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The Implications of Formal and Informal Institutions on the Conservation of On-farm Trees

An analysis from the Department of Mirriah, Republic of Niger

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Master Thesis in Geography, 30 credits
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Abstract

In light of an observed increase in vegetation cover or “re-greening” on a broad scale in the West African Republic of Niger, this thesis presents two villages from the department of Mirriah which, despite territorial proximity, face differences in the regeneration of on-farm trees. In order to understand potential drivers and barriers to the adoption of agro-forestry measures, this thesis aims at exploring the factors that influence the management of land and on-farm trees by small-scale Hausa farmers in both villages. Based on the theory of Institutional Ecological Economics and following the Institutional Analysis and Development (IAD) Framework, the paper analyzes the interaction between customary land use systems and formal institutions.

The comparison between mainly qualitative data gathered in a ten-week field study conducted in autumn 2009 and Niger’s environmental legislation reveals that statutory provisions are at clear variance from customary resource management practices. The study finds that the resources trees and land cannot be regulated as separate entities, because land tenure arrangements largely influence tree management. An analysis of semi-structured household interviews by means of logistic regression shows that land ownership increases the likelihood to plant trees, but does not influence farmers’ willingness to care for the resource. Yet, tree planting and conservation efforts are counteracted by current forest policy. The study concludes that the devolution of tree management and control rights from the national government to the examined village communities seems crucial if farmers are to sustain their resource stock.

Keywords: *property rights; devolution; re-greening; Niger; Sahel; logistic regression; IAD Framework; institutions; agro-forestry; customary land use*

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Introduction

According to the Human Development Index (HDI) issued by the United Nations Development Program, the West African Republic of Niger is one of the world's poorest countries (UNDP 2010). Poverty is not only expressed by extremely vulnerable and precarious living conditions, but a prevailing lack of natural resources¹ such as arable land and freshwater. The country is located in the Sahel zone which lies at the fringe of the Sahara desert and is characterized by low and highly erratic rainfalls, low bio-productivity and periodically occurring droughts – constraints that render rain-fed agriculture and livestock rearing very difficult. Yet, more than 90 percent of Nigeriens are small-scale subsistence farmers or pastoralists. Particularly for farmers, trees not belonging to the category of forests but growing on agricultural land ("on-farm trees") play an important role (Bellefontaine et al. 2002): They do not only prevent soil erosion, but provide a wide range of ecosystem services such as food, feed and nitrogen fixation. The purchase of firewood and non-timber products has the potential to diversify incomes and reduce the dependency on rain-fed agriculture. Hence, rural societies and trees are closely and dynamically linked.

However, during particularly severe drought periods from the early 1960's to the late 1980's – referred to as "Sahelian crisis" (Mortimore & Adams 2001) – tree cover and soil fertility have declined substantially. The crisis led to a vast scientific discourse on a human-driven desertification, whereas land clearance and overgrazing were considered main drivers for resource depletion (Hulme 2001; Nicholson 2001). A high population growth of more than three percent per year (World Bank 2009) puts an additional pressure on the fragile natural resource base, and acts as driver of land cover change.

Against this background it seems surprising that a considerable number of researchers report an increase in vegetation cover or "re-greening" for the last 20 years (Herrmann & Hutchinson 2005): Satellite images reveal bigger patches of biomass rehabilitation in the southern fringe of the country where population density is highest. An in-depth literature study gives reason to believe that this phenomenon can largely be traced back to the community forestry program Farmer Managed Natural Regeneration (FMNR). Its proponents claim that the introduction of soil and water conservation (SWC) techniques and agro-forestry measures have led to the rise of 200 million trees at an area of more than 5 million hectares, thereby increasing crop yields and soil fertility (Lawarnou et al. 2006; Tougiani et al. 2009; Reij et al. 2009). The introduction of so called Rural Wood Markets might have had a positive effect on vegetation cover as well (Mahamane et al. 1995; Noppen et al. 2004). Both projects were initiated by external donors in light of the desertification discourse and implemented from the late 1980's in Southern Niger. Particularly FMNR considered the protection of trees on agricultural land as basis for poverty reduction and soil fertility increase. The projects might not have been as successful, however, if they had not been accompanied by major changes in natural resource legislation: Due to paradigm shifts on the international agenda from the late 1980's, the participation of rural communities

¹ The term "natural resources" is used in this thesis to refer to renewable resources as components of living ecosystems. The term may also include nonrenewable mineral resources, which are not addressed here.

in natural resource governance became a mantra in order to assure the sustainable management of the natural environment (Thomson 1996a; Ribot 1999; Hilhorst 2008). The centralized forestry policy at the expense of customary usage systems – introduced with colonialism from 1935 and continued during post-independence governments – was increasingly considered inefficient. Legislative reforms throughout the 1990's thus focused on the decentralisation of national authority to local² governance bodies and the partial devolution of resource management and control rights to local communities, as in the case of FMNR and Rural Wood Markets.

This development provides the background for my thesis. The apparent success of the above mentioned programs does not only highlight the importance of a better understanding of the ecological and economic function of trees in integrated land use systems, and for the improvement of livelihoods in rural Niger. It furthermore opens up for a discussion about interactions between forest policies and customary resource management practices as well as the most appropriate form of governance to sustain on-farm trees, and to adopt agro-forestry measures. To this end, **this thesis aims at exploring the factors that influence land use and tree management by Hausa farmers in two village communities.** These are Goulouske and Garin Tsangaya in the department of Mirriah, Zinder region (see 2.1.1 and 4.1), with the first village apparently subject to re-greening, and the latter one degrading.

Key to my analysis is the institution of resource tenure rights. Assuming that the study villages are functional social-ecological systems³ that are embedded into different levels of organization (Hanna & Jentoft 1997; Folke et al. 2005), this thesis builds on the **theory of Institutional Ecological Economics** that helps to explain interactions between rural actors, the physical environment, and institutional settings. Following this theory (see 1.1), **I hypothesize that the interaction between (A) customary land use and management systems and (B) legally codified or formal institutions is a determinant for the state of a natural resource,** namely on-farm trees.



Map 1: Republic of Niger
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The thesis is structured as follows. Firstly, the theoretical background underlying this work is presented. Secondly, the methodological considerations and research logic underlying ten weeks of field work in 2009 are described. Thirdly, I shall elaborate on the analysis of mainly qualitative data gathered. Before presenting my study results, I will shortly provide the reader with a background on the socio-economic as well as biophysical features of Niger. A summary of both the desertification and re-greening debates shall highlight the

² Geographically, the notion of 'local level' is variable. Generally it is lower than the national and regional levels and corresponds to the municipal or district size (Alinon & Kalinganire 2008).

³ Instead of the conventional concept of 'socio-ecological' systems, Folke et al. (2005) use this term to emphasize the integrated concept of humans in nature and to stress that the delineation between social and ecological systems was "artificial and arbitrary": "Treating the social or ecological dimension as a prefix may give it less weight during the analysis" (p.443).

growing political recognition of on-farm trees for rural livelihoods. My field data are then presented in three consecutive steps: In chapter 3, I describe the rules on land and trees as codified in the environmental legislation of Niger. Because both resources are regulated in sectoral laws, a brief overview on the emergence of resource tenure rights in the country and potential barriers to local resource management practices shall be provided. Besides, authorities in charge for natural resources in my study region will be presented. In chapter 4, the setting of customary rules on usage and management of on-farm trees in two study villages is described, as well as the interaction between land tenure arrangements and tree management. Besides, modes of rule enforcement and sanctioning regarding on-farm trees are presented, whereby the potential impact of formal institutions on local management behaviour is analysed. In chapter 5, the findings will be summarized and discussed.

1. Methodology and theoretical considerations

1.1 Theoretical background: Institutional Ecological Economics

Considering the two study villages as social-ecological systems (Folke et al. 2005), people's behavior and livelihoods are dynamically linked with the natural environment. In order to analyze natural resource management on the local scale, an interdisciplinary approach is thus required. According to Ostrom's framework for the analysis of social-ecological systems (Ostrom 2009b), firstly the general ecological conditions need to be captured, i.e. how on-farm trees are affected by human impacts and natural variability. Second, the nature of the resource stock (amount, species variety) must be considered, its socio-economic and environmental implications, in addition to the way it is valued by different resource users and stakeholders. This in turn "determines use, management and tenure relations" which accompany the resource (Benjaminsen & Lund 2001: 7). Tyler (2006: 5) states that

"interactions between socio-economic systems and the natural environment are full of twists and turns - reflecting changing incentives afforded by markets and other institutions, and the dynamics of ecosystems themselves."

In the case of Niger we need to consider that land and trees growing on it are often sources of conflict and power struggles (Benjaminsen et al. 2008; Lavigne-Delville 1999), as they involve a combination of different resource user groups (e.g. nomadic herders or sedentary farmers), traditional chiefs and State authorities who are aiming at regulating access and control over resources (Williams 1998; Swallow et al. 1997; see chapters 3 and 4). Following this reasoning we can assume that resource management activities cannot be dealt with in isolation from the surrounding institutional context, but that management decisions and behavior of rural resource users are influenced by various incentives (Bromley & Cernea 1989). According to different reports on community land use in West Africa (Lavigne-Delville 1999; Mortimore & Adams 2001; Benjaminsen et al. 2008), resource management is embedded in social networks, with individual behavior being governed by self-imposed conventions, cultural or

religious norms and taboos (Ostrom 1990; North 1990), or so called informal institutions⁴. The way of using the environment is furthermore constrained by a set of formal institutions⁵ or socially recognized and written rules, laws and constitutions (Behera & Engel 2004). Rules are thereby defined as “generally agreed-upon and enforced prescriptions that require, forbid or permit specific actions for more than a single individual” (E. Ostrom 1986, cited in Schlager & Ostrom 1992: 250)⁶. Institutions in general “consist of cognitive, normative and regulatory structures and activities that provide stability and meaning to social behaviour” (Dick Scott, cited in Jentoft 1997). They include any kind of shared restraint that humans devise to shape day-to-day interactions in order to achieve settled objectives. Yet, objectives can only be achieved given an effectively implemented mechanism (*governance structure*) which ensures that rules are enforced and observed. This structure should be able to guarantee order, eliminate conflicts and realize mutual gains, which in turn requires a mechanism that detects violation and enforces sanctions in order to deter anyone from breaking rules (Behera & Engel 2004; North 1990).

The concern for institutional factors in the exploitation of natural resources has been growing over the past decades, and has been translated into institutional reforms and the restructuring of natural resource governance (Benjaminsen & Lund 2001).⁷ The underlying assumption was that (a) decision makers and individuals are inter-dependent, whereas the choice of one harms the other; (b) institutional arrangements are generally able to counteract resource depleting behavior and, by altering rules and the structure of incentives, (c) the performance of individuals towards resource conservation could be improved (Ostrom et al. 1993). The analysis of institutions and their impact on local resource use is thus a promising approach in order to discover the factors that are potentially hampering sustained management of tree resources. In this regard, the role of local governance institutions, formal regulations and entitlement over access and management of renewable resources, or the institution of property rights respectively, is particularly relevant⁸. Property thereby “provides a focus on how access to, use of, and control over ‘things’ or resources are organised in society” (Benjaminsen & Lund 2001: 15). The role of institutions for two study villages will be at the centre of my analysis, as it is often argued that many resource conservation policies have failed because managing institutions have not

⁴ Informal institutions are believed to be spontaneous in origin, self-enforced by a community and do not depend on external authorities for dissemination, enforcement or control (Posner & Rasmussen 1999). Informal constraints are usually present in a society for a long time and can take centuries to millennia to change (Behera & Engel 2004).

⁵ Compared to informal institutions, formal institutions tend to change faster – with a time frame from decades to centuries (Behera & Engel 2004) – and are closely related to the division of labor and structural complexity of industrialized nations (North 1990, 1994). Yet, since institutions are subject to historical changes, a clear differentiation between both forms of institutions is not always feasible: Over time, norms of a society can turn into formalized rules and be hence enforced by governmental authorities (North 1990).

⁶ In referring to uses made of natural resources, ‘rules’ are often confused and interchangeably used with the term ‘rights’. Yet, whereas ‘rules’ refer to the “prescriptions that create authorizations”, ‘rights’ stand for “particular actions that are authorized”: “For every right an individual holds, rules exist that authorize or require particular actions in exercising that [...] right” (Schlager & Ostrom 1992: 250).

⁷ Resource governance is the way of using power, enforcing rules and resolving conflicts (Thomson 1996a).

⁸ ‘Property’ in this regard has been described as a ‘benefit stream’ and property rights as claims to this stream “that some higher body...will agree to protect” against adverse claims (Bromley 1992: 2). ‘Property’ is furthermore a social relation or contract that defines its holder with certain rights against all others who in turn have the duty not to interfere with the benefit stream (Bromley 1992; Schlager & Ostrom 1992).

been properly adjusted to the local context (Brown 2003): There is often a problem of ‘fit’ between resource governance arrangements and the attributes of the resource system, resource units, and users (Hanna et al. 1997; Berkes and Folke 1998; Young 2002).

A variety of authors argues that the availability and enforcement of clear property or ownership rights is crucial for the protection of or investment in natural resources, as the lack thereof may cause an “open access”⁹ situation where excessive resource use cannot be controlled¹⁰ (Ostrom 2009a; Mwase et al. 2006; Chhatre & Agrawal 2008). However, neither privatization of natural resources, i.e. (exclusive and absolute) private ownership, nor nationalization (governmental appropriation) is necessarily beneficial to the resource (Bromely & Cernea 1989). Based on a variety of field studies and game theory experiments, modern institutionalists revealed that resources used in common were best governed and prevented from depletion when rural communities had collectively organized and established a set of rules and norms, which Ostrom called “design principles”¹¹ (Ostrom, 1990, 2009a). These included, among others, that resource users had the right to make rules congruent with local conditions; users (*appropriators*) monitored each other’s conformance with these rules; they imposed graduated sanctions against rule-breakers (*violators*) and possessed ready access to conflict resolution mechanisms (Ostrom 1990, 1994, 2008). The researchers emphasized that local resource management systems achieved particularly good governance outcomes if they were nested in “poly-centric” or multi-level governance systems, i.e. when various, formally independent units of decision-making coexisted across organizational levels (Ostrom 1994, 2008): Self-governing collectives such as local village councils or any other “unit of coercion” (Bromley 1992) would share resource management and problem solving responsibilities with local governments, a governance form often termed “co-management” (Folke et al. 2005; Tyler 2006). My thesis takes up on this discussion within the so called Institutional Ecological Economics.¹² The research design is described next.

⁹ ‘Open access’ is considered the complete absence of any established property right (non-property or *res nullius*) on a resource that is not controlled or managed by anyone (Schlager & Ostrom 1992). It needs to be distinguished from so called “common pool resources” which describe resources used and controlled in common by members of a community of persons (Bromley 1992; Alden Wily 2005).

¹⁰ This reasoning goes back to the much-cited “Tragedy of the Commons” as outlined by Garrit Hardin (Hardin 1968). Hardin had described a set of pastoralists inevitably condemned to the overexploitation of a pasture as it was not owned by anyone regulating access and use. His underlying assumption was that each user of a resource used in common, led by self-interest, would subtract from the benefits others would derive from the same (finite) resource and hence reduce the availability of this resource. This would finally cause the degradation of the resource.

¹¹ A design principle is defined as “a conception used either consciously or unconsciously by those constituting and reconstituting a continuing association of individuals about a general organizing principle” (Ostrom 1994: 4).

¹² Institutional ecological economics belongs to the theory of (new) institutional economics or “new institutionalism”, which is an interdisciplinary approach encompassing economics, political science, sociology and anthropology. It has informed a significant body of research on environmental governance and common pool resources in particular. This section, however, shall not outline the genesis of this approach, but only highlight its assumptions of relevance for this thesis. For a detailed overview see Söderbaum (1992), Røpke (2004), and Paavola (2007).

1.2 Methodology

1.2.1 Preparation of the field trip, study aim, and research design

Before my departure to Niger my assumption about the two study villages was that the vegetation cover on agricultural land is subject to decline in one village (Garin Tsangaya (GT), termed “brown village”), and to tree regeneration in the other (Goulouske (GOU), termed “green village”). Based on expert knowledge, both villages were said to have similar biophysical preconditions, i.e. comparable rainfall patterns, topography and soil texture. This was the information our research team, consisting of five students from different scientific disciplines and country backgrounds¹³, had received from the organizers¹⁴ of the project entitled “Human Dimensions behind the re-greening of Sahel.” Yet, my research was not intended to analyze the state of resource depletion/ regeneration. Rather, it aimed at uncovering potential barriers and motivations to land use and tree management in the study villages.

