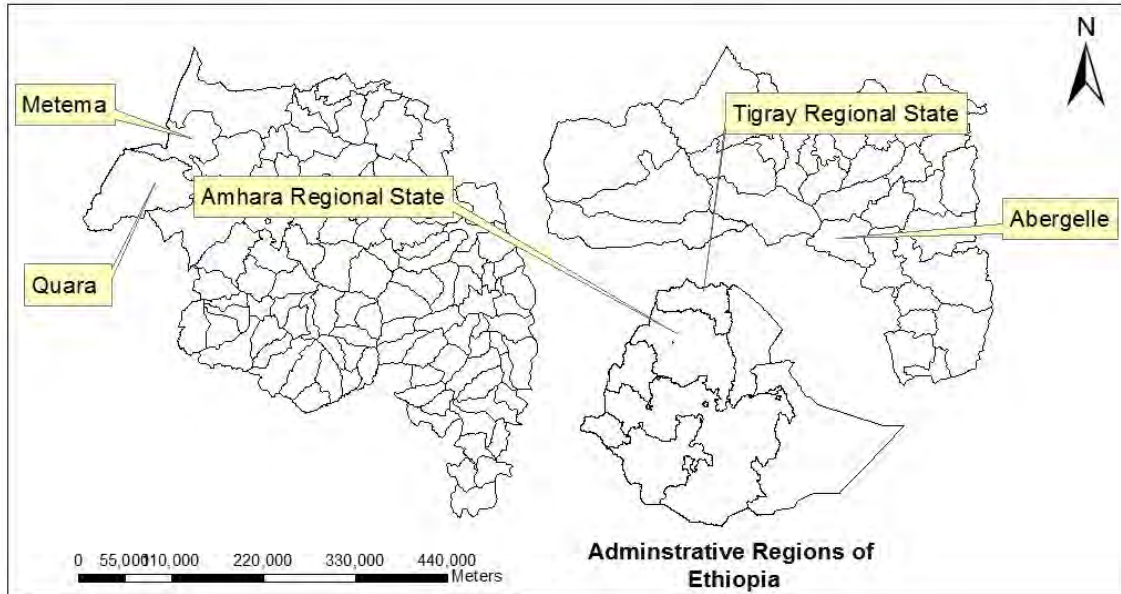


Figure 1. Map of the study areas. The Abergelle, Metema, and Quara districts in Tigray and Amhara Regional States

Methodology

Data collection and analysis

For this study data were mainly collected at community level in each research location. For a detailed description of the research methodology see Chapter 3. In three districts a total of 25 focus groups discussions and 33 key informants interviews were held. For a description of the methods for data analysis see Chapter 3. utilization and management in particular were used.

The qualitative data were supplemented with a households survey amongst 99 households from Abergelle, 57 from Metema, and 40 from Quara (for detail methodology see chapter 5). From the household survey, information on land holding size, boswellia trees ownership, constraints to gum and resin production and marketing by households, and cooperatives membership were employed in this chapter. The quantitative data obtained through household interview were analyzed using descriptive statistics mainly frequencies, minimum, maximum, and means.

RESULTS

Institutions and gum and resin production and marketing

Natural resources management in general and gum and resin resources use and management in Abergelle and Metema/Quara is subject to the influences of a complex of both formal and informal institutions. This institutional complex is rather different than that in Borana

(Chapter 3). The most important formal institutions are the state institutions at either federal or regional level. In addition, at local level, both formal producer cooperatives and informal local institutions exist. The latter do not only concern customary local institutions, but also informal bureaucratic institutions. Moreover, the conservation and use of forests is not only influenced by formal forestry institutions, but also by formal institutions from other sectors. The following sections describe how these various institutions affect gum and resin use and management in Abergelle and Metema/Quara.

Formal institutions for forest use and management at federal and regional level

Officially, Ethiopia is a federal country. In Borana this federal structure was not found to impact significantly on the use and management of gums and resins. However, in northern Ethiopia, where a long history of gum/resin production exists, this federal structure is reflected in the institutional arrangements for gum/resin exploitation. A variety of formal institutions exist at federal and regional states' levels that impact forest utilization and management in general and the ABs in particular. Rural Land Use and Administration (# 456/2005) and Forest Conservation, Development and Utilization (#542/2007) proclamations are important formal institutions at federal level (Table 1). Article 10.1 of the rural land use and administration proclamation obligates rural land owners to use their land and natural resources on it in a way that does not cause damage to the resources. A rural land may be provided free of charge for a citizen who is 18 years and older and wants to farm for living (Article 5.1.a and b). The same proclamation embeds the transfer of communal rural holdings into private use when found necessary (Article 5.3). Apparently, this latter provision, which is often interpreted by many as potential for land redistribution, is a challenge for sustainable, long term investment in resource management. Forest Conservation, Development, and Utilization proclamation recognizes private, community, and state forest ownership and development. It stipulates several provisions that apparently encourage the production of quality and competitive forest products for local and international markets (Article 6.1). The proclamation assures that a forest developed on a private holding or in a state forest leased officially is the property of a person who developed them. It demands forest owners to be responsible for replacing harvested trees and protect them from pests, disease, and fire (article 7.2 (a-d)). On the other hand, it prohibits cutting, processing or extraction of forest products from a state forest; destroy, damage or falsify forest boundary marks; cause damage to a forest by setting fire or in any other manner; settle or expand farmland within state forest boundary; construct any infrastructure in a state forest without permission of the appropriate authority (Article 14 sub article 1-5). It restricts forest product transport from a private forest owner without obtaining a forest product movement permit (article 7.1).

Regional States have the obligation to adopt the federal forest proclamation to their regional circumstance. Consequently, Tigray Regional State developed an elaborated regional forest proclamation, but the Amhara Regional State did not yet develop it. In both states specific proclamations, regulations, and directives for rural land use and administration as well as for gum and resin production were also developed.

In the Tigray Region, several official regulations impacting on forest management and gum and resin production have been formulated. These include the rural land use and administration proclamation (# 136/2000), forest conservation, development and utilization regulation (14/1994), and gum and resin resources utilization and marketing regulation (#001/2004). The rural land proclamation prohibits cutting of a number of tree species including ABC trees even from own farmlands (article 13.3). The regulations demand the owners of the farmlands to protect and manage these trees even if they are on their farmlands (Article 13.5). Penalties of transgressing these obligations range from 100 Birr to 1000 Birr (Article 29.2(7)). In fact, the regulation acknowledges the ownership of the trees to the farmland owner (article 13.1). Particularly, gum and resin trees are declared as the properties of the land owners and the owners can utilize them by tapping or renting out (Article 13.4). Articles 4.2 and 11.1 of the forest regulation prohibits cutting of incense, gum, Ficus, and Cordia trees in the state forests, feeding livestock by cutting fresh branches, and collecting fire and construction woods without permission of the owners. Trees planted by individuals can be utilized by them any time without causing soil erosion and land degradation (article 5.1a). A person who plans to transport forest products from own holdings can be granted permit from district forestry or natural resources management department (article 8.1). Article 3.2 of the gum and resin development and marketing regulation strictly prohibits cuttings of ABC trees on individual holdings as well as public lands. Article 3.3 specifies conditions under which incense trees are tapped. Accordingly an incense tree is tapped only if its height, diameter, and circumference is greater than 20 m, 13 cm and 40 cm respectively, the number of incisions on a tree should not be greater than nine, the stands should rest for 3 consecutive years following continuous harvesting for 3 - 4 years, and tapping should be done between September and May, though the exact start and end dates vary depending on localities. According to the proclamation, concessionaries have an obligation to develop a resource base via conservation and planting. Articles 3.1 and 3.2 allow production by smallholders, cooperatives, and companies. ABC trees on farmlands are the properties of the owners and they can produce and sell the gum and resin in a competitive market (Articles 3.2 and 10.3).

Also in the Amhara Regional States several regional regulations on forest management and gum and resin production have been enacted. These include the rural land use and administration proclamation # 133/2006, regulation # 48/2000, gum and resin utilization and management regulation #001/2007, and gum and resin development and marketing cooperatives establishment directives #16/2004. Proclamations or regulations on Forest Conservation, Development and Utilization do not exist in the region except a draft provisional proclamation that is not yet endorsed. Article 13.5 of rural land use and administration proclamation obligates a land user to plant trees around his/her land and protect them properly. Land owners can use their land for agricultural and natural resource developments and other activities. Article 6 of the natural gum and resin utilization and marketing regulation declares that all natural boswellia stands, under concession or not, are state property. It also obligates producers to follow the appropriate tree diameter for tapping, intensity and season of tapping, and protect the resource from fire, disease, and pests and

develop the resource base. Tapping is not allowed if the diameter of the incense tree is less than 10cm. The regulation also requires 5 years of continuous tapping to be followed by 2-3 years of resting (article 7).

Smallholders can produce frankincense from boswellia stands in their farmlands by themselves or by contracting them out (Article 16.1). They can also get benefits from gum and resin through employment. For the cooperative model of gum and resin production, local communities should assure themselves for tapping knowledge and skill and legal personality (Article 5.1.5). It is strictly forbidden to cut gum and resin trees for other uses, and produce, transport and utilize 'illegally' (Articles 18.1 & 18.2). The directives on gum and resin cooperatives establishment obligate the producer cooperatives to conserve and develop the resource base they hold via concession. Cooperative membership is compulsory for smallholders to utilize the ABC resources. The directive also does not favour the establishment of more than one cooperative in a district (Article 8.1 (a)).

Comparison on federal and regional level formal institutions

Comparison of the multi-institutions for ABs use and management shows some alignment and also divergence (Table 2). While the two regional states have specific institutions for gum and resin resources, the federal does not. The federal forest proclamations recognizes three forest ownership and use rights: smallholders, cooperatives and companies. As per this proclamation smallholders can develop their own trees and sell them at markets of their preference after getting the necessary permit. The regulations on forest utilization, management and development in Tigray regional states aligns along with the federal proclamations, and recognizes forest ownership and use right by smallholders, cooperatives and companies. In Amhara regional state there are not yet a corresponding forest proclamation or regulation.

In Tigray gum and resin utilization and development regulations allow production by smallholders, cooperatives, and companies. In contrast, the cooperative establishment directives of the Amhara regional state favours gum and resin production and trade by cooperative and companies only. For smallholders, cooperative membership is compulsory to produce gum and resin from trees on farm lands or homesteads. This is contrary to (a) the federal forest proclamation that allows production and marketing of forest products by smallholders, and (b) the gum and resin utilization and development regulation in the same regional state that allows smallholders to produce gum and resin either by themselves or by hiring their trees.

In general, the formal institutions enacted for forests in general and the gum and resin in particular at federal and regional state levels are complementary, only the Gum and resin Marketing and Development Directives of the Amhara Regional State are regional specific (Table 2). The Rural Land Use and Administration proclamations of the federal and regional states advocate the development and conservation of natural resources, especially forests. In

Table 2. Comparison of institutional provisions between Federal and Regional States with special focus to AB species

<i>Main features</i>	<i>Federal</i>	<i>Tigray Region</i>	<i>Amhara region</i>
<i>Forest use</i>	Individuals can not utilize forest products from state forests without permission Individuals can utilize forest products from their own trees without restriction	Individuals can not utilize forest products from state forests without permission Individuals can utilize forest products from their own trees without restriction	No rules*
<i>ABs use in public lands</i>	No explicit provision for AB species	Cooperative membership is a precondition to use boswellia trees on public lands It is not allowed to cut AB trees in the state forest without permission	Cooperative membership is a precondition to use boswellia trees on public lands It is not allowed to cut AB trees in the state forest without permission.
<i>ABs use on farmlands</i>	No explicit provisions for AB species	Owners of boswellia trees can produce gum and resin from their farmlands or homesteads without restriction	Owners of AB trees can produce gum and resin from trees on farmlands or homesteads without restriction (Regulation # 001/2007) Cooperative membership is a precondition to use AB trees on private farmlands (Directive #16/2004) **
<i>Frankincense and gum sell</i>	No explicit provision for AB species.	Individual producers can sell at markets of their preference Members of cooperatives should sell to the cooperatives shop	Individual producers can sell at markets of their preference (Regulation # 001/2007) Individuals cannot produce and sell if they are not members of cooperatives (Directive #16/2004) Members of cooperatives are obligated to sell to the cooperatives shop

* Forest Conservation, Development and Utilization proclamations are not yet enacted.

** The rules enacted by the Bureau of Cooperatives and the Bureau of Agriculture of the Amhara Regional state for ABs trees on farmlands conflict with each other (cf. regulation #16/2004 and regulation #001/2007).

Tigray regional state, the proclamations have given special provisions for conservation and development of gum and resin trees. In contrast, all proclamations also have provisions that allow the conversion of communal lands into agricultural land uses when necessary. This is

implemented mostly by conversion of *Boswellia* forests into farmlands; hence the impact of the proclamations on gum/resin resources is divergent.

Gum and resin cooperatives

In both Abergelle and Quara recently local producer cooperatives have recently emerged as formal institutional arrangements for gum and resin production and marketing. The cooperatives were established on the premise of improving the livelihoods of the local people and promoting the management of the ABC resources by the local people. In Abergelle the gum and resin cooperatives were initiated in 1997, and in Quara in 2008. In both regions, in all relevant *kebele* (districts) one specialized gum/resin producer cooperative has been established. In Metema, the establishment of cooperatives for gum and resin production is an ongoing process.

The development of the gum and resin cooperatives in Abergelle and Quara have greatly influenced both the production and marketing of the gum and resin. In contrast to Borana, they play an important role in governing access to the resources. In areas where the gum and resin cooperatives exist, the local forests on public lands are granted to them in order to produce frankincense. This has limited access to the *Boswellia* trees on growing on public forest lands for individuals. Membership in a local producer cooperative is a must to produce gum and resin from the public forests; producing gum and resin from public forests without cooperatives membership is 'illegal'. Since the emergence of these arrangements, some of the *Boswellia* forests that used to be under the concession of Gum and resin processing and marketing companies were transferred to the cooperatives. In Abergelle the *boswellia* forests on public lands are controlled by general purpose cooperatives, that do not only produce and sell gum and resin but also trade in other commodities. The cooperatives in Quara are officially only involved in gum and resin production and trade. However, the actual production is not carried out by its members, but outsourced to a specialized crew comprised of a coordinator, squadron, and tappers (for the details see chapter 6).

The formation of gum and resin cooperatives has greatly influenced access to the market. In all areas they have become important actors in buying and selling gum and resin products. Although the gum and resin cooperatives were believed to improve the market structure dominated by few private traders and a state marketing enterprise, in reality they have not improved the oligopoly market that was dominant in the area for long time. The gum and resin cooperatives have become sole buyers of the gum and resin in the market, and both members and non-members of the cooperatives are forced to sell to the cooperatives in their respective Kebele. This has limited access to markets of their preference for the producers. The individual producers (both members and non-members) complained that they can not sell to the cooperatives shops whenever they want to do it. Rather they are forced to sell to the cooperatives shops only once per year at the end of the production season at a date yearly announced by the cooperatives. Hence, the emergence of gum and resin cooperatives in the

study areas have influenced gum and resin production and marketing by changing the oligopoly gum and resin market structure to the monopsony.

The performance of the gum and resin cooperatives in both Abergelle and Quara is not as originally envisaged. There are several reasons that explain why the cooperative arrangements are short of the original expectations on marketing benefits. First the role of the local people in the formation of the cooperatives was very minimal. Only 6 percent of the respondents mentioned that they were members of the cooperatives because they considered that the membership would benefit them. Another 84 percent of the respondents indicated that they were members of the cooperatives because it would allow them access the boswellia trees. Another reason mentioned by 74 percent of the respondents for the cooperative membership is the fear that they might otherwise not receive general state benefits such as improved agricultural crop varieties and fertilizers. The gum and resin cooperatives have even been introduced in Quara where the local people do not exploit these products as a livelihood activity and do not have any experience of producing the gum and resin. A second reason for the limited impact of the gum/resin cooperatives is that in several cases the motive for the formation of the cooperatives was to exclude non-local users rather than to address the livelihoods needs of the people. This is typical the case in Quara, but can also be observed in Metema. Furthermore, the gum and resin cooperatives are also blamed for the turning into internally-oriented bureaucracies (see also the section on informal bureaucratic institutions) and for paying only scant and irregular dividends to members. An additional reason for the lack of impact of the cooperatives in Abergelle is, that these are general purpose cooperatives engaged in the trade of several products and giving minimal attention to promoting gum and resin production and marketing.

The cooperatives mainly focus on the utilization of the gum/resin resources, but play a minimal role in improving the management of the resource base. So far their institutional impact is restricted to allocating the Boswellia stands under their concession among members (in Abergelle) or to crews of producers (in Quara). Although the cooperatives should follow the management regulations as formulated by the Bureau of agriculture, e.g. in respect to exploit the resources by alternating tapping years with resting, respondents mentioned that many cooperatives are not following these rules.

Informal institutions for gum and resin production and marketing

Customary institutions

The Gumuz, Wore, Qimant and Quaregna are the major ethnic groups in Metema and Quara districts and have their own indigenous institutions that are mainly concerned with conflict resolution, burial ceremony, and rituals (Table 3). In all ethnic groups the society uses these indigenous institutions to maintain peace-and-order. None of these institutions, however, constitute rules, norms, and enforcement mechanisms with respect to forest utilization and management in general and ABs in particular; rather they are mostly related to social relations. *Mangama* is an indigenous institution of the Gumuz used to settle disputes and

maintains peace and wellbeing of the society. The *Qimant* has both social and religious institutions. The social institution of Qimant, *Afersata*, is the gathering of multitudes that investigates and resolves hidden breaches committed by community members or outsiders. *Meba* is a religious institution of Qimant and involves offering of money, grains, candle, or honey to churches. This is based on a belief that in the course of time either a suspected contravener reveals himself or something evil might happen to him. However, it is practiced only after the *Afersata* institutions fails to discern and resolve breaches. An indigenous institution of Wore, *Qire*, is used to discern and resolve contraventions committed underground is *Qire*. The procedure in *Qire* to identify a contravener or resolve conflicts is called *She'eni*. It is a gathering of multitudes. *Afersata* is also an indigenous institution for the Quaregna ethnic group in Quara district.

Table 3. Customary institutions in Metema and Quara

Main features	Customary institutions				
	<i>Qire</i>	<i>Afersata</i>	<i>Mangama</i>	<i>Mate Qedem</i>	<i>Mofer Zemet</i>
Ethnic group	Wore	Qimant, Quaregna	Gumuz	All ethnic groups	Non-locals
Purpose	Maintain peace and order	Maintain peace and order	Maintain peace and order	Establish farmlands	Establish farmlands
Role in AB use and management	No specific role	No specific role	No specific role	No role	No role

In addition several customary institutions exist that are land-use focused. However, rather than focusing on forest conservation and management, they focus on agricultural development and concern norms for the conversion of the AB woodlands into other lands uses. For instance, *Mate Qedem* is a customary arrangement for individualizing communal and/ or public lands without the knowledge of local formal agencies that are in charge of rural land use and administration. Among the respondents of the household survey 42% has acquired farmland under this arrangement, as compared to 48% who had formally acquired farmland via the Kebele council (the other 10% of respondents cultivated crops on rented farmlands). The custom of *Mate Qedem* allows a person to establish farm plots by clearing a plot of land on public forests lands. This custom is mostly used by recent settlers. For many people this customary arrangement form their working rules and any action based on them is locally accepted. Consequently, *de-facto* privatisation of woodlands for farming is omnipresent in Metema and Quara. According to the household survey, individual land holdings range from 3-50 hectares (average = 7.25 and SD =7.3). Only 5 percent of the respondents mentioned that they own more than the maximum holding allowed. As revealed by key informants and focus groups discussions farm lands are often expanded at the expense of *Boswellia* forests and that many unregistered farms that are not controlled by the formal agencies in charge of land use and administration. As a result individual land holdings as big as 50 hectares are common,

contrary to the official maximum holding of 10 hectares . *Mofer Zemet* is another customary arrangement by which highlanders come to the lowlands, clear boswellia forests and cultivate crops. It refers to the clearing of the Boswellia woodlands for cultivation by non-local people who come to the area only during the cropping season.

From focus groups discussions with recent migrants it became evident that these customary arrangements reflect the focus of the migrant community in Quara and Metema on crops cultivation and animal production rather than on production of gum/incense. This is conditioned by their cultural background. The migrants originated from the highlands of Gondar and Wollo, where mixed farming is an age old and culturally entrenched vocation. Hence, farming is for the migrants an honoured vocation, and other occupations particularly gum and resin production are considered as low status jobs. In contrast to the local people in Abergelle, they have no historical and long term experience with gum/resin production, And cutting trees in order to expand farmlands is both tradition and common practice. As a result, the woodlands in Metema and Quara are progressively shrinking and Moreover, the government is stimulating the expansion of mechanized agriculture in this region. The predominant agricultural focus causes that the formal rules and regulations that are specific to the AB resources (Table 2) and designed to promote their utilization and development are not enforced by the local state agencies in charge, such as the Bureau of Agriculture, Kebele and district administrators.

In Abergelle there is no conspicuous customary institution operating at community level. However, unlike in Metema and Quara, the ABs are much appreciated and the culture of incense production is well advanced with production forming part and parcel of the local livelihoods. This is conditioned by several factors: (i) the relatively long years of production history in the area; (ii) limited alternative livelihoods opportunities, and (iii) strict formal regulation prohibiting conversion. The incorporation of gum and resin production in livelihoods is evident. 28 percent of the respondents we interviewed owns boswellia trees in their farmlands and/or homesteads. Most of these trees are remnants of naturally grown trees. Planting is still uncommon in the area. On average these households own 124 trees (range 10 to 1000 and SD=190). These trees are utilized by a variety of arrangements including (a) own production, (b) share-cropping, (c) transfer of use right via labor contribution, or (d) transfer of use rights for free. Arrangements (b), (c) and (d) are mostly employed when tree owners are constrained by labor shortage, or when the opportunity cost of working on them is high, or when the number of boswellia trees is low, and the trees are located in remote farms. In most cases, the private production arrangement is used, as the number of trees owned do not require external assistance for their exploitation. Although it contradicts with the formal government provisions that allow free gum and resin production and marketing by smallholders, the producers are *de-facto* obligated to sell their products to the cooperatives shops. The cooperatives do not only buy the gums/resins from the private producers, but also allocate the use of Boswellia trees on public lands to their members. In this way, people who do not own private trees (in our survey 72 %) still can be involved in Boswellia exploitation.

Informal bureaucratic institutions

As explained above, the formal institutions formulated at federal and regional level are often locally represented by new formal organisations. In performing their actual practices, they do not just implement the formal regulations, but may further adjust them to conform with their own interests. Consequently, next to local customary institutions, also informal local bureaucratic institutions may exist. These informal bureaucratic institutions are developed by administrators and natural resources or forestry professionals at district or Kebele level. They may significantly impact on the access to both gum-resin production and marketing (Table 4). Local people, having little information about the macro-institutional provisions, accept the informal bureaucratic rules developed by the administrators as if they were statutory laws. On the other hand, the administrators and experts have their own justification to make these informal local rules: First the primary concern of local level state agencies regarding gum and resin is coordinating production to generate state revenue. They argue that allowing gum and

Table 4. Informal institutions for gum and resin production and management in Abergelle, Metema and Quara

Main features	Informal rules in Abergelle	Informal rules in Metema/Quara
Access to production	Production from parkland trees on own land is permissible any time	Smallholders are not allowed to produce gum and resin even from trees on their farmlands/homesteads. Only cooperatives societies are allowed to produce gums/resins from leased lands.
	Trees on farmlands or homesteads are the properties of the land owners	All <i>Boswellia</i> trees, whether on farmland, or forests are state properties
Access to market	Smallholders who produce gum and resin from their own trees are obligated to sell to cooperatives shops only	Smallholders are not allowed to sell gum and resin unless they are members of a gum-resin producer cooperative
	Selling gum-resin at village markets or retailer shops is illegal	Selling gum and resin at village markets or retailer shops is illegal.
	The grades of gum and resin are fixed by the store men of the cooperatives during exchange	
	Price is fixed by the cooperatives every year before the production starts and then communicated to producers	
	Producers can sell gum and resin only ones per year when the cooperatives announce the date	

resin production by smallholders would disperse the production volume among thousands of households making control over their production and marketing difficult. Moreover, the products may not be properly channelled to the export markets thus limiting export-related state revenues. Hence, according to them, optimal production for international markets is best assured by cooperatives and companies rather than individual production. Second they claim that it is difficult to control whether products are derived from privately owned trees or trees on public lands, making it attractive for private producers to illegally collect products also from public forests. Being confronted with the obligation to efficiently implement sometimes contrasting formal rules and regulations, they are obliged to develop their own norms for dealing with such inconsistencies.