Given the embeddedness of the project in the overall debates on desertification and re-greening of the Sahel, I conducted an in-depth literature study on both narratives, as well as on the role of institutions in natural resource management. In order to properly understand the potential impact of institutions on use and management of on-farm trees in the villages, I firstly needed to analyze the structure of tenure rights. To this end, the division of resource property rights into ‘bundles’, as described by Schlager and Ostrom (1992) proved very helpful, which ought to be the basis for my research design (see 1.2.4.1). Following the above outlined distinction between formal and informal institutions (1.1), I needed to gather data on the customary system of tenure rights developed in the two villages as well as the one codified in the national environmental legislation. The literature study on this part proved particularly difficult, as most articles were either dealing with forests or land, but hardly with both resources combined (agro-forestry) or trees outside forests/on-farm trees (Bellefontaine et al. 2002). As outlined in the theory part, I was also aware that rights cannot exist without their respective duties. Thus, the sanctioning and enforcement mechanisms around them were to be analyzed as well. In order to learn about these mechanisms, I needed to identify the relevant actors – both in the villages and within the government. So the next step of preparation was to work out and arrange meetings with the most important authorities in charge for natural resource management from the department of Mirriah. Of high importance were the forestry department¹⁵ and the land tenure commission (*commission foncière*), whose work will be explained in chapter 3. The **research variables** were developed: (1) the customary land use system in both villages, integrating the traditionally developed rights bundles that govern access, use and management of both land and on-farm trees, and (2) formal

¹³ Germany and Brazil (Master program “Globalization, Environment and Social Change”, Stockholm University), Sweden (Master program “Ecosystems, Resilience and Governance”, Stockholm Resilience Center), two from Niger (Master in Agricultural Science, Centre régional d'enseignement spécialisé en agriculture (CRESA), University Abdou Moumouni, Niamey)

¹⁴ Dr. Line Gordon and Dr. Elin Enfors from the Department of Systems Ecology, Stockholm Resilience Centre; Dr. Lowe Börjeson from the Department of Human Geography, Stockholm University; Dr. Adamou Mahaman Moustapha and Dr. Mahamane Larwanou, CRESA, Niamey University

¹⁵ The full name is ‘Ministry for environmental protection and the fight against desertification’(see chapter 3). The designation ‘forest department’ is interchangeably used in order to underline my focus on the forest policy for this thesis.

institutions, comprising legally codified resource tenure, the structure of actors involved in the governance of both land and trees on local level as well as sanctioning and enforcement mechanisms. Apart from the potential impact of local governance institutions on farmers' resource management behavior, I encountered another factor: Whereas the importance of ownership rights to trees has been discussed (e.g. Tougiani et al. 2009; see 1.2.4.1), the correlation between land rights and land use has not been analyzed for Niger. Thus, this correlation should become an integral part to the analysis of customary tenure practices.

I divided my initial **research question** "*Which factors influence the use and management of on-farm trees in the two study villages?*" into two sub-questions:

- (1) *How does the interaction between customary land use systems and formal institutions affect farmers' performance in managing on-farm trees?*
- (2) *How do property rights in land affect the management of on-farm trees in both study villages?*

In order to answer these questions, I considered qualitative and exploratory research particularly relevant: "The power, and one of the main characteristics, of qualitative research is in its being generative, in that it is concerned with discovering phenomena, constructs, and propositions" (Levin-Rozalis 2004: 2). The methods I chose to apply were so called 'Participatory Rural Appraisal' (PRA) exercises and semi-structured interviews.

1.2.2 Data collection

Participatory Rural Appraisal (PRA) methods proved particularly useful because the approach subsumed a variety of tools that I could flexibly adjust for my research. The basic knowledge was provided by a workshop in Stockholm.¹⁶ PRA was developed in the 1980's and originates in approaches towards rural community development. It excels by its dynamism and constant advancement. The basic idea of PRA is to move beyond 'top-down' research and an external 'extraction' of knowledge. Rather, it aims at enabling local, often illiterate or otherwise disadvantaged people from developing countries to share, analyze and enhance their knowledge of their living conditions or 'own reality', which shall ideally lead to their empowerment (Chambers 1994). By using symbols, physical objects (e.g. beans or pebbles), and other types of oral communication, locals shall actively be involved in the exploration and analysis of both their community and their territory (Chambers 1983). Within the two months of my field stay I applied a variety of PRA tools (listed in Annex 1). Among others, I gathered data on

- Past events such as drought periods, changes in land use and practices, population trends and underlying reasons, assessed by means of *participatory time lines* (Annex 5);
- The distribution of natural resources within the village territory, identified by the design of *village sketch maps* (with the example of Garin Tsangaya provided in Annex 4);

¹⁶ Previous to our departure to Niger our research group had a 3-day preparatory training on participatory research at the Stockholm Resilience Center, conducted by Dr. David Gibbon of 'Agricultural and Rural Livelihood Systems', UK.

- The stratification of the population in both villages into resource endowment groups by means of *wealth ranking*, whereas the amount of land, small ruminants and months of nutrition per year and household were compared (see Annex 6);
- Rules on access and use as well as sanction and control mechanisms over both land and on-farm trees by means of a *resource use decision grid*;
- Land tenure arrangements and (past and present) modes of access to land on the village level by use of a *tenure classification matrix*;

I however did not only apply PRA. After I had conducted several exercises on the general background of the villages as well as resource use and distribution, I carried out semi-structured interviews with smaller focus groups and 40 heads of households,¹⁷ the latter of which provided the basis for my statistical correlation between land tenure types and the management of on-farm trees (see 4.4) as well as the villagers' attitude on formal institutions (see 4.8). To gather information on the work, rule enforcement and sanctioning by both the forest department and the land commission (COFO), I conducted semi-structured interviews with various governmental authorities, non-governmental organizations and researchers in Zinder, Niamey and particularly the department of Mirriah (Annex 1). Semi-structured interviews on the basis of a loose guide of previously developed questions proved helpful as I could guarantee that the topics I was interested in were covered, without compromising the 'freedom' of the interviewee to express personal opinions, experiences, and views (Willis 2006).

1.2.2.1 Application and problems encountered

The basis for the PRA methods conducted were books of Chambers (1983) and Schoonmaker Freudenberger (1994). The latter turned out to be highly important, as it provided useful information on the practical application of PRA in relation to tree and land tenure. I designed my methods either accordingly or developed own exercises following the suggestions of this book. Important to note is that my research often followed a continuum between Participatory Rural Appraisal and the so called Rapid Rural Appraisal (RRA): Whereas in PRA the community manages the research process and is the principal collector and analyst of information, the research with RRA is mostly managed and answered for by outsiders, hence the researcher (Schoonmaker Freudenberger 1994). However, the communities selected their own representatives, designed maps and shaped the outcome of my analysis. Firstly, I wanted to learn about the history of the villages and people's livelihoods, thereby focusing on the role of land and on-farm trees. This did not only serve for a better understanding of the village structures, but also for the establishment of a good and trustworthy relationship with the farmers, which was essential to have in order to gather more 'delicate' data on issues such as the socio-economic structure of the population, power relations, and of course the rules governing use and management of natural resources. I felt that in order to build trust, I needed to be patient. By showing interest in the villages' history and cultural aspects I wanted to express my respect. At the beginning of my field work I furthermore wandered around the villages and spent several days in the fields, in order to observe and

¹⁷ I selected 20 households in each village to have a comparable sample.

learn about farmers' dealing with the natural resource stock. I listened to farmers' stories about the most important trees: Baobab (*Adansonia digitata*) and Ana tree (*Faidherbia albida*, Hausa: Gao).

I applied all PRA methods (listed above and in Appendix 1) in both villages, if possible in the same day. In doing so, I could practice with a group from one village and, in case I encountered some practical difficulties, correct my methods and apply an improved exercise in the second village. I either worked alone with the focus groups or in pair with a member of our research group. The groups were usually not larger than 7 people, mostly smaller. In Garin Tsangaya it often proved difficult to gather just 2 or 3 farmers. I further tried to triangulate the information gathered, which means that I applied different tools to address the same issue and interviewed a wide range of people: male and female and, if possible, young and elder persons. The statements repeatedly made were considered valid and reliable. Yet, it turned out to be difficult to interview women, as they have a particularly busy day in preparing meals, raising their children and supporting their husbands with the harvest (see chapter 4). Frequently, we needed to give them a small amount of money¹⁸ or useful products such as soap or batteries in exchange for their time. When it came to discuss the rights to land and on-farm trees, women often refused to answer explaining that their husbands were in charge for these resources. In Garin Tsangaya women were very reluctant to give interviews in the beginning, as for cultural reasons they were not allowed to talk to outsiders without the permission of their husbands. Grouping and triangulation became harder at the peak of the harvest season from mid-October: Men were busy in harvesting their crops, as nomadic herders were about to enter the fields with their livestock.¹⁹ Due to their belief in Islam, villagers were praying five times the day, so that I had to exactly plan the time needed for each exercise. On some days I could not work at all as the farmers had left the village to celebrate births, name-givings or, sadly, mourn for a deceased. Another constraint was due to our dependency on transportation²⁰ from our accommodation in the town of Mirriah to the villages, which did not at all work properly. The cooperation with the town's forest department had another negative effect: As we initially used their car and driver, villagers were very sceptical, timid and reluctant to provide us with any detail regarding the use and management of trees. Mostly when we tried to ask about the (illegal) cutting of trees farmers even seemed to hide certain information, probably as they were aware of the sanctions related to woodcutting. I soon felt that I had to wait for some weeks, when more trust was built so that I could eventually convince them to talk about these issues. The fact that we finally stayed overnight in the villages for one week in a row certainly helped to reduce the initial scepticism of the villagers. Another barrier to my work was the lack of knowledge of Hausa, the

¹⁸ Our research team had a long discussion on whether we should 'pay' for the time of women. Yet, two girls of the group were researching the role of women and needed to talk to them literally at all costs. In order to avoid biased results, I finally agreed to take this 'unethical' step.

¹⁹ The relationship between farmers and herders will be explained in chapter 4. In Niger, as in other Sahelian countries, nomadic herders move south from late October in order to water and feed their animals (see 2.2).

²⁰ At first we used both car and driver from the forest service, but for many reasons we had problems in getting the car. After 3 weeks of our stay we either borrowed another car or took a motorcycle. Finally we stayed in the villages to spare the transport.

language spoken in both villages. Thus I needed a translator. Although the translator served as a cultural intermediary on the one hand, this constellation complicated the collection of information, as I had to rely on his translation. Consequently, I captured but a fraction of what the farmers had said. And of course I was not sure whether the translation had reflected the actual message. The situation was different when I talked to government officials and NGOs. I could communicate in French, with the head of the NGO 'CRAC/ GRN' even in English. Yet, during the interviews I faced another problem: I could only take notes as my battery-driven voice recorder broke right from the beginning due to climatic conditions (humidity, dust storms). Accordingly, when an interviewee was rapidly speaking in French, I had difficulties to capture all information.

1.2.3 Research logic and interpretation of data

As outlined in the previous section, I conducted two months of field work and thereby followed an exploratory, qualitative research approach. Creswell (1998: 15, cited in Dahlgren et al. 2007: 12) offers the following definition:

“Qualitative research is an inquiry process of understanding based on distinct methodological traditions of inquiry that explore a social or human problem. The researcher builds a complex, holistic picture, analyses words, reports detailed views of informants, and conducts the study in a natural setting”.

A qualitative perspective relies on constructivist philosophy in which “realities exist in the form of multiple constructions, socially and experimentally based, local and specific, dependent for their form and content on the persons who hold them” (Guba 1990: 27, cited in Lal et al. 2001: 4). Following this reasoning I had to be careful with value judgments and assume that ‘realities’ are dependent on my own experiences and my pre-understanding from several disciplines. The research I pursued was an act of interpretation. Qualitative research is holistic in that all separate parts are interpreted within the overall context. Important is the relationship between researcher and informant: Compared to quantitative research where information is reduced to numbers and where views are rather ‘captivated’ within one paradigm (Kuhn 1970), my research took, as point of departure, the perspective of the informant and aimed at conceptualising the meaning of phenomena and human action. The basis was thereby that I was open and curious towards the stories told by the informants. The relationship between me and the informants was interactive. By working in smaller focus groups I tried to gain an in-depth understanding of the setting and the resource management behaviour of the farmers. I was dependent on the cooperation or even mediation of the researched population. Furthermore, my research tried to reflect the different views and objectives of the respective informants. Based on the data gathered and the ‘reality’ I faced, I could develop my hypotheses or assumptions - an approach often called ‘grounded theory’ (Dahlgren et al. 2007). The specific feature of this approach is that it can follow a so called ‘abductive’ line of reasoning²¹: The data gathered by qualitative research are tested against emerging

²¹ There are three paths of research logic: deductive, inductive, and abductive logic. In ‘deductive’ logic, there is a valid connection between the hypotheses and a previous theoretical assumption. The hypothesis is explained by deductive premises

hypotheses or theories at a later stage of the research; one can oscillate between data and theory. The approach helps to construct and establish explanations and give them logical power: “This research is not theory-dependent; it is field-dependent in the sense that the questions it poses do not arise from a theory, but from the findings, data and phenomena that revealed themselves during the research process” (Levin-Rozalis 2004: 8). That is what I did during my stay and after returning from Niger. As mentioned above, I mainly made notes during my interviews. These were transcribed partly during my field work and once back in Sweden. I coded the texts and grouped them into sections, thereby generating a certain pattern of statements. On the basis of the transcriptions or textual accounts I identified ‘keys’, i.e. topics or terms repeatedly appearing, along which to analyze the interviews. Through the analysis of my field data, I generated knowledge about the topic, which then led me to return to theory, whereby Institutional Ecological Economics proved particularly relevant (see 1.1). In the literature, this phenomenon is often referred to as ‘hermeneutic circle’ (Dahlgren et al. 2007).

1.2.4 Analysis of the data

This section aims at shortly outlining the concepts, framework, and model I selected to analyze the wealth of qualitative – and partly quantitative – data gathered.

1.2.4.1 Conceptualization of property rights by Schlager and Ostrom

As outlined above, I designed my household interviews following the classification of Schlager and Ostrom (1992), which also helped to analyze the rights system encountered and cluster my findings accordingly. Rights are classified as follows:

Table 1: Classification of rights bundles by Schlager and Ostrom (1992)

(1) Use rights:

- Access (= right to enter a defined physical property, e.g. to walk across a field)
- Withdrawal (= right to obtain the products of a resource, e.g. catch fish)

(2) Control or decision making rights:

- Management (= the right to regulate internal use patterns, i.e. how, when and where to harvest, and to transform the resource by making improvements, e.g. plant a crop)
- Exclusion (= the right to determine who will have access to a resource)
- Alienation (= the right to rent out, sell, bequeath or transfer use and control rights to others)

Against the common categorization of property rights according to the respective right holder,²² the authors group certain types of rights into ‘bundles’, which are the decisive factor in resource governance designs. ‘Bundling’ means that a State, an individual or a community can hold different rights towards a (set of) natural resource(s) at the same time. Synonymously, the term ‘tenure’ is often used (Sida 2007). From this categorization follows that instead of one person having all rights to a given plot of land *and* the resources growing on it, rights may be divided according to the resource: The land could be owned

derived from the theory. The field is the court where the a priori hypothesis can be examined. ‘Inductive’ logic is the opposite of the previous line of reasoning: Hypothesis are formed according to empirical generalizations, such as repetitive phenomena observed in the field. It attempts to formulate a general law of probability. ‘Abductive’ logic examines the field in order to lay bare the variables and elements of importance as well as their connections. See e.g. Dahlgren et al. (2007)

²² Usually, property rights are divided into public property (*res publica*), private property (*res privatae*) and group/ community property (*res communes*), see Bromley (1992).

by one person, the tree by another. Yet, the term 'owner' would only be used in case a person holds the complete bundle of rights over a particular resource, with the right of alienation often assumed to be the strongest command (Lund 2001).

1.2.4.2 The usefulness of computer programs: Open Code, CmapTools, R

As mentioned in the section regarding my research logic, I transcribed and coded my interviews in order to reveal 'keys' along which to analyze the given information. A useful tool was the software 'Open code'²³ which provided the technical structure for this application. In a later step I could compare documents containing an interview each and easily detect repeated statements, which I then used for the results section. Another beneficial software was 'CmapTools' which can be downloaded for free from the web.²⁴ This program helped to structure thoughts, design graphs and to link discovered phenomena. A very important program for my research was the statistical software R that was used to run a logistic regression model²⁵ for the analysis of 40 semi-structured household interviews, which will be explained next.

1.2.4.3 Statistical correlation between land tenure and sustainable tree management

As mentioned above, I hypothesize that land tenure arrangements have an impact on the management of trees. How did I proceed to analyze a potential correlation? Towards the end of my stay I conducted the interviews, after I had applied various PRA methods to get to know the villages in general and in particular the system of rights and rules on the management of both land and trees. The preparation for the interviews consisted of a random selection of 20 households in each village on the basis of the result from a wealth ranking exercise (see 4.2, Annex 6). The interviews with each head of household took approximately one hour, during which I asked general questions about land use, farmer's attitude towards land and forest policy, and the resolution of resource-related conflicts. Of particular interest was the part on trees growing on farms, where I asked about species composition as well as use and management rights and practices (see questionnaire in Annex 3). Important to note is that I related these questions to the tenure arrangement of each field an interviewee cultivated, so that initially I asked about the number of fields and whether they were (a) borrowed, (b) leased, (c) bought or (d) inherited. I further asked about the proximity of each field to the interviewee's house, the mode of acquiring the field and the duration the farmer had cultivated each field. All answers were later coded and filled into an excel file. The definition of land tenure arrangements was based on a discussion with the vice director of the Ministry for Agricultural Engineering (*Génie Rural*) in Zinder and the 'bundling of rights' scheme developed by Schlager and Ostrom (1992; see 1.2.4.1 and 4.2):

²³ The software for this program was provided by Henrik Ernstson from the Stockholm Resilience Center.

²⁴ See www.cmap.ihmc.us

²⁵ The model was developed and run in cooperation with Jens Heinke, Potsdam Institute for climate impact research (PIK).

Table 2: Definition of land tenure arrangements²⁶

Tenure Arrangement	Rights
Inheritance (French: <i>heritage</i>)	Full rights (access, withdrawal, management, exclusion, alienation) After the death of the family founder (<i>chef d'exploitation</i>), the field commonly used by the family is passed to the children. The land is divided on the basis of Islamic law, along the share of 1/3 to daughters and 2/3 to sons. Each married male heir becomes a head of his household (<i>chef de ménage</i>) and of the share of land he inherited.
Purchase (French: <i>achat</i>)	Full rights (access, withdrawal, management, exclusion, alienation) All 'bundles of rights' to the land, including exclusion and alienation, are sold from the land owner to the buyer. The buyer becomes owner of the land.
Lease or 'security deposit' (French: <i>gage</i>)	Access, limited withdrawal and management rights (in accordance with Owner) The land is transferred in exchange for either money or any other 'security deposit'. It remains at any time the property of the initial owner who holds exclusive alienation rights (<i>droit à la propriété</i>). The person leasing has certain management and usage rights (<i>droit d'usage; eng. usufruct</i>). This tenure arrangement is valid as long as the deposit is not repaid.
Loan or 'temporary borrowing' (French: <i>prêt</i>)	Access, limited withdrawal and management (in accordance with Owner) The land is loaned for a temporary or undefined period, without any security deposit or monetary transaction. Borrowed land stays at any time the property of the initial owner who holds exclusive alienation rights. The land may at any time be resumed by the owner.

At the time when I conducted the interviews I had not yet decided how to analyze them. This of course influenced the selection criteria or variables for the model. Only during the process of data interpretation I found the article of Owubah et al. (2001) which served as the basis for my analysis. Logistic regression proved particularly useful to relate components of tenure systems to tenure performance. For my purpose, the method was applied to approximate the influence of one's land tenure arrangement on the management of on-farm trees and to compare the performance of both study villages. More precisely, I wanted to estimate the willingness of farmers to engage in the (a) protection²⁷ of trees and in their (b) planting. These two management options were consequently selected as the main **dependent variables** for the model. I chose them because the preservation of and care for naturally regenerated trees on farms as well as deliberate tree planting are the two main options available for ensuring a sustainable²⁸ supply of these resources. A third dependent variable was the (c) fertilization of land. This criterion was selected taking into account that nearly exclusively manure is applied in both villages. Animals' faeces contain tree seeds, so that the use of manure is likely to contribute (indirectly) to the natural regeneration of trees. I selected the regression model as it helped to analyze binary answers to the dependent variables. For example, farmers were asked whether they preserved and/ or planted trees on their field (yes/ no). I would like to note two things here: I could not make a distinction between indigenous and economic tree species (e.g. Baobab; see 4.1) to be planted/ protected, as the answers were too stratified. Thus, both species are integrated in the binary answer. Moreover, I initially asked for the amount of manure used, whereas the interviewees could answer in

²⁶ Transfers of land can take many more forms, such as share-cropping, swap, devolution, gifts, barter, pledge or share contract (Lund 2001). But these forms are difficult to distinguish and have thus not been considered for this thesis.

²⁷ Protection thereby combines all qualitative answers to the question whether farmers would exceptionally **care** for a planted or naturally grown sprout in order to keep it on his field with intention. The answers referred to 'fencing' by thorns or dead wood as much as the 'digging of wholes' around a sprout for water to infiltrate. In order to integrate these stratified answers, I formulated the binary variable "protection (yes/ no)."

²⁸ For this thesis, the definition of the Brundtland commission is used: "Sustainable development is the development that meets the needs of the present without compromising the ability of future generations to meet their own needs."

“number of charts” of manure put on each field per year.²⁹ Yet, as farmers had no perception of the size of their fields in numerical terms, in hectare for instance, it was impossible to relate the amount of fertilizer used per field to its size. Consequently, I only asked whether manure was used or not.

Following the reasoning of Owubah et al. (2001), a farmer’s willingness to engage in the sustainable management of on-farm trees is determined by the value attached to the resource, the (financial/ technical) means of a household, and potentially also the resource tenure rights, all of which are the **explanatory variables**. Based on the qualitative background knowledge I had at the time when conducting the household interviews, the following explanatory variables were the ones considered most relevant for the correlation:

(1) *Type of Village*: In order to compare the tree management practices between both villages, I integrated Garin Tsangaya or ‘non- Garin Tsangaya’ (i.e. Goulouske).

(2) *Land tenure type*: As mentioned above, I asked the farmers for the modes of acquiring and the length of cultivating each field. I further asked for the land tenure type based on the classification of Schlager and Ostrom (1992; see 1.2.4.1). When analyzing the given answers I realized that the rights bundles to land were the same for either borrowed or loaned fields. The same goes for heritage vs. purchase. Thus, the initial four tenure types I had asked for were clustered in two categories: ‘possession’ (heritage, purchase) and ‘non-possession’ (loan, borrowed). I deliberately avoided using the Western concept of ‘tenure security’: According to Bruce (1993), the term combines the *confidence* in the legal system to protect a tenure holder’s rights in land, a long *duration* of cultivation, and full *ownership* rights to land which implies the rights to exclude users and alienate land. Some of my interviewees perceived a field borrowed for several decades to be their ‘own’. Yet, they would not be able to sell this land or claim it legally in case the actual owner returned. ‘Tenure security’ might thus have a different meaning in both communities so that the concept’s usefulness can be contested, which will be discussed in chapter 5. For the statistical analysis, only rights bundles were considered.

(3) *Distance* per field from the user’s house (in minutes): This variable was integrated as I assume that a certain distance of a field inhibits the guarding of trees and hence the prevention of outsiders from infringing on the tenure holder’s rights to use (non-)timber forest products (see Thomson 1980, 1996a).

(4) *Age of user* (compiled in numbers): As explained above, I designed my household interviews prior to a detailed knowledge on how to actually analyze them. Unfortunately, I did not ask the interviewees for their level of education. This would have been useful as, according to Owubah et al. (2001), “a value of a resource is also a function of what one knows about the resource” (p. 256). However, I integrated the age of the farmer, assuming that younger farmers might have a different tree management attitude.

²⁹ This measure was suggested by my colleague Issoufou Bagnian, stating that it would be familiar to farmers. However, I did not weigh the content of each chart. Besides, some farmers transported manure only in baskets so that an approximation and comparison of the amount used was impossible.

There is one model for each of the three sustainable tree management practices. For the use of manure I added (5.1) 'Possession of a chart (yes/ no)'. I assumed that this might influence the farmer's willingness to apply manure, but would not matter for tree management. To test the impact of my independent variables on sustainable tree management practices, I used the statistical software R and followed the manual by Manning (2007). The modelling procedure is explained in detail in Annex 2. The results of the statistical correlation will be presented and discussed in chapter 4.4.

1.2.5 Data presentation: The Institutional Analysis and Development (IAD) Framework

A way to compare and present my data as well as to highlight factors potentially inhibiting the sustainable management of on-farm trees in my study villages is to follow the so called 'Institutional Analysis and Development (IAD) Framework'³⁰, which has been developed in the early 1980's by Elinor Ostrom and other scholars from Indiana University (USA) (Ostrom 1990; Koontz 2003). The IAD has later been extended to a 'general framework for analyzing sustainability of social-ecological systems' (Ostrom 2009b), but the basic version shall suffice for my thesis.³¹

A framework designed for research on natural resources is particularly useful in that it provides "a common set of relevant variables and their subcomponents to use in the design of data collection instruments, the conduct of fieldwork, and the analysis of findings about the sustainability of complex social-ecological systems" (Ostrom 2009b: 420). A framework further allows for the integration of several theories of action and methods (Koontz 2003). For the reasons outlined in section 1.1 and 1.2.2, I thereby considered Institutional Ecological Economics and Participatory Rural Appraisal (PRA) particularly useful. The importance of institutions for resource management is taken up by the IAD, which therewith complements institutionalism. The IAD assists in describing patterns of behavior of resource users (*actors*) on a local scale which guide their decisions over some course of action, in my case the management and use of on-farm trees in the villages Goulouske and Garin Tsangaya. It portrays a community as not being encapsulated, but an open and functional social-ecological system which is to some degree shaped by four types of *incentives* external to individuals:

(1) *The physical world* (Koontz 2003), i.e. the natural environment surrounding an individual: Here, biophysical characteristics of the resource system itself (in my case number and diversity of on-farm tree species and soil organic matter content), as well as potential biophysical constraints impacting on the state of the resource system (e.g. rainfall) are described (chapter 4.1).

(2) *Attributes of the community within which individuals are embedded*. Factors such as the socio-economic attributes of resource users within the village, the location, size, and settlement structure of

³⁰ Similar features outlined in the IAD are found in the frameworks developed by Oakerson (1986) and Edward and Steins (1998), both cited in Kant and Lehrer (2004), and in thus of Di Gregorio et al. (2008).

³¹ The IAD is usually used for the analysis of one (common pool) resource, hence either (grazing) land or forests. The framework for the institutional analysis of agro-forestry systems as suggested by Kant and Lehrer (2004) proved to be inadequate for analyzing my data, so that I modified the IAD for my purpose.

the community and the performance of the village leader may impact on farmers' resource management behavior and will consequently be highlighted (chapter 4.2).

(3) *Rules, norms, and complementary duties that create incentives and constraints for certain actions.* Here it is important to recall the distinction between formal and informal rules. Informal rules are thereby developed within the community, which in turn impacts the behavior of individuals. The informal system of rights bundles will be analyzed at this stage, whereby the focus is on rights governing resource usage, access and management (chapters 4.3 and 4.4).

(4) *Interactions with individuals outside the village community.* At this stage, the focus is on how rights are enforced and conflicts resolved by local governance bodies. It is furthermore discussed how the action of traditional authorities and other resource user groups (herders, woodcutters) impact on the resource management behaviour of the villagers (chapter 4.5 *et seq.*).

This thesis thereby highlights the interaction between three "levels of action" that the IAD Framework describes (Koontz 2003; Kant & Lehrer 2004): the constitutional level, i.e. the framework determining the creation, enforcement and modification of formal rules (chapter 3); the collective choice level, i.e. where decision-makers (village leaders, government officials) create rules that impact day-to-day activities and the operational level, i.e. day-to-day activities affecting the resource system directly (chapter 4). Hanna and Jentoft (1997) speak of organizational levels, which refer to the State, locality and community.

2. Republic of Niger: Country background

2.1 Geographical and biophysical background

The Republic of Niger is a landlocked country located in the Sahel,³² a tropical and semi-arid region along the southern margin of the Sahara desert. The bioclimatic zone consists of predominantly annual grasses with shrubs and trees; the mean annual rainfall lies between 150 and 600 mm y^{-1} . The geographical patterns of rainfall, vegetation cover, soils, human settlement and land use follow a strong North-South gradient – from the almost lifeless Sahara in the North, covering four fifths of the country, to Savannas in the South (Xue et al. 2004). This explains that Niger, despite being one of the largest countries in West Africa, is at the same time one of the least densely populated. Over 90 percent of the population concentrates on arable land in the southern fringe of the country near the fertile Niger River basin, which comprises only some 12 percent of the total country surface (CIA 2010; Mortimore & Adams 2001). Niger is dependent on the Monsoon climate system, which causes changes in circulation and rainfall at seasonal³³ and inter-annual time scales. The soils are mostly unstructured with low nutrient content. According to Breman et al. (2001), the low soil organic matter content is considered a more serious constraint to agriculture and rangeland quality than low and erratic rainfalls. The soil tends to crust which causes water runoff; infiltration is hampered.³⁴ Thus, during the rainy season, the water concentrates in local depressions or pools, which provide surface water for the livestock of traditionally nomadic herdsman and domestic animals. As Niger's inhabitants depend almost completely on subsistence agriculture and livestock production, they are particularly vulnerable to frequent droughts occurring in the region (see 2.2).

2.1.1 Localization of the two study villages

If we look at the administrative division of Niger, the two study villages are located in one of the country's eight regions: Zinder. It consists of five departments³⁵ and 55 communes. My research was conducted in Mirriah, which lies in the centre of Zinder region. The department of Mirriah consists of 17 communes, whereas the town of Mirriah (ca. 20.000 inhabitants) itself is one.³⁶ The department of Mirriah has nearly 767.000 inhabitants according to the last census of 2008³⁷, and is one of the most

³² The word Sahel is derived from Arabic for 'shore'. A possible explanation is the shift in vegetation cover that early traders faced when they entered the Sahel from the Sahara desert towards the South (Xue et al. 2004).

³³ The seasons are : (1) Cold and dry season (mid-December to mid-February), characterised by relatively cool nights with temperatures partly below 10 degrees (Hausa: *Rani*); (2) Dry and hot season (March-May) with hot winds and temperatures partly exceeding 45°C (Hausa: *Bazara*); (3) Rainy season (June-September) characterised by partly extremely violent rains, high humidity and a mean temperature of 33°C (Hausa: *Damana*); (4) Dry and warm season without rains (October to mid-December) with temperate humidity and a mean temperature of 35°C (Hausa: *Kaka*). Sources: SDR (2009) and personal communication to translator Mr. Ousmane.

³⁴ Breman et al. (2001) state that water is used very inefficiently: Only 10-15 % of rainwater is taken up for plant growth, while the rest is lost through run-off, evaporation and drainage.

³⁵ These are namely Matameye, Magaria, Mirriah, Gouré, and Tanout.

³⁶ According to the Central Census Office (*Bureau central du recensement, BCR*), the community of Mirriah comprises 60 villages (data of 2002, gathered by Issoufou Baggian). According to Dr. Abdoulaye Mohamadou, member of this research project, Mirriah was the first commune in Niger after the administrative reform in 2004.

³⁷ Departmental division for Agriculture, Mirriah (data gathered by Issoufou Baggian)

am referring to 'on-farm trees' in this thesis. Tree species composition and other attributes of my study villages will be discussed in the forth chapter of this thesis.

2.2 Socio-economic background and land-use systems in Niger

There are several ethnic groups living in the Republic of Niger; their central religion is the Islam. Whereas some ethnicities such as the Hausa had created smaller kingdoms previous to French colonization in 1935 and are traditionally living in communities, other groups such as the Fulani and Twareg have a tradition of "stateless societies" (Thomson 1996b: 9).³⁸ Consequently, these groups are not likely to share the same set of values towards governance or to value the state above their own ethnic group. Politico-ethnic differences are furthermore compounded by economic disparities (ibid.). However, given the fact that mere 15% of Nigeriens are urban dwellers, all ethnic groups share a high dependency on a healthy natural environment for their livelihoods. Hausa, who today contribute to over 54 percent of the country's population of ca. 14.7 million (World Bank 2009), are traditional subsistence farmers, living from staple grains such as millet (*Pennisetum glaucum*) or sorghum (*Sorghum bicolor*). Another agricultural group is the Djerma-Songhai. The (semi-) nomadic Fulani base their livelihoods on animal husbandry, thereby depending on the natural productivity of grasslands. Both production and land-use systems³⁹, respectively, contribute considerably to the country's GDP: Agriculture is the most important sector with a share of 42.6 % to the country's economy. Livestock products are the second most traded goods (World Bank 2009). Both production systems are dependent on the resources land and trees, but it is important to highlight that both Hausa and Fulani have different claims and resource use patterns. The multiple use of each of the resources derives from its multiple functions (Williams 1998; Swallow et al. 1997). For instance, land is used for grazing, cropping and gathering of various ecosystem services such as herbs. Trees and shrubs provide a variety of products used for feed, food, medicine, construction material and generally an income for rural and urban dwellers, as the products of some species are purchased on local markets. Particularly in the dry zone of Southern Niger, the products obtained from trees on farms are critical elements for rural livelihoods, especially in drought periods: When millet crops fail, rural households collect leaves, fruits and twigs from trees in order to balance their diets.⁴⁰ Besides, 96% of Nigerien households use firewood as their single fuel source (World Bank 2007). Nomadic herders depend on grazing areas, weeds and non-timber forest products to feed their animals. From the beginning of the dry season, when pastoralists move down southwards in order to water their livestock from surface ponds, vegetation on agricultural fields is used as temporary pasture (see 4.3). Both Hausa and Fulani traditionally share a mutually beneficial relationship, as farmers exchange grain or crop residues for manure produced by herders' livestock (French: *contrat de partage*).