The nature of these informal institutions shows similarity and differences across sites in several aspects. While in Abergelle smallholders are allowed to produce gum and resin from boswellia trees on their farmlands or homesteads without restriction, this is not the case in Metema and Quara. In all cases however access to boswellia trees on public land requires membership of a local cooperative. Due to resource scarcity the boswellia trees on public woodlands in Abergelle are distributed rotationally to members of the cooperative for producing frankincense. This means that the use right of boswellia stands on public lands is granted to the cooperatives, and members enjoy only limited period of access, which is during their rotation turn. Each Kebele has its own cooperative association that produces and buys frankincense. However, unlike the case in Abergelle, members of cooperatives in Metema and Quara are not allowed to produce frankincense from trees found even on individual farmlands as these are defined as state trees and not meant to be owned by private farm owners. Common across the site is also the ‘illegality’ of producing frankincense by individual households from boswellia trees on public lands. Cooperatives and companies are the only organisations with formal access right to these public resources.

Due to the prohibitive nature of the informal bureaucratic institutions smallholders are not allowed to produce gum and resin, not even from trees on their farmlands/homesteads. In fact the cooperatives and gum companies produce gum and resin from trees in the homesteads/farmlands of individuals without paying the owners of the land anything. This contradicts with the federal forest proclamation and the Amhara regional state’s that allow the utilization of the gum and resin trees in the farmlands by the owners of the farmlands (Table 2). In particular, it is contrary to the case in Abergelle where smallholders can produce and sell gum and resin. The group discussions and interviews made clear that even for the cooperative arrangements of gum and resin production, there are a number of informal preconditions that hinder farmers to organize themselves in local producer cooperatives. For instance, against the provisions on the federal cooperative society establishment proclamations, the locally-developed rules by administrators and NRM professionals in Metema require:

- a) The district is the minimum geographical area to establish gum and resin cooperatives vs. many cooperatives in a district (Table 2).

- b) A minimum of 50 individuals is needed to establish primary cooperatives vs. a minimum of 10 members.
- c) A minimum share capital price of 500 Birr per person vs. a flexible share price (e.g. 30 Birr in Abergelle and 55 in Quara).
- d) An assured skill for tapping for membership in cooperatives that render products or service vs. membership without any skill requirements.
- e) A project proposal formulation to be able to lease boswellia stands on public lands.

Similar local rules are also found in the other districts, but the exact regulations are district specific. In Quara tapping skill is not a criterion for cooperative membership and leasing the Boswellia stands. Gum and resin cooperatives in Quara leased boswellia stands which they outsourced to non-local production crew. But in Metema tapping skill is obligatory for cooperative membership. In Abergelle although tapping skill is not a precondition for cooperative membership, it is obligatory to get boswellia stands via rotational distribution. While the district is the minimum administrative unit to establish gum-resin cooperatives in Metema and Quara, the minimum administrative unit in Abergelle is Kebele and hence there are many gum and resin cooperatives in this district. In Metema the minimum number of members set to establish primary cooperatives by the informal institutions is five times greater than the minimum required by federal cooperatives proclamation. Whereas project proposal formulation precondition is not mentioned for cooperative establishment in Abergelle, it is a major requirement in Metema and Quara. There are discrepancies in some of the requirements between Metema and Quara, districts in the same Regional States and show how much the informal institutions have impacted gum and resin production and trading in the areas.

The focus groups discussions with local people in charge of organizing the establishment of the gum and resin cooperatives in Metema indicated that these extra rules and demands present barriers for them not to establish gum-resin cooperatives. First, coordinating people over a district as large as Metema or Quara is difficult, for these people are different with respect to ethnic and religious backgrounds as well as livelihood occupation. The fact that new people settle every year in the area makes the community less cohesive. Most people do not want to take risk since they do not know each other beyond a certain village. Second, attaining the minimum number of members set by the informal rules is not easy. Indeed, organizing themselves to get the minimum number of members set by the Federal cooperatives proclamation is not an easy task let alone the requirement for 50 individuals by the informal institutions. Third, the minimum share capital of 500 Birr is high to afford and also high compared to their analysis of anticipated benefit. Fourth, assuring themselves to have tapping skills and to write a project proposal is not in their capacity and they could hardly materialize it. To date gum-resin cooperatives are not established in Metema. Consequently, gum and resin production is practiced neither by individuals nor by cooperatives in Metema. The formal institutions enacted for cooperatives establishment are not enforced but they are replaced by the informal institutions that contradict them and imposed extra requirements.

In Abergelle smallholders are not allowed to sell the frankincense they produced even from trees on their farmlands or homesteads at markets of their preference. Rather it is obligatory to sell at the cooperatives shops in the respective Kebele, which otherwise is labelled as illegal for the seller as well as the buyers. Breaking this rule can lead to imprisonment or confiscation of the products especially by the cooperatives associations. This means that gum and resin exchange is carried out in a monopsony¹⁰ market; the cooperatives being the monopsonists. Some of the trade restrictions also imply that local people who do not produce frankincense either from own trees or public lands can not buy it from local shops for household use. In effect, this contradicts the provisions given by the macro-level rules (Table 2). Furthermore, the informal bureaucratic rules are enacted with respect to fixing the market schedule, grades of products and their prices. The producers can sell the gum and resin products only once per year at the end of the production season when the cooperatives society announce the date. Hence, producers cannot sell their products whenever they need finances constraints. Moreover, the price paid by the cooperative is fixed by a committee of the cooperative, and local producers have only a limited influence on the fixing of gum grades and prices. The practice of obligatory selling to cooperatives who fix the selling date, grade and price violates the general principles of the free market and the formal regulations that smallholders have the right to sell gum and resin at competitive markets.

Formal institutions in other sectors

The formal arrangements for AB use and management are impacted not only by the various institutions related to the forestry sector, but also by the formal institutions related to other sectors. This is illustrated by the earlier descriptions of how the AB woodlands are considered by some government organisations as potential areas for resettlement and/or for mechanized agriculture. The provisions by Rural Land Use and Administration proclamations advocate the management of forest resources on the one hand; on the other hand, they allow the conversion of communal or public lands to private holdings when necessary. The second provision often prevails over the first. Data obtained from the Bureau of agriculture in Metema district show that in the period 2003-2010 about 19271 people with 6730 heads of households have been settled in the Metema district, each household officially granted 3 ha of land. As discussed above, these newly established farms have often been expanded into *Boswellia* woodlands via *Mate qedem* arrangement. In addition, the last years about 23,247 hectares of *Boswellia* woodlands have been granted to investors for mechanized cultivation of cotton and sesame. The key informants interview show that most of the incumbent farms are established by clearing the woodlands dominated by *Boswellia* trees. This clearly illustrates that the formal rules developed to promote gum-resin utilization and development and the formal rules developed in other line ministries are competing and have diverging outcomes.

¹⁰ A market characterized by many sellers and a single buyer who sets the price. Moreover, there exist entry barriers in the market.

DISCUSSION

Interaction between formal and informal institutions

This study shows that the AB resources in northern Ethiopia are subject to the influences of multiple institutions. Analytically, the institutions can be grouped into formal and informal institutions. The formal institutions are of diverse origin: they are related to the forestry sector, line ministries, and local people. The informal ones involve two categories of people: the local people and administrators/NRM professionals. The main institutions that impact gum and resin resources use and management are government regulations/directives enacted for AB, government regulations/directives in other sectors, and local cooperative associations, customary norms and rules for individualizing communal resources, informal bureaucratic rules. This confirms the concept of legal pluralism which states that natural resources use and management is subject to a multiple and diverse set of normative considerations and regulatory frameworks (Merry, 1988, Benda-Beckmann, 1991; Mwangi and Meinzen-Dick (2009).

The institutions that influence gum and resin use and management interact both horizontally and vertically. Vertically there is interaction between (a) government regulations/directives for AB and customary norms and rules for individualizing communal resources, and (b) government regulations/directives for AB and informal bureaucratic rules. The interaction between the government regulations/directives for AB and the customary norms and rules is competitive and with diverging outcomes. While there exist several government regulations advocating ABs use and management, the customary rules and norms worked against it and facilitated the conversion of the woodlands. Besides, the customary institutions include norms to access and individualize farmlands on public lands. These customary institutions focus on securing farmlands security and hardly have a role in woodlands utilization and management. Horizontally the interaction is between (a) government regulations/directives for AB and government regulations in other sectors, and (b) informal bureaucratic rules for AB and the customary rules and norms of the locals. In both groups the outcome is diverging. Whereas the government regulations/directives for AB favour gum and resin production and marketing in a competitive market, the informal bureaucratic institutions have made the market to be more regulated. Besides, the government rules in other sectors consider the AB woodlands as potential resorts for agricultural land uses and settlement. But the formal institutions for AB favour their use and management.

As demonstrated by these interactions the government several regulations/directives for AB are not enforced and complied in practice. Rather, they remain paper documents. The formal institutions for regulating resin production have become mostly ineffective due to (a) the customary rules and norms for individualizing the AB woodlands, (b) the informal bureaucratic rules that govern gum and resin production and marketing, and (c) the government regulations in other sectors representing diverging interests. These different

forms of conflicting institutions reflect the descriptions of diverging outcomes and ineffective formal institutions by Helmke and Levitsky (2004). The provisions in non-forestry sectors and the local level customary rules and norms diverge from government regulations. Moreover, the government regulations regarding gums and resins production and management are made ineffective by competing government regulations from other sectors to convert the AB woodlands into other land uses. And the formal regulations are also made ineffective by the informal bureaucratic institutions that form the local rules in use governing AB use and management at local level that fail to address appropriate resource management. These divergent outcomes of different institutional arrangements coupled with ineffective formal regulations have resulted in resource degradation rather than woodland conservation and sustainable gum/resin production.

Informal institutions dominance in formal institutional environment

Considering the ineffectiveness of the formal institutions, the question is why the federal and regional state regulations for AB are more an intent than a cause for improved ABs management. Several reasons can be put forward to answer the question why they remained paper documents rather than effectively influencing gum and resin use and management. These include the deficiencies in the formal institutions, the impact of formal institutions from other sectors, and the difficulty of introducing formal institutions for local forest management in areas without customary local institutions.

(a) Deficiencies in macro-level formal institutions

This study shows that government regulations and proclamations for forest conservation, development, and utilization in northern Ethiopia have two main deficiencies. First, despite the power vested on regional states by the Constitution (Article 52.2.d) to administer land and natural resources in accordance with the umbrella laws enacted by the federal government, there is often a delay in the development as well as in the implementation of the corresponding regulations at a regional state. In Amhara regional state a proclamation corresponding to the federal forest proclamation #94/94 is not yet enacted. In contrast, in Tigray a corresponding regional regulation #14/1994 was enacted in the same year. Second, despite the implementation of two consecutive federal forest proclamations # 94/1994 and # 542/2007, corresponding versions are not yet enacted in Amhara regional states. This means almost for two decades forest proclamation in Amhara regional state did not exist. The Regulations for gum and resin utilization and management themselves are enacted in the absence of the regional state's forest proclamation. This implies that working with old regulations that are repealed by the new federal regulations makes forests in general and the AB resources in particular to be utilized in a situation of an institutional void. On the other hand, in both regional states the federal rural land use and administration and Cooperatives proclamations were implemented by their corresponding regional versions soon after federal ones were enacted (Anonymous, 2005; 2006; 2007). This could be explained by less attention given to the forest sector compared to the others in the country, like agriculture. Nonetheless, the supply of state regulations and directives for AB resources utilization and management in

Tigray and Amhara regional states implies that under the same national forest policy the attention given to the ABs resources varies among the regional states. In Oromia regional state, also well-endowed with AB resources, neither formal regulations and directives nor informal rules, norms, and beliefs are generated for their utilization and management (Chapter 3).

(b) Competition from formal regulations in other sectors

As indicated already above, the regulations and directives enacted for ABs by the state agencies are outcompeted by their counterparts in other line ministries. The government regulations in other sectors have diverging provisions regarding gum and resin utilization and management. On one hand, specific rules exist that favour conservation and development of ABs. On the other hand, contradicting provisions that affect ABs exist in the same proclamations/regulations. For instance, apart from the provisions that support AB trees conservation and utilization by smallholders, the Rural Land Use and Administration proclamations allow the transfer of communal holdings to private ones, whenever necessary. Also it allows a transfer of communal lands for free to an adult citizen who wants to engage in agriculture (Anonymous, 2005). Furthermore, regulations and directives enacted for guiding utilization and management of the same gum and resin resources have contradicting provisions. For instance, the Regulation for gum and resin utilization and management and the Directives for gum and resin cooperatives establishment in Amhara regional state are the cases for government regulations that contradict between different line ministries (Anonymous, 2004, 2007).

(c) Introducing formal institutions in the absence of customary institutions that regulate AB use and management

Customary institutions on forest management and utilization in general and AB species in particular are not yet developed in Abergelle nor Metema/Quara. But customary institutions (e.g. *Mate Qedem and Mofer Zemet*) that facilitate the individualization of communal lands for farming exist. The lack of customary rules, norms, and beliefs for AB resources in Metema and Quara is attributed to the weak attachment the locals have with gum and resin for their livelihoods. Locals in Metema primarily depend on crops production rather than on gum/incense production (Lemenih et al., 2007; Dejene, 2008; Lemenih and Kassa, 2010). The formal institutions for ABs use and management are supplied in situations where the local people may not value the AB resources and hence do not generate customary institutions for their use and management. This conforms to the findings in other drylands of Ethiopia and elsewhere. In the drylands of Borana, south Ethiopia, institutions specific to AB are not generated by the traditional Borana gada system, which is reputed for its NRM since long time. This is mainly because the locals perceive the AB resource base in Borana as stable. They even consider forest to encroach on pasture. Also the gada system gives priority to livestock production and gum and resin collection as a livelihood strategy is a recent occupation for the pastoralists (see chapter 4). If locals do not value the resource (Gibson et al, 2000; Gibson, 2001) and feel or predict the resource is deteriorating (Agrawal, 2002; McCay, 2002), they do not feel stimulated to put rules to manage them. In general, perceived

resource scarcity is needed before strong institutions for resource management are developing. Societies may address scarcity of a given resource by abrogating private ownership and imposing strong public institutions for more equitable distribution (White and Runge, 1995; Gibson, 2001; Tucker et al., 2008). The case of gum and resin resources use and management in the drylands of Ethiopia shows that introducing formal institutions in situations where the local people do not value the resources may affect their effectiveness.

The observed deficiencies of the macro-level formal institutions for gum and resin production is in agreement with the findings of other studies. Various authors show that the regulations of macro level state regulations may not be implemented as intended because (a) they may be distorted in implementation by officials and/or experts (e.g. Larson and Ribot, 2007), (b) they may be filtered or ignored by local communities (Gibson et al., 2000; Cleaver, 2002; De Koning, 2011), (c) national governments may lack adequate resources to enforce their laws (Gibson et al., 2000; Gibson et al., 2005), (d) institutions developed in other sectors may compete with them (de Montalembert 1992; Kowero, 2003). Mwangi and Meinzen-Dick (2009) uncovered that in the situation of plural legal systems, it is the local level interpretations that matters most and are therefore practiced instead of following the rules from the macro level institutions. The dominance of formal state regulations enacted in other sectors over the formal state regulations on AB show that institutions specific to a sector or a particular resource would only be fruitful if inter-sectorally coordinated. Such coordination is indispensable in forestry because policies in other sectors often create incentives and capacities to exploit and enhance forest resources. Nevertheless, successful co-ordination within sectors cannot be taken for granted (Hogl, 2002).

As a result of the ineffective formal institutions, in both Abergelle and Metema gum and resin use and management is governed by informal bureaucratic institutions. Despite the macro-level state regulations on AB that grant rights for smallholders to produce and sell gum and resin from the trees in their holding, the informal bureaucratic rules do not grant the smallholders in Metema to benefit from this provisions. The informal bureaucratic rules are blamed to be more bureaucratic and limit smallholders' access to gum and resin resources. The case in Metema and Quara show that local communities are required to develop project proposals, assure for their tapping skills, and register as members of cooperatives to access boswellia trees in their localities, but they do not have such capacity. On the contrary, private and state companies that can easily assure for the capacity required can get boswellia stands much easier than the community. The informal bureaucratic rules have also limited smallholders access to the gum and resin market and thereby restricted them not to sell the gum and resin in markets of their preference. The results show that in all the drylands we investigated the gum and resin producers are forced to sell only in local cooperative shops making the gum and resin market a monopsony. While the smallholders are forced to sell the gum and resin in a monopsony market (in cooperative shop), the cooperatives can sell them via auction to markets of their preferences. Besides, the gum and resin companies as producers and oligopoly buyers have more information about the market and prices than the local communities do. In Borana, another gum and resin producing dryland in Ethiopia, the

informal bureaucratic rules also force the producers sell the gum and resin to the cooperatives in a respective Kebele (see chapter 4). This is in agreement with the findings of Larson and Ribot (2007) for Honduras and Senegal where they show that local communities are not allowed to materialize the benefits the law grants to them due to the pressure experts, government administrators, and merchants place on them. Moreover, how smallholders access ABs resources and their market in Abergelle, Metema and Quara implies that property right alone is not enough to benefit from a resource in question (cf. Ribot and Peluso, 2003). The other implication is related to tenure rights. These are considered crucial for local people to put their efforts to manage resources (Gibson et al., 2000; Gibson, 2001), but in Metema and Quara locals do not have secure tenure on AB resources: all natural *boswellia* stands, regardless of where they grow, are declared state property.

Several studies emphasized that formal regulations often tend to impose new rules, practices, and models over indigenous institutions rather than building upon them (Pacheco et al., 2008; Pokorny and Johnson, 2008). Beyond this, our findings show that informal bureaucratic institutions developed by local administrators and experts in fact are the rules-in-use regarding gum and resin production and marketing, regardless of how much they contradict with the macro level (federal and regional level) institutions. The formal institutions developed for forest conservation and development in general and the ABs in particular did not appear to ease the pressure on the resources as was anticipated. This is in agreement with studies that underline the importance of community rules, norms, and practices in reshaping formal bureaucratic institutions (Gibson et al, 2000; Cleaver 2002; Mwangi, 2009; De Koning, 2011) as well as the influences of administrators and foresters in skewing resources and market access provisions that the macro-level formal institutions grant to smallholders (Larson and Ribot, 2007). The findings of this study, therefore, contribute to the existing knowledge regarding the roles of formal institutions by uncovering the impact of informal bureaucratic institutions on formal ones.

CONCLUSION

Gum and resin utilization and management in northern Ethiopia is subject to the influence of multiple institutions. They include (a) state regulations on management and exploitation of gum and resin trees formulated by the government forestry administration at and regional levels, (b) informal bureaucratic rules developed by the administrators and NRM experts at local level, (c) formal regulations in other sectors, and (d) customary institutions that facilitate the conversion of the ABC woodlands into farm lands. While government regulations in forestry/AB sector have provisions that promote wise use and management, those in other sectors promote the conservation and management of the ABs on one hand and activate the conversion of the ABs woodlands into other types of land use on the other hand. Customary norms, rules and beliefs that guide the ABs use and management specifically do not exist. Relevant customary institutions are mainly those that activate the conversion of the ABs woodlands. Multiple interactions exist between (a) formal state regulations for AB and

informal institutions developed by administrators and NRM experts, (b) formal state regulations for AB and those in other sectors, and (c) formal state regulations for AB and customary institutions. Consequently, the formal institutions developed for ABs use and management are ineffective and not complied with. Rather they are outcompeted by informal bureaucratic institutions, customary institutions and institutions in other sectors. The result shows that the formal institutions at federal and regional levels remain more an intent than a cause for improved forest management. Hence they did not appear to ease the pressure on the resources as was anticipated. The conclusion is that the informal bureaucratic rules constructed by local administrators and experts are the rules-in-use regarding gum and resin production and marketing regardless of how much they contradict with macro level state regulations. In general the interaction between formal and informal institutions is of a competitive nature, and local people as well as migrants often react with indiscriminate cutting and woodland conversions. This calls for harmonization of formal-informal institutions. Moreover, closer coordination across policies of the various sectors is needed to improve the conditions of the resources in the future.

Chapter 5

The role of gums and resins in the livelihood strategies of households in the drylands of Ethiopia

Teshale Woldeamanuel, K. Freerk Wiersum and Mulugeta Lemenih



ABSTRACT

In Ethiopia gums and resins such as myrrh and frankincense are important non-timber forest products (NTFPs). Their use and trade has a long history, and their economic importance is increasing. The arrangements for production and trade of these products vary regionally. In this study we assess how gum and resin utilization fits into the livelihoods strategies of rural households in different regions. In Borana 89% of the households are individually engaged in gum and resin production; the products are mostly informally traded. Their use is part of a predominantly pastoral livelihood system with gum and resin acting as supplementary cash crops or safety nets in times of emergency; it provides 36% of all cash income. In Abergelle 58% of the households are engaged in gum and resin production. Producers are often organized in cooperatives and sell the products on government regulated markets. The production fits into a diversification strategy with NTFP production forming a component of a mixed farming system; it provides 31% of the cash income. In Metema local farmers were not involved in NTFP exploitation but rather in cash crop production. Here gum and resin production is a specialized activity of commercial enterprises using laborers from outside the region. The different roles of NTFPs in rural livelihoods not only depends on the type of livelihood activities and the value of the NTFPs, but also on the institutional arrangements for access to both resources and the market and the nature of production systems.

Keywords: Non timber forest products, livelihood systems, exploitation arrangements, resource and market access.

INTRODUCTION

The importance of forest resources to the livelihoods of the people living in and around forests has been recognized across the globe. It is estimated that between one billion (WCFSD, 1999; Scherr *et al.* 2003) to 1.6 billion people (World Bank, 2001) depend on forests to sustain their livelihoods. Non-timber forest products (NTFPs) form an important component of such forest resources. Pimental *et al.* (1997) estimate the value of worldwide extraction of NTFPs at about 90 billion USD per annum; about one third of this extraction concerns local use. In different forest regions of Africa, the use and sale of non-timber forest products (NTFPs) were found to contribute between 20 and 50% of the household income (Shackleton and Shackleton, 2004; Sunderland and Ndoye, 2004; Paumgarten and Shackleton, 2009). Many NTFPs are consumed in the local economy without entering the national or international market, but others have important commercial functions (Belcher *et al.*, 2005).