³⁸ However, in the recent decades, nomadic or semi-nomadic Fulani have started to settle down- voluntarily or due to restrictive governmental policy (see e.g. Thébaud & Batterbury 2001). On the other hand, more and more farmers have started to breed livestock. A distinction between the two ethnicities becomes hence blurred over time.

³⁹ For a detailed description of the different production systems in West Africa see e.g. Shettima & Tar (2008).

⁴⁰ Focus group interview, Garin Tsangaya, 09-26-09

Small-scale farmers are dependent on manure, as inorganic fertilizer is hardly affordable and relatively inefficient given the soil characteristics (Breman et al. 2001). However, in recent years and mainly due to farmers' encroachment into areas formerly occupied exclusively by pastoralists, conflicts between the two ethnicities are rising (Thébaud & Batterbury 2001; Nori et al. 2008). The northward expansion of agricultural land and an intensification of land use, i.e. the shortening of fallow cycles, are justified by the saturation of areas suitable for farming (Mortimore & Adams 2001). Herders, in turn, had to expand pastoral land into natural vegetation areas. An annual population growth of more than 3 percent puts an additional pressure on the already scarce resource base. The outlined developments have led to a debate on a manmade desertification of the Sahel, which I will shortly outline next.

2.3 Debate on desertification and re-greening of the Sahel

2.3.1 Desertification debate

As outlined in section 2.1, the Nigerien Sahel is characterized by highly erratic rainfall patterns. Due to the climatic and economic conditions, both Nigerien ecosystems and societies are highly vulnerable to periodically occurring droughts and famines: "Periodic drought is a normal and inherent feature of the Sahel and although it is unpredictable, it is also inevitable" (Hesse & Trench 2000: 2). Although the Sahel had experienced several drought periods over the past 500 years, there are no available records of a drought as persistent as the one starting in the 1960's and continuing until the late 1980's (Xue et al. 2004). In the 1990's, the rainfalls were not as scarce as in the previous decades, but still below the climatological average (ibid.). The summer drought period did not only lead to a human tragedy with thousands of deaths and massive livestock losses, but also to severe changes in the Sahelian landscape. Both soil erosion and the drastically reduced vegetation cover prompted a scientific debate on the desertification⁴¹ of the country and research on the causes of drought (Sendzimir et al. 2009). The desertification debate mainly revolved around two extreme views: (1) Firstly, the effects of human-driven land clearance and degradation as well as population pressure on rainfall, which implies positive land-surface and atmospheric feedbacks *internal* to the region (*anthropogenic factors*). (2) Secondly, unfavourable anomalous patterns in sea-surface temperature (SST) and thus the existence of drivers *external* to human control (*physical/ natural processes*):

Already from the 1930's researchers developed the concept of desertification. Stebbing (1935) claimed to have found signals for an advancing of the Sahara desert into the Sahel. Subsequently, Aubreville (1949) described the 'dessication' (see Fn. 41) of productive land as a result of human activity in the African tropical forest zone. The discussion on human causes of vegetation change was intensified

⁴¹ Hulme and Kelly (1997: 214) define **desertification** as "land degradation in dry-land regions, or the permanent decline in the potential of the land to support biological activity and, hence, human welfare". It is not to be confused with the terms **drought**, referring to "a period of two years or more with below-average rainfall" or **desiccation**, which is defined as "aridification resulting from a dry period lasting a decade or more." However, the distinction between these terms is not always clear (Xue et al. 2004).

after the Sahelian droughts of the 1970's and 1980's (Hulme 2001). Many studies showed that overgrazing of natural rangelands, the northward extension of cultivated area and over-exploitation of forestry resources coupled with severe droughts were leading to widespread land degradation (Benjaminsen 1993; Gray 1999; Dregne and Tucker 1988). The changes in vegetation cover were also said to be the consequence of the region's declining resilience to change (Sendzimir et al. 2009). Sahelian societies were marked as unable to adapt to natural varieties and uncertainties. These findings prompted an increase in development projects in the Sahel, whereas their utility and effectiveness was widely doubted (Batterbury & Warren 2001; Herrmann & Hutchinson 2005; see 3.2).

However, by the means of improved technology, such as satellite remote sensing, another group of researchers challenged the views on large scale degradation due to human activity and reasoned about the linkages between desertification and climate variability (Tucker et al. 1991; Nicholson et al. 1998; Prince et al. 1998). Thereby, two categories of explanations were provided: Internal feedback mechanisms (Ottermann 1974; Charney et al. 1975) and changes in global circulation patterns related to varying sea-surface temperatures (Folland et al. 1991; Nicholson 2001). The researchers argued that measuring rates of dryland degradation was a complex challenge and required long time series of rainfall data, remote sensing-based indicators of surface conditions, and field observations of soil attributes, floristic composition etc. Due to continuous research and advanced technology, the inter-relationships between global climate forcing, droughts, and desertification are much better understood today. However, Sahelian rainfall variability and the reasons for occurring droughts have not yet been fully captured. Although there is overall consensus on local degradation in the Sahel (Xue et al. 2004), opinions on widespread degradation differ widely. The reconsideration of both rate and scale of degradation with more appropriate data is important, as it affects policy making with respect to economic development strategies and donor programmes (Schlesinger et al. 1990). Furthermore,

“the socio-economic and political drivers of land use change should be more tightly integrated with biophysical process studies. New links in the process chains may be discovered, leading to a better reconstruction of past and better predictions of future climate changes and anomalies in this sensitive region” (Xue et al. 2004: 77).

Although many researchers have shifted away from the paradigm of human resource mismanagement and environment damaging behavior, the research on desertification demonstrates that changes in surface properties caused by intensification of land use may have caused serious consequences for the regional climate. To avoid these consequences, the implementation of sustainable resource management policies is considered a priority (ibid.).

2.3.2 Re-greening and Farmer Managed Natural Regeneration (FMNR)

The debate on degradation and desertification of the Sahel has been further challenged in recent years when scientists observed a massive increase in natural vegetation cover, which frequently was referred to as the “(re-)greening” of the Sahel (e.g. Olsson et al. 2005; Warren 2005). Proponents of this reversed trajectory speak of a rise in on-farm trees at a magnitude of 200 million on an area of 5 million hectares

of formerly sparse scrubland in the Nigerien regions of Maradi and Zinder, which comprise around 50% of cultivated land (Sendzimir et al. 2009; Tougiani et al. 2009). These results were obtained by the analysis of aerial photographs, satellite images and observations on the local scale (Tucker et al. 1991; Reij & Waters-Bayer 2001). The core of the re-greening debate was the finding that the increase in vegetation cover could not be attributed to changed rainfall patterns alone, but that human factors would play an important role (e.g. Olsson et al. 2005, Herrmann et al. 2005).

The “success story” (Reij 2006) of the re-greening is attributed to manifold reasons. Beside rural-urban migration and higher rainfall, changes in natural resource management practices on the local level have been put forward (Reij 2006; Tougiani et al. 2009; Reij et al. 2009). The most integrated approach to the re-greening phenomenon, taking social, economic and political factors into consideration, was conducted by the systems ecologists Sendzimir et al. (2009) by means of causal loop diagrams. By examining ‘interdisciplinary clusters of factors’, the researchers showed that there is a variety of inter-woven drivers behind the vegetation increase.

This finding is in line with the proponents of the community-based agro-forestry⁴² program ‘armer Managed Natural Regeneration (FMNR), which could have had a big impact on the observed biomass increase. Some authors claim that the introduction of soil and water conservation (SWC) techniques, such as water harvesting and the systematic natural regeneration of trees from living stumps, in the regions of Maradi and Zinder from the early 1980’s did not only increase crop yields and soil fertility, but potentially also led to higher food security of approximately 2.5 million people (Larwanou et al. 2006; Tougiani et al. 2009). Yet, technical innovation alone might not have prompted land and tree cover rehabilitation, but according to Tougiani et al. (2009: 378) required

“interrelated technical practices and social arrangements that are appropriate to a region’s biophysical characteristics and that address protection, maintenance and sustainable management of resources.”

Moreover, spontaneous adoption of agro-forestry enterprises by rural communities is said to be successful only when *institutional arrangements* are addressed and eventually modified. In the case of the ongoing program FMNR so called “local conventions” have been developed, determining the governance of resources by villagers in accordance with the forestry department (Tougiani et al. 2009; see 3.2.2.1). Thereby critical are the *ownership* of innovation, the *confidence* of farmers to control risks and the extensive *allowance to manage* on-farm trees (Tougiani et al. 2009). These factors are taken as the starting point for the analysis of my study villages and will be discussed during the following sections. Proponents of FMNR state that a more profound analysis of the observed environmental rehabilitation and of barriers potentially inhibiting this development could enrich the literature on African resource management, which often reports more ‘doom’ than ‘gloom’ (Reij 2006).

⁴² The World Agroforestry Centre (ICRAF) defines agro-forestry as “a dynamic, ecologically based natural resource management system that, through the integration of trees on farms and in the agricultural landscape, diversifies and sustains production, enhancing social, economic and environmental benefits for land users at all levels” (Bellefontaine et al. 2002, *web source*)

3. The regulation of natural resources and resource governance institutions

As outlined in the previous chapter, the Republic of Niger has long been subject to a story of progressive resource degradation, accelerated by persistent drought periods and high pressure on the natural resource stock due to a fast growing population. Policy-makers have thus constantly adapted national environmental legislation to halt resource degradation. The apparent success of the program FMNR, however, shows that the delegation of management rights to on-farm trees to local communities and the appreciation of local conventions (see 3.3.1) for resource governance are a promising approach to counteract the desertification narrative. The program focuses on the management of the resources land and trees as an integrated renewable unit or “holistic land-use system” (Kant & Lehrer 2004: 281). As the management of on-farm trees or agro-forestry parklands, respectively, cannot be dealt with in isolation from the constitutional level (see 1.2.5), this chapter seeks to explore whether the current environmental legislation in Niger takes an agro-forestry approach into account. Central to the chapter are the questions on how resource tenure is regulated and whether customary rights are recognized in the legal framework. A critical examination of the national legislation on both forest resources and land, as well as its codification shall not only provide the background for the analysis of resource management on micro level, but also outline potential institutional barriers and sources of conflict for the adaptation of sustainable agro-forestry practices on the ground.

3.1 Historical background: Erosion of customary institutions and the question of ownership

To understand the overlapping of frequently incompatible norms and legal systems (*legal pluralism*; see Lavigne Delville 1999, 2007), as well as the conflict of powers that characterizes current resource governance in Niger, it is indispensable to have a look at the formation of respective legislation. Two pillars are exceptionally important to consider: The impact of French colonialism and post-independence governments on (1) the political-administrative power structure and (2) the formation of property rights to natural resources. The institution of property rights can be seen as particularly influential because it highly affects the interaction of people with natural resources (Meinzen-Dick & Pradhan 2002). The attempt to trace the codification of resource tenure in Niger was confronted with the realization that rights to land and vegetation are usually treated separately from one another in the literature, just like forestry and agriculture. Kant and Lehrer (2004: 281) attribute this situation to the effects of Europe’s agricultural and industrial revolutions and neo-classical economic theories of specialization and trade:

“Just as farming and forestry technologies began to specialize, so did the institutions related to these fields, which developed independently into two different schools of thought- one for forestry and one for agriculture. The emphasis on specialization restricted the optimal integration of institutions [...]”

Presumably following this logic, the colonization of Niger in 1935 by France brought about the establishment of separate institutions specialized in each of the two sectors, both geared to rural development. Control rights over resources were distributed across various stakeholders, formalized by different statutes, leading to an ‘institutional segregation’. Central to French colonialism was the policy

of direct rule or *Association*, where Europeans and urban citizens were subjected to civil law (based on the French *Code Civil*) and the rural population left with customary authorities (*indigenat*). This differentiation was justified by the wish to create institutions “appropriate to African conditions” (Ribot 1999). In order to control land use and management in rural areas, the colonial administration changed the decision-making power of traditional authorities: In villages, the smallest unit of socio-political aggregation, village chiefs (Hausa: *Maigari*) had held only ritual powers derived from the recognition of their “magico-religious alliance” with local genies (Lavigne Delville 2007: 36). Access to and allocation of land was regulated and negotiated within lineages (Lund 2001; Alinon & Kalinganire 2008). The French granted customary authorities,⁴³ particularly the cantonal chief⁴⁴ (Hausa: *Sarki*), the power to allocate land-use rights and to control the territory. Both Sarki and Maigari were in charge for the collection of taxes to centrally appointed administrators⁴⁵ and the regulation of conflicts around land (Boubacar 2000). As traditional authorities were centrally appointed and not elected in public fora, they became *upwardly* accountable⁴⁶ to the central state administration, but not *downwardly* to the rural population they sought to govern (Ribot 1999). This system of accountability prevailed after independence in 1960. However, the military regime of Seini Kouché (1974-87) brought about a destabilization of institutions in charge for land, as well as growing conflicts around the resource, as land was now declared to belong as private property to the tiller of the soil (*mise en valeur*), no matter which (customary) tenure rules were previously held. Yet, any resolution of disputes by any local authority was prohibited (Lund 1997; Hilhorst 2008). Only from 1986, when the process of establishing new tenure legislation, the Rural Code (French: *Code Rural*), was initiated, people could claim the land they had hired or leased and which was lost under Kouché. However, complementarity and competition between institutions for land did not disappear until today (Lund 1997; Benjaminsen et al. 2008). Besides, all land was now nationalized, amounting *de jure* to an abolition of customary systems. Customary authorities were denied any official responsibility except for conflict resolution. Hilhorst (2008: 8) summarizes the outcome of this period:

“Customary’ local governance institutions...used to be effective in exercising authority over access to and use of land and natural resources, and resolving conflicts. Although their relevance continues in most rural areas..., their powers have been undermined. The destabilization of these institutions started during colonial times and continued after independence, reflecting the growing power of the central state, the expansion of statutory law, and changing social relations [...].”

⁴³ The term “customary” is very ambiguous, as customs change and evolve over time, adjusting to new social, political and economic circumstances. In this thesis it is used to describe “a system of authority based on anteriority and alliance, in which access to resources depends on social belonging, and the rights are allocated – and sometimes renegotiated – under the auspices of land management institutions” (Lavigne Delville 2007: 35).

⁴⁴ Shortly after World War II, the French colonial administration decentralized the politico-administrative structure of its West African colonies. Each has created geographically smaller units of governance, appointed administrators to manage these units, created councils to advise these structures, devolved responsibilities to these new governance structures and centralized approval of all decisions in a certain hierarchy, among which the canton was one administrative unit. See Lund (1997).

⁴⁵ By 2004, the administrative division stretched from the sous-préfet of the Arrondissement (also overseeing the Rural Community and villages), préfet of the Department and governor of the Region, to the Minister of the Interior and president at the Federal level (Ribot 1999). Arrondissements were renamed or divided into communes after 2004.

⁴⁶ For specification on (horizontal or vertical) ways of accountability and a discussion of this term see Agrawal & Ribot (1999).

Whereas control rights over land were allocated to state-appointed traditional authorities and, with the introduction of the Rural Code, shifted to the Ministry for Agriculture, the power to control and sanction the use of forest resources was centered in a new governmental body founded in 1935: The French West Africa forest service. Following the French system of *tutelle* (oversight), forest administrators were now centrally appointed (Ribot 1999). The centralization of tree management authority at the level of the colony was justified with the fear of losing vegetation cover, as observed in neighboring colonies. Based on the French West African Imperial Forestry Code of 1935, the colonial administration formalized a common property status of the 15 apparently most valuable tree species, whereby the consumption of these species should be reduced and demand shifted to other indigenous or 'rough' species. These remained under free use and management by smaller communities (Thomson et al. 1986). Besides, certain areas were now classified as 'forests', thereby following the French notion of a space exclusively reserved to the production of forestry products and wood. Forestry products were strictly separated from agricultural products.⁴⁷ The colonial policy brought about a fundamental intervention in customary practices: Until 1935, trees were treated as open access resource with loose customary rules on usage (Thomson et al. 1986). On account of their overall abundance, they had exclusively been managed passively (i.e. simply left on fields). The only species which had been protected on national level was the Ana tree (*Faidherbia albida*) due to its agro-forestry attributes;⁴⁸ baobab (*Adansonia digitata*) and date palm (*Phoenix dactylifera*) were privately owned (see 4.3.1.3). The customary system neither had an equivalent to the notion of forestry vs. agricultural products, nor that of delimited space. Thomson et al. (1986: 13) conclude that

“because colonial subjects...had at the time no effective political or legal recourse against these centralizing initiatives, and little power to force colonial officials to take account of local conditions, individual rules included in the French West African Imperial forestry code reflected precious little sense of the realities of local agricultural production and wood stock management systems.”

The onset of severe drought periods and a constantly degrading resource stock triggered a debate on man-made desertification (see 2.3.1), and led to a country-wide policy program on the protection of trees (*Sahel Vert*) under the then president Diori Hamani (ruling 1960-1974).⁴⁹ From early 1960, people started to sell wood in the Zinder region, hereby increasing both the value of and pressure on trees (Thomson et al. 1986). After independence, the government of Seini Kounché enacted a new Forestry Code or law no. 74-7 of 4 March 1974 “codifying the forestry regime of Niger.” The French West Africa forest service was renamed to “Ministry for Environmental Protection and the Fight against

⁴⁷ The cited document, entitled “Approche développement local et décentralisation: Enjeux conflictuels et impacts sur la gestion durable des ressources forestières” (*Local approach to development and decentralisation: Conflicting issues and impacts on the sustainable management of forestry resources*) was provided by the NGO CRAC/ GRN and does neither possess of a date nor author.

⁴⁸ It fixes nitrogen and enriches soil fertility by facilitating cereal crop up-take of phosphorus. Thomson et al. (1986) state that the Sultan of Zinder had forbidden illegal cutting of this tree under penalty of death.

⁴⁹ Part of this initiative was the tree planting program for young farmers known as *Jeunesse Pionnière*. Interview with the head of the departmental forest service, Mirriah, 10-05-2009.

Desertification.”⁵⁰ Attempts to grant management rights to local communities were not made; alternative management rules had never been established. The authority to manage and control forestry resources stayed with the central government. The forest department’s technical service *Eaux et Forêts* was now in charge for controlling the Forestry Code’s enforcement and started to patrol across the country, fining illegal cutting of trees. Thomson et al. (1986) summarize the forest policy of this time:

“Most villages had lost their power of independent activity as the result of colonial, and then independent regime efforts to establish controls over major forms of organization in rural areas. Villages...had no authority to enforce sanctions against violators of locally-devised use rules.”

The policy of centralizing power over both land and trees (*tutelle*), direct rule (*Association*) and strong resistance to authorizing self-governance for local communities which continued during the first three decades after Niger’s independence can be seen as an expression of French political theory: the concept of a sovereign, single-centered governmental system, where the executive typically exercises more power than the legislature (Thomson 1996b). Furthermore, the treatment of both land and trees as independent resource units during colonialism and post-independence governments followed the French *droit de propriété* approach, where *propriété* (property) was based on one basic and valuable right to “possess and dispose of a thing to an absolute degree”,⁵¹ defining and evaluating all other rights (Alinon & Kalinganire 2008).

3.2 Natural resource governance: Trends of decentralization and participation

As the past resource governance regime, relying on the colonial approach to promote centralized resource management over indigenous practices, was increasingly considered inefficient, the Nigerien government, since the end of the 1980’s, started to take the codification of customary practices into account. A major push for this shift was a development on the international agenda, whereby “sustainable’ natural resource management”, “decentralization” and “participation” of all relevant stakeholders and resource users into decision-making were postulated by donor agencies and researchers (see among others Hilhorst 2008, Tyler 2008). Ribot (1999: 4) put it drastically:

“In the 1980’s the developmentalist view of the third-world State flipped from a progressive force of change and modernization to a backward primordial arena or greed, hindering development...The undifferentiated category of ‘civil society’ flipped...to being the source of creative energy for modern market-oriented change- if only the State could be rolled back.”

Besides, people and local communities now turned from being viewed as “environmental villains destroying nature with ignorance” to “heroes”, whose local knowledge would prevent resources from degradation (Ribot 1999: 4; see also Fairhead & Leach 1996). These paradigms or ‘flips’ in state-society oppositeness were consequently promoted in the so called Poverty Reduction Strategy Paper (PRSP) of the 1990’s by the World Bank as part of its strategy for economic growth and rural development (Ly et

⁵⁰ French: *Ministère pour la protection de l’environnement et la lutte contre la désertification*

⁵¹ La propriété “est le droit de jouir et disposer des choses de la manière la plus absolue” (Art. 544 du Code civil). It furthermore integrates the *nue-propriété*, which is the “right to dispose of one’s good at one’s own discretion, and to eventually modify or destroy it” (*le droit de disposer de son bien à sa guise, et éventuellement de le modifier ou de le détruire*), excerpts from articles 274, 578 and 587, Code Civil in Aulagnier (1998).

al. 2006). Taking the concerns of the PRSP into consideration, reforms on environmental governance were undertaken throughout this decade. Decree no. 92-030 of 8 July 1992 codified the general principles for rural development of Niger, whereby five 'strategic axes' for this sector were determined: the integrated management of natural resources; the organisation of the rural sector by shifting management responsibilities to the population and modifying the role of the government; food security; the intensification and diversification of the production; and the financing of the rural sector (Ly et al. 2006). One important reform was undertaken following the National Conference of 1991, which recommended the decentralization of resource governance (Hilhorst 2008):

3.2.1 Decentralization and local administration

Following the dissatisfaction with centralized resource governance, a process of decentralization was initiated, which can be described as "any act in which a central government formally cedes powers to actors and institutions at lower levels in a political-administrative and territorial hierarchy" (Agrawal & Ribot 1999: 4). It was hoped that decentralization would "contribute to rebuilding the state from below, thus enhancing the legitimacy of government" (Hilhorst 2008: 12). Decentralization was justified with increased efficiency and equity in public decision-making, greater responsiveness of government to citizens, and an improvement in natural resource management (Agrawal & Ribot 1999; Alinon & Kalinganire 2008). As Niger faced a series of coups d'état and economic crises throughout the 1990's, the process of preparing the necessary institutional framework for establishing local bodies for resource governance took until 2004 (Ribot 1998; Reij et al. 2009). Within the newly established communes as part of the decentralized administrative government structure (*région, département, commune*), councilors were elected based on political party lists. These in turn elected the mayor. The formal mandate of local councils is to strengthen decentralized management of natural resources and environmental protection. Furthermore, they are involved in converting agricultural land to residual plots (planning decisions). Problematic is the fact that local governments were formally superposed on top of existing customary institutions, what reinforced the above mentioned legal pluralism. And although local customary chiefs were now represented and able to give advices on local development issues, they were not granted any decision-making power⁵² (Hilhorst 2008). Hence, though resource management responsibility was decentralized, the rural population is still vaguely represented, since villagers have little influence over national political parties and are unable to choose their own candidates. Villagers might not consider the new councils as legitimate (Ribot 1999). As Hilhorst put it,

"Local governments may need to reconcile legitimacy and legality, because they are not obliged by law to delegate responsibility over natural resource management to the most appropriate level." (2008: 15)

Municipal councils are institutionalized through law and linked to existing structures of government, such as the executive of ministries or technical services. Of interest to this thesis are the forest department and the tenure commission, as outlined below. In order to control their work and formulate

⁵² For specification on types of power see Agrawal & Ribot (1999)

general policies at the communal level, a central government administrator, the *Sous-préfêt* (sub-prefect), is appointed.⁵³ Councils are partly financed by taxes or levies on natural resource use such as on firewood or the purchase of parcels. Thereby they run the risk to be intruded by party interests or local (commercial) clientele, which could be detrimental to rural livelihoods. By now, however, no formal transfer of authority (by so called decrees of application or French: *décrets d'application*) has taken place (Hilhorst 2008). Still, local governments already influence use and management of natural resources in providing support to local conventions (see 3.2.2.1) or in arbitrating disputes.

3.3 Sectoral regulation of land and forest resources

Both decentralization and popular participation, i.e. power-sharing in decision-making, rely on various sets of laws: Organic codes or constitutions determine levels of government (national, regional, local) among which responsibilities and powers are divided. These codes lay down the actors represented at each governmental level, elected or appointed, and their mutual relation. Electoral codes in turn determine the procedures of election and the details of representation by elected officials. Most important for this thesis, however, is the third set of laws: Technical codes. These are the “bodies of law” determining responsibilities and decision-making over specific sectors of economy and society (Ribot 1999: 6). In this regard, the decree n° 93-015 of 2 March 1993 “fixing the principles of orientation to the Rural Code” (POCR) is fundamental because it provides the legal framework for all activities related to natural resources with the aim to protect the environment and generally the quality of life for natural resource users in Niger. The POCR was prepared by the above mentioned decree no. 92-030 of 1992 and contains sectoral laws, among others on land (*code foncier*), animal husbandry or pastoralism (*code pastoral*), and water (*code de l'eau*). Although these sectors are directly linked to vegetation, the Nigerien government enacted a Forestry Code *sensu stricto* with law no. 2004-040 of 8 June 2004, replacing that of 1974, but not the sectoral laws (Ly et al. 2006). A detailed description of the environmental legislation would go beyond the scope of this thesis. Yet, it is important to keep this legal pluralism in mind. For the purpose of this paper, I will concentrate on the Forestry and Rural Code and critically examine how agro-forestry, customary rights and popular participation have been considered.

3.3.1 The Forestry Code

The Forestry Code of 2004 determines fundamental principles and modalities to protect, valorize and manage forestry resources, whether by the State, “territorial collectives” or others. It is important to note that while the old Forestry Code based resource governance exceptionally on “forests” (see 3.1), the new law opens for the treatment of agriculture and forestry as an integrated land use system:

⁵³ On each administrative level, there is a governmental authority controlling the work of the technical services, setting the general policies of their respective administrative level, and preventing and settling conflicts. These are the governor on the regional level, the prefect on departmental level, and the sub-prefect at communal level. They build the administrative framework structure (*structure d'encadrement*). The information are based on a discussion with the vice director of the Ministry for Agricultural Engineering (*Génie Rural*) and a member of the NGO 'GENEVICO', 10-26-2009, Zinder.

Article 4 states that forestry resources comprise forests classified as “territories... covered with trees, bushes and other non-agricultural vegetation”, “land dedicated to forestry use”, and agro-forestry parklands. The latter are defined in article 5 as “open or closed territories covered with trees or forestry species maintained by their *owners* and on which activities such as livestock rearing or agriculture are practiced in an integrated manner”⁵⁴ (my emphasis). Apart from the avowal of agro-forestry, this article is particularly interesting insofar as it highlights the primacy of the French *droit de propriété* approach (see 3.1). In this regard, article 16 states that all trees or vegetal species which are not formally registered as *private* belong to the State.⁵⁵ However, the government claims a right of inspection on all trees (*droit de regard*)⁵⁶ and possesses ultimate control rights, implying a perpetuation of the system of *tutelle* (see 3.1; Ly et al. 2006). This is expressed in article 3 prescribing that the State, i.e. the Ministry for Environmental Protection and the Fight against Desertification (short: *ME/ LCD*), was the “guarantor of the preservation of forestry resources” (*garant de la gestion*). To safeguard the “ecological equilibrium”, the code regulates the clearing of trees and bushes (Art. 37 *et seq.*) as well as bush fires (Art. 42 *et seq.*).

Furthermore, the Forestry Code provides the basis for the classification and declassification of forested areas (Art. 20 *et seq.*): In accordance with the council of Ministers (see 3.2.1), a forest management plan (*plan d'aménagement forestier*) is established (Art. 17, 21), which shall be integrated into the land management plan of the land tenure commission (COFO; Art. 30; see 3.4.2). Certain forested areas have been classified and particularly protected (*controlled zones*): The clearing of land is prohibited and certain indigenous species must not be removed or mutilated (Art. 34). Yet, the State can entrust local management structures (*structures locales de gestion de bois, SLG*) in form of written concessions to safeguard the sustainable⁵⁷ exploitation and commercialisation of forestry resources in designated “Rural Wood Markets” (*marchés ruraux de bois*): These markets have been set up countrywide around densely, naturally grown forested areas whose boundaries are delimited.⁵⁸ Licensed woodcutters (*bûcherons*) from the territory sell dry wood there, with the income being shared among the State, the forest department, and the community (*territorial collective*).⁵⁹ The SLG, comprised of members of the forest department and the territorial collective, regulates the species that

⁵⁴ Own translation. Original verbatim: “*Les parcs agro-forestiers sont des terrains clos ou ouverts, couverts d'arbres ou d'essences forestières entretenus par les propriétaires et sur lesquels sont pratiquées de manière intégrée des activités d'élevage ou d'agriculture.*”

⁵⁵ “*Toutes les forêts qui ne font pas l'objet d'appropriation privée sont des forêts domaniales*”, Art. 16, law n° 2004-040 of 8 June 2004 on the forestry regulation in Niger

⁵⁶ Discussion with the vice-director of the Ministry for Agricultural Engineering (*Génie Rurale*), Zinder, 10-26-09.

⁵⁷ Art. 79 of the framework law n° 98-56 ‘concerning the management of the environment’ codifies the sustainable use of natural resources, thereby defining the principle as a “resource use that satisfies the needs of the present generation without compromising the satisfaction of needs of future generations” (own translation)

⁵⁸ Interview with the head of the mobile forestry brigade (technical service *Eaux et Forêts*), department of Mirriah, 09-23-09; for further information see Mahamane et al. (1995) or Noppen et al. (2004). Detailed regulations for the organisation and transport of wood in agglomerations are outlined in chapter 3, section 3 of the Forestry Code.

⁵⁹ Out of the sum earned, 20% are paid to the community. From the remaining 80%, 60% are paid to the government (treasury) and 40% to the forestry brigade’s account (“*compte 3001*”). Source: Head of the departmental ME/ LCD, Mirriah, 10-05-09

can be harvested, the amount of wood and authorizations as well as the procedures for selling.⁶⁰ Rural wood markets are interesting for the discussion on participatory management of forestry resources, as local management structures are integrated in the planning, elaboration, implementation, and evaluation of activities related to forestry (Art. 9, 18). Territorial collectives in controlled zones are furthermore allowed to prune and trim trees according to “customary habits”, whereby they are granted extensive usage and management responsibilities. Yet, the rural population is urged to actively participate in the valorization of their forests, for instance by soil and water conservation techniques, the planting of trees, and any measure to promote and protect the natural regeneration of trees (Art. 31). Last but not least, by the integration of SLG in the governance of forestry resources on community level and of local councils (3.2.1) in the elaboration of forest management plans, the government recognizes the use of ‘customary bylaws’, i.e. “subsidiary laws that are enacted by local governments” (Nkonya et al. 2005, cited in Alinon & Kalinganire 2008: 2).⁶¹ In applying a participatory management approach in controlled zones, some authors state that the Nigerien Forestry Code is the most progressive law compared to the Sahelian states Burkina Faso, Senegal, and Mali (Ly et al. 2006; Yatich et al. 2008; Alinon & Kalinganire 2008). Yet, Ribot (1999) sees some major weaknesses regarding the accountability of SLG to rural populations, the influence of forest services in determining logging quota and the dominance of commercial traders in urban wood markets.

Another step towards participative forest management, and of high interest to this thesis, is the gradual acceptance of local conventions that describe “all agreements which encompass an auto-restriction dimension” between social groups with the objective to preserve the environment and “install compatibility between using and renewing natural resources” (Alinon & Kalinganire 2008: 2). According to its proponents, local conventions have been a key to the acceptance of the soil and water conservation program FMNR, thereby accounting for the integration of all resource users and the forest department into resource management decisions (Larwanou et al. 2006; Tougiani et al. 2009; see 2.3.2). The tree management and usage rights granted to communities participating in FMNR, as well as the inclusive governance structure established (*village committees*) resemble the SLG in the Forestry Code. Besides, some villages started to establish rural wood markets (Tougiani et al. 2009), which gives reason to believe that FMNR takes place only in controlled zones.