The role of NTFPs in the livelihoods of rural households is manifold. In remote areas they are often the only source of cash income (Belcher and Schreckenberg, 2007). Even in cases where the absolute NTFPs-derived income is not high, they play an important role because the timing of their production may complement that of other activities. They may provide an income at critical times of the year when other activities fail (Schreckenberg *et al.*, 2002; Shackleton, 2006). In view of the importance of the NTFPs in contributing to local livelihoods, much attention has been focused on their role in livelihoods strategies of households. These forest products may have either a role of a 'safety-net' (a resource that households can turn to in times of need), a subsistence product (for households' own consumption) or as a cash earner (Belcher and Schreckenberg, 2007).

When in the 1990s the role of NTFPs in rural livelihoods was recognized, it was assumed that the NTFPs are mainly collected from the wild with little requirements in respect to capital investment or skills to obtain them (Angelsen and Wunder, 2003). Later it was recognized that in case of valuable NTFPs local people often invest in active management or even cultivation of NTFPs species. Such investments do not only involve the development of technical practices for improved production, but also the development of tenure regulations limiting the accessibility of NTFPs to specific user groups or individuals (Ros-Tonen and Wiersum, 2005). The diverse types of forest-people relationships (Byron and Arnold, 1999) and the diversity of the NTFPs and their production systems (Belcher *et al.*, 2005; Ros-Tonen and Wiersum, 2005) imply that the scope for NTFPs exploitation depends on both product characteristics and institutional characteristics in respect to the access to resources. Moreover, as NTFP often function as a cash crop, also the institutional arrangements in respect to access to markets is a major factor impacting on their role in the rural households (Belcher and Schreckenberg, 2007). Consequently, for understanding the contribution of NTFPs to rural livelihoods attention should focus both on the institutional characteristics of NTFPs production and marketing systems as well as to the nature of rural livelihood strategies.

This study focuses on the roles of gums and resins in the livelihoods of rural people in the drylands of Ethiopia. These gums and resins are traditional commercial products with high export value. In some areas they are still collected from the wild, but in other regions conscious management practices have been introduced (Lemenih et al., submitted, chapter 2). In north Ethiopia the production and trade of gum and resin has a long history and claims even go back to the Aksumite Empire that reigned around the first millennium A.D (Gebremedhin, 1997). Their importance in rural livelihoods is demonstrated by the results of some recent studies indicating that in south and southeast Ethiopia they contribute about one-third of annual household income (Lemenih et al., 2003; Worku, 2006). These studies, however, did not further specify what role these NTFPs played in the livelihood strategies of the producers nor how this role was related to institutional arrangements for their production and trade. In this study we assess what role gum and resins play in the livelihood strategies of producers in different regions of Ethiopia, and whether a specific relation exists between gum and resin exploitation arrangements and the livelihood strategies. The following questions are addressed: (i) what are the livelihood activities of the households in the areas? (ii) what is the role of gums and resins in the livelihood strategies? and (iii) what factors affect this role?

CONCEPTUAL FRAMEWORK

Rural livelihoods in developing countries are often partly depending on natural products. These products are often collected from multiple use environments and characterized by multiple users. In this diverse environment claimed by socially differentiated resource users, gaining effective command on the products first requires rights of access to and control over the resources to be established and secondly, a series of activities to transform the rights into livelihood benefits (Leach et al., 1999; Ellis, 2000). The rural livelihoods analysis serves as an important model to identify the main conditions influencing the outcomes of livelihood activities (Ellis, 2000). According to Scoones (1998), this framework helps in outlining the key question on what combination of livelihood assets will result in the ability to follow different livelihood strategies and with what outcome. Livelihoods in this framework refers to the assets, the activities, and the access to these that together determine the living gained by a household (Ellis 2000). Five types of livelihood assets – natural, human, physical, financial , and social capital- are identified (Scoones, 1998; Ellis, 2000). The translation of such a set of assets into a livelihood strategy composed of a portfolio of income earning activities is mediated by a great number of contextual, social economic and policy considerations. Ellis (2000) distinguished two key categories of factors that influence access to assets and their use in pursuit of viable livelihoods, i.e. social relations, institutions, and organization on the one hand, and trend and shock factors on the other. Social relations refer to the social positioning of individuals and households within society. Important social factors influencing the status and relations of a household are gender, caste, class, age, ethnicity, and religion. Institutions refer to both formal rules, conventions, and informal codes of behaviour that constraints human interaction. Organizations, as distinguished from institutions, are groups of individuals bound by some common purpose to achieve objectives. Social relations, institutions, and

organizations are critical mediating factors for livelihoods because they inhibit or facilitate the exercise of capabilities and choices by individuals or households. Trends and shocks refer to exogenous dynamics that impact on livelihoods. Some important trends are demographic trends such as population growth and out-migration from rural areas, growth of non-farm activities in rural areas and economic trends, e.g. in respect to prices and market developments. Shock represents a particular challenge to livelihoods sustainability as households must have the ability to deal with such sudden and irregular events. Shocks encompasses events such as drought, floods, pests, diseases, and civil war that may destroy assets directly or indirectly.

The sustainable livelihoods framework stresses both the multiple enterprise nature of rural households and the variety of livelihood strategies used to generate livelihood outcomes. Households can be engaged in different household activities and aim at different livelihood outcomes. The livelihood activities can be divided between natural resource and non-natural resource based activities. The former include collection or gathering (e.g. from woodlands and forest), food cultivation, livestock keeping and pastoralism, and non-farm activities such as brick making, weaving, thatching and so on. The latter include rural trade (marketing of farm outputs, inputs, and consumer goods), rural services, rural manufacture, remittances (urban and international), and other transfers such as pensions deriving from past formal sectors employment (Ellis, 2000).

As part of their livelihood systems rural people may use non-timber forest products as natural assets that contribute to household subsistence needs or cash income generation. These products may be collected from the natural vegetation or from semi-domesticated trees incorporated in the farming systems (Belcher et al., 2005; Ros-Tonen and Wiersum, 2005). The products may have a specific role in reducing vulnerability and contributing towards the well-being of households. Several studies have indicated that especially poor people often depend on NTFPs to secure their livelihoods (Neumann and Hirsch 2000; Ambrose-Oji, 2003; Pattanayak *et al.*, 2004; Shackleton and Shackleton, 2004). The pro-poor economic characteristics of these products in terms of low requirement for skill and capital and open access to the resources explain this dependency (Sunderlin *et al.*, 2005, Belcher, 2005). Moreover, the NTFPs often offer an alternative means of production in times of necessity or environmental stress. This safety net function of forests is particularly important for the poor and landless families (Byron and Arnold 1999; Angelson and Wunder, 2003; McSweeney, 2004). Due to the fact that NTFPs can be used either as an emergency product, a subsistence product or a commercial product, several strategies for integrating these products in the farmers' livelihood systems can be distinguished (Shackleton and Shackleton, 2004; Wiersum and Ros-Tonen, 2006).

Belcher et al. (2005) distinguished five strategies in respect to NTFP production (Belcher et al., 2005): subsistence, supplementary, integrated, specialized-natural, and specialized-cultivated strategies. In a subsistence strategy the NTFPs contributes little to the household total income, but they are the main or the only source of cash income. The NTFPs are

collected from the wild on de facto open-access lands. The supplementary strategy involves a greater integration of household in the cash economy. The NTFPs contribute less than 50% to the total household income and harvested from wild. They supplement the household's income often at times when other sources of income are low. In an integrated strategy the NTFPs are cultivated and integrated into a diverse set of income earning activities. The households are well integrated into the cash economy and the NTFPs contribute less than 50% of the households cash income. In the two specialized groups, households rely on NTFPs as the main sources of income. In the specialized-natural strategy, production relies on natural regeneration, whereas in the specialized-cultivated strategy, the NTFP is cultivated and actively managed (Belcher et al., 2005; Kusters et al., 2006). The extraction of subsistence based and low value NTFPs, mostly from the natural vegetation, mostly takes place within a coping strategy aimed at fulfilling safety and emergency needs. The production of high-value NTFPs, often from semi-domesticated trees, is more common in diversification or even in specialization strategies (Shackleton et al., 2008).

RESEARCH METHODOLOGY

Study Areas

Within Ethiopia the production of the gums and resins from woodlands varies across regions. The *Combretum-Terminalia* woodlands prevailing in the northern part of the country are dominated by *Boswellia papyrifera*, which is the source of most widely marketed Tigray type white frankincense. In the southern part of the country the *Acacia-Commiphora* woodlands dominate; they are composed of a variety of gum and resin producing species; *Acacia senegal* and *Acacia seyal* for gum Arabic production, *Boswellia neglecta* and *Boswellia rivae* for frankincense, and *Commiphora myrrha* and *Commiphora guidotti* for myrrh and oppoponax (Lemenih et al., 2003; 2007; Dalle, 2004). Also the prevailing land-use systems vary regionally: in the north mixed farming predominates and in the southern Ethiopia pastoralism. And also the production methods and marketing of gums and resins vary. In several northern regions gum and resin production is a long-established practice using tapping techniques; the production rights have gradually been devolved from commercial enterprises to local communities. In the south the products are still collected as natural ooze and only recently efforts were undertaken to regularize their sale (Lemenih et al., submitted; Chapter 2).

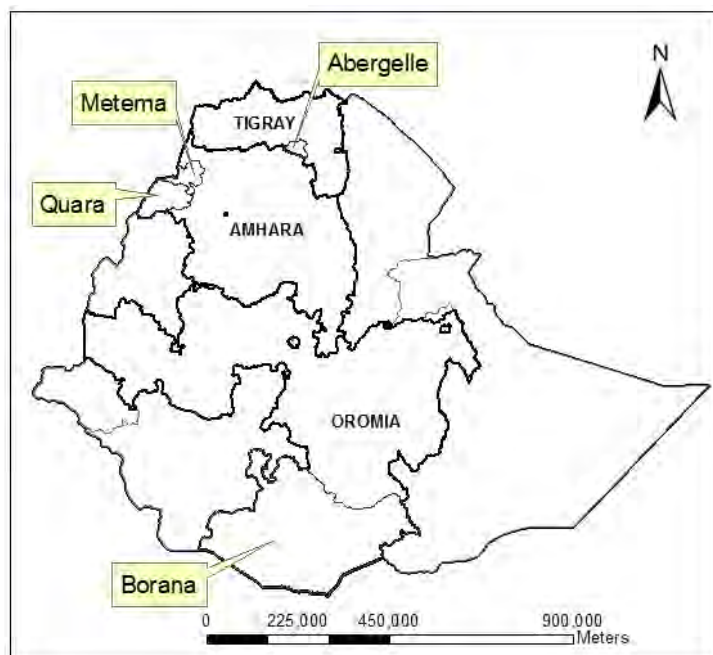


Figure 1. Map of study areas

We studied three regions with different gum and resin exploitation systems and institutional arrangements for their production and trade (Table 1). The three sites also differ in history of gum and resin production and in degree of the ABCs species domestication. In Abergelle non-local actors especially state companies dominated gum and resin exploitation for several decades. Recently this has changed, and currently gum and resin are exploited by local farmers, either individually or in cooperatives. In Borana local people have historically been collecting gum and resins and selling it on unregulated and informal markets. Currently, local producer cooperatives are being initiated to regularize the production and trade. Although there are also efforts to establish gum and resin cooperatives in Metema, at present the production and trade of gum and resin is carried out solely by external state and private companies. For further details on the different production systems see Lemenih et al. (submitted, Chapter 2) and on the nature of the institutional arrangements see Chapter 3, 4 and 6 .

Table 1. Characteristics of the research sites

<i>Study sites</i>		<i>Type of gum and resin exploitation arrangements</i>
<i>Zone or district</i>	<i>Kebele</i>	
Abergelle district	Jijke, Siye, Hebret	Individual, cooperative, and company
Borana zone		
Arero district	Dhas, Wachile	Individual households and cooperatives
Yabello district	Adegelchat	Individual households and cooperatives
Liben district	Melka Guba	Individual households
Metema district	Lemlem Terara, Agam Wuha	Companies using external labor

In each district *Kebeles*¹¹ were selected using the combined criteria of ABC resource base, their species mix, ethnic composition, and presence or absence of community based production associations (Table 1).

Data collection and analysis

In order to collect data about household activities and the role of gums and resins in the household strategies a systematic household survey was conducted. It was preceded by open interviews with focus groups and local experts (cf. Ellis, 2000). These preliminary investigations enabled us to know the importance of both households and community level factors that affect gum and resin use and management in the area, to understand the dynamics in the livelihoods strategies and how they were evolved, and to assess how community level and external factors have impacted gum and resin utilization and management. This information guided the formulation of the survey questions. Sample households were selected by stratified random sampling amongst different household categories using wealth classes developed by governmental and/or non-governmental development organizations as a basis. The lists of the households in each category was obtained from development agents. In total 317 households were interviewed: 99 households from Abergelle, 97 from Metema, and 130 from Borana. Structured and semi-structured questions were employed. Data were collected on the types of livelihoods strategies of households, when and how they households started them, total production, amount consumed and sold, price, factors affecting the role of gum and resin in the livelihoods strategies of the households, types, amount and price of inputs used, and how resource and market access is made.

Income sources of the households were disaggregated into crops, livestock, forest-based, non-farm activities and remittances (Ambrose-Oji, 2003; Fisher, 2004; Babulo et al., 2008; Tesfaye, 2010). For each livelihood activity, net income was calculated as gross value minus the total costs of all purchased inputs. In all net income calculation the family labour was not considered. Only the cost of hired labor is included. The income for each of the livelihoods activity was calculated as follows:

(a) *Net crop income*

Gross income for each crop type is calculated by multiplying the total product by its unit price. Then the net income for each crop is calculated by deducting the cost incurred on different types of inputs (fertilizers, draft power, seeds, hired labor, pesticides and insecticides) from the gross income. Then the net income for all crops is the sum of the net income of each crop cultivated by the household. Since most households sell the crop harvest between January-May, the average local price of the period was used.

¹¹ *Kebele* is the lowest formal administrative unit. Several *Kebeles* comprise a district

(b) *Net livestock income*

The gross income of the livestock is sum of the total value of income from livestock sales, products (meat, milk, egg, butter), and services (draught power and transport). Net livestock sale is the value of sold livestock plus slaughtered. It is equal to the number of sold and slaughtered livestock multiplied by a market price of the livestock. This is done separately for each type of livestock and the total net sale of livestock is the sum of the sale of all types of livestock. The net income from livestock products and services is calculated by deducting the annual costs incurred from the gross income of livestock products and services. Then the total net income from livestock is the sum of the net income from sales of livestock, livestock products, and services. In this calculation the values in cash and own consumed are included.

(c) *Forest-based income*

In this chapter forest based income refers the subsistence and cash income from commercial NTFPs called gums/resins. The other products of the ABCs (e.g. fuel wood, scent woods, and charcoal) are not included in forest income calculation for the following reasons: (a) in the northern study sites (Abergelle, Metema, and Quara) it is illegal to use and sell the ABC species for uses other than gum and resin products, (b) although the ABCs are used for extractive uses (fuel wood, scent woods, and charcoal) in Borana, only few people are engaged in their commercial use. The net income from gum and resin is the value of gum and resin sold plus the value consumed locally. The net income is calculated by multiplying the total quantity sold/consumed by its unit price. To calculate the net income no cost deduction is made because the gum and resin are collected from natural stands and no investment is carried out to develop them. Moreover, the labor invested in their collection is family labor. Besides, households sell the gum and resin at their villages.

(d) *Non-farm income*

This refers to non-agricultural income sources. In this study the safety net program by the government that employ a substantial number of households who contribute labor to public works (e.g. road construction and maintenance, area closure, soil and water conservation activities, and forest rehabilitation) is important. The payments are net of any costs incurred related to a person's engagement in an activity.

(e) *Remittances*

They include transfers to rural households in cash and kind from family members, relatives, friends/neighbours, and sometimes from government agencies or the NGOs as aids. Both domestic and international transfers are included. The net income from remittances is the amount received by the households.

The contribution of each of the livelihoods activities was analyzed using descriptive statistics. We tested the significance of the mean income difference from gum and resin between regions using t-test and among wealth groups and livelihoods strategies using F-tests in SPSS (PASW Statistics 18).

RESULTS

Regional differentiation in livelihood systems and their dynamics

In Abergelle, Borana, and Metema the livelihoods activities generally consists of a combination of crop cultivation, livestock husbandry, gum and resin production and trade, and non-farm activities. Income from remittances is negligible. The contribution of these different activities to total income and cash income varies considerably between the three regions (Table 2). In Abergelle mixed farming supports a mixed economy. Crops (28%) form the main source of income; other important sources of household income are livestock production (26%), non-farm income (26%) and gum and resin (20%). The cash income forms 54 % of total household income. The crops are mostly directly consumed and provide only 5% of the cash income. The main cash income is derived from non-farm activities (38%), gum and resin (31%), and livestock (25%).

In Borana also a mixed economy prevails, but here livestock husbandry forms the main earning activity providing 48% of total household income. Other important household earning activities are gum and resin (30%), crops (14%) and non-farm income (9%). No remittances are received. The cash income forms 81% of the total household income. It is derived from livestock (43.5%) followed by gum and resin (36%), non-farm income (11%), and crops (9%) (Table 2). The important role of gum and resin production is demonstrated by the fact that they contribute for 30% to total household income and 36% to cash income. In Metema crops (87%) form the major share of the total household income. Livestock (13%) supplements the income. The main cash income is derived from crops (79%) followed by livestock (20%). Gum and resin production does not contribute towards household income. This activity is carried out by external laborers rather than local households.

Table 2. Average annual cash and total income from different livelihoods activities (in Birr*/year and %). Numbers in brackets show standard deviation.

	<i>Total</i>	<i>Crops</i>	<i>Livestock</i>	<i>Gum and resin</i>	<i>Non-farm</i>
Abergelle					
Cash income	5612	304 (5%)	1397 (25%)	1746 (31%)	2165 (38%)
Total income	8714	2518 (28%)	2285 (26%)	1746 (20%)	2165 (26%)
Borana					
Cash income	10457	948 (9%)	4552 (44%)	3812 (36%)	1145 (11%)
Total income	12847	1770 (14%)	6120 (48%)	3812 (30%)	1145 (9%)
Metema					
Cash income	11610	9181 (79%)	2326 (20%)	0 (0%)	103 (1%)
Total income	42323	36819 (87%)	5395 (13%)	0 (0%)	109 (0%)

* Birr is the unit of currency in Ethiopia. 1 dollar is about 16.81 Birr.

Table 3 shows that the differences in total and cash income as well as the contribution of gum and resin to household income between regions is significant ($p < 0.001$). There is statistically significant difference in mean income earned by households from gum and resin between Abergelle and Borana ($p < 0.001$). Households in Borana get a mean income from gum and resin that is Birr 2062 higher than in Abergelle. This may be due to the free access households can have to collect the gum and resin in Borana. Here households can collect any amount they can do from the gum and resin producing trees on communal lands. Whereas in Abergelle access to gum and resin production is restricted and households access can work only on limited AB trees. Even they can access the trees only on rotational basis. Similarly, in Borana the total income households get from all livelihoods activities is Birr 4443 higher than those in Abergelle. The total cash income households get is Birr 3654 higher than Abergelle. This can be explained by the fact that besides the sale of gum and resin all livestock and crop income is subsistence based in Abergelle than Borana. But in Borana they relatively earn cash.

Table 3. Differences in mean income between the Borana and Abergelle study regions

Regional difference in income	Mean difference	t-value	Sig.(2-tailed)
Gum-resin income	2062.56	6.7	0.000
Cash income	4443.66	5.8	0.000
Total income	3654.96	4.4	0.000

The livelihood strategies have considerably changed over the past decades (Figure 2). In all three sites mixed farming involving a combination of crop and livestock production has increased over the past years, whereas sole cropping (in Abergelle and Metema) and sole livestock keeping (in Borana) have decreased. The production of gum and resins has gradually increased. The number of households engaged in gum and resin production has doubled from 28% in the years before 1991 to 59% in 2010. In Abergelle the change in livelihood activities was relatively small compared to Borana and Metema. Originally, gum and resin production did not involve a livelihood diversification strategy for the local people in Abergelle. The production was introduced by gum companies using external labourers mostly from Eritrea. Gradually the local people were also hired by the companies and gained experience in resin tapping. As a result local labour replaced the non local labor force and fully took over the production activity. This activity was not their only diversification strategy; the local people are also engaged as hired labourers even outside the district.

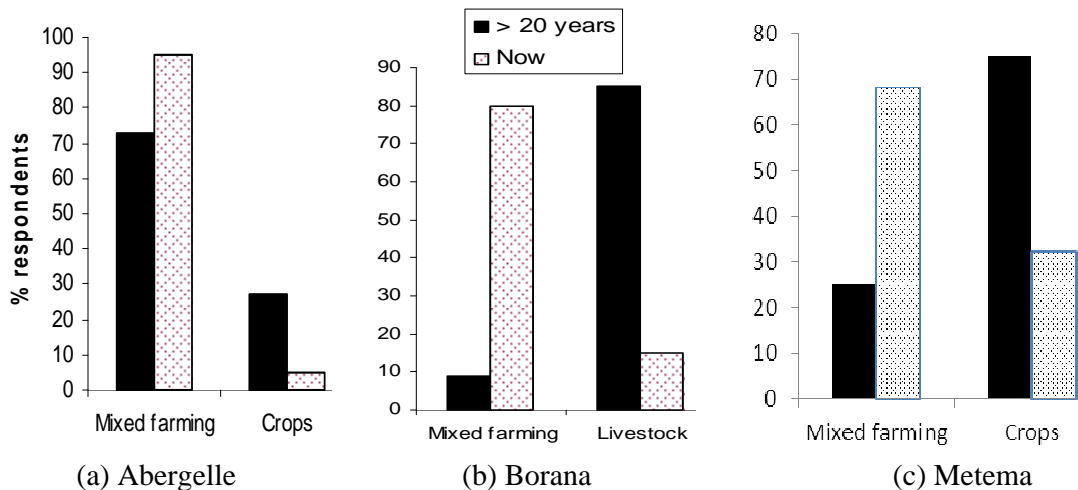


Figure 2. Main dynamics in livelihood activities in the three research areas

In Borana pure pastoralists decreased from 100% prior to the 1960s to 85% in the early 1990s. Crop cultivation started in the 1960s and has rapidly grown since the early 1990s. More than three-fourth (78%) of the respondents started crops cultivation due to frequent drought that affected livestock production and productivity. Since 1991 a massive agricultural extension program of the government in the areas has contributed to the further extension of crop cultivation and currently over 80 % of the respondents cultivate crops, although crop income is still low. Recently, households have further diversified their livelihoods strategies by increased production of gums and resins. In Borana gum and resin production was started by herders/children collecting the products as a chewing gum. Later also other local people began to collect the products as a subsistence product to be used during famine periods. In the 1960s commercial collection started. It became gradually intensified in response to the frequently occurring drought. The engagement of the households in gum and resin production increased from less than 50% of the respondents prior to 1991 to 90% at present. The gum and resin production plays an important role in supplementing the livestock and still low crop income in Borana. At present gum and resin production is increasingly carried out by local producer cooperatives that were externally initiated as a part of drought-coping development programmes.

In Metema the change in livelihood activities was greatly influenced by migration. Prior to 1960s the local people were mainly engaged in shifting cultivation (75%) and only 25% in mixed farming. Since that time, the region was settled by migrants. Prior to 1991, 75 percent of the new settlers were solely engaged in crops cultivation, but at present the number of people solely engaged in crops cultivation is 32%. The wealth they accumulated from sesame and cotton production helped them diversify into animal husbandry.

The livelihood systems in the three regions are characterized by a diversified household economy in Abergelle, a traditional pastoralist system gradually changing towards mixed farming in Borana, and crop cultivation in Metema. The unfavorable production conditions in

Abergelle are reflected by low incomes and a high contribution (38%) of non-farm activities and gum and resin production (31%) to the cash income. In Borana the incomes are about 50% (total income) to 100% (cash income) higher than in Abergelle. Due to the good agricultural conditions, in Metema commercial cropping predominates with incomes partly being invested in livestock keeping. In this region the total income derived from cropping and livestock keeping is about 3-5 times higher than in Borana and Abergelle respectively. Even though cash income is only 27% of total household income, in absolute terms the cash income from commercial crops such as sesame is twice the cash income in Abergelle and somewhat higher than that in Borana. As a result of the good crop production potential gum and resin production do not play any role in the household economies. Rather, this production is in the hand of commercial enterprises making use of external laborers.

The role of gum and resin in livelihood strategies

The differences of the role of gum and resin production in the household economies can be further explained by considering how their use by local people in Abergelle and Borana is influenced by wealth status and use as emergency crop respectively.

Table 4. Mean income comparison of gum and resin within wealth classes

Abergelle				Borana			
<i>Groups</i>		<i>Mean Difference</i>	<i>One way ANOVA F-test</i>	<i>Groups</i>		<i>Mean Difference</i>	<i>One way ANOVA F-test</i>
Poor	Medium	-1700*	0.017	Poor	Medium	3474*	0.000
	Rich	-840*	0.005		Rich	4518*	0.000
Medium	Poor	1700*	0.017	Medium	Poor	-3474*	0.000
	Rich	860	0.923		Rich	1044	0.070
Rich	Poor	840*	0.005	Rich	Poor	-4518*	0.000
	Medium	-860	0.923		Medium	-1044	0.070

Gabriel test: * shows the mean difference is significant at 0.05 level

Wealth class and regional variations

The engagement of local community in gum and resin production and trade differs between Abergelle and Borana (Table 4). In Abergelle, 58% of all respondents produce and sell gum and resin. The majority (46%) of these producers belong to the medium wealth category, and 31% and 23% to the rich and poor categories respectively. The mean annual income the rich, medium, and poor earn from gum and resin is 900 Birr, 2600 Birr, and 1740 Birr, respectively. The differences between the poor people and the rich and medium-off people respectively is statistically significant (at 0.05 level), but not the difference between the medium and rich.

In Borana 89% of the households are engaged in gum and resin production. The majority of the households depend on these products on a daily basis to finance their daily needs; exchanging either in cash or in kind. Mostly they exchange the gum and resin for food items (e.g. sugar, coffee, pasta, and macaroni). This arrangement helps the producers to get the commodities in their locality with relatively fair prices as well as save the money they would otherwise pay for transportation, accommodation, food and other items. The majority of households that daily collect gum and resin are poor (73%); the medium (26%) and rich (1%) are less involved. The mean annual income the poor, medium, and rich earn from gum and resin is 6631 birr, 3157 Birr, 2113 Birr respectively. The difference in income between poor people and medium-off and rich people respectively is statistically significant at 0.05 level. But there is no statistically significant difference in mean income between medium and rich. In contrast to medium-off and rich people, the poor people are often not regularly involved in livestock activities such as watering and pasturing. Therefore they can engaged in gum and resin collection as a full time activity, even by camping in the production areas.

Role of gums/resins as emergency products

The role of the gums/resins in the livelihoods is also demonstrated by their importance in times of emergencies such as droughts. Between the two regions important differences in such coping strategies exist (Table 5). In Borana 94 % of the respondents depend on gum and resin for coping with emergencies such as droughts and other livelihood crisis. During times of emergency they collect and sell the products to purchase grains. In rare cases, the gum and resin are consumed as chewing gums. Other coping strategies consists of the receipt of emergency aid (92% of respondents), livestock sales (37% of respondents), support from relatives/neighbours (26% of respondents, and consumption of savings (6% of respondents).

Table 5. Strategies for coping with times of stress and emergencies in two regions of Ethiopia

Coping strategies	Percentage of the respondents	
	<i>Borana</i>	<i>Abergelle</i>
Consumption of savings	6	15
Livestock sale	37	62
Gum and resin sale	94	20
Relatives/neighbours support	26	20
Emergency aid by GOs/NGOs	92	65

In Abergelle, during livelihoods stress households used to migrate to the highlands, where there is relatively good harvest. Recently, alternative coping strategies have been developed in the form of emergency aid by GOs and NGOs (66% of respondents). Moreover, 62% of the respondents sell livestock when they face livelihoods stress and purchase grains from areas as far as 6 hours travel. Other coping strategies consist of support of relatives (20% of respondents), consumption of saving (15% of respondents). Gum and resin as a coping strategy engages only 20% of the respondents.

Factors influencing the role of gum and resin in households' livelihoods strategies

The role of gum and resin in the livelihoods strategies does not only depend on their role in livelihood systems, but it is also affected by the nature of gum and resin production system and the local arrangements regarding access to production and marketing.

Nature of the production system

The nature of gum and resin production system affect the role of gum and resin in the livelihoods strategies in different ways. First, gum and resin harvesting methods vary between sites. In Abergelle the products are harvested by tapping the trees, while in Borana naturally oozed exudates are collected. This allows households in Borana to collect and sell the products opportunistically, whereas in Abergelle production is dependent on regular bi-weekly tapping cycles and formal markets. Consequently, it is easier to collect the products and sell them on the informal market during emergencies in Borana than in Abergelle. In Abergelle options for producing gums as a coping strategy are therefore limited, and traditionally in this region another coping strategy was used, i.e. temporary migration to highlands. In view of the regular production cycle, in Abergelle gum and resin production is mainly used as a diversification strategy by medium and rich people.

Access to resources and markets

The livelihood role of gum and resins is also highly impacted by the institutional arrangements for access to both the resources and the market. Important regional differences in such arrangements exist (see also Chapter 3, 4 and 6). In Metema gum and resin production is solely done by external laborers employed by commercial enterprises. Since its inception gum and resin has been produced by individual pastoralist households in Borana. They collect the products freely from communal/public woodlands without any access restriction. Also market access is still not yet fully formalized. The poor can produce and sell the products daily in markets of their preference. In contrast, in Abergelle for more than six decades private and state companies were the sole gum and resin exploiters and smallholders still have relatively little access to resources and market. All the *Boswellia* stands on public lands are still under formal concession of cooperatives and companies and individual gum and resin producers hardly have the opportunity to utilize the gum and resin from communal or public lands. Accessing these woodlands as a cooperative member is subject to several regulations. First, tapping skill is obligatory. Only those households who worked previously as laborers for companies have acquired this knowledge and qualified for the criteria. Mostly this concerns the better educated and trained people, whereas poor people do not have developed tapping skills. Second, membership in cooperatives societies is a precondition for getting formal access to *Boswellia* stands on public lands. Third, gums and resins are sold in a regulated market. All producers are obligated to sell gum and resin in the cooperative's shop at dates specified by the cooperative's committee. This is normally at the end of the production season. This limits poor people to use the products as an emergency resource to be

sold in times of needs. But it does not limit the opportunity of medium-off and rich people to produce them as components of diversification strategy.

DISCUSSION AND CONCLUSION

The role of gum and resin in the household economy as found in this study is in agreement with several other studies in Ethiopia and adjacent areas. The contribution of these products to 20 to 30% of total household income is comparable with the contribution (32.6%) of these products to households in Liben, southeast Ethiopia (Lemenih et al., 2003). It is also comparable to the reported contribution of mountain forest resources to local livelihoods of 27% in case of state owned forest in the highlands of Tigray, northern Ethiopia (Babulo et al., 2008) and of 34% for a participatory forest management scheme in Bale highlands, southern Ethiopia (Tesfaye, 2010). Also for other regions in Africa a range between 20% and 50% has been reported for the contribution of NTFPs to rural households income (Arnold and Ruiz-Perez, 1998; Neumann and Hirsch, 2000; Lemenih et al., 2003; Shackleton and Shackleton, 2004; Paumgarten and Shackleton, 2009).

Our data demonstrate that, with the exception of the specialization strategy, the various livelihood strategies for using NTFPs as found in other studies (Ros Tonen and Wiersum, 2005; Shackleton, 2006; Shackleton et al., 2008; Paumgarten and Shackleton, 2009) are of relevance for gum and resin production in Ethiopia. The role of gum and resin in local livelihoods differs significantly between the three study sites. In Metema, the local households are not engaged in the production and sale of these products. Rather, they are employed in more financially lucrative commercial cropping activities. The gum and resin production is in the hand of commercial enterprises consisting of either commercial companies or local cooperatives, who use external laborers for product harvesting. Although our study did not assess the livelihood systems of these laborers, it could be hypothesized that these people are engaged in a specialized livelihood strategy in case they are permanently employed or a diversification strategy in case of temporary employment. In Abergelle and Borana gum and resin production forms an important component of the household economy of local people, but the household strategies for exploiting these products are different (Table 6). In Abergelle local people are engaged in multi-enterprise household activities and they exploit gum and resins as part of a diversification strategy. In Borana the local people are traditionally engaged in a pastoral livelihood and they exploit gum and resins mostly as part of a supplementary or coping strategies, especially in times of needs. The traditionally pastoral land/use system in this region is gradually becoming more diverse with a greater supplementary role for the gums and resins. In both regions important changes in the gum/resin exploitation arrangements are taken place with gums and resins increasing in importance (see also Chapter 6). In Abergelle, the original company-based arrangement has been replaced with a cooperative arrangement, in addition also a more informal private arrangement exist in this region. As a result of these changes, the local access to the gum/resin resources has improved. Although in Borana the cooperative arrangements also

has been introduced, this arrangement is not as strongly developed as in Abergelle. But individual collection has greatly increased during the past decade (see also Chapter 3). But notwithstanding these changes in role of gums and resins for local households and changes in formal exploitation arrangements, the basic strategic role of the gums and resins in the livelihood systems have not changed drastically. Both in the private and cooperatives arrangements the gums and resins are used as a diversification strategy in Abergelle, and a coping cum supplementary strategy in Borana.

Table 6. Strategic role of gum and resin exploitation in livelihood systems of households in different regions of Ethiopia

Characteristics	Research locations	
	<i>Abergelle</i>	<i>Borana</i>
Predominant livelihoods system	Mixed farming	Pastoralism
Strategic role of gum and resin in livelihood	Diversification	Supplementary and coping
Exploitation arrangements	Mainly cooperative production and sale	Individual collection and emerging cooperative sale

Our findings indicates that different strategies for using NTFPs may be present in different regions. This coexistence results both from regional differentiation and dynamics in livelihood systems. Many studies on NTFPs (e.g. Sunderland and Ndoye, 2004) tend to focus on one dominant production system and hence suggest that the livelihood role of NTFPs is mostly dependent on its economic role in the range from subsistence to commercial livelihood systems. As demonstrated by our study, in addition other factors play an important role and the multifaceted nature of NTFPs in livelihood systems needs to be considered. The contrasting situations in Abergelle and Borana show that depending upon the basic nature of a livelihood system, the production of NTFPs may play a different strategic roles. Our findings also show that livelihood systems may change and diversify over time (Scoones, 1998, Ellis, 2000). Such diversification may be caused by both local and external factors. In Borana diversification into gum and resin production was mainly due to the frequent drought that affected livestock productivity (Worku, 2006). These inspired several development policies and interventions. For instance, the provision of inputs and credit facilities for crops cultivation via state agricultural extension program has promoted crops cultivation (Kamara, 2004) and resulted in a gradual change from pastoral livelihoods to a greater orientation on mixed farming livelihoods. In Metema, it is as a result of the resettlement program that the traditional livelihoods system based on shifting cultivation shifted to a system based on sedentary agriculture and cash crop farming (Lemenih et al., 2007; Dejene et al., 2008). In many countries it has been observed that such livelihood diversification may involve a greater reliance on non-natural based livelihoods (Scoones, 1998, Ellis, 2000). This development has not yet occurred in our research areas.

The main form of non-farm income currently present in Abergelle and Borana is via food-for-work programs designed by the government. These projects are normally based on a limited period of donors funding. They mainly have the nature of providing a safety net in times of emergencies rather than of stimulating alternative livelihood activities. The local people are mainly engaged in them as a coping strategy rather than as a diversification strategy. Consequently, the traditional livelihood strategies are not much affected other than through a diversification in possible coping strategies. This means no viable non-farm activities are yet developed in all the study areas, and that the supplementary or diversification role of forest products remain significant. This is recognized by the formal governmental policy. However, the efforts at stimulating gum and resin production through the stimulation of production and sales cooperatives have not resulted in a greater livelihood role of the NTFPs. Rather, the new institutional arrangements created conflicts between different kinds of exploitation arrangements and decreased the role of the products in the coping and supplementary livelihood strategies of poor people. This illustrates that the stimulation of NTFP production should not be considered as a pro-poor activity, but rather should be assessed in the context of their role in the overall social and economic household conditions (Ruiz-Pérez et al., 2004a; Ros-Tonen and Wiersum, 2005; Marshall et al., 2006). The assertion by Angelson and Wunder (2003) that extraction of subsistence based and low value NTFPs takes place within a coping strategy, while those of high-value NTFPs is more common in diversification or even in specialization strategies is only partly supported by our findings regarding the multiple role of gum and resin in households livelihoods strategies in the drylands of Ethiopia. The role of NTFPs in the livelihood strategies of rural households does not only depend on their economic role, but also by the manner in which access to the resources and the market of gum and resin is controlled by both formal and informal bureaucratic institutions. These factors are highly interrelated. The identification of household strategies for incorporating NTFPs into livelihoods should therefore be based on an integrated assessment of the overall nature of the livelihood systems, the nature of both the NTFP production and marketing systems and their institutional characteristics.

Chapter 6

Institutional arrangements and dynamics in gum and resin production in the drylands of Ethiopia

Teshale Woldeamanuel, K. Freerk Wiersum and Mulugeta Lemenih



ABSTRACT

The Acacia, Boswellia, and Commiphora (ABC) species in Ethiopia provide gum and resin products of commercial value at national and international markets. Due to their importance different production systems have been developed. Most production systems are based on extraction of natural resources. Despite a long history of gum and resin trade and growing economic importance and increasing scarcity of the ABC resources, little domestication in the form of conscious development of the resource base, e.g. in the form of intensified cultivation has taken place. In this paper we assess the nature of the different exploitation arrangements and their dynamics and investigate why scarce and commercially valuable gum and resin producing trees are in their early phases of domestication. It is argued that socio-political factors deter domestication. The exploitations arrangements have evolved in response to both government policies as well as changes in local livelihood conditions. Rather than a systematic progression of exploitation arrangements, an ad-hoc development took place. The degree of domestication of the ABC species does not simply depend on their role in the household economy. Rather, it is primarily influenced by the diversity, dynamics and interaction in exploitation arrangements and the related development policies and interventions. Sustainable utilization of the ABC resource requires better adjusted arrangements for access to both resources and markets. This implies increased domestication of NTFPs is less likely in case of unbalanced processes of institutionalization, including conflicts between different types of exploitation arrangements.

Key words: Acacia, Boswellia, Commiphora, exploitation arrangements, domestication, socio-political factors

INTRODUCTION

Non-Timber Forest Products (NTFPs) contribute substantially to the livelihoods of a large number of people in developing countries (Arnold and Ruiz-Perez, 1995). They also play important roles in national and world economy (Neumann and Hirsch, 2000). The role of NTFPs is often highlighted in tropical rain forests, but also in dry forests they play important roles. For instance, in the African savannah regions quite a number of NTFPs are important commercial products and contribute significantly to the economies of various countries (Sunderland and Ndoye, 2004; Chikamai *et al.*, 2009). Some of these NTFPs, specifically gum arabic, frankincense and myrrh, are reported as the oldest traded NTFPs and used for a wide range of local and global industrial applications (Chikamai and Tchatat, 2004; Lemenih and Teketay, 2004).

Ethiopia is one of the countries known for production and trading of gum and incense (Lemenih *et al.*, 2003; Chikamai *et al.*, 2009). Gums and incenses of commercial importance include gum arabic, frankincense, myrrh and opoponax, which are obtained from the genera *Acacia*, *Boswellia* and *Commiphora* (Lemenih *et al.*, 2003; 2007). The gum and resin trade has a long history in Ethiopia (Gebremedhin, 1997). Since organized commercial production began six decades ago, gum and resin utilization has been under state monopoly. But in the early 1990s a trade liberalization took place. Since then interest in gum and resin production and trade has grown. The gum and resin production and trade involves both smallholders, local producer cooperatives, and private and state enterprises (Lemenih, 2005). For local people gums and resin production may form an important livelihood component. In different regions the products provide local communities with 30% to 40 % of their incomes (Lemenih *et al.*, 2003; Eshete *et al.*, 2005; Worku, 2006). In view of their role in contributing to local livelihoods, a variety of NGOs are involved in promoting production and trade. But the government regulations remain a major factor shaping the organization of gum and resin production. As a result of its economic importance different gum and resin production systems have been developed. Lemenih *et al.* (accepted, Chapter 2) distinguished seven main production systems which differ in respect to both the manner of production and marketing as well as to ecological status in respect to domestication and/ or degradation. These different systems also vary in respect to the management history and intensity.

In north Ethiopia gum and resin production is an established and relatively intensive practice, but in the south it is relatively new and less intensive. In both areas gum and resins are mainly produced from natural vegetations, which are prone to degradation. Despite the long history of production and trade in northern parts of Ethiopia, and the important role of the products in local livelihoods, the commercially valuable and increasingly scarce ABC trees are still in the early phases of domestication (Lemenih *et al.*, submitted, Chapter 2). In contrast to the gum gardens of Sudan (Ballal *et al.*, 2005; Rahim, 2006), or the coffee gardens in the Ethiopian uplands (Wiersum, 2010) little domestication of ABC species occurred and no specialized production systems have been developed. The process of domestication is impacted by economic, technical, and ecological factors (Homma, 1992), and/or socio-political factors

(Michon, 2007; Belcher et al, 2005). Mostly it is conceived of as a local process involving systematic changes in tenure conditions and resource prices (Wiersum, 1997; Den Hertog and Wiersum, 2000). Most studies on the dynamics of domestication process focus on understanding the role of factors stimulating domestication. Much less attention has been given to the question why some valuable and scarce resources are not or hardly becoming domesticated. In this paper we examine the dynamics of the gum and resin exploitation arrangements and the factors that deter the domestication of ABC species in Ethiopia. We address the following specific research questions: (a) What arrangements for gum and resin exploitation are present? (b) How have these arrangements evolved and how did they interact? and (c) What factors affected the limited process of domestication of the gum and resin producing resources in Ethiopia?

THEORETICAL FRAMEWORK

Dynamics in forest exploitation

When considering forest exploitation often a distinction is made between natural and plantation forests. These two types of forests are often characterized as bio-diverse natural ecosystems versus human-created monocultures. During the last decades several studies have indicated that in reality many intermediate forest types exist along an axis of increasing tree-people interactions. The various intermediate forest types represent different phases in forest domestication and play important economic, social, political, and ecological roles (Michon and De Foresta, 1997; Wiersum, 1997; Belcher et al, 2005; Michon et al., 2007).

The process of domestication is multidimensional and has several interpretations (Wiersum, 1997). In a narrow sense, domestication is considered as a biological process involving changes in morphological and genetic make-up of selected crops or tree species in order to increase its productivity. In a wider sense, it is considered as involving an ecological process in the form of homogenization of production conditions: ecosystems are adjusted to the human domain by increasing the production of human-valued natural resources. And in an even more inclusive interpretation, domestication is conceived of as including also an acculturation process involving the adaptation of species to human-controlled production conditions. Considering these different dimensions of increasing people-vegetation interactions, Wiersum (1997) distinguished four phases of domestication:

- Phase 1. Procurement of wild tree products by controlled gathering or collection,
- Phase 2. Conscious management of useful trees through protection of productive trees, stimulation of production capacity by tree tending activities (e.g. coppicing, removal of competitive trees and protection of natural regeneration).
- Phase 3. Cultivation of selected wild trees in plantation
- Phase 4. Cultivation of genetically selected or improved tree crops in intensively managed plantations.

The process of domestication does not only involve changes in management practices in order to stimulate production, but also changes in the way management is organized, for example with respect to access rights to the resources and management responsibility. It also involves adaptation of production arrangements to market conditions. For instance, new organizational arrangements for forest products marketing can be developed including marketing cooperatives or certification of products for environmental sustainability or social responsibility (Wiersum et al., 2008). The main socio-political factors influencing these dynamics in resource exploitation are the following:

Role of NTFPs in local livelihoods. Local people may be engaged in different livelihoods strategies, e.g in respect of subsistence versus commercial production. A variety of social, economic and cultural conditions determine the livelihoods choices of people. Belcher *et al.* (2005) and Ros-Tonen and Wiersum (2005) discuss how the intensity of NTFPs management is associated with their role in households' livelihoods. Where the NTFPs are used for temporary subsistence purpose, they are mainly harvested from wild systems that are hardly managed. But as their role shifts to regular household use or commercial purposes, the NTFPs are often harvested from more or less intensively managed systems in natural vegetations or cultivated systems. Hence, the likelihoods for a gradual domestication of NTFPs progresses as their role in livelihoods advances from subsistence use to commercial use. In the first case local people are often involved in survival or coping strategies, and in the second case in diversification or specialization strategies (Belcher *et al.* 2005; Ros-Tonen and Wiersum, 2005; Shackleton et al., 2008; see also Chapter 5).

Resource tenure. Resource tenure in the form of access to both land and trees (Fortman and Bruce, 1988) impacts the intensity of forest management. The lack of secure tenure often discourages resource managers to cultivate trees since some level of tenure security is a minimum condition for investing in any resource management (Shepherd, 1992; Belcher et al., 2005; Belcher and Schreckenberg, 2007). But alternatively, the lack of secure tenure may be an incentive for tree planting, as this practice can be used as a tool for establishing and maintaining land tenure control when local control and ownership is challenged (Michon et al., 2007).

Access to markets. Increased market access impacts both the technical and social aspects of forest management. Increased market demand and reduced supply creates the stimulus for people to cultivate and produce a product that was harvested previously from wild (Homma, 1992; Neumann and Hirsch, 2000; Belcher and Schreckenberg, 2007). Integration of a product to a market also creates the stimulus for people to create a property right for a resource in question: when a resource is commodified, the emergent commodity status makes the users restrict access by creating property (Ribot and Peluso, 2003). Market integration can also facilitate specialization as well as engagement in alternative activities; this may undermine the importance of local tree products used for subsistence purposes (Agrawal, 2002).

Forestry and agricultural development policies. The production of non-timber forest products are often influenced by general forestry and agricultural policies focused on intensified management (Belcher et al., 2005). Policies often consider specialized systems of forest or agricultural production as reflecting modernity, and therefore promote intensive cultivation and specialized management and marketing. As the multiple values of multi-purpose production systems are unrecognized, this often has a detrimental effect on forest systems (Kowero et al., 2003). The customary system of forest resource control are not appreciated and indigenous practices for forest resource management are commonly regarded as ‘primitive’. As it is considered that the government is responsible for creating the proper institutional arrangements for enabling improved forest use and management (Wiersum, 1997) the dynamics in production intensity becomes more dependant on government policies (Laird et al, 2010) than dynamics in local conditions.