Whereas the regulation is clear on controlled zones subject to forest management plans, the Forestry Code is all but clear on so called ‘uncontrolled’ zones. In these areas, no local management structures (SLG) are found. Control and management rights to trees are exceptionally with the forest department, whereby wood use is surveyed by an irregularly patrolling forest brigade (see 3.4.1).⁶² As

⁶⁰ Interview with the head of the mobile forestry brigade (technical service *Eaux et Forêts*), department of Mirriah, 09-23-09

⁶¹ Alinon and Kalinganire (2008: 2) explain further: “Bodies enacting bylaws go beyond the executive sphere and comprise local councils having a legislative dimension. Bylaws are consequently enacted at the local level by elected or executive institutions.”

⁶² Head of the forestry brigade, Mirriah, 10-05-09

forestry resources are generally part of the “common heritage of the Nation”⁶³ and thus equally subject to the general principles of preservation, valorisation and natural regeneration (Art. 9), the same duties as for resource users in controlled zones can be considered to apply. Article 39 is clear in stating that all kinds of clearing (*défrichement*) require an authorization from the communal forest department. Furthermore, the resource user needs to pay and be officially authorized for any kind of tree-felling and the usage of forestry products for commercial purposes (Art. 51, 57⁶⁴). This means that the customary rights granted may only serve to fulfil individual or family needs.⁶⁵ Rights thereby comprise “cultivation, livestock rearing, and the cutting [*cueillette*] of forestry products”⁶⁶ (Art. 54). Article 52 is more specific in allowing for the collection and use of dead wood for energy consumption or the construction of agricultural tools, the collection of fruits and products of exudation, as well as medical plants.

Although the State generally “encourages traditional practices for sustainably managing natural resources on community level”⁶⁷ and despite the positive fact that agro-forestry parklands are subsumed under the term “forestry resources”, rights to on-farm trees are more than vague, particularly with regards to resource management in uncontrolled zones where my study villages are located. The distribution of formal rights to trees on farms in these areas can thus only be understood when looking at the information provided by members of the departmental forest service in Mirriah (see 3.4.1). Yet, before I turn your attention to this section, I would like to note that one important factor has not been mentioned in the legislation: From a discussion with the former permanent secretary (SP) of the Departmental Land Tenure Commission (COFODEP) in Mirriah I learned that (economic) trees can be owned and inherited in principle (4.3). The Forestry Code merely states that all vegetation needs to be managed in favor of the resource.⁶⁸ Formal rights around on-farm trees and respective responsibilities are further complicated when looking at the regulation of the resource land in the Rural Code.

3.3.2 The Rural Code

Article 16 of the Rural Code (*Code Rural*) prescribes that “everything growing naturally or artificially on land belongs to the *owner* thereof”⁶⁹ (my emphasis). This provision is in stark contrast to the regulations in the Forestry Code that I outlined, and thus highly important for the analysis of the management of on-farm trees. Whereas article 5 of the Forestry Code grants wider management rights to the owner of the forest resource – conditional to the forest department’s right of inspection – article 16 of the POCR centers tree ownership in the primary rights holder of the underlying land. The regulation thus leaves room for interpretation and confuses responsibilities. Besides, the provision of Article 16 expresses once

⁶³ Art. 78, skeleton law n° 98-56 regarding the management of the environment

⁶⁴ “No right to the exploitation of forests for commercial purposes can be granted for free”, Art. 57 (own translation)

⁶⁵ Art. 51, law n° 2004-040 of 8 June 2004 codifying the forestry regime in Niger; Head of forestry brigade, 10-05-09, Mirriah

⁶⁶ “*Dans les forêts protégées, les droits d’usage coutumiers comprennent la culture, le pâturage et la cueillette des produits forestiers, y compris sur les chantiers forestiers lorsque l’exercice de ces droits ne compromet pas l’exploitation de ces derniers.*”

⁶⁷ Article 22 of the framework law n° 98-56 for the environment

⁶⁸ Former SP COFODEP Mirriah, 10-26-09, Zinder; Art. 3 of law n° 98-56 concerning environmental management

⁶⁹ “... *tout ce qui s’unit au sol, naturellement ou artificiellement, qu’il s’agisse du couvert végétal ou d’aménagement divers réalisé par l’homme, appartient au propriétaire du sol*”, Art. 16, decree n° 93-015 of 2 March 1993 POCR

more the legislator's preference for *private property* according to French legal tradition, as observed in the Forestry Code (see 3.1 and 3.3.1; Lavigne Delville 2001). This focus becomes tangible when recalling the reasons for establishing the Rural Code in 1994: Hesse and Trench (2000) state that a legal framework should be developed that would address problems of land tenure insecurity⁷⁰ and conflict. Tenure insecurity was judged to be a central factor contributing to the stagnating rural development and the degradation of the physical environment observed since the 1970's. The Rural Code thus aimed at clarifying the conditions under which land could be held and transferred in order to secure land tenure for rural actors. Additionally, citizens should get wider access to land (Hilhorst 2008). By granting the opportunity to privatize land, the government hoped that investment in land would increase, thereby improving agricultural productivity (Lund 2001). Last but not least, the Rural Code aimed at planning land use (*aménagement du territoire*), thus delimiting areas for either agriculture or pastoralism.⁷¹

However, the one-sided focus on private ownership completely ignores the concept of resource usage rights. These play a fundamental role to rural livelihoods, as it will be shown in the analysis of the study villages (chapter 4). Yet, private ownership does not imply that land can be managed and used at one's own discretion. As for forest resources, the state has a right of inspection (*droit de regard*) on land, namely by land tenure commissions (*commission foncières*, short: COFO) headed by the Ministry for Agriculture. These have been set up at all administrative levels from 2004 (see 3.4.2). The territorial community as well as every citizen has the duty to contribute to the valorisation (*mise en valeur*) of all natural resources as part of the common national heritage. If this does not happen within three successive years, the State can temporarily withdraw the usage rights of the actual cultivator and charge a third person to manage the land.⁷² This right is derived from the provision that use and management of land need to be sustainable and rational. Its protection and optimisation need to be ensured.⁷³

3.4 Stakeholders involved in natural resource governance on local level

Before I turn to the analysis of the two study villages, I will briefly describe the stakeholders dealing with natural resource governance on local level which I consider important for this thesis. Local councils have been outlined in chapter 3.2.1, being part of the administration on local level. For this thesis, the *executive* is particularly interesting. Regarding management and use of on-farm trees, the forest department is the most important actor. Stakeholders in charge for land and conflict resolution are mainly the tenure commissions (COFO), traditional chieftaincy, as well as the religious leadership.

⁷⁰ The concept of tenure security is contested, so that various definitions coexist. One was provided in the method section of this thesis. The concept describes the measure of command over a resource and the degree of certainty of the extent and duration of rights (see Lund 2001).

⁷¹ These are namely corridors for transhumance and grazing areas

⁷² Art. 18; Art. 121, decree n° 93-015 POCR

⁷³ Art. 3 and 78, skeleton law n° 98-56 regarding the management of the environment

3.4.1 Ministry for Environmental Protection and the Fight against Desertification

As mentioned above, the principal stakeholder dealing with forestry resources in Niger is the Ministry for Environmental Protection and the Fight against Desertification (ME/ LCD). Beside forestry resources, this ministry is also in charge for fisheries (*politique halieutique*) and hunting (*politique cynégétique*).⁷⁴ The ME/ LCD is represented at all administrative levels of the country, whereby only the department of Mirriah shall be considered at this stage. The departmental ministry for the environment (*Direction Départementale de l'Environnement, DDE*) is comprised of five technical services, which are the executive organs of the ministry (see fig. 2). The 'Reforestation Service' executes programs on tree planting and the restoration of land. The 'Service of Authorization' issues permissions to log wood (*permis d' exploitation*) for construction material (*bois de service*), firewood (*bois de chauffe*) or tools (*bois d'oeuvre*). The prices per permit differ depending on the zone regulated in the forest management plan (see 3.2.2.1) and to the tree species, whereas protected species are much more expensive.⁷⁵

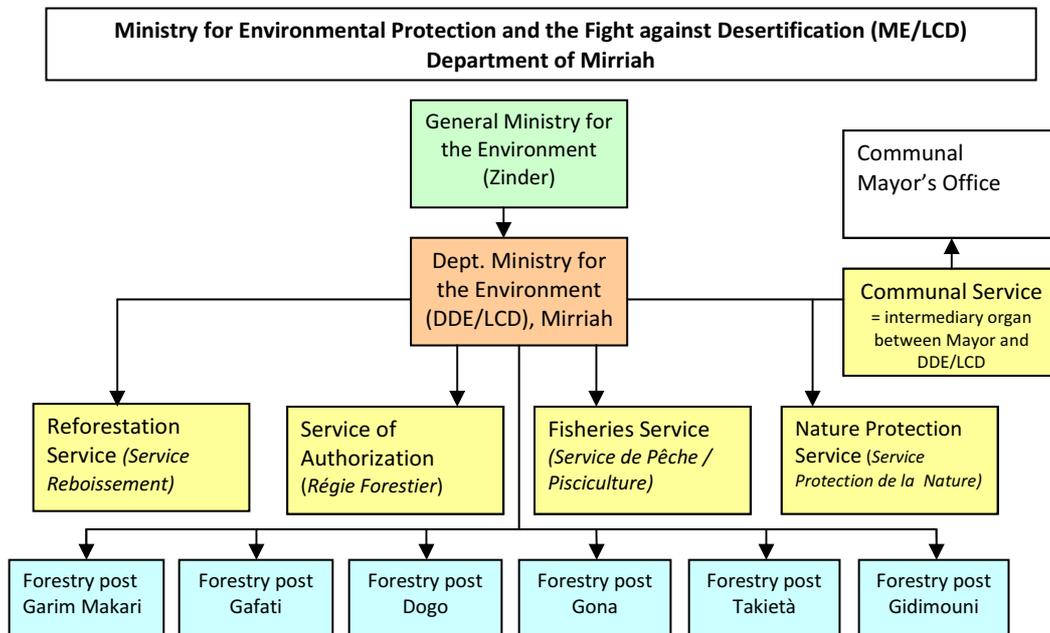


Figure 2: Organizational chart ME/ LCD, Own representation based on an Interview with the Head of DDE/ LCD

My study villages are located in an 'uncontrolled' zone (see 3.3.1). To get a license for the professional trade of firewood, for example, one has to pay 500 CFA per annum and 975 CFA per m³ (*stère*) of wood.⁷⁶ This service furthermore controls revenues from fines collected by the 'Nature Protection Service' or forestry brigade (*brigade forestier*), which is of particular interest to this thesis. The brigade's aim is to control access over forestry resources, to halt illegal cutting and to protect ligneous species. The forestry brigade is seen as a paramilitary force, as employees or *brigadiers* need to have a military service education and could be armed under the forestry regime of 1974.⁷⁷ Since recently, the work is regulated in law no. 2005-013 of 27 May 2005. According to my informant, fallen branches, leaves, and

⁷⁴ Head of the communal service since 2006, Mirriah, 09-21-09

⁷⁵ The taxes are regulated in *ordonnance* 92-037 "relatif à l'organisation de la commercialisation et du transport du bois"

⁷⁶ Interview with the head of the communal service (see figure 2), Mirriah, 09-21-09. 656 CFA are 1 €.

⁷⁷ Art. 32, law n° 74-7 of 4 March 1974 codifying the forestry regime in Niger

fruits for household use/ daily consumption can be taken for free. Still, users need to have permission from the brigade. The household chief addresses himself to the forestry chief, who in turn issues the allowance.⁷⁸ The forestry brigade patrols on communal level and controls the possession of allowances for the use of forestry resources. The brigade fines people cutting or pruning trees without authorization. If the offence is minor, a person (*délinquant*) caught in the act of illegal cutting (*inflagrant délit*) is sometimes only warned or advised. In severe cases, however, he is transported to the headquarters of the forestry department, where the director decides about further steps and fines according to the gravity of the tort, the tree species and the diameter of the wood cut (5000-100.000 CFA). The fines (*pénalités*) are regulated in article 82 *et seq.* of the Forestry Code. For example, the illegal cutting of an Ana tree (*Gao*) is fined with 20.000 CFA, and of a Baobab (*Kouka*) with 15.000 CFA.⁷⁹ The offender can even be imprisoned for up to six months from the age of 13 (§40 Penalty Code). The head of the DDE/ LCD gives orders when to patrol (*ordre de mission*), whereas patrols are more frequent after the harvest period in late October. There are no regular patrols and no fixed routes regarding my study villages, located in the communes of Mirriah and Zermou. Upon request, my informant could not show me any register of the dates and locations where they departed, neither of the fines levied or taxes collected. The head of the forestry brigade merely stated that “those who patrol in the field [*ceux qui partent en brousse*] are not interested in statistics: that is up to those people who stay in their office.”⁸⁰ However, a share of the patrol’s revenues needs to be paid monthly to the commune.⁸¹ This intransparency gives strong reason to believe that the fines declared do not match the reality.⁸² The forestry brigade is self-financed and thus particularly prone to corruption.⁸³

A fourth pillar of the technical services is the communal service, which reports the work of the DDE/ LCD to the Mayor. The technical services are generally in charge for sensitizing the population on the importance of trees to halt desertification and to spread information on Niger’s environmental legislation.⁸⁴ There are five forestry posts on communal level.⁸⁵ Even villages can have a local forestry post which is appointed by the DDE/ LCD. These can issue allowances to cut and sell wood. The posts need to report all transactions to the commune, which in turn needs to report to the department and so on.⁸⁶

⁷⁸ Interview with the head of the communal service, Mirriah, 09-21-09

⁷⁹ Head of the forestry brigade, Mirriah, 10-05-09

⁸⁰ Ibid.

⁸¹ Art. 10, letter F.2., law n° 2002-017 “déterminant le régime financier des régions, des départements et des communes”.

⁸² All revenues from fines charged and permits issued for woodcutting or the commercial use of wood need to be registered with the head of DDE/ LCD, who needs to declare the revenues to the regional ME/LCD in Zinder. Revenues from all administrative levels are registered with the national treasury. Source: Head of DDE/ LCD, Mirriah, 10-05-09. Unfortunately, I could neither review the books in Mirriah nor in Zinder. I did not even receive an approximation of monthly or annual revenues.

⁸³ Statements of farmers from both villages; Focus group discussion at the head office of the Rural Code, Niamey, 11-03-09

⁸⁴ Head of the communal service since 2006, Mirriah, 09-21-09

⁸⁵ Competent for my study villages is the forestry post in Garim Makari. The post in charge for Zermou is located in Gafati.

⁸⁶ 10% of the money collected go to the mayor, 40% to the account of the communal Forestry brigade (“*compte 3001*”) and the rest to the other departments. Source: Head of the forestry brigade, 09-23-09, Garin Tsangaya

3.4.2 Land Tenure Commissions

Based on the principles of orientation (POCR) of 1993, land tenure commissions (COFO) should be created to enforce the provisions of the Rural Code (see 3.3.2). From 2004, these have been established at all administrative levels: The National Committee of the Land Code is located in the Nigerien capital Niamey (*Comité National du Code Rural*) and headed by the Minister of Agriculture. Furthermore, COFOs have been created on the regional level (*commission foncière régionale, COFOREG*), the departmental level (*commission foncière départementale, COFODEP*), the communal level (COFOCOM) and even the village level (*commission foncière de base, COFOB*).⁸⁷ Depending on the level, the COFO comprises different members. However, technical services of the Agricultural, Environmental and Livestock Ministry, resource user groups such as farmers and pastoralists as well as the traditional chieftaincy are represented on all levels except the village level.⁸⁸ In some communes and according to the importance of the stakeholders for the communal economy, professional woodcutters (*bûcherons*) or fishermen are represented. The COFO shall be a democratic platform where all user groups and parties in charge for environmental management have the same voice.⁸⁹ The COFO delimits the boundaries of agricultural land, corridors and grazing areas, with the latter two being traditionally reserved for mobile groups (pastoralists), both sedentary and nomadic. The COFO controls the adherence of field limits, issues formal land title deeds upon request and controls the valorization of communal land.⁹⁰ In every region, a 'land use scheme' (*Schéma d'Aménagement foncier, SAF*) is developed where different forms of land use and rights thereof are determined.⁹¹ The COFO needs to be informed in case of land-related conflicts and land transactions.⁹²

3.4.3 Traditional chieftaincy

Compared to other Sahelian countries, customary institutions in Niger have a legally recognized role (Lavigne Delville 2007). The election criteria and functions of the traditional chieftaincy in Niger are described in the decree n° 93-028 and the law n° 2008-22 of the Land Code, 'on the status of the traditional chieftaincy in the Republic of Niger'. The traditional chieftaincy is integrated in the administration of the country and denominated according to their sphere of influence (e.g. village chief, cantonal chief or grouping chief for nomadic herders). The highest authority is the Sultan.⁹³ The village chief pays taxes collected from his community to the municipality. The cantonal chief does not receive taxes but "cooperates actively in their levy" within their sphere of influence.⁹⁴ The cantonal, province and grouping chiefs are paid from the national budget and have become civil servants with the

⁸⁷ The composition of COFOCOM and COFOB is regulated in by-law n° 098/MDA/CNCR/SP of 25 November 2005.