Institutional arrangements

As illustrated by the factors influencing forest exploitation dynamics, the production of gums/resins is subject to a variety of local norms and formal regulations. These are collectively denoted by the term institutions. Institutions are the rules of the game in society (North, 1990) or systems of established and prevalent social rules (Hodgson, 2006) that shape social interaction. They operate at both macro-and micro levels (Williamson, 2000). The macro level concerns the institutional environment (the rules of the game), which affect the behaviour and performance of economic actors. The micro-level concerns the institutional arrangement between economic units that governs the ways in which its members can cooperate and/or compete. Sometimes, governance structures and institutional arrangements are considered as distinct. But several scientists (e.g. Slangen et al., 2008) consider them as synonymous. According to them governance structures are the institutional arrangements (play of the game) governing rights over resources, goods, and services, and the structure and terms of exchange and access to resources. This governance structure is embedded in deeper traditions, norms, cultural, religious, and socio-political systems (Kirsten et al, 2009). In order to emphasize that gum and resin exploitation is governed by the socio-political rules of the games regarding both production and trade, in this paper we will use the term gum and resin exploitation arrangements rather than the term gum and resin production systems as used in an earlier paper describing the characteristics of the gum and resin utilization systems in the studied sites (Lemenih et al., submitted, Chapter 2). The term exploitation arrangements emphasizes that the gum and resin utilization systems are characterized by a pluriformity in institutional arrangements in respect to local norms for using these products as well as access to resources and markets.

The different exploitation arrangements may not just simply co-exist independently. Rather, they may interact as a result of their reciprocal relations (Brown and Ekok, 2001). As a result of such reciprocal relations, the ‘rules of the game’ of how to exploit forest resources under different exploitation arrangements may influences each other and impact on the action of forest resource exploiters. Hence, forest exploiters may not just carry out exploitation

activities per the norms of one specific institutional arrangement, rather their activities may be based on rules from different arrangements. They may be formal or informal, planned or unplanned, and complementary or conflictual and competing in nature (cf. Arnhe, 1994).

RESEARCH METHODS

Study Areas

This study was conducted in three drylands regions of Ethiopia known for gum and resin production and marketing. We selected Abergelle district in the Tigray region, Metema and Quara districts in the Amhara region, and Borana sub-region in Oromia region (Figure 1). The three sites differ regarding the status of history of gum and resin production and degree of domestication (Table 1), for details see Lemenih et al (submitted, Chapter 2). Abergelle was selected due to the role of gum and resin in locals' livelihoods, existence of formal institutions specific to ABCs use and management, scarcity of the ABC resource base and co-existence of smallholders' and cooperatives' gum and resin exploitation arrangements. The Metema and Quara districts were selected for their abundant but rapidly deteriorating boswellia resource base, presence of commercial ABC enterprises, and absence of smallholders gum and resin production. The two districts differ in respect to the presence (in Quara) and absence (in Metema) of cooperatives arrangements for gum and resin production and trade. The Borana area was selected on the basis of its well-established traditional institutions for natural resource management, pastoralist livelihoods strategies, emergence of gum and resin cooperatives, and the existence of different ABC species. In the Borana sub-region natural resource management is mostly governed by traditional institutions (Legesse, 1973, Chapter 3), whereas in Abergelle and Metema these matters are governed by formal government institutions (Chapter 4).

Across the sites some differences in woodland types and ABC species composition occur. The *Combretum-Terminalia* woodlands prevailing in Abergelle and Metema are dominated by *Boswellia papyrifera*, which is the source of most widely marketed type of white frankincense. The *Acacia-Commiphora* woodlands dominating in Borana is composed of a variety of gum and resin producing species, including *Acacia senegal* and *Acacia seyal* for gum arabic; *B. neglecta* and *B. rivae* for frankincense; and *Commiphora myrrha* and *C. guidotti* for myrrh and oppoponax (Lemenih et al., accepted, Chapter 2).

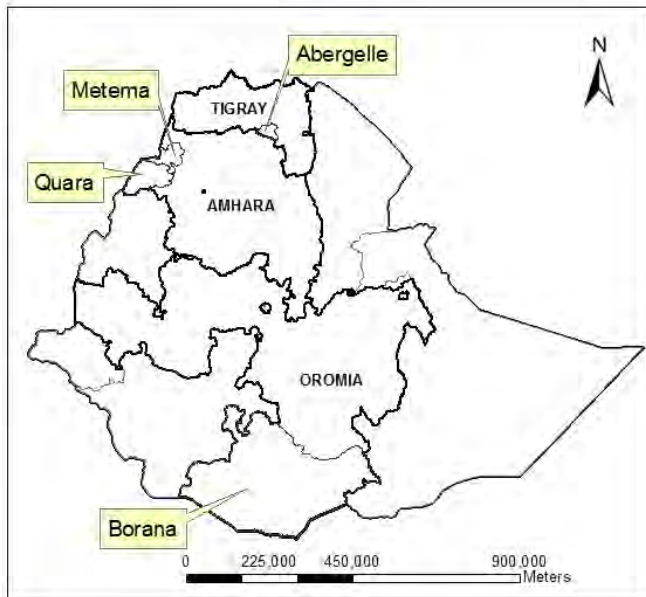


Figure 1. Map of the study areas

Table 1. Woodlands/ABC species composition, their domestication status, and livelihood strategies in the study sites

Main features	LOCATIONS		
	<i>Abergelle</i>	<i>Borana</i>	<i>Metema/Quara</i>
Woodland types	<i>Combretum-Terminalia</i>	<i>Acacia-Commiphora</i>	<i>Combretum-Terminalia</i>
ABC species composition	<i>Boswellia papyrifera</i>	<i>A. senegal, A.seyal; B.neglecta, B.rivae, C.myrrha, C.guidotti</i>	<i>Boswellia papyrifera</i>
Gum and resin production history	Organized commercial Production started in 1940s	Organized commercial collection is recent. But subsistence production has long history	Organized commercial production started since 1980s
Domestication status	Access and harvesting rights are controlled by formal institutions.	Access and harvesting rights are part of the traditional grazing land management.	Access and harvesting rights are controlled by formal institutions.
	Conscious management of the ABC trees on farmlands/homesteads and enclosures. Recent attempts to plant them	No conscious management of the ABCs species. No attempt to cultivate the ABC trees	No conscious management and cultivation of the ABCs.
Major livelihoods strategies	Mixed farming dominated by food cropping	Pastoralism	Mixed farming dominated by cash cropping

The three sites also differ in respect to the main livelihoods activities of the local people (see Chapter 5). In Abergelle and Borana households are engaged in gum and resin production as a complementary activity to farming. Mixed farming is the major economic activity in Abergelle. Cereals are cultivated for subsistence, and small ruminants are the main form of animal husbandry. In Borana pastoralism is the principal livelihood strategy with recent attempts to diversify into agriculture, forest products marketing, and petty trade (Tache and Oba, 2010). In Metema traditional hunting-gathering was the major livelihood activity before mixed subsistence farming replaced it in 1960s when highland settlers arrived into the area via self and state sponsored resettlement programs. Currently mixed farming dominated by cash cropping is the prevalent livelihood strategy. The major cash crops are sesame and cotton, and sorghum is the major food crop. The farmers do not produce and trade gum and resin to supplement livelihoods (Eshete et al., 2005; Lemenih et al., 2007; Dejene, 2008). In this region ABC exploitation is mostly done by laborers employed by external concessionaires.

Research methodology

Data collection and analysis

For this study data on exploitation arrangements, resource and market access, and determinants of ABC species domestication were collected and analyzed at community and households levels. In each district a representative Kebele¹² was selected. This selection was based on criteria in respect to ABC resource base, species mix, ethnic composition, presence or absence of community based production cooperatives and gum and resin processing and marketing companies. In each community both focus group discussions and key informant interviews were held. Overall, 19 focus group discussions and 37 key informant interviews were held. In addition several participatory methods were used to collect information on the nature and characteristics of the different organizations and institutions that impact forest use and management in general and access to the ABC species, gum and resin production and trade in the areas in particular, as well as on the dynamics of gum/resin exploitation. Also federal and regional states' proclamations, regulations/directives for NRM in general and with respect to the ABC species use and management were examined. Further details on the research methods and methods for data analysis are given in Chapter 3.

The information was further supplemented with information obtained from a household survey held with a total of 327 households; 99 from Abergelle, 57 from Metema, 40 from Quara, and 130 from Borana. The main results of this survey are reported in Chapter 5. The survey results employed in this paper include information on the contribution of different

¹² *Kebele* is the lowest level formal administrative unit in Ethiopia

economic activities to household incomes, memberships in cooperatives, and household's engagement in ABC resource management.

RESULTS

Types of gum and resin exploitation arrangements

At the three sites six distinct gum and resin exploitation arrangements were identified. Some of the exploitation arrangements are unique to a site, while others are common across two or more sites. (Table 2). The differences concern both the access to the ABC resources, the type of labor used in collecting the products, and the access to markets. The main contrast in respect to the access to the resources is related to whether these rights concern individual local people, local cooperatives or commercial enterprises with concession rights. Historically, formal access rights were given by the state to commercial firms in the form of concession rights for collecting gums/resins. This system was common in the traditional production areas such as Abergelle district in northern Ethiopia. In south Ethiopia (Borana region) production no concession system was introduced, and here local people collected the products within their customary pastoral land-use arrangements as an open-access resource. Gum and resin production and marketing by cooperatives have got increasing attention by state and NGOs. Such cooperatives have been formed in both Abergelle, Borana and Quara. Between these two regions differences exist in respect to methods for allocation of exploitation permits to individual collectors. Owing to the limited ABC resource base, the cooperatives in Abergelle concentrate their production activities on public *Boswellia* forests which the members access rotationally. In this region also private arrangements for production from trees that have consciously been protected on private farmlands and homesteads are present. Also in Borana the cooperative arrangement and the private arrangement co-exist. The members of cooperatives can freely collect the resources. There is no scarcity stimulating rotational allocation or territorial restriction. In Quara the cooperatives hire local people to harvest the products from the concession areas allotted by the government to cooperatives. In this region as well as Metema also company exploitation arrangements are still present. Under this arrangements the access rights are restricted with a similar system of leases defining access as in the cooperatives' arrangements.

The different exploitation arrangements do not only differ in respect to access rights, but also in respect to their labor arrangements. The cooperatives in Borana and Abergelle are production cooperatives with members who are actively engaged in gum and resin production. But the cooperatives in Quara is primarily a sales cooperative. This cooperative outsources the production activities to non-local people. Also the company arrangements prevalent in Abergelle and Metema/Quara vary in terms of the labor used for production. Whereas the companies in Quara/Metema outsource the production to non-local producers, the company in Abergelle employs local people.

The exploitation arrangements also vary in their access to markets (Table 2). The cooperatives and companies access the market without restriction. The cooperatives auction their ABC production at domestic markets to the companies, whereas the companies operate at both domestic and international markets. However, in case of gum and resin production by individual farmers the access to markets is more restricted. In Abergelle, farmers who individually produce gum and resin from trees on farmlands/homesteads are not allowed to sell the products at markets of their preference. They are obligated to sell to the cooperatives' shops in respective Kebele. In contrast, in Borana the pastoralists are allowed to freely collect ABC products from the woodlands and to sell these at markets of their preference. In practice, however, trading access is restricted by extra-customary and extra-legal instructions exercised by officials of Kebele that favour the cooperative arrangement.

Table 2. Gum/resin exploitation arrangements currently observed in the study sites

Characteristics	Cooperatives using own labor	Cooperatives using non-local labour	Companies using local labour	Companies Using non-local labour	Farmers using Homesteads/ farmlands	Pastoralists using communal lands
Production systems	Natural vegetations	Natural vegetations	Natural vegetations	Natural vegetations	Managed natural boswellia stands	Natural vegetations
Resource access	Rotational distribution of stands in Abergelle	Concession agreement	Concession	Concession	Unrestricted access for household members	Unrestricted access
Labour source	But unrestricted access in Borana Family labour Regardless of age and sex in Borana. In Abergelle the family labour is restricted to adult men	Hired labor/ outsourcing	Hired labour/ outsourcing	Hired labour Outsourcing	Family labour but restricted to adult men	Family labour regardless of age and sex
Market access	Sale at domestic markets on auction.	Sale at domestic markets on auction.	Sale at national and international markets	Sale at national and international markets	Sale to cooperatives	Sale at local markets to local and external traders
Location	Abergelle and Borana	Quara	Abergelle	Metema and Quara	But not allowed to sell to other traders Abergelle	Borana

Dynamics in gum and resin exploitation arrangements

As illustrated by the recent development of the cooperation schemes, the exploitation arrangements are not static, but rather dynamic. In respect to these dynamics two main developments can be distinguished. The first is a more or less autonomous local process that evolved in response to either short term and long term livelihoods conditions. The second is a government policy dominated process. The first process dominates in Borana and the second in Abergelle and Metema/Quara. In these last two regions the process is further differentiated than in Borana (Figure 2).

In Abergelle and Metema/Quara gum and resin exploitation evolved at different periods but showed similar tendencies in respect to a gradual change from company-based to cooperative-based exploitation arrangements. Different variations in this general trend evolved (Figure 2). In Abergelle the exploitation started in 1940s by state and private companies that used non-local labor. They employed external laborers from the Blen region in Eritrea. They were hired by the companies and worked for several years in the area until the local inhabitants recognized the value of the exploitation and took it over. When companies started to shift the production to other areas, the local farmers continued their exploitation and gradually started conscious protection of the trees on their farmlands and in homesteads. Since 1997 gum and resin exploitation by farmers from public lands was officially dissolved by the government and the cooperatives arrangement with local labor was introduced. The results of the households survey show that 85 percent of the respondents were members of the cooperatives. Membership in cooperatives associations is the only option to access *Boswellia* trees on public lands.

In Metema and Quara gum and resin exploitation was started in 1960s as a replica of the original exploitation arrangement in Abergelle. Since its inception gum/resin exploitation arrangement by state and private companies has been the sole arrangement in the Metema/Quara region; only the original labor force consisting of Blen people was gradually replaced by external labor from other regions. In Metema this situation continuous up to the present. But in Quara a cooperative was formed in 2008. As discussed above, this is only a sale cooperative rather than a production cooperative, and the production is still outsourced to external laborers. The reason for the establishment of this cooperatives was primarily to obtain concession rights to the gum and resin resources and to exclude non-local people from accessing these products.

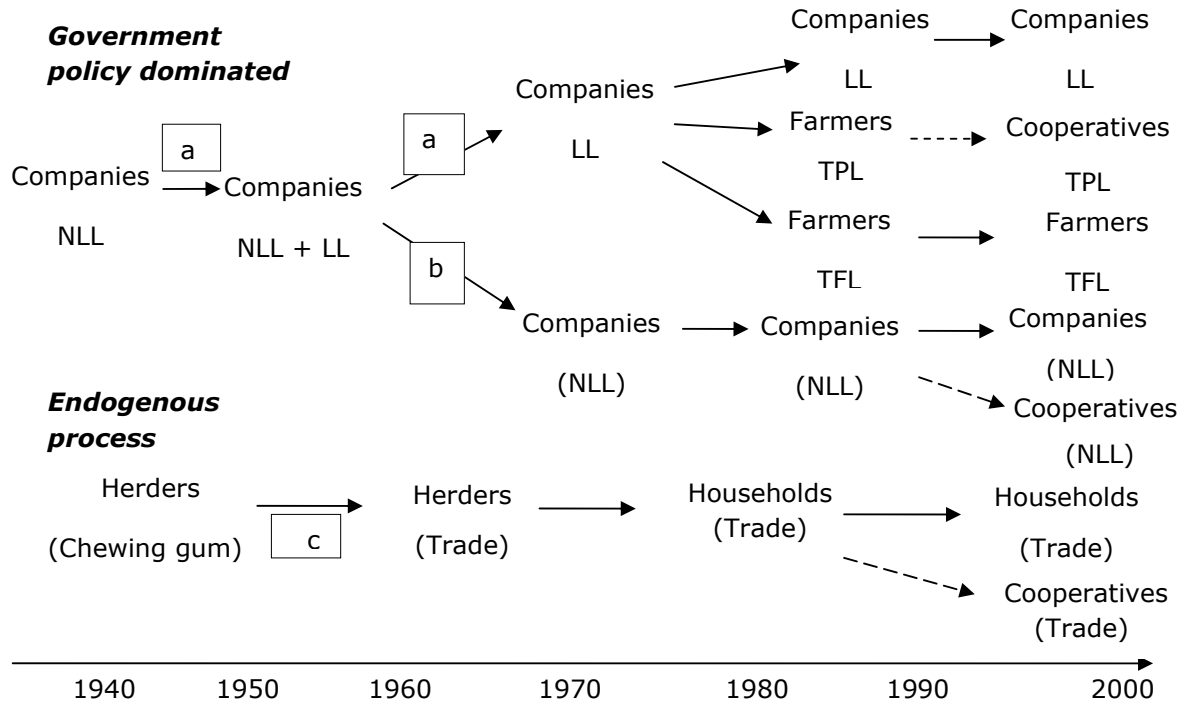


Figure 2. Dynamics in gum and resin exploitation arrangements. Letters (a) Abergelle, (b) Metema/Quara, (c) Borana; Acronyms: *NLL*: None local labor; *LL*: Local labor; *TPL*: Trees on public land; *TFL*: Trees on farmland

In Borana gum and resin collection started as a subsistence production strategy by herders/children collecting chewing gum. Gradually it changed to include commercial production in times of droughts and developed into an emergency resource. In the 1960s the commercial demand for gum and resin started to grow. In the beginning collection and marketing was entirely done by individual people on occasional basis, but gradually it became further integrated into livelihoods strategies. The number of households who collect gum and resin has been growing. In follow-up of the state policy of stimulating rural cooperatives, recently also the cooperatives arrangement for gum and resin exploitation was introduced by state organizations and development NGOs. During our study 78 percent of the respondents indicated to be member of cooperatives. These cooperatives are multi-purpose oriented, and local people mainly joined them to access aid funds and materials from governmental and non-governmental organizations rather than to facilitate gum and resin production and sale.

As demonstrated by these data, the government stimulated change from company exploitation arrangements to cooperative exploitation arrangements had a mixed impact on the access rights to the gum and resin resources and on the labor arrangements for harvesting these products. The reason for stimulating the cooperative arrangements was to improve the livelihoods of local people via collective action. However, as reported by respondents, the actual performance of the cooperatives is often influenced by involvement of local elites and people who speculated on financial and other benefits from membership. This explains why

there is an attempt to establish gum and resin cooperatives in Metema, and why in some communities where local farmers do not produce still gum and resin cooperatives were introduced.

Interaction between or among the gum and resin exploitation arrangements

In the regions where different gum and resin exploitation arrangements coexist, the relation between them (Figure 3) may be either complementary or competing. According to the official policy the establishment of gum and resin cooperatives had as objective to improve the smallholder production conditions and access to the market. However, rather than facilitating community development, the establishment of cooperatives has in several cases resulted in conflicts with the alternative exploitation arrangements. This is the case in Abergelle where the relation between the cooperatives and the farmers’ exploitation arrangements is contentious. The farmers are obliged to be members of cooperatives to access ABC trees on public lands; this has limited the traditional informal access rights by the farmers to the resources. Also farmers are forced to sell the gum and resin at cooperatives shops and the cooperatives have become monopsonists hindering free market exchange.

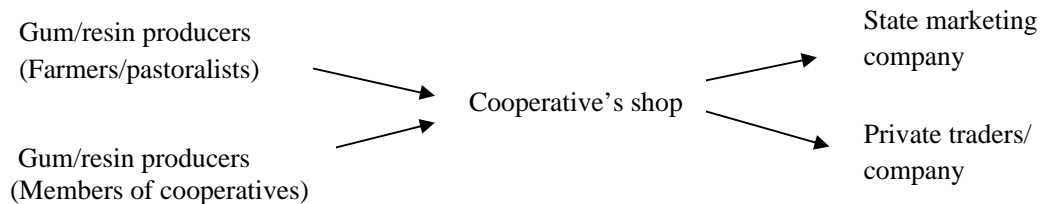


Figure 3. The interaction between the cooperatives and farmers/pastoralists arrangements

In contrast, in Quara, the relation between the cooperative and company arrangements is complementary, at least as far as trade is concerned. The cooperatives sell gum and resin to the companies via auction, which is also a preferred arrangement for the companies for obtaining the products. Regarding resource access, however, the two arrangements are conflicting. The companies sometimes blame the cooperatives for claiming the stands under company concession. Such allegations resulted in 2008 in a serious conflict that interrupted gum and resin production and that was taken to court for resolution. Also in Borana the relation between the pastoralist’s and cooperative’s arrangements is conflicting. The cooperatives backed by lower level administrators, who are also members of the cooperatives, may coerce the pastoralists not to sell gum and resin in other markets than the cooperatives’ shop. Similarly, traders are intimidated not to buy gum and resin directly from the producers. Thus, also in this region gums/resins are mainly sold in a monopsony market.

Reasons for limited domestication of ABC trees

As indicated in chapter 2 (Lemenih et al., accepted), the development of the ABC exploitation is limited mostly to the early phases of domestication in the form of controlled gathering from the natural vegetation and conscious management of trees by improved tapping techniques.

The dynamics and functioning of the different exploitation arrangements show that several socio-political factors limit the advancement of the ABC species domestication. These factors are summarized in Table 3 and described below.

Table 3. Socio-political determinants of limited ABCs domestication in the study areas

Determinants of domestication	Abergelle Borana Metema/Quara		
Degree of embeddedness in multi livelihoods strategies of local communities			
- Culture/norms	*		***
- Customary institutions for coping with drought	***	***	*
- Customary institutions for easy entry into agriculture	*	**	***
Degree of control over resource access and market access			
- Restricted access to production	***	*	***
- Market arrangements	**	*	***
- Restricted access to planting materials	***		**
Development interventions/policies	**	***	***

*, **, and *** stands for low, medium and high impact respectively

Degree of embeddedness of ABC exploitation in multi-livelihoods strategies of local communities

One of the main reasons for the lack of advanced phases of ABCs domestication in the study areas is the role of gum and resin products in the livelihoods of local people. As elaborated in Chapter 6, in Abergelle gum and resin is produced as a component of a multi-enterprise livelihood system involving mixed farming. Gum and resin contributes to 31% of the cash income, while non-farm activities, livestock, and crops contribute 20%, 25% and 28% respectively of the cash income. In the predominantly pastoral livelihood system in Borana livestock contributes 48% of the total income of households. Gum and resin are produced as safety nets in times of emergency or to obtain supplementary income. Gum and resin, crops, and non-farm activities contribute 30%, 14% and 9% respectively of the total income of the household. In Abergelle, gum and resin production forms a diversification strategies of the households, and in Borana a supplementary or coping strategy. In Metema and Quara crops production is the dominant activity that contribute more 87% of the total households income. Livestock also contribute about 13% of the total income of the households. In this region people are not engaged in gum and resin production.

The importance of gum and resin to households vary across research sites due to the engagement of the local communities in the different regions in specific land-use and livelihoods strategies. Due to the long tradition of gum and resin production in Abergelle, in this region local people have recognized its commercial value and therefore have gradually started to integrate gum and resin production in their mixed farming systems. This has resulted in initial efforts at protection of the trees on croplands and in home gardens. Although in Abergelle regular droughts occur, gum and resin is not considered as an emergency resource. Rather, during times of drought local people temporarily migrate into the adjacent highlands where there is a relatively better production than the low lands. This contrasts with the situation in Borana. In this region gums and resins are well-recognized as an emergency resource. But the main traditional institutions regulating land-use in this area are related to pastoralism. The Borana value livestock based livelihood activities over any other activity. This is not only due to the economic importance of livestock, but also due to their social, cultural, and ritual values. The Borana believe livestock is for the people and the people are for the livestock. This belief is reflected in a strong traditional institutional arrangements regulating land-use called the *Gada* system (see Chapter 3). Within this setting there exists a long established tradition of helping each other during livelihoods stress, e.g. by giving livestock to a fellow Borana who lost his own cattle in a time of crisis. Due to this strong reliance on livestock, traditionally the livelihoods were little diversified. Only recently alternative livelihood activities such as crop cultivation and increased use of natural resources have started (see below). As a consequence, hardly any efforts at domestication of gum and resin has yet been undertaken in this region.