⁸⁸ see *Code Rural*, decree n° 93-015, Art.118 et seq.

⁸⁹ Focus group discussion at the head office of the Rural Code, Niamey, 11-03-09

⁹⁰ Art. 121, decree n° 93-015 of 2 March 1993, PdO to the Land Code

⁹¹ "*Schéma d'Aménagement Foncier*", Art. 127 et seq., decree n° 93-015 of 2 March 1993, PdO to the Land Code

⁹² interview with mayor of Zermou, 09-16-09

⁹³ Art. 3 of law n°2008-22

⁹⁴ "...ne perçoit pas les impôts et taxes mais collabore activement à leur recouvrement", Art. 13, *ibid.*

implementation of the Rural Code (see 3.1).⁹⁵ The traditional chieftaincy possesses the right of conciliation in customary, civil and commercial issues. Particularly the cantonal chief (Sarki) is often considered the main arbitration body when it comes to conflicts on agricultural or grazing land between and within territorial collectives (see 4.6.1). He also plays a crucial role regarding the decision on the date of liberation for agricultural land, i.e. the day when herders are allowed to let their cattle enter the fields. All cantonal chiefs are represented in the General Assembly of the authorities dealing with natural resources, meeting once a year in Zinder.⁹⁶ The traditional chieftaincy has the right of inspection (*droit de regard*) on all activities related to land and is involved in land transfer processes.⁹⁷

3.4.4 Religious leadership

Beside governmental and customary law, there are two more legal systems governing resource management in Niger (*legal pluralism*, see 3.1): Animist law and Islam. Both of them are not deeply considered in this thesis but are mentioned for reasons of completion. While animist law is concerned with the belief in spirits and (sacrificial) offerings, the Islam strongly influences social coherence and the daily life of villagers. Yet, the influence of religious leaders and laws has decreased over time. There is still a Muslim court (*Al Kali*) which people can address themselves to in case of conflict. It heads the religious structure and interprets the Islamic law (Lund 2001). The most important religious actor on the village level is the *Marabout*. He teaches the reading of the scripture Koran, calls for prayers, and reads out Koran verses in the mosque. In case of inner- or intra-familial disputes, as well as of conflicts around land, he can be asked for advice (see 4.6.1). Furthermore, he is one of the main witnesses in land transaction processes. However, we have to be careful when using the designation *Marabout*, as every male villager who finished the Koran school will become Marabout. Yet, there is only one main Marabout in each village.⁹⁸

⁹⁵ Art. 22 law n° 2008-22 of the Rural Code

⁹⁶ Interview with the permanent secretary of the communal tenure commission (COFOCOM) in Mirriah, 10-30-09

⁹⁷ Discussion with former SP of the COFODEP Mirriah, 10-26-09

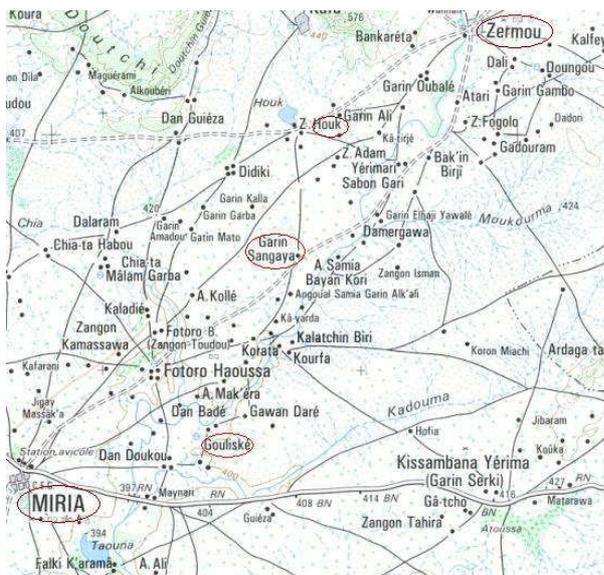
⁹⁸ personal communication with research colleague Issoufou Bagnian

4. Analysis of resource use, management and governance in two study villages

The section on environmental legislation in Niger has pointed to several legal changes as a consequence of a diminishing vegetation cover and stagnation in rural development. The inefficiency in resource management by the central government has been tackled in setting up local councils of ministers and land tenure commissions (COFO) at all administrative levels. With the formal recognition of local management structures (SLG) in so called *controlled* zones and the gradual acceptance of local conventions, the new Forestry Code of 2004 significantly improved the legal status of customary usage rights to trees. Though Niger's legislation is considered progressive in this regard compared to other Sahelian countries (Ly et al. 2006; Alinon & Kalinganire 2008), there are still regions which are not subject to forestry management plans (*uncontrolled zones*), in which my study villages are located. This chapter consequently seeks to explore the enforceability of legal provisions on land and on-farm trees in the two study villages and to uncover potential barriers regarding the implementation of sustainable tree management practices. Before customary resource governance practices are described, it is important to introduce the village settings (*action arenas*). As outlined in the method chapter, I will present my data following the Institutional Analysis and Development (IAD) Framework (see 1.2.5).

4.1 Biophysical attributes of the village communities

This first section of the analysis of the study villages concerns the natural environment surrounding the two communities, which is crucial for understanding the physical boundaries impacting on local resource management behavior. I did not gather all data myself, but have to partly fall back on the research of my colleagues Lisen Runsten and Marat Murzabekhov (Murzabekhov 2010). As outlined in section 3.3.2 on the Rural Code, land is divided into different areas in order to take account of the various resource user groups in Niger.



Map 3: Location of the study villages,
Hydrology department, Zinder

Consequently, each of the two study villages is scattered around by small agricultural fields and grazing areas for both village animals and livestock of herders, with corridors for transhumance passing right through the farmland.⁹⁹ Goulouske has a centralized residential area and is located at the edge of a large grazing area, which passes along a small river and a valley from Mirriah to Zermou (map 3). Following the land use sketch map of Garin Tsangaya (Appendix 4), the same river as of Goulouske passes by this village from the South-

⁹⁹ Exercise on the development of grazing areas and farmland with the village chief of Goulouske, 10-31-09

West towards Zermou (East). While Goulouske has four corridors for transhumance crossing the village, the two corridors do not pass directly through Garin Tsangaya but are at some 10 minutes walking distance from the village centre. Generally, the settlement structure of its residential area is more dispersed. For my interviews, I had to walk several times to Garin Alkali or Garin Malam, all located within the village territory of Garin Tsangaya and some 30 minutes away from its centre (Appendix 4).

As in most parts of Niger, villagers draw the vast majority of their subsistence needs from an integrated agro-silvio-pastoral production system. This means that the rain-fed cultivation of millet, sorghum, beans and groundnuts, under an open canopy of the nitrogen-fixing perennial Gao and other species of lesser size, is coupled with animal husbandry. Lisen Runsten counted a vast variety of on-farm trees: Around 97 different species per hectare in Goulouske and some 78 species/ ha in Garin Tsangaya. These are mainly indigenous species such as *Guiera senegalensis* (Hausa: Shabara), *Balanites aegyptiaca* (Adouwa) or *Ziziphus spina-chriti* (Kurna). Baobab (*Adansonia digitata*) was abundant, too.



Figure 3: Tree size classes (in meter), Lisen Runsten

Although according to the data of Runsten we cannot highlight a trend in species closer to or farer away from the village centres, we can observe that in both study villages only a minor share of trees measure 7m or more (see figure 3). The biggest share of trees is seedlings and young trees. The village of Goulouske thereby counts a slightly higher proportion of old trees and seedlings, and also slightly more trees in absolute numbers.

Regarding the size classes, the measurements of Runsten are more or less in line with the findings of my research colleague Marat Murzabekov. For each of the villages, Murzabekov (2010) compared aerial photographs from 1975 with Quickbird satellite images from 2009 and visually interpreted changes in tree cover. He finds that the village territory of Goulouske was subject to degradation in big trees. For Garin Tsangaya, Murzabekov could not identify a clear pattern of changes in this tree size class. In both villages, the signal of 'greening' (i.e. regeneration) in smaller trees was stronger than that of degradation, whereas Garin Tsangaya achieved better results. Although, unfortunately, I did not make the differentiation between bigger and smaller trees when asking villagers for their perceived landscape changes during a timeline exercise¹⁰⁰, farmers from both villages stated that trees have been diminishing since 1970 at the latest (see Appendix 5). I can but assume that this perception refers to bigger trees, which would be in line with the research of my colleagues. The difference in recorded signals of greening in smaller trees between the villages may be partly backed when looking at the management of on-farm trees described in chapter 4.4.

¹⁰⁰ Conducted on September 7 and 12, 2009 in Goulouske and on September 8 in Garin Tsangaya.

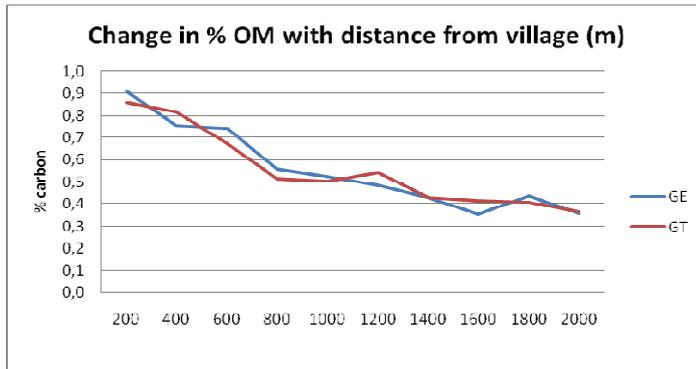


Figure 4: Soil organic matter concent, Lisen Runsten

As outlined in chapter two, the soils in Niger generally have a low content in organic matter. Runsten found that the closer fields are to the village center, the more fertile are the soils. This can partly be explained by the fact that after the harvest in late October, the village animals graze on the surrounding fields, where they are looked after by semi-nomadic herdsmen (*Berber*)

living in the village territory. Besides, farmers of both villages do not have a toilet, so they need to 'do their business' on the adjacent fields. A last explanation may be that the willingness to apply manure generally decreases with a field's distance from the cultivator's house, as chapter 4.4 will indicate. The nutrient-poor soils in turn lead to marginal yields. Runsten measured only some 291 kg per hectare (ha) of millet and 254 kg per ha of sorghum in Goulouske. Interestingly, Garin Tsangaya had far higher yields¹⁰¹ of millet (695 kg/ha), but fewer of sorghum (211 kg/ha).

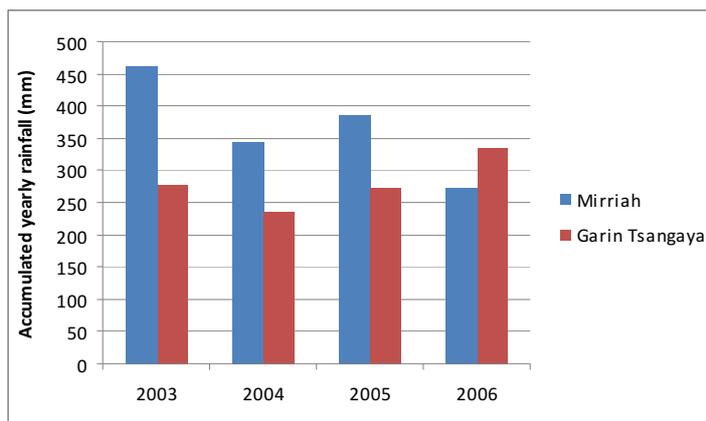


Figure 5: Rainfall in Mirriah and Garin Tsangaya, Lisen Runsten

Beside the soils, another severe constraint to agriculture is the relatively low, but highly erratic rainfall. Although there are no rainfall records for Goulouske, we managed to receive data for Mirriah and Garin Tsangaya, which are at 7 km and 5 km distance from Goulouske (see 4.2).

As shown in figure 5, rainfall differs substantially between relatively close locations:

Whereas Mirriah had about 460 mm of precipitation in 2003, the village of Garin Tsangaya, just about 12 km away, received only some 270 mm over the year. In 2005, the village reported a local drought. Important to note is that even though the rainfall might be of average across the year, the time of rainfall is decisive: If rainfall is too low at the beginning of the sowing season in June, farmers need to sow up to 5 times, and still risk crop failure or low yields. This in turn causes high food insecurity and makes adaptation measures to climate conditions crucial.¹⁰² The purposeful cultivation of on-farm trees could be one measure.

¹⁰¹ The yields refer to the fresh weight of crop panicles.

¹⁰² For details on adaptation measures of Sahelian farmers to drought see e.g. Mortimore (1989) or Mortimore & Adams (2001).

4.2 Socio-economic attributes of the village communities

Resource management behavior is not only dependent on the availability of a certain resource stock and water, hence the 'physical world' (Koontz 2003). Following the IAD framework (see 1.2.5), another factor influencing resource managing behavior is the village community humans are embedded in, whereby attributes such as its location, size, proximity to markets as well as the socio-economic composition may be important (see also Hanna et al. 1997).

Goulouske is located close to a main road and at 7 km distance from the market centre of Mirriah. Garin Tsangaya is only 5 km away from Goulouske, but the roads leading there cross agricultural fields and are hardly passable. Garin Tsangaya is thus 12 km away from Mirriah, but also 12 km from the next bigger town and market centre: Zermou (see map 3 in 4.1). Both villages clearly differ in terms of their infrastructure. While Goulouske has 6 mosques, 7 Koran schools and one public primary school, Garin Tsangaya possesses only one main mosque and one Koran school.¹⁰³ The newly built public school was out of function when our research team worked there. Goulouske possesses one mill, Garin Tsangaya none. While the houses in Goulouske are built of bricks and surrounded by brick walls based on clay extracted from a nearby lake, houses and fences in Garin Tsangaya are often made of crop residues and wooden sticks.

Table 3: Demographic structure of study villages

	Goulouske	Garin Tsangaya
<i>Gender distribution</i>		
Male (no)	607	401
Female (no)	597	381
Households (no)	214	144
Total no. inhabitants	1204	782
<i>Age structure</i>		
<15 yrs	539 (44.8%)	348 (44.5%)
15-60 yrs	607 (50.4%)	392 (50%)
>60 yrs	58 (4.8%)	42 (5.5%)
Share of seasonal migrants (leaving)	26.03%	21.19%

Source: Interviews and wealth ranking by Issoufou Bagnian, Lisen Runsten & Friederike Mikulcak

This difference may be explained when we look at both history and socio-economic composition: Whereas Goulouske was founded only at the beginning of the 20th century, Garin Tsangaya came into being already around 1840.¹⁰⁴ The village chief of Goulouske is, according to himself, descendant of a traditional, local aristocracy. This may explain why his lineage is ranked among the wealthiest of the village, as the below mentioned wealth ranking exercise¹⁰⁵

has revealed (table 5). The village chief of Garin Tsangaya, in turn, was ranked in the lower part of the middle income group. The difference in location and origin may explain the difference in resource management and influence by authorities, as I will explain in sections 4.4 and 4.6. Another difference between the villages is their size. While Garin Tsangaya has some 780 inhabitants distributed across 144

¹⁰³ These information are based on a participatory village map exercise conducted by Juliana Porsani and Issoufou Bagnian.

¹⁰⁴ Historical timeline exercise, conducted 09-07 and 09-12-09 in Goulouske and 09-08 in Garin Tsangaya

¹⁰⁵ For the wealth ranking, Lisen Runsten, Issoufou Bagnian and I had held several village meetings in both villages, received the names on each head of household, the number of persons within the household, the number of fields as well as the tenure arrangement thereof, the number of small and big ruminants and the number of months the crops from their fields would suffice to nourish the household within one year. These wealth criteria were selected during two focus group meetings and hence agreed upon by the villagers themselves. The exercise was conducted the 09-12 and 09-30-09 in Goulouske and the 09-22-09 in Garin Tsangaya. For details on this exercise see Appendix 6.

households; we recorded more than 1200 inhabitants and 214 households in Goulouske. The reasons for this difference are not perfectly clear. Yet, although in both villages many people have been migrating during the drought periods starting from the early 1960's,¹⁰⁶ and still migrate seasonally (table 3), many more farmers from Garin Tsangaya seem to have left their village permanently due to the lack of rainfalls and higher poverty compared to Goulouske.