The biophysical environment in Metema/Quara is conducive to cash crop cultivation (e.g. sesame and cotton). The cultivation of cash crops is financially more lucrative than gum and resin production. Most inhabitants in the districts are recent settlers from the highlands, where mixed cropping is an established and culturally embedded practice. The local people consider crop cultivation with additional animal husbandry as the basic constituents of their livelihood strategies. Several local institutions, e.g. in respect to share cropping, land sharing and renting of oxen support these strategies. Tree tapping does not feature in these strategies, as it is considered as arduous and unrewarding. Rather than exploiting the tree resources, the local people convert the ABC woodlands into crop fields. Such conversion is stimulated by the customary land-use institutions. The local *Mofer Zemet* arrangement allows external people who are not registered as a resident in a Kebele to clear a plot of woodland and temporarily cultivate it during the rainy season. And the widespread *Mateqedem* arrangement enables de-facto private cultivation of plots in the public forestlands without the formal approval of local authorities.

Degree of control over resource access and market access in local or non-local exploitation arrangements

As illustrated by the presence of specific local institutions related to the prevailing livelihood strategies, there exists a variety of local arrangements for accessing the gum and resin resources. This institutional diversity does not only concern access to the resources, but also access to markets. Only in Borana the trade of gums/resins concerns a locally initiated activity. But in the other regions it was an externally induced activity of commercial enterprises. The company-based arrangements have gradually been replaced by cooperative-based arrangements, but this development still was externally induced. At present, non-local exploitation arrangement still dominate resource access in the northern regions, whereas in the Borana region local arrangements still dominate. Although the cooperative-based arrangement was intended to stimulate local exploitation, the actual situation is often different. In all northern regions private exploitation is discouraged, although in Abergelle some private production is taking place. In Metema the company-based arrangement still prevail, while Quara the cooperatives only act as trade cooperatives and employ external people for the gum and resin production. In Abergelle the formal rules and regulations for gum and resin marketing are implemented in such a way that it makes their production less attractive for smallholders. Smallholders are forced to sell to cooperatives' shops rather than on markets of their preference. The sales can only be made at the end of the production season; this limits the opportunity to use the products as an emergency resource in times of financial needs (see chapter 3 and 4 for the details).

The limited attention towards private arrangements for exploitation has restricted domestication, notably in the form of tree cultivation. For instance, the arrangements did not stimulate the development of local knowledge on artificial regeneration. Even though in Abergelle some conscious conservation of trees on farmlands or in home gardens has taken place, 82 % of the respondents have not planted *Boswellia* trees. This is partly related to the fact that they are not allowed to cut branches of existing trees to be used for vegetative propagation. Since private production is mostly discouraged, local people have not got the opportunity to develop their ingenuity and creativity in managing the tree resources. Consequently, no indigenous knowledge and techniques of management developed. This is illustrated by the research finding that 93% of the respondents in Abergelle do not have knowledge on how the *Boswellia* trees can be reproduced.

Development policies and interventions

The limited role of the NTFPs in the local livelihoods and related lack of domestication is not only influenced by the government policies on their production and trade, but also by other development policies. For instance, in Tigray regional state in the north, including the Abergelle district, frequent land redistributions has caused insecurity of land tenure. Until 2008 land redistribution in Tigray was implemented by transferring a share of a dead husband's land to other families. This did not only create conflicts between the ex-and

incumbent owners, but also served as a disincentive for investing in long-term production processes such as gum production. The Metema and Quara regions have for decades been involved in resettlement campaigns; this often resulted in the emergence of land grabbing and land speculation, and the conversion of the public *Boswellia* forests into farmlands. The farmlands are often used for mechanized production of sesame and cotton and in contrast to the smallholder cultivation systems in Abergelle no trees are maintained on these lands. Also in Borana many development interventions by the NGOs and state agencies have been focused on stimulating crop cultivation in private croplands. These initiatives have weakened the role of the *gada* system in regulating the traditional pastorally-based natural resource management systems. As a result, privatization of woodlands for grazing and establishment of cultivation enclosures is increasing.

Another external factor limiting local investments in more intensive gum and resin production consisted of the civil war that ravaged northern Ethiopia. It resulted in significant displacement of local people. Since the end of this war, in Abergelle increasing attention is given to the development of gum and resin production and trade, and some initial efforts at establishing technical extension services have been started. But in Metema and Quara, no development policies have been initiated to stimulate improved technical management and organisation for the ABC resources.

DISCUSSION

The case of ABC species in northern and southern drylands of Ethiopia shows that despite the growing importance of gum and resin in the livelihoods strategies of households (chapter 5) and the economy of the nation (Lemenih Lemenih and Kassa, 2011), there appears little advances in their domestication. Even the relatively advanced phases of domestication for ABCs in Abergelle are not as advanced as that of *Coffea arabica* in the Ethiopian highlands (Wiersum, 2010) or of *Acacia senegal* in the Sudan (Ballal et al., 2005; Rahim, 2006). Considering these examples, one would expect that at least in Abergelle, both due to the long history of production and due to the role of these products in the multi-enterprise household economies as well as the possibility to use the crops as emergency resources, there would have developed relatively advanced stages of ABCs domestication. In reality, however, domestication is still little advanced in this region, and even less in other regions. The domestication has been mostly limited to the first phase of domestication characterized by the introduction of social controls to regulate harvests. Wiersum (1997) termed this the acculturation phase, but as demonstrated by our data it might also be characterized as the phase of institutionalization. The institutionalization of the gum and resin production in Ethiopia has a long history and involved a dynamic process. But this first phase of domestication in a social sense, was not followed up by an active process of domestication in the sense of ecological and biological change in production systems (see Chapter 2). This demonstrates, that although the development of social arrangements for controlled use of NTFPs is an essential first phase of domestication, it will only stimulate further domestication

in case the arrangements are effective in stimulating local creativity and innovation. But as demonstrated by our data, if this is not the case, the social arrangements may even limit domestication in an ecological and biological sense.

Three major reasons for the limited process of the ABC trees domestication in Ethiopia stand out. In the first place, our result shows that it is not just the contribution of the NTFPs to households income that determines their degree of domestication, but also how they are related to different livelihoods strategies (for further detail see chapter 5). The data demonstrate that the domestication of NTFPs progresses as their role in livelihoods strategies progresses from a coping strategy (e.g. Borana) to a diversification strategy (e.g. Abergelle). This findings are in agreement with several studies that associate advancement in domestication of NTFPs with an increasing role in local livelihoods strategies (e.g. Belcher *et al.*, 2005; Ros-Tonen and Wiersum, 2005).

In the second place, the result illustrates how the degree of domestication is highly influenced by the location-specific exploitation arrangements and their impact on both resource access and market access. Various aspect of the exploitation arrangements are important in explaining the limited domestication of the ABC resources. The dominance of gum and resin exploitation by a single and externally introduced state company for six decades determined the focus on utilization than on developing the resource base (Chapters 3 and 4). It is only recently that macro-level rules and regulations that favour gum and resin utilization by a wider variety of actors, including individuals, local producer and marketing cooperatives, and private trade companies were enacted (chapter 4). Currently, several gum and resin exploitation arrangements (companies, cooperatives, and individuals) may coexist either at regional or local level. The various exploitation arrangements do not simply coexist, but interact. As postulated by Arnhe (2001) such interactions may take several forms: formal or informal; planned or unplanned; and complementary, conflictual, competing in nature. As demonstrated by our study, in the case of gum and resin production the interaction is mostly competitive rather than complementary. In all the study areas the cooperatives arrangements for gum/resin production have recently become dominant. In several cases conflicting interactions between the cooperatives arrangements and the company or private arrangements have been developed. For instance, the exclusion of smallholders in Metema and Quara by external concessionaires instigated the smallholders to clear the ABC resources on or around their farms. They do so to defend their land claims. Such externally controlled concession arrangements for forest exploitation limit both access by local people to resources and markets and limit investments in domestication (Belcher *et al.*, 2005). The conflicting and competitive relationships between the gum and resin exploitation arrangements prevent an active process of local-level domestication and limits the effectiveness of externally induced institutional arrangements. Similar examples showing that nationalization the NTFPs has declined their production and management have been reported from India (Chambers *et al.*, 1990).

These examples demonstrate that contrary to the expectations of Ethiopian policy, the cooperatives in practice do not always contribute towards the combined goals of socio-economic development and improved land-use. Instead of counteracting monopolies and monopsony's (cf. Normark, 1996; Belcher and Schreckenber, 2007), the gum and resin cooperatives have become monoposonists. Their competing and conflictual relations with the private exploitation arrangements has limited the opportunity for individuals to participate in the production and management of the ABC resources and has restricted endogenous development of domestication. Moreover, in several cases the cooperatives still operate under the traditional concession system that was traditionally employed for giving commercial firms access to the ABC resources. This traditional exploitation arrangement is still maintained in Metema.

In the third place our research demonstrate that policies intending to stimulate more intensive tree resource management are often frustrated by development of regulations and policies designed for other sectors. Although the ABC species are valued for their gum and resin by the forest policy, the ABC woodlands in locations such as Metema become targeted for resettlement and development of mechanized agriculture. This observation is in line with the claim that the root causes of forest degradation are often found outside the forestry sector (de Montalembert, 1992); and forest use, development, and conditions are the fundamental consequences of the wider configuration of national policy and economic development (Kowero et al, 2003). The findings imply that unless inter-sectorally coordinated, generation of state regulations specific to a sector or a resource may not bring a fruitful outcome. This is indispensable in forestry because policies in other sectors often create incentives/capacities to exploit forests.

The findings of this study contribute to the existing knowledge on domestication of trees by revealing the impact of different institutions in respect to exploitation arrangements. Our data demonstrate that the types of exploitation arrangements, their dynamics, and interaction govern both resource and market access, and ultimately the advancement in domestication phases. We found that the first phase of domestication in a social sense, which involves the procurement of wild tree products by institutionalization of practices for controlled gathering or collection (Wiersum, 1997), is crucial in domestication of trees. Our data demonstrate that this process does not only involve controlled use by local people, but may also involve government controls on exploitation. But the progression from this first phase of domestication to a next phase is determined by a much greater variety of institutional arrangements for access to both resources and markets. This is reflected in a diversity in types of exploitation arrangements, their dynamics, and interaction. The different types of exploitation arrangements may involve different types of dynamics in resource control, and may either promote or deter gradual intensification of management.

CONCLUSIONS

Many studies on the characteristics and scope of non-timber forest products (e.g. Sunderland and Ndoye, 2004; Belcher et al., 2005) have focused on one prominent type of exploitation arrangement. As demonstrated by this study, in case that a specific NTFP play an important role in household economies, it may be produced and marketed in different exploitation arrangements. The different arrangements may vary in respect to both the role of the products in a multi-enterprise household economy and livelihood strategy, and in respect to the institutional arrangements for access to the resources and to the market. These arrangements are not only influenced by formal government rules and regulations, but also informal rules and norms are important. The evolution of the exploitations arrangements is not only dependent on government policies, but also on dynamics in local livelihood conditions and related norms. Moreover, the relations between the various arrangements may be either complementary or conflictive; they may impact on both the access to resources and to the market. As a result of this institutional pluriformity in respect to the production and use of NTFPs, the degree of their domestication does not simply depend on the role of NTFP in the household economy. Rather, it is primarily influenced by the diversity, dynamics and interaction in exploitation arrangements and the related development policies and interventions. The manner in which the products have become institutionalised during the initial phase of domestication in a social sense, highly impacts on the ability and willingness of local people to domesticate NTFPs in an ecological and ecological sense. Sustainable utilization and increased domestication of NTFPs is less likely in case of unbalanced processes of institutionalization, including conflicts between different types of exploitation arrangements.

Chapter 7

Synthesis and conclusions



This chapter presents the main findings of this study. First the findings are summarized following the research questions presented in chapter 1. Subsequently, the results are discussed and reflected upon with respect to their scientific implications. Finally, the overall conclusion related to the main research objective of this study is presented.

SUMMARY OF MAIN RESEARCH FINDINGS

Drylands in Ethiopia cover more than half of the total land area of the country and inhabit about one-third of the population. Although these drylands are often considered to have marginal agricultural potential, they host valuable vegetation resources, such as *Acacia*, *Boswellia* and *Commiphora* (or so-called ABC) tree species providing gum and resin products. Gum and resin production and trade have a long history in Ethiopia and constitute an important economic sector. At present, however, the woodlands and the ABC species are under pressure (overuse and poor management). Especially in the traditional production areas in north Ethiopia the pressure is high (Lemenih et al., 2007; Dejene, 2008), even though specific regulations were enacted to govern their use and management into a more sustainable direction (Anonymous, 2007). Given this problem statement, the main objective of this study is to investigate how formal and informal institutions shape the use and management of gum and resin resources in the dry woodlands of Ethiopia. The following four questions were addressed: (i) What types of gum and resin woodland management and production systems are present in Ethiopia and how are they related to the land-use and socio-political conditions? (ii) How do multi-level formal and informal institutions interact and affect gum and resin production and management? (iii) How does gum and resin utilization fits into the livelihoods strategies of households in the study areas? (iv) What dynamic processes in institutional arrangements for gum and resin production and management systems have occurred in various regions of Ethiopia and how did these influence the intensity of gum and resin use and management?

This study is based on the consideration that, conceptually, two contrasting developments with respect to gum and resin production may be distinguished: domestication and degradation. The process of domestication is conceptualized as involving not only a change in ecological characteristics of the forests, in the biological characteristics and in the genetic make-up of plants, but also a change in the institutional conditions with respect to access to resources and markets. This social dimension of domestication by bringing forest production systems in the human domain has been termed ‘acculturation’ (Wiersum, 1997). However, in this study it was conceptualized as a process of institutionalization. Whereas domestication can be considered a process of aggradation of resource values and ecosystem services, degradation can be conceptualized as quality loss either of the original ecosystem characteristics or of the production capacity of the gum and resin producing woodlands. These two processes are often studied in isolation, but in this study they are considered co-evolving processes.

In chapter 2 we used this co-evolutionary frame for assessing the nature and diversity of gum and resin producing woodlands (research question 1). In three sites we studied the variation in woodlands management and gum-resin production, and the socio-economic and biophysical factors that condition their use and management. On the basis of their organisational features, we identified seven present gum and resin production models, and related these to different phases of domestication and to different degrees of ecosystem degradation. The production systems gradually evolved from extraction of wild trees to production in an adapted forest system. However, despite several decades of production system development, domesticated woodlands with an adapted forest structure and composition and with increased provision of services are still scarce. Almost all systems of production are based on natural stocks of the ABC species, without further development of the resource base. Only in one region (Abergelle) initial initiatives for incorporating trees in agricultural systems are observed. At the same time, many of the woodlands are currently subject to serious degradation due to low quality management practices. This is mainly to be attributed to the lack of effective institutional arrangements for gum-resin production and trade and to the weak economic position of the NTFPs in relation to other forms of land-use. The findings illustrate the importance of domestication as not only involving a change in ecological and biological characteristics, but a development of effective institutional arrangements for production and trade as well. We conclude that the institutional dimension of domestication determines whether forests and/or specific forest resources will become degraded or aggraded in the sense of resource loss or enrichment.

The observation that the lack of effective institutional arrangements result in resource degradation rather than intensified production and domestication should not be interpreted as that there is only one appropriate type of exploitation arrangement. As illustrated in Chapter 6, different histories of exploitation in different regions may result in location-specific types of exploitation arrangements. The question of how gum and resin use and management is shaped by the historic interactions between formal and informal institutions (research question 2) is further elaborated in Chapter 3 and 4. Chapter 3 focuses on how the production in the Borana region in south Ethiopia is related to the well-established *gada* system of pastoral management and to recent development strategies in this drought-prone region. The rangelands in Borana have been well managed by the *gada* system for ages, but specific institutions for gum and resin producing species have not been developed. Recently, gum and resin production is impacted by external institutions that create better access to markets as well, although neither the traditional nor the external institutions regulate the access to the gum and resin resources. Whereas the traditional and external institutions do not interact with respect to the gum and resin production and trade, they do interact with respect to range land management in general and this interaction is mostly competing. Formal institutions introduced to the area often compete with the traditional institutions for range land management rather than building upon them. The gum and resin production is based on the collection of naturally oozed exudates, which does not result in overexploitation. Nonetheless, the ABC resources are under pressure as a result of competition from non-traditional and non-

gum and resin based livelihoods activities (e.g. commercial charcoal, scent wood and firewood production). Besides, the range lands hosting the ABC species are cleared and privatized for cultivation and grazing. Consequently, the traditional Borana range land management system and its related institutions do not assure sustainable use and management of gum-resin producing species.

Chapter 4 elaborates upon the institutional dynamics of ABC exploitation in north Ethiopia. The production originated in the Tigray area (including Abergelle region), from where it gradually expanded to regions such as Metema and Quara. Despite the state regulations on gum and resin production and management that were introduced in this region, the system is under intense pressure. This situation is explained by the nature of and interactions between the formal and informal institutions concerning the use and management of *Acacia* and *Boswellia* (AB) species in this region. This production system is subject to the influences of multiple institutions: state regulations for gum and resin production, state regulations for other land-use sectors, informal bureaucratic institutions, and customary institutions. Multiple interactions exist between (a) formal state regulations and informal bureaucratic institutions on gum and resin production, (b) state regulations on gum and resin production and government regulations for other sectors, and (c) state regulations for gum and resin production and customary institutions. The state forestry regulations have provisions that promote gum and resin use and management. However, the informal bureaucratic rules developed at local level are often not in line with these state regulations and do, on the contrary, restrict smallholders' resource and market access. State regulations in other sectors may also either promote gum and resin production, or stimulate the conversion of the woodlands into other land uses. As a result of the historic external control over gum and resin exploitation, local customary rules, norms, and beliefs on AB use and management have hardly been developed. Only in the more 'traditional' region Abergelle, limited endogenous development in the form of deliberate protection of AB trees on farmlands has taken place. In Metema, the customary local norms do not stimulate such gum and resin domestication and production, but rather promote expansion of farmlands. In addition, in both regions, the federal and regional state regulations for ABs are outcompeted by informal bureaucratic institutions. These are the local rules-in-use regarding gum and resin production and marketing regardless of they are in line with macro level state regulations or not. Local people often react to these formal and informal bureaucratic institutions that restrict their access to resources and markets with indiscriminate tree cutting and woodland conversion. Therefore, to improve the conditions of the ABC resources in northern Ethiopia, a closer coordination across policies over different sectors and a better harmonization of formal and informal institutions are needed

As indicated by Chapter 3 and 4, major contrasts in the institutional arrangements for gum and resin exploitation exist between north and south Ethiopia. Due to its commercial value, gum and resin use and management has traditionally been governed by the state in north Ethiopia. For several decades, the exploitation was governed as concessions, but gradually some local arrangements for gum and resin production also developed. In contrast, in south

Ethiopia the resources were not recognized as interesting commercial commodities which were to be governed by the state. Also, no specific customary institutional arrangement for gum and resin production developed locally; rather the products were freely collected within the traditional system for pastoral land range management. However, since the past decade this situation has started to change. The government started to stimulate local involvement in gum and resin production by promoting cooperatives. These were not only introduced in the northern region, but gradually in the south as well. As result of development programmes of both state agencies and NGOs, the cooperatives' arrangements have emerged as the dominant exploitation arrangements for gum and resin (chapter 4 and 6). Although both in the north and

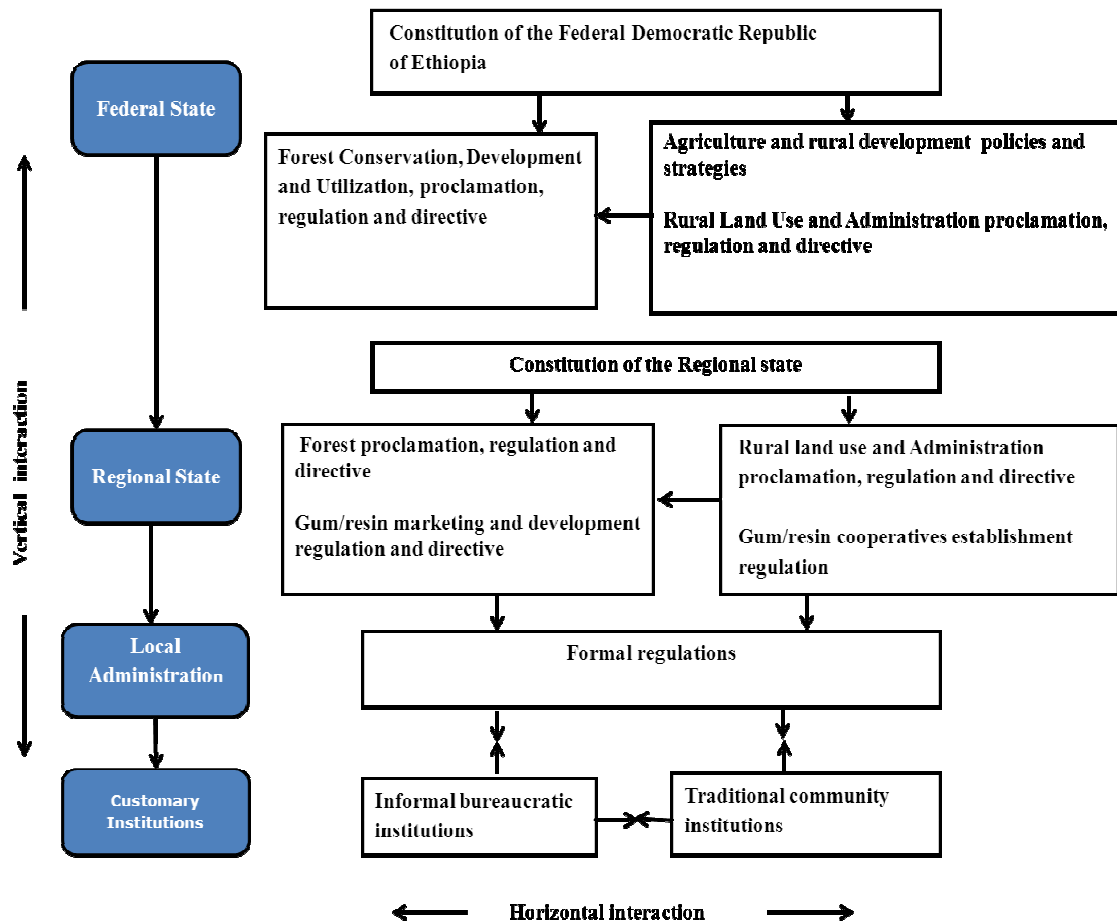


Figure 1. Institutional diversity and interaction for gum and resin use and management in the drylands of Ethiopia.

the south private people are also involved in the gum and resin production and marketing, the private exploitation arrangement is not very prominent. In the south, access to gum and resin production is officially unrestricted, but market access is restricted by informal bureaucratic rules (chapter 3). In the north, both resource and market access are restricted.

As indicated by the data presented in Chapter 3, 4 and 6, dry woodland utilization and management in general and gum and resin in particular are subject to a complex network of institutions that interact vertically and horizontally in Ethiopia (Figure 1). Vertically, higher level formalized bureaucratic institutions influence rule making and implementation at successive lower levels. Their implementation at local level is however affected by the interface between formal and informal institutions. Horizontally, institutions across sectors either compete or complement each other. It shows that policy making and implementation in the forestry sector should consider institutional diversity and interaction at different levels and across sectors.

Chapter 5 further discusses how the gum and resin production systems relate to the livelihood systems of local producers (research question 5). Several recent studies demonstrate that gum and resin are important products in rural livelihoods in the drylands of Ethiopia. These studies, however, did neither further specify what role the products have in the livelihood strategies of the producers nor how this role is related to institutional arrangements for gum and resin production and trade. In chapter 5 it is shown that the production of gums and resins is mostly a part-time activity in multi-enterprise household systems. The livelihoods systems and the contribution of the multiple activities to cash and total income vary among the study areas. In south Ethiopia, the role of gum and resin production in livelihoods has increased recently. Initially the products were collected as a famine crop; now it is produced and sold on daily basis by more than four-fifth of the respondents as a supplementary livelihood activity. In contrast, in Abergelle, where gum and resin production was started by external organizations and subsequently indigenized by the local people, the gum and resin are used as a diversification strategy by households. In Metema and Quara, the rural smallholders do not attach any livelihoods role to gum and resin. Rather, gum and resin production is a specialized activity of commercial enterprises using laborers from outside the region. In Abergelle and Borana, cooperatives increasingly use similar arrangements.

The findings demonstrates that the role of the specific types of NTFPs in livelihoods strategies of rural households depends on the nature of the multi-enterprise livelihood systems and on the socio-economic household conditions. Not only the value of the NTFPs, but also the institutional arrangements that govern production system and market access are important factors regarding how the NTFPs fit into the livelihoods strategies of specific categories of households. These institutional arrangements are shaped by the interactions between formal and informal institutions. In Abergelle, where the formal regulations and informal bureaucratic rules restrict both market and resource access, individuals cannot produce gum and resin from the trees on public lands. In addition, they do not rely on gum and resin production as a coping strategy, even in times of livelihoods shocks. In Borana, the formal and informal rules do in contrast not restrict resource and market access. Here the gum and resin production and management systems are embedded in the coping or supplementary livelihood strategies of the households. These result demonstrate that role of the ABC trees in livelihoods is strongly affected by the complex of institutional arrangements that focus on

ABC species themselves or other related sectors that indirectly affect their use and management.

Studies on domestication have normally focused on factors stimulating this process. However, the question of why some valuable and scarce resources are hardly becoming domesticated has got much less attention. In chapter 6 we address this question by examining the dynamics of the institutional arrangements for gum and resin exploitation and their impact on domestication (research question 4). The process of gum and resin utilization followed different pathways in the drylands of north and south Ethiopia. In the south its local use started as chewing gum and famine food. Later, the production became commodified in response to increasing market demand offering the possibility for using the products to cope with livelihood stresses. In contrast to these endogenous developments in the south, the gum-resin production systems were introduced by private and state companies in the north. These externally-introduced production systems have gradually been modified under the influence of emerging institutional arrangements with respect to access to resources, labor and markets. This institutional dynamics has resulted in six different exploitation arrangements: cooperatives using local labor, cooperatives using non-local labor, companies using local labor, companies using non-local labor, farmers from homesteads / farmlands, and pastoralists from communal lands. These arrangements resulted from autonomous local processes on one hand and government dominated processes on the other hand. The arrangements evolve in time. One overarching trend can be distinguished, i.e. a growing dominance of cooperative arrangements. This trend is stimulated by both the state and non-governmental development organisations. Despite this overarching trend, several variations in exploitation arrangements still exist. Some arrangements are unique to a specific region, while others are common across two or more regions. The different exploitation arrangements do not simply coexist but they may also interact. The interaction may result in a competition for resource access. With respect to access to markets, the arrangements may be either synergetic or competitive. The findings further strengthen the conclusions of Chapter 2 that the status of ABC trees domestication greatly depends on the institutional arrangements for access to resources and markets. They illustrate that in case the institutional arrangements are not developed in a way that benefit the local people, domestication is unlikely to progress much beyond the first phase of establishing social control over resource use. In case of inappropriate arrangements, degradation rather than domestication may occur.

SCIENTIFIC REFLECTION

As indicated in Chapter 1, this study is based on a multi-theoretical perspective including concepts such as dynamics in production systems, institutional arrangements and livelihood strategies. These conceptual frames were identified on the basis of the existing scientific literature discussing the main principles regarding the use and management of non-timber forest products (NTFPs). These different issues have often been studied in isolation, but this

study attempts a more integrated approach. The study is also characterized by two specific analytic approaches, i.e. a multi-location approach and a focus on dynamic processes.

Many studies on the nature and dynamics of NTFP production systems (e.g. Belcher et al., 2005; Ros-Tonen and Wiersum, 2005; Laird et al., 2010) are based on a comparison of representative cases of different types of NTFP production. Still relatively few studies have been carried out to systematically assess the diversity in production and exploitation arrangements of *one* type of NTFP. The focus of this study on regional variation in gum and resin exploitation allowed to identify the diversity of both production systems and exploitation arrangements and to gradually contextualize this diversity. This approach provided a detailed qualitative understanding of the interplay between formal and informal institutions determining the management of NTFPs, and the impact of the NTFP production system on both the role of NTFPs in rural livelihoods and their domestication status (Figure 2). The study therefore compliments the often prevailing approach of most comparative NTFP studies by focusing on the role of specific production and livelihood factors rather than institutional processes explaining difference in the use of NTFPs. Only in 2010 a first monograph on wild product governance was published (Laird et al., 2010). As will be further elaborated below, this book is mostly focused on formal policies and regulations, but gives little attention to linking these institutions at ‘external’ levels to the local level institutions governing the actual management of the resources. This study gives specific attention towards such multi-level institutional linkages.

The study is also characterized by its focus on dynamic processes concerning both forest use and management, institutional arrangements and livelihood strategies. The dynamics in management is assessed not only as a historical process, but also related to the concept of domestication. The analysis of the dynamics in institutional arrangements focuses on the interrelated developments of new external institutions and adaptations in local institutions, and considers both access to resources and access to markets. Also the changing role of NTFPs in the livelihood strategies is analysed (Figure 2). Through an interactive approach a progressive historic contextualization of the different production systems and exploitation arrangements was made. This dynamic approach compliments the usual approach in most NTFP studies of only considering present production systems. Therefore, this study contributes to better understanding of the nature of NTFP governance systems as a dynamic institutional complex regulating the intensity of exploitation and management..

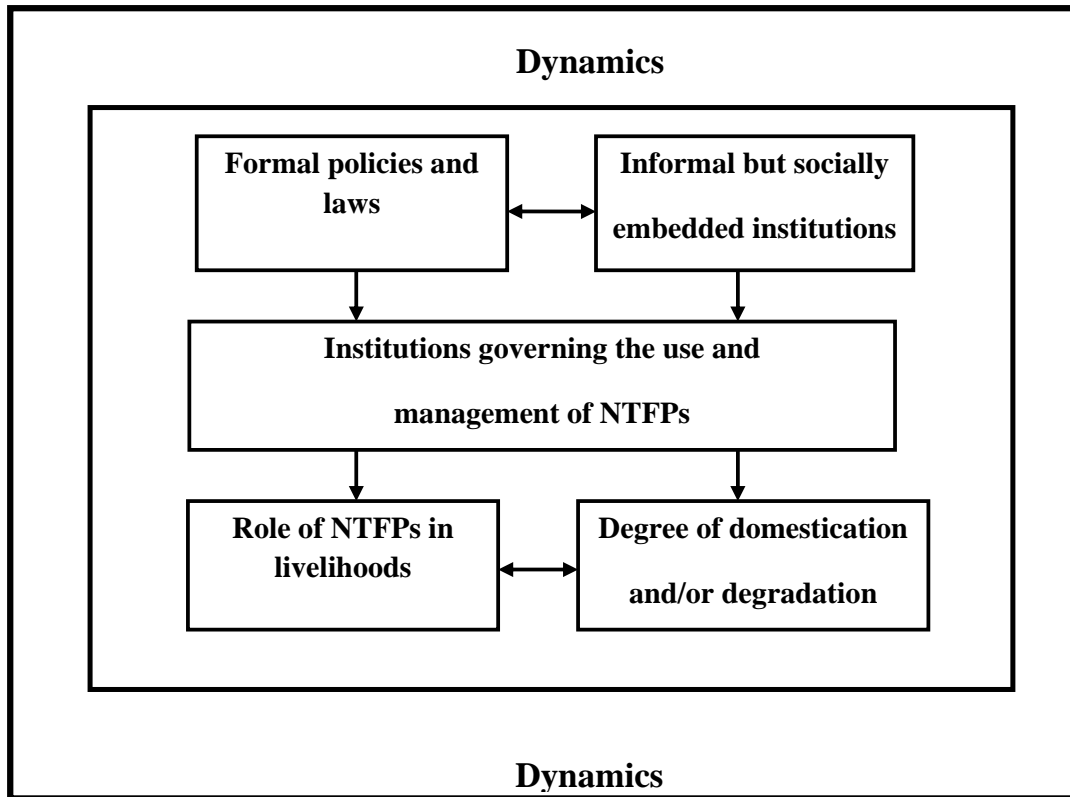


Figure 2. Analytical model illustrating the relations between the different processes influencing the nature of NTFP production systems.

Domestication versus degradation of NTFPs

Studies on the dynamics in NTFP production are often focused either on domestication (e.g. Homma, 1992; Leakey and Simons, 1998; Paudel and Wiersum, 2002) or on degradation (e.g. Rahim, 2006). In this study the two processes were considered as co-evolving. This perspective resulted in the recognition, that although domestication in a social sense (for example regulation of access and ownership) can be considered a first essential phase of domestication, it is not ‘automatically’ followed-up by subsequent domestication phases in an ecological and biological sense (for example plantation development and species enrichment). Whether such progression from the first phase (‘social’ domestication) to the next ones (‘ecological and biological’ domestication) will take place, is determined by the types of existing institutional arrangements, their dynamics, and their interaction that govern both resource and market access. The institutionalization of social controls over access to resources, labor and markets may involve either the state, companies and/or local people. Depending on the nature of such institutional mixes, the exploitation arrangements may either promote or deter resource management. This implies that institutionalization of NTFP production in a way that neglects the various groups of resource users especially local

communities may result in resource degradation rather than enhancement. An example is ineffective state control over resources, which may lead to an open access regime, without strengthening the resource base through plantations and/or species enrichment.

Role of NTFPs in livelihoods

In several studies on the role of NTFPs in rural livelihoods, various strategies for incorporating these products in the livelihoods systems have been identified. Usually, much attention is given to relate the different livelihood practices to the economic characteristics of a species (e.g. Belcher et al., 2005) and to the access to markets (e.g. Belcher and Schreckenberg, 2007; Ros-Tonen and Kusters, 2011). As indicated by this study, the role of the gum and resin products in the livelihood strategies of rural households does not only depend on their economic value, but also on the tenure regulations for accessing the resources and the manner in which the market of gum and resin is controlled by both formal and informal bureaucratic institutions. This study, therefore, contributes to the existing NTFP literature by uncovering the fact that it is not the (high or low) value of the product in itself that determines the role of an NTFP in the livelihoods strategies of households, but rather the degree of their embeddedness in the households' economic strategies as well as the types of institutions that determine resource and market access..

Institutions on NTFP use and management

In a recent textbook on NTFP regulation, conceptualized as NTFPs governance, this concept is identified as referring not only to the combination of governments regulations and laws, but also to political, institutional, and cultural frameworks through which diverse interests in NTFPs are coordinated and controlled (Laird, 2010, p. 6). The institutional and cultural frameworks include both formal public institutions and informal institutions that exist in rural communities. Notwithstanding this characterization, that was also used in this study, the cases in the textbook mostly involve descriptions of NTFP policy and law. This illustrates that the role of informal and customary institutions is still given limited attention in many NTFP studies. Moreover, the book also devotes little attention to the role of market institutions in NTFP governance. This study therefore tries to contribute towards a better understanding of the nature of: (1) formal institutions in the form of both rules of the game of government and marketing organisations and of civil society organisations, and (2) informal institutions in the form of local customary rules and norms as well as of socially-embedded practices of local bureaucrats. This approach conforms with recent approaches in studying forest governance (e.g. Gibson et al., 2000; Lemos and Agrawal, 2006; De Koning, 2011). The role of what Larson and Ribot (2007) characterized as 'double standards on an uneven playing field' has still received little attention in studies on NTFP governance.

Interaction between formal and informal institutions

As demonstrated by our research findings, the different categories of institutions constituting NTFP governance are not just co-existing, but they interact. It is often assumed that formal institutions affect the performance of the informal institutions. But recent studies on forest

governance show that informal institutions also reshape the formal ones (Gibson et al. 2000; Mwangi, 2009; De Koning, 2011). Informal institutions are often represented in terms of socially sanctioned norms of behavior (e.g. attitudes, customs, taboos, conventions, and traditions). Jütting et al (2007) argue that informal institutions also comprise of extensions, elaborations, and modifications of formal rules outside the official framework. Although such informal institutions have been given due attention in political sciences (cf. Helmke and Levitsky, 2004; Jütting et al., 2007), the informal bureaucratic institutions and their interaction with the formal rules has received little attention in forest governance studies in general and in NTFP governance analyses in particular. This study therefore illustrates the importance of taking the interactions between formal and informal institutions into account in studying forest and NTFP governance.

Normark (1996) show that cooperatives play important role in counteracting the oligopoly and monopsony market structure. Although gum and resin cooperatives as interface between formal and local institutions emerged as an alternative arrangements for gum and resin governance, their impact fall short in expectation due to the dominance of informal bureaucratic norms and rules in their use and management. Rather than counteracting oligopoly and monopsony, the gum and resin cooperatives themselves have become monopsonist.

FINAL CONCLUSION

The ABC woodlands and the related gum and resin resources in the drylands of Ethiopia are subject to two contrasting processes: degradation and domestication. The first process dominates; this is due to the lack of appropriate institutions that regulate resource and market access and downplay the competition of alternative land use options, like agriculture. There exist a variety of production systems, but most are in an early phase of domestication. This is the result of the prevailing gum and resin governance system which consists of a variety of interacting institutional arrangements for exploitation. Due to the dominance of the previous concession arrangements for commercial firms and due to the current dominance of concession arrangements for cooperatives, the exploitation arrangements often offer limited access of individual smallholder producers to the resources and the markets for individual smallholder producers. This limited access for local people has hampered their ability and willingness to invest in more intensive and sustainable production systems.

The different governance arrangements are characterized by the dynamic interaction between formal and informal institutions. This has resulted in a regional differentiation in exploitation arrangements. In south Ethiopia gums/resins are utilized in the absence of traditional and formal institutions that govern access to ABC resources and their respective markets. But the formal and traditional community institutions interact in a competitive manner at the level of the overall pastoral land-use system, favouring the conversion and privatization of the ABC woodlands. In north Ethiopia gum and resin exploitation is characterized by competing

interaction between state regulations enacted for gum and resin trees, informal bureaucratic rules and norms, customary institutions for individualizing ABC woodlands, and state regulations across sectors. Informal bureaucratic rules and norms at local level are the dominant rules-in-use, whereas formal government regulations did not result in improved management. Only few customary norms and rules that affect resource and market access for gum and resin products have been developed.

The role of gum and resin in the livelihood strategies of local people varies. It does not only depend on the nature of the socio-economic position of households or on the economic value of the ABC resources themselves. It also depends on the degree of embeddedness of ABC resources in multi-livelihood activities of the households as well as on the institutional arrangements in place that impact on resource and market access.

In view of the current degradation of the Ethiopian woodlands, sustainable production of gum and resin will be less likely if the current process of gum and resin utilization continues. Enriching the resource base by conservation and planting is essential. Such resource enrichment activities should be combined with the design and strengthening of appropriate governance arrangements. The stimulation of more effective exploitation arrangements for improved production and management of the gum and resin resources should be based on a diversified governance approach, which reflects the region-specific institutional constraints and dynamics as well as the prevailing livelihood systems. The following region-specific governance approaches are suggested for stimulating sustainable use and management of the gum and resin resources in Ethiopia:

Co-management between state and local communities in Abergelle

Gums and resins are important products in the livelihoods strategies of the households in Abergelle. They generate cash income that supplements subsistence oriented livelihood systems. The use of gum and resin producing resources in Tigray have been dominated by formal state regulations for more than six decades. Currently, formal rules and regulations that favour gum and resin production and marketing by smallholders and cooperatives as well were enacted. As a result, co-management of the AB resources between state and local community is being practiced in the region. However, the evolving co-management governance which is characterised by limited participation of local people, dominance of informal bureaucratic norms and rules, and driven by utilization rather than developing the resource base (Chapter 2, 4 and 6). The prevailing institutional arrangements need to be restructured in such in a way that the local people can better participate in their utilization and management. The implementation of the macro-level regulations enacted for AB management should be strengthened by giving more attention to the provisions aimed at facilitating participation by smallholders. This might stimulate local people to put more efforts in co-management of the resource as well as employ their own motivation and creativity in further domesticating the ABC species.

Traditional institutions based governance in Borana

The Borana area is famous for the well-established traditional institutions for natural resources management. Here gum and resin utilization is also complementary to livestock production, for the ABC trees provide shade and browse. Gum and resin production also supplement the predominantly pastoral based livelihood systems in times of drought. Nevertheless, the Borana range lands have been exposed to variety of external interventions. Gum and resin production is also being formalized. The cooperative arrangements for production and marketing are important in this regard (Chapter 2, 3 and 6). Besides, the range lands and the ABC species are being utilized for non-gum and non-traditional uses. As a result, managing the ABC species as part of the entire range lands without introducing institutions specific to them is not enough for sustaining their use. This calls for the need to strengthen the traditional range land management system. This is also justified by interconnectedness of gum and resin production with the major livelihood activity, pastoralism, in Borana. Since the *gada* institutions do not have rules and norms that control access to the ABC resource base, supplying institutions specific to them is crucial. The concessionary arrangement for gum and resin utilization exercised in north Ethiopia, and that grants lease rights on the ABC woodlands to companies and local cooperatives, may however conflict with the traditional resource management institutions. Hence, it should not be further stimulated in Borana. On the contrary, by all types of formal interventions, the existing traditional natural resources management systems in Borana should be respected and build up on.

Public-private partnership in Metema

In Metema and Quara local people do not attach any livelihood role to the gum and resin resources since the residents originated from the highlands of Gondar and Wollo, where mixed farming is an age old and honoured vocation that entrenched into the culture of the society. Other occupations particularly gum and resin production are considered as low status jobs. Here the ABC trees are cut like any other tree. Besides, cutting trees and expanding farmlands in the area is both tradition and common practice supported by the customary institutions for individualizing farmlands such as *Mate Qedem* and *Mofer Zemet* (Chapter 2, 4, and 5). Therefore co-management of the ABC resources may not be a viable option for gum and resin governance in both areas. Instead a public-private partnership for gum and resin governance can be one. However, this partnership should not be similar to the existing arrangement currently practiced in Metema and Quara. Rather an improved arrangement should be developed with the following preconditions: (a) well defined boundaries between *Boswellia* stands on public lands and communal/private lands, (b) reinvestment of the benefits arisen from the use and management of ABC resources in their conservation and development as well as in community services and local infrastructure, and (c) involvement of the concessionary organizations in further developing the resource base.

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Summary

Dry woodlands comprise the largest forest resources in Ethiopia. An important feature of these forests is their richness in *Acacia*, *Boswellia* and *Commiphora* (ABC) species that produce gum and resin. Gums/resins significantly contribute to rural livelihoods, the national economy, and ecosystem stability. Their contribution to local livelihoods is in terms of both cash income and subsistence value. In different parts of the country they contribute up to one-third of the annual household income. Currently, an estimated US\$12 million gum and resin are consumed locally, the rest is exported. During the 2007/08 fiscal year, Ethiopia earned a revenue of about US\$7.7 million from this export. However, the woodlands and the ABC species are under intense pressure. Especially in the traditional production areas in north Ethiopia the pressure is high and the policies that were enacted to shape their use and management have not been very effective. The main objective of this study is to investigate how gum and resin utilization and management is carried out in the drylands of Ethiopia and what processes affect this. The following four questions were addressed: (i) What types of gum-resin woodland management and production systems are present in Ethiopia and how are they related to the land-use and socio-political conditions?, (ii) What dynamic processes in institutional arrangements and gum-resin production and management have occurred in various regions of Ethiopia?; (iii) How do multi-level formal and informal institutions interact and affect gum and resin production and management?, and (iv) How does gum-resin utilization fits into the livelihoods strategies of households in the study areas?

The study is based on a multi-theoretical approach giving attention to both diversity and dynamics in ABC woodlands production systems, institutional diversity and interaction regarding the governance of ABC resources, and the role of gum and resin in the livelihoods strategies of the households. The study design consisted of a comparative case study of three regions in north (Abergelle), northwest (Metema and Quara), and south Ethiopia (Borana). The three locations are characterized by ecological and socio-economic differences as well as a different history of gum and resin production. A two-phase research approach consisting of a base-line survey and a systematic household survey was used. The base-line survey served to assess the local socio-economic, institutional and land-use conditions; data were collected through open interviews with groups and key informants. The household survey served to obtain further detailed information on the ABC production conditions and the role of the products at household level. The survey included 327 respondents; it was follow-up by feedback meetings with groups of participants to check and validate the main issues that emerged from it. The qualitative data from key informant interviews and focus group discussion were transcribed, categorized, and interpreted. The data from household survey was analysed using descriptive statistics and mean comparisons in SPSS.

Chapter 2 discusses the diversity in gum and resin management and production systems and how different exploitation arrangements are related to different phases of resource domestication and/or degradation. Seven presently existing production models are identified. In south Ethiopia pastoral people mainly collect the products in the form of ooze from

natural vegetation. In north Ethiopia the production is part of mixed farming practices or is done by externally hired laborers. Production is done by tapping wild trees. Despite decades of production history in this region, the species is not cultivated and hardly domesticated in an ecological or biological sense. The production systems gradually evolved from open-access extraction of wild trees to a controlled production in assigned forest plots. This institutionalisation of access rules concerns a process of domestication in a social sense. However, this process is not yet very effective; the ABC woodlands are often subject to serious degradation as a result of competing land-use practices and inappropriate social arrangements for production and trade of the gums/resins. These findings show that the nature of domestication in a social sense determines whether forests and/or specific forest resources can be further domesticated in an ecological and biological sense resulting in intensified management and resource enrichment, or whether they are subject to degradation.

Chapter 3 and 4 elaborate how gum and resin production is shaped in the different parts of Ethiopia by the location-specific interaction between formal and informal institutions. Chapter 3 discusses how gum and resin production and marketing in Borana is related to the interplay between well-established traditional land-use institutions and external institutions. Both the traditional and external institutions do not explicitly control access to the gum and resin production system, but under traditional conditions gum and resin extraction was embedded in a strong customary system for controlled pastoral land use. The traditional institutions did not developed rules and norms regulating market access. The external institutions impacted gum and resin production mainly by creating access to markets, but this has not yet had much impact on the actual exploitation arrangements. The woodlands are experiencing increasing pressure due to the increase in non-traditional and non-gum and resin based livelihoods activities that negatively affect ABC woodlands. Also, the traditional natural resources management institutions are weakened due to modernization processes and contribute at present little to sustainable use and management of gum-resin resources. This situation calls for either revitalizing the traditional range land management system, or generating institutions specific to ABC species that integrate the customary and external institutions.

Chapter 4 discusses the nature and interactions of formal and informal institutions concerning the AB resource use and management in the north and northwest Ethiopia. Existing government regulations recognize gum and resin production and marketing by both smallholders, cooperatives, and companies. However, in practice gum and resin production and marketing by smallholders is restricted. This is the result of informal bureaucratic institutions that act as rules-in-use regarding gum and resin production and marketing regardless of whether they contradict with the regulations of federal and regional states. Moreover, the customary rules and practices and the sectoral government policies often compete with the formal regulations for ABC species use and management. The interaction between government regulations and informal institutions is generally competing; this often results in indiscriminate tree cutting and woodland conversion. The situation requires

harmonization of the formal and informal institutions and coordination of institutions across sectors.

Chapter 5 discusses the relationship between gum and resin production and the livelihood systems of local producers. Both the livelihoods systems and the contribution of the multiple activities to cash and total income vary among the study areas. In Borana the use of gum and resin is part of a predominantly pastoral livelihood system with gum and resin acting as supplementary cash crops or safety nets in times of emergency. In Abergelle the production fits into a diversification strategy with gum and resin exploitation forming a component of a mixed farming system. In Metema local farmers were not involved in gum and resin exploitation; here production is a specialized activity of commercial enterprises using laborers from outside the region. The findings show that not only the value of the ABC resources, but also the degree of the embeddedness of the product in multi-livelihoods strategies of the households as well as the institutional arrangements that govern production system and market access are important regarding how these products fit into the livelihoods strategies of the households.

Chapter 6 brings all the information together and further assesses the nature of the different institutional arrangements for gum and resin exploitation, and their dynamics and interaction. It also elaborates the relation between the status of ABC resource domestication and their exploitation arrangements. The process of organizing gum and resin utilization followed different pathways in north and south Ethiopia. In the south it started as the collection of products for chewing gum for subsistence use; later it was marketed as a coping mechanism during periods of livelihood stress. In contrast to these endogenous developments, in the north the production was introduced by external private and state companies. Only gradually also some informal systems of private exploitation evolved. After 1990 cooperatives took over many of the concession areas of the commercial companies. This cooperative movement also was introduced in the south. As a result of these location-specific dynamics in organizing the production, six exploitation arrangements evolved. These arrangements differ with respect to whether their organization is company-based, cooperative-based or privately based, and are characterized by different rules and regulations regarding access to resources and markets, and the type of labor used for production. In all study areas the exploitation arrangements co-exist with a growing importance of the cooperative arrangements. The institutional arrangements are not conducive to stimulate intensification of production, rather they may limit local participation and endogenous development of informal and location-specific institutions. Moreover, the effectiveness of the exploitation arrangements may be limited as a result from competing development policies and programmes aimed at other land-use sectors. These findings further illustrate that the limited progress in ABCs domestication greatly depends on the nature of institutional arrangements for access to resources and markets, the relation of formal and informal institutional arrangements, and development policies.

In chapter 7 it is concluded that the use and management of the ABC species in Ethiopia is very diverse both in terms of production systems, institutional arrangements for exploitation, and roles in local livelihoods. The nature of location-specific production systems is greatly affected by the local system for ABC governance. Such a system involves a complex set of both formal and informal institutions at both government level and local level. The informal institutions do not only include customary institutions of local communities, but also informal rules-in-use of local bureaucrats. The historic process of institutionalisation of ABC governance differs between regions. Depending on local land-use conditions and government policies, different exploitation arrangements have been developed based on either company, cooperative or private control over the production, labor and marketing. But despite of this diversified stage of domestication in a social sense, the production systems are still in an early phase of domestication in ecological and technical sense and intensified production through tree cultivation or plantation establishment has hardly been developed. Several gum and resin production systems are even subject to serious degradation due to the inappropriate nature of, and sometimes even competition between, the exploitation arrangements, as well as the economic position of the ABC resources in relation to other forms of land-use. The complex pattern of institutions governing the production of gum and resin also impacts on the role that the resources play in local livelihoods. Both the role of gum and resin production in the prevailing land-use conditions and the degree of control on market and resource access determine how the gum and resin fit into the livelihood strategies of the households. As the governance of gum and resin production involves a complex, diverse and dynamic web of formal and informal institutions, it will not be effective to stimulate production as a means for both sustainable forest use and livelihood improvement by a generic development policy. Rather a diversified and regional-specific approach is needed that builds upon the location specific characteristics of the gum and resin production systems and exploitation arrangements.

Samenvatting

Het merendeel van de bossen in Ethiopië bestaat uit droge bossen. In deze bossen komen diverse boomsoorten voor van de geslachten *Acacia*, *Boswellia* en *Commiphora*. Deze soorten produceren gommen en harsen, waaronder wierook. De bomen dragen bij aan de ecologische stabiliteit, en hun producten dragen bij aan zowel de lokale levensomstandigheden en de nationale economie. De gommen en harsen dienen voor het eigen gebruik van de lokale bevolking en voor de verkoop. In verschillende gebieden leveren deze producten tot een derde van het jaarlijkse gezinsinkomens op. Het jaarlijkse binnenlandse gebruik heeft een geschatte waarde van US\$12 miljoen. In het fiscale jaar 2007/08 droeg de export US\$7.7 miljoen bij aan het nationale inkomen. Echter, zowel de droge bossen en de gom/hars producerende bomen staan onder grote druk. Met name in het traditionele productiegebied in Noord-Ethiopië is deze druk groot. De beleidsmaatregelen ter regulering van het gebruik en beheer van deze natuurlijke hulpbronnen zijn niet erg effectief. De doelstelling van deze studie is te onderzoeken hoe het gebruik van gommen en harsen is georganiseerd, hoe de droge bossen worden beheerd en welke processen daarbij een rol spelen. Het onderzoek richt zich op vier vragen:

- (i) Welke typen van beheer en gom/hars productie komen er voor in Ethiopië en hoe zijn zij gerelateerd aan landgebruiksystemen en sociaal-economische omstandigheden?
- (ii) Welke veranderingen in de institutionele kaders, in gom/hars productie en in beheer zijn er opgetreden in verschillende gebieden in Ethiopië?
- (iii) Welke interacties bestaan er tussen de verschillende niveaus van formele en informele instituties die ten grondslag liggen aan de productie en het beheer van deze natuurlijke hulpbronnen?
- (iv) Welke rol spelen deze natuurlijke hulpbronnen in de strategieën voor levensonderhoud van lokale huishoudens?

De studie is gebaseerd op een multi-theoretische benadering met aandacht voor zowel de diversiteit en dynamiek van de gom/hars productie, de diversiteit in en interactie tussen instituties op het gebied van die productie, en de rol van de producten in lokale huishoud strategieën. De studie had het karakter van een vergelijkende case-study verspreid over drie regio's in Noord (Abegelle district), Noordwest (Metema en Quara district) en Zuid Ethiopië (Borana district). Deze drie gebieden verschillen in ecologisch en sociaal-economisch opzicht van elkaar en hebben een verschillende geschiedenis ten aanzien van gom/hars productie.

In alle gebieden werd eerst een verkennende base-line survey uitgevoerd en vervolgens een systematische huishoud survey. De base-line survey had tot doel om de lokale sociaal-economische condities, institutionele condities, en de lokale landgebruiksystemen te karakteriseren. Gegevens werden verzameld via open interviews met focus groepen en lokale experts. De kwalitatieve gegevens van de interviews werden eerst uitgeschreven, en daarna gecategoriseerd en geïnterpreteerd.

De huishoud survey had tot doel om meer gedetailleerde gegevens te verzamelen over de productie omstandigheden voor gom/hars en over de betekenis van deze producten voor de lokale huishoudens. Aan deze survey werd deelgenomen door 327 respondenten. De interviews werden opgevolgd door een terugkoppelings-bijeenkomst met de respondenten ter controle en validatie van de belangrijkste uitkomsten van de interviews. De gegevens van de interviews werden statistisch geanalyseerd met behulp van SPSS.

Hoofdstuk 2 beschrijft de diversiteit in vegetatiebeheer en productie van de gom/hars en analyseert hoe de verschillende vormen van exploitatie zijn gerelateerd aan verschillende fasen van domesticatie en/of degradatie van de natuurlijke hulpbronnen. In het studiegebied werden zeven vormen van gom/hars exploitatie aangetroffen. In Zuid Ethiopië worden deze producten hoofdzakelijk in het wild verzameld door veehouders tijdens het hoeden van vee. In Noord Ethiopië vindt de exploitatie plaats door het tappen van natuurlijk voorkomende bomen. De productie is een onderdeel van gemengde landbouwsystemen van lokale boeren. Daarnaast wordt de productie ook uitgevoerd door arbeiders die in dienst zijn van commerciële bedrijven, die concessie rechten van de overheid hebben verkregen. Ondanks de lange geschiedenis van productie in dit gebied, zijn de bomen nog nauwelijks gedomesticeerd in ecologisch of biologisch opzicht. De productie is nog nauwelijks geïntensifieerd door de ontwikkeling van meer-productief bos of agroforestry systemen en/of gebruik van morfologisch of genetisch aangepaste bomen. Wel zijn de productiesystemen geleidelijk geëvolueerd van ongecontroleerde gom/hars extractie naar gecontroleerde productie in daartoe aangewezen bosgebieden. Deze institutionalisering van toegangsrechten kan beschouwd worden als een vorm van domesticatie in sociaal opzicht. Dit proces is echter nog weinig effectief, en de bossen zijn vaak ernstig gedegradeerd als gevolg van conflicterende vormen van landgebruik en slechte toepassing van de regels voor productie en verkoop. Uit deze onderzoeksresultaten valt op te maken dat met name de aard van domesticatie in sociaal opzicht bepaalt in hoeverre bossen of specifieke boomsoorten ook gedomesticeerd kunnen worden in ecologisch en biologisch opzicht, en in hoeverre er sprake is van intensivering in productievermogen of van bosdegradatie.

In hoofdstuk 3 en 4 wordt de invloed van de formele en informele instituties en hun interacties op de gom/hars productie verder gedetailleerd. Hoofdstuk 3 beschrijft hoe de productie en verkoop van gom/hars in Borana (Zuid Ethiopië) wordt bepaald door de interactie tussen het sterk ontwikkelde traditionele systeem voor landgebruik en de externe instituties voor plattelandsontwikkeling. Zowel de traditionele en de externe instituties zijn niet speciaal gericht op gom/hars productie. Oorspronkelijk was de gom/hars productie echter geïncorporeerd in een sterk ontwikkeld lokaal systeem voor pastoraal landgebruik. De regels betroffen voornamelijk de toegang tot graasgebieden en waterbronnen, maar niet de toegang tot markten. Recente ontwikkelingsprogramma's leggen veel nadruk op een verbetering van de markt voor gom/hars, maar hebben niet veel invloed op de exploitatie systemen. De bossen staan onder een toenemende druk als gevolg van de ontwikkeling van nieuwe vormen van levensonderhoud waarin gom/hars geen rol speelt. Ook neemt als gevolg van modernisering het belang van de traditionele instituties voor landgebruik af, waardoor deze weinig meer bijdragen

aan het duurzame gebruik en beheer van de bosvegetatie. De verdere ontwikkeling van meer duurzame systemen voor gom/hars productie zou gebaseerd kunnen worden op het opnieuw versterken van de traditionele organisatie voor lokaal landgebruik, of op de ontwikkeling van specifieke systemen voor gom/hars productie waarin elementen van het traditionele productiesysteem gecombineerd wordt met externe vernieuwingen.

Hoofdstuk 4 beschrijft de aard en de interacties van de formele en informele instituties in Noord en Noordwest Ethiopië. De huidige overheidsregulering erkent formeel de diversiteit aan exploitatie systemen van particuliere boeren, boerencoöperaties en commerciële firma's. In de praktijk zijn echter de mogelijkheden voor productie en verkoop door lokale boeren beperkt. Dit wordt veroorzaakt door informele instituties die in praktijk de regulering van gom/hars productie bepalen, ongeacht het feit of zij in tegenspraak zijn met de formele regelgeving van de overheid. Bovendien treedt er vaak een discrepantie op tussen de lokaal gebruikelijke regels en praktijken, de sectorale ontwikkelings-programma's van de overheid en de formele regelgeving voor het gebruik en beheer van gom/hars producerende bomen. De interactie tussen de overheidsregulering en de informele instituties is vaak van competitieve aard; dit leidt vaak tot ongecontroleerd kap van bomen en bosontginning. Het oplossen van deze problemen vereist een betere afstemming tussen de formele en informele instituties en een betere coördinatie van de sectorale ontwikkelingen.

Hoofdstuk 5 beschrijft de betekenis van gom/hars productie voor de huishoudens van de lokale producenten. Tussen de drie studiegebieden treden belangrijke verschillen op ten aanzien van zowel de huishoudstrategieën en de rol van de meervoudige huishoudactiviteiten bij het verkrijgen van een inkomen. In Zuid Ethiopië (Borana) is gom/hars productie een onderdeel van de hoofdzakelijk pastorale huishoudstrategieën. Deze productie geldt voornamelijk als een supplementaire activiteit voor het verkrijgen van een financieel inkomen, of als een verzekering voor slechte tijden, bijvoorbeeld als gevolg van droogtes. De productie in Noord Ethiopië (Abergelle) vormt een onderdeel van een diversificatie strategie, waarin gom/hars productie een onderdeel vormt van een gemengd landbouwsysteem. In Noordwest Ethiopië (Metema) zijn de lokale boeren niet betrokken bij de productie; de gom/hars productie vormt hier een gespecialiseerde activiteit van commerciële bedrijven die externe arbeiders gebruiken. De betekenis van gom/hars productie in de huishoudstrategieën van de lokale bevolking hangt dus niet alleen af van de waarde van de producten, maar ook van de mate van integratie van hun productie in lokale landgebruiksystemen en van de aard van het institutionele kader ten aanzien van hun productie en verkoop.

Hoofdstuk 6 brengt alle informatie samen en beschrijft de kenmerken van de verschillende institutionele arrangementen voor gom/hars productie en hun dynamiek en interactie in de verschillende gebieden in Ethiopie. Ook wordt de relatie tussen de mate van domesticatie en de aard van de exploitatie omstandigheden nader geanalyseerd. De organisatie van de exploitatie ontwikkelde zich in Noord en Zuid Ethiopië op een verschillende manier. In Zuid Ethiopië startte de exploitatie als een lokale activiteit gericht op lokaal gebruik. Geleidelijk werden de producten ook verkocht ter verkrijging van een inkomen voor het overleven van slechte tijden.

In tegenstelling tot deze lokale ontwikkeling werd de exploitatie in Noord Ethiopië geïntroduceerd door externe commerciële organisaties die concessierechten verkregen van de overheid. Geleidelijk ontwikkelde zich ook informele exploitatie-systemen van lokale boeren. Na 1990 werden veel concessiegebieden van de externe organisaties overgenomen door boerencoöperaties. Deze coöperatieve benadering werd later ook in Zuid Ethiopië ingevoerd. Als gevolg van de locatie-specifieke ontwikkelingen kunnen er thans zes verschillende vormen van productie onderscheiden worden. Deze verschillen ten aanzien van hun organisatievorm (bedrijf, coöperatie of particulier), de regels omtrent toegang tot producten en markten, en de inzet van arbeiders. In elk van de onderzoeksgebieden komen verschillende productie systemen naast elkaar voor; de coöperatieve systemen nemen in belang toe. De verschillende organisatievormen zijn niet effectief in het bevorderen van meer intensieve vormen van productie. In verschillende gevallen belemmeren zij lokale participatie en de ontwikkeling van lokaal aangepaste informele vormen van organisatie. De effectiviteit van de exploitatie wordt tevens belemmerd door een tegenstrijdig ontwikkelingsbeleid en conflicterende ontwikkelingsprogramma's voor andere vormen van landgebruik. Deze situatie vormt een verder verklaring voor de geringe mate van domesticatie van de gom/hars producerende bomen. Dit wordt in belangrijke mate veroorzaakt door de aard van de instituties, de regelgeving op het gebied van toegang tot natuurlijke hulpbronnen en de markt, de relatie tussen formele en informele instituties en het ontwikkelingsbeleid.

De resultaten van het onderzoek worden in hoofdstuk 7 samengevat. De resultaten geven aan dat het gebruik en beheer van gom/hars producerende bomen in de droge bossen van Ethiopië zeer divers is ten aanzien van zowel productiesystemen, institutionele kaders voor exploitatie en de rol van gom/hars productie in de lokale huishoudens. De aard van de lokaal-specifieke productiesystemen wordt in grote mate bepaald door de lokale systemen voor de regulering van gom/hars exploitatie. Deze systemen bestaan uit een complex van formele en informele normen en regels van zowel de lokale gemeenschap en de overheid. De informele regelgeving betreft niet alleen de traditionele normen en regels van de lokale gemeenschappen, maar ook de informele normen die de dagelijkse beroepsuitoefening van het lokale overheids personeel bepalen. De wijze waarop de regulering is ontwikkeld verschilt per regio. Als gevolg van de lokale verschillen in landgebruik en regio-specifiek overheidsbeleid hebben zich verschillende vormen van gom/hars exploitatie en productie ontwikkeld. De verschillende typen worden gekenmerkt door de mate van betrokkenheid van commerciële firma's, coöperaties of particuliere boeren bij de productie, arbeidsinzet en verkoop van de producten. Ondanks deze grote mate van diversificatie in de sociale organisatie van de productie, is de productie in technisch opzicht nog weinig geïntensifieerd. De verschillende productiesystemen bevinden zich in ecologisch en biologisch opzicht nog in een vroeg stadium van domesticatie en er zijn nog nauwelijks intensieve vormen van productie in de vorm van aanplant en boomcultivering ontwikkeld. Verschillende van de productiesystemen zijn zelfs onderhevig aan ecologische degradatie en terugloop van productievermogen. Dit wordt veroorzaakt door het ineffectieve complex van regelgeving, waarbij soms competitie optreedt tussen verschillende vormen van regelgeving, en de economische waarde van de productie in verhouding tot andere vormen van landgebruik. Het complexe systeem van regelgeving voor de gom/hars productie heeft ook

gevolgen voor de betekenis van deze producten voor de lokale huishoudens. Er bestaan verschillende huishoudstrategieën die worden bepaald door de rol van de gom/hars producerende bomen in het lokale landgebruikstelsel, en de mate van lokale controle op de toegang tot de producten en hun markten. Omdat de regulering van gom/hars exploitatie gekenmerkt wordt door institutionele complexiteit, diversiteit en dynamiek en interactie tussen formele en informele instituties, is het niet zinvol om het stimuleren van de productie als middel voor duurzaam bosbeheer en armoedebestrijding te baseren op een generieke ontwikkelingsstrategie. Er dient een regionaal-specifiek beleid ontwikkeld te worden dat aansluit bij de bestaande, historisch ontwikkelde, locatie-specifieke vormen van gom/hars exploitatie en productie.

About the Author

Teshale Woldeamanuel was born at Shinshicho, Southern Ethiopia on 24th of June 1976. He received his undergraduate studies at Faculty of Forestry, Alemaya University of Agriculture and graduated in 1997 with great distinction and award of Gold Medal. Then he worked as a graduate assistant at Wondo Genet College of Forestry since September 1999 as a graduate assistant until he joined Agricultural Economics and Management department, Wageningen University in September 2001 for his MSc studies. He specialized in Agricultural Development Economics and wrote a Masters thesis entitled 'Subsistence farmers rationales in switching to commercial agriculture: the case of small farmers at Wondo Genet, South Ethiopia'. After his graduation in June 2003, he was reinstated as a lecturer at Wondo Gent College of Forestry, Hawassa University. He also coordinated the Continuing Education Programme of the College from September 2003 to December 2006. In January 2007 he started his PhD research on dryland resources, livelihoods and governance at the Forest and Nature Conservation Policy and Forest Ecology and Forest Management groups, Wageningen University. Particularly, his research focused on diversity and dynamics in use and management of gum/resin trees in Ethiopia. After his return, Teshale will work as an assistant professor at Wondo Genet College of Forestry and Natural Resources, Hawassa University.

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Completed Training and Supervision Plan



Wageningen School
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Description	Department/Institute	Year	Credits
I. General			
CERES orientation program	CERES, Utrecht	2007	5.0
Literature review and proposal writing	Wageningen University	2007	6.0
FNP and FEM Research Seminar	Wageningen University	2008/09/10	4.0
Ceres Summer School 2008/2009	Nijmegen University	2009	3.0
Ceres Summer School 2009/2010	ISS, The Hague	2010	1.0
II. Research Methods and Techniques			
Complexity in and b/n social and ecosystem	CERES, WUR	2007	3.0
Interdisciplinary and Transdisciplinary Research: Intersession and Communication Skills	Wageningen University	2009	1.3
III Academic skills			
Community Based Conservation and Rural Development	Wageningen University	2007	3.0
Institutional Economics and Economic Organization Theory	Wageningen University	2010	3.0
IV. Seminars and Workshop Presentations and Attendance			
Institutional analysis of gum and resin producing trees utilization and management in Borana. In National Workshop on FRANKincense, Myrrh and gum arabic: sustainable use of dry woodland resources in Ethiopia (FRAME), Ethiopia	Ethiopian Institute of Agricultural research Addis Ababa, Ethiopia	2008	2.0
Local processes of gum-resin utilization and management. In Decentralization, Power and Tenure Rights of Forest Dependent People Symposium.	Dahod, India	2009	2.0
Facilitation and presentation at the workshop 'Building Future Scenario for the future of dry forests in Borana, Ethiopia'	Borana, Ethiopia	2010	2.0
Facilitation and presentation at the Workshop 'Building Scenario for the future of dry forests in Metema, Ethiopia'	Metema, Ethiopia	2011	2.0
Dryland resources, livelihoods and sustainability. In National Workshop on FRANKincense, Myrrh and gum arabic: sustainable use of dry woodland resources in Ethiopia (FRAME), Ethiopia	Ethiopian Institute of Agricultural Research, Addis Ababa, Ethiopia	2011	2.0
Total			39.3

The FRAME project

FRAME: Frankincense, Myrrh and gum arabic: sustainable use of dry woodland resources in Ethiopia

More than half of the total land area in Ethiopia is covered by arid to semiarid woodlands with marginal agricultural potential. These woodlands are commonly overexploited for their natural resources, which reduces the local livelihood options for a rapidly expanding population. Climate change (e.g. drought) may intensify this negative trend. Consequently, there is an urgent need for improved land-use strategies that will make the vast arid and semiarid woodland resources optimally contribute to the livelihoods of local people and national development goals.

The dry woodlands in Ethiopia are not resource poor as they host several woody species that hold economically well recognized aromatic products such as gum arabic, frankincense and myrrh, which are widely used locally and in several of today's commercial industries such as cosmetic, pharmacological and food industries. Frankincense and myrrh are among the oldest internationally traded commercial tree products. Ethiopia is worldwide the main producer of frankincense and myrrh, and exports much gum arabic. Gum/resin production could significantly contribute towards sustainable development of these dry woodland areas. However, the overexploitation of natural resources by intensive grazing and intensive resin/gum harvesting and the lack of land management threatens the sustainability of the woody vegetation, and as a result of that also the long-term gum/resin production. Local communities may also enhance the productive capacity of the natural vegetation by establishing protected enclosures and by cultivation of trees. Such production systems may have a lower status regarding biodiversity and natural ecosystem functioning, but maintain ecological buffering capacity and improve production for human benefit.

The FRAME program addresses the following main research question: in what way dry land forests in Ethiopia can be made productive while maintaining ecosystem integrity in terms of sustainability of production and vegetation cover, with special attention to resin and gum resources?

FRAME uses a multidisciplinary approach involving scientific disciplines ranging from landscape-level geo-information studies to village-level socio-economic studies, plot level ecological and harvesting technology studies to tree-level ecophysiological studies with a strong contribution of local knowledge in answering the central research question. FRAME thus establishes a scientific basis for the sustainable management, including cultivation, of gum and resin yielding tree species and their habitat, the dry woodlands in the Horn of Africa. FRAME is actually involved in development of long-term scenarios for proper use and selection of suitable areas of dry woodland resources in Ethiopia.

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