The wealth ranking exercise (Fn. 105 and Annex 6) I conducted with my colleagues Lisen Runsten and Issoufou Bagnian revealed that almost half the households (48%) in Garin Tsangaya can be counted as 'poor', compared to some 28% in Goulouske (see table 5). The factors of comparison were, among others, the number of domestic animals and fields per household as well as the months per year the harvest would suffice to nourish the household. For this thesis, the exercise was particularly relevant not only for assessing the vulnerability of farmers, but also to reveal the distribution of land tenure types among the households and villages, which may have an impact on the management of on-farm trees (see 1.2.1 and 4.4). The stratification of land tenure types has been explained in chapter 1 and was based on the 'bundling of rights' scheme developed by Schlager and Ostrom (1992; see 1.2.4.1).

Table 4: Land tenure stratification among the study villages

Garin Tsangaya					Goulouske				
# Fields	Inheritance	Lease	Loan	Purchase	# Fields	Inheritance	Lease	Loan	Purchase
182	131	25	15	11	467	294	50	49	74
%	72	13.7	8.2	6	%	63	10.7	10.5	15.8

Source: Wealth ranking by Issoufou Bagnian, Friederike Mikulcak and Lisen Runsten

If we look at the stratification of land among the villages, it becomes clear that although the tenure arrangement 'inheritance' is the most common in both villages, almost 16% of households in Goulouske have bought a field- compared to only 6% in Garin Tsangaya. Although the total ratio of fields which are not fully owned, i.e. loan/ lease, is almost the same for both villages (see table 4), there is a tendency that more people in Garin Tsangaya than in Goulouske lease their land to someone in exchange for money or other 'security deposits'. The form of lending land, in turn, can be seen as an expression of a strong customary support system: Landless and poor get an opportunity to cultivate land. Around the village centre of Garin Tsangaya, people deposited manure so that those with few or no animals could fertilize their fields.

This may be explained by taking a closer look at the wealth distribution. Half the households in Garin Tsangaya can live only some 2 to 3 months per year from their harvest and have merely some 1.7 small ruminants in average (see table 5). Although the yields were partly higher in Garin Tsangaya (4.1), the few months of nutrition provided by the harvest can probably be attributed to the small amount of fields: The poorer share cultivates 1.7 fields per household, whereas they possess one field and hardly rent or lease land. However, the richer and 'middle class' families in Garin Tsangaya possess more small

¹⁰⁶ Historical timeline exercise, conducted the 09-07 and 09-12-09 in Goulouske and the 09-08 in Garin Tsangaya

and big ruminants in average, which in turn seem to be an important source of household income.¹⁰⁷ In Goulouske, the poorest group still had 4 to 5 months of nutrition from their fields, almost 3.5 small ruminants and 2.9 fields in average per household. Except for the group of ‘wealthy’ farmers, all groups have more fields in average compared to the ones from Garin Tsangaya. The poorer section still has two own fields and one borrowed or leased. Although it was impossible to measure or even approximate the size of each field, and thus to relate the hectares in land to each household¹⁰⁸, there is reason to believe that the relative wealth of farmers in Goulouske and the relative poverty in Garin Tsangaya is very much based on the factor land, which in turn may impact the willingness to plant or protect on-farm trees (see 4.4). Many households from both villages earn an additional income from *Maraboutage*, i.e. teaching the scripture Koran in other villages, by (dry-season) petty trade or artisan activities. However, given the high dependency on rain-fed agriculture and the outlined biophysical conditions (erratic rainfalls, droughts, yields), farmers of both villages seem to be highly vulnerable, particularly those with reduced access to land.

Table 5: Results of wealth ranking exercise

Goulouske							
Group	No. Households	% of total no. households ¹⁰⁹	Ratio big ruminants/ h.	Ratio small ruminants/ h.	Ratio total fields/ h.	Ratio own field/ h.	Ratio leased fields/ h.
Wealthy	31	25%	1.65	7.5	4.5	3.6	0.94
Middle	60	48%	0.97	3.38	3.78	3.13	0.65
Poor	35	28%	0.14	3.5	2.86	1.97	0.89
TOTAL	126	100	0.9	5.4	3.7	2.92	0.79

Garin Tsangaya							
Group	No. Households	% of total no. households	Ratio big ruminants/ h.	Ratio small ruminants/ h.	Ratio total fields/ h.	Ratio own field/ h.	Ratio leased fields/ h.
Wealthy	13	19%	3.38	10.31	4.92	3.7	1.23
Middle	23	33%	1.22	3.87	2.7	2.13	0.57
Poor	33	48%	0.18	1.73	1.7	1.36	0.33
TOTAL	69	100	1.13	4.1	2.64	2.06	0.58

The vulnerability might increase when looking at the development of farmland. Farmers from both villages told me that the value of land has very much increased over the past decades. In the 1970’s, when land per household was abundant, people freely hired fields to their neighbors and even to people from outside the territory. This situation has changed completely. Due to high population pressure, the size of fields per capita has diminished drastically.¹¹⁰ We now observe a fragmentation¹¹¹ of farms which will increase in the future as nearly half the population of both villages is younger than 15 years and

¹⁰⁷ In both villages, goats and sheep are the most numerous domestic animals, but wealthier families also own cattle. Possessing an ox is a sign of relative wealth. Other highly valued animals are camels and horses.

¹⁰⁸ During the first of my 40 household interviews I asked the farmers for the size of each of their fields. Yet, farmers do not seem to have an understanding of ‘size’ in our terms. When we explained the unit ‘hectare’, the answers were so stratified and unrealistic that we ceased to pose this question. Besides, I did not have the time to measure the fields by GPS, as I was the only one in our research group dealing with rights in land and trees, and consequently had a huge workload.

¹⁰⁹ Household is abbreviated to ‘h’ in the columns of this table.

¹¹⁰ According to the permanent secretary of the Rural Code’s central office, farmers in Niger have 0.4 ha of land in average.

¹¹¹ Discussion (in French) with Philippe Lavigne Delville, 11-06-09 in Niamey. He used the term *morceliation*.

property is bequeathed according to Muslim rules (table 3): “The area of arable land is completely saturated; there is no more land left for selling.”¹¹² Today, people from both villages would sell land only if they were in desperate need for money, for instance if the head of a household needed to get a severe medical treatment. They rather lease land than lending it out. Due to its higher value, inner- and intra-familial conflicts around land and mutual mistrust have risen and people increasingly wish for formal titles (see 4.6.1). The saturation of land implies at the same time that there is no more land left in fallow, which may have severe impacts on the soil fertility: “The traditional system of soil regeneration through timely and prolonged fallowing is now bankrupt” (Thomson 1982: 3). A shift to more active techniques of soil regeneration has thus become crucial if farmers are to continue exploiting their land and to retain their livelihoods. The cultivation of on-farm trees could thereby be one way to enhance soil fertility. Moreover, the purchase of timber and non-timber forest products could serve as an adaptive strategy to uncertain climatic conditions and reduce farmers’ dependency on agriculture, which is the more urgent for the poorer share of the communities.

4.3 Access, use and management of land and on-farm trees in the study villages

In light of the outlined constraints to agriculture and the need to diversify livelihoods, let me now explore which value farmers attach to on-farm trees and how they deal with both trees and land on a daily basis. Central to the next sections will be the (customary) setting of rules, norms and rights concerning resource access, usage and management, which is one of the four pillars of the IAD Framework (1.2.5). These have been called “substantive operational rules” (Thomson 1996a) and follow the rights bundling scheme of Schlager and Ostrom (1992; see 1.2.4.1). To recall the classification:

(1) Use rights:

- Access (= right to enter a defined physical property, e.g. to walk across a field)
- Withdrawal (= right to obtain the products of a resource, e.g. catch fish)

(2) Control or decision making rights:

- Management (= the right to regulate internal use patterns – i.e. how, when and where to harvest – and to transform the resource by making improvements, e.g. plant a crop)
- Exclusion (= the right to determine who will have access to a resource)
- Alienation (= the right to rent out, sell, or transfer use and control rights to others)

To identify right-holders to land and on-farm trees, and to visualize the distribution of the outlined rights bundles between the state, community and individuals, I developed a scheme for each of the resources. The motivation was that the “definition of [tenure] rights, the marking of how and where they are held, who grants them, and who holds them are not straightforward under the ‘classic’ tenure system models” (Barry and Meinzen-Dick 2008: 1). The description of rights to land thereby highlights potential implications for the management of on-farm trees. We have to consider here that the range of rights from individual to common property use is often obscure. Internal customary practice is further dynamic and changing over time and during different seasons (Behera & Engel 2004), whereby the latter fact was partly considered, too. Besides, the structure of household decision-making needs to be

¹¹² Exercise on historical and present land use with a group of men, 09-26-09, Garin Tsangaya

understood. The basis for my tables was the so called 'tenure box', a tool for mapping tenure rights as suggested by Barry and Meinzen-Dick (2008). I developed it for the purpose of this thesis by integrating data from various PRA exercises and focus group interviews (see tables 6 and 7).

4.3.1 The village chief

The most important actor on village level is the village chief (*Maigari*), whose rights, duties and tasks will come up across the following sections. He acts as the custodian in controlling the actions of the villagers, supervising access and usage of land and trees, and giving advices on natural resource management in general. Besides, he needs to be informed about every decision processes in the village (Lavigne Delville 1999). He is also the most important actor when it comes to the arbitration of conflicts. The Maigari is the one who represents the village in front of authorities, both governmental (forestry department, COFO) and traditional (mainly the cantonal chief, *Sarki*). His attitude or 'enthusiasm' regarding the cooperation with the one or other actor may impact on the presence of either state or customary authorities in the village and lastly influence the attitude of the farmers on natural resource management.¹¹³ The cooperation between both villages and authorities will be discussed in 4.5 *et seq.*

4.3.2 Decision-making on household level

Looking at the household level, we mostly find large extended families (Hausa: *babban gida*) with smaller subsidiary (nuclear) units (Hausa: *kara min gida*) in both villages: Large families are comprised of the family founder (French: *chef d'exploitation*) and more than two sons with their wives and children. Smaller family units consist of a single male (*chef de ménage*), his wife (wives) and children (Boubacar 2000). Traditionally, the extended families or lineages were large collective production units, under the leadership of the eldest male. Since recently, however, the smaller family units have become more autonomous and carry out their own production activities (see Boubacar 2000; Diarra & Monimart 2006). Decision-making within families is organized on "patrilineal, gerontocratic principles", which means that the eldest male working the land makes and enforces rules that the younger kinsmen follow (Thomson 1996a: 193). However, "if the titular head of a family unit is no longer physically active, the operational head nonetheless consults him about critical production decisions" (*ibid.*). Decisions concern the cultivation of crops, the planting and management of trees, sales of livestock and other produces on market days, or the transfer of both land and economic trees. Women have hardly a say.¹¹⁴ In case a woman becomes a widow, her eldest son or male relative has the decision-making authority (table 6).

4.3.3 Access and usage rights to land

When discussing access and usage of land, we need to divide it into land held in private¹¹⁵ or in common by an extended family (*lineage holding*).¹¹⁶ This divide is highlighted in the first tenure box (table 6): I

¹¹³ Technical assistant to the central office of the Rural Code in Niamey, 11-03-2009

¹¹⁴ For a detailed discussion on gender and land in Niger see for instance Diarra and Monimart (2006).

¹¹⁵ For the tenure box, the stratification into land tenure arrangements plays no role.

mention both the lineage and individuals. Traditionally, control and access over farmland is held and distributed by the lineage that started farming in the village (*first occupants*), personified in the male head of this lineage or village chief (Hilhorst 2008). Access to land and other resources depend on community/ lineage membership, social status, age and gender (Lavigne Delville 1999: 2):

“The distribution of rights is...based on the socio-political system...and on family relationships..., so that social networks govern access rights. [...] rights held by individuals are the fruit of *negotiations* in which local land authorities act as arbiters; customary law is by nature “procedural” and *not codified*. It does not define each person’s right, but the procedures by which access to resources is obtained” (*my italics*).

Wives and unmarried children can through their husbands or parents receive land for cultivation (*secondary rights*). As touched upon in section 4.2, it is important to note that a household holding a field in private can confer temporary usufruct rights (again *secondary rights*) to other persons outside the family- by lending the field for an undetermined period or renting it out on a short term in exchange for money or any other security deposit (Lavigne-Delville et al. 2001; see table 2, section 1.2.4.3). The delegation¹¹⁷ of usufruct or cultivation rights is negotiated between the owner of the landholding and the third person, and usually takes place within the village community. In most cases, the land owner consults village elders, the village chief and/ or the religious leader (*Marabout*) to witness the transfer or delegation (see 3.4.4). Often, a small sum or token ‘gift’ (*cadeau*) is paid for the witnesses to “remember the transaction”.¹¹⁸ This shall reduce the likeliness of dispute around land (see 4.6.1). Yet, those holding secondary rights face some restrictions. They are supposed to protect (valuable) trees on the fields they cultivate and not to undertake any investment that could be interpreted as a strategy to ‘appropriate’ the land permanently (Hilhorst 2008). This fact is particularly interesting for the re-greening discussion and will thus be separately analyzed in section 4.4. Another important notion regarding the discussion on both planting and protection of trees is that agricultural land in general becomes *common* grazing land during the dry season (Williams 1998). This means that field boundaries become blurred. After the ‘date of liberation’ (see 3.3.3.), pastoralists can enter the fields and let their cattle roam freely.¹¹⁹ Yet, the village chief shall formally be asked to approve the settlement on his territory, so that land is not a common resource “in the strict sense” (Lavigne-Delville 2007: 37):

“While use rights are shared within a social group or set of allied social groups, power over the resource (power to make rules and enforce them) is held by a given lineage and exercised by its representative.”

Let me recall that we do not only speak about nomadic herders, however. There are semi-nomadic Berber living in both village territories that women – in charge for domestic animals – cooperate with:

“From December to May the shepherds care for our animals. They spend each day on the grazing area, roaming around. They eat the remaining parts from crops, shrubs and little trees. Animals are anywhere during the dry season. There are no restrictions. The cooperation with the shepherds is important as we have time to finish our share of the harvest and go to granaries in surrounding villages.”¹²⁰

¹¹⁶ It is important not to confuse the term with “communal” land, which refers to grazing areas or corridors for transhumance.

¹¹⁷ Lavigne Delville et al. (2001: 4) use the term “delegation” of rights to describe the “mechanisms by which an actor negotiates and receives from a third person, according to more or less precise clauses, the right to exploit an agricultural landholding” (own translation). The term ‘right’ is thereby used in a normative, descriptive way and not in legal terms.

¹¹⁸ Maigari of Goulouske, 10-01-09; see also Benjaminsen et al. (2008)

¹¹⁹ Interview with the permanent secretary of the communal land commission (COFOCOM) in Mirriah, 10-30-09

¹²⁰ Seasonal calendar with a group of women in Garin Tsangaya, 10-23-09

Table 6: Land tenure box (both communal and private)

Rights Holder	State (COFO)	Community	Lineage	Women (and children)	Men	Herders
Access	The date for the liberation of fields, i.e. when herders can enter the agricultural zone, is set by the General Assembly		Everyone can cross the land without any restriction			Can have free access during the dry season, after the harvest. Yet, the village chief approves the settlement ('controlled access')
Withdrawal	COFO can withdraw use rights when a field has not been valorised for three consecutive years	Women of the community can collect firewood (fallen branches) from everywhere	Family harvests and distributes yield according to size of each household	<ul style="list-style-type: none"> Collect weeds, herbs, and branches for firewood Sow and assist husbands in harvest Communal land: Get a share of the harvest that they can sell freely. They keep the money earned¹²¹ 	<ul style="list-style-type: none"> Do the weeding and collect the harvest 	<ul style="list-style-type: none"> Let their cattle graze and roam around in the dry season Animals eat leaves from trees, fruits that have fallen off, and crop residues
Management	State (COFO) determines land use areas: Agricultural land, grazing area, corridors	<ul style="list-style-type: none"> The community is granted customary land use and management rights by the State The village chief supervises access and usage of land 	<ul style="list-style-type: none"> lineage holding: Family manages field in common Private holding: The husband decides, even if the woman has inherited a field 	<ul style="list-style-type: none"> Women can have their own plot inherited from their fathers. Yet, Married women have no say, but they can cultivate their own plot (counter-season) A widow has exclusive management rights in case the children are young. Otherwise, the eldest son or male relative has management authority. 	<ul style="list-style-type: none"> Private holding: Man decides about land use (fertilization, seeds, machines, crop rotation) Communal land: Family eldest decides about land use 	<ul style="list-style-type: none"> No management rights, but the duty to use the resource rationally and sustainably
Exclusion	COFO controls and fines encroachment of farming area into corridor/ grazing area <ul style="list-style-type: none"> COFO issues land title deeds which shall increase tenure security and reduce conflicts around land 	The village chief used to distribute land of his territory among households. Today, he only witnesses land transfers and is in charge for excluding herders before the liberation date	The family eldest determines the access to land	A widow has exclusion rights	Men usually have the exclusion right. In case herders want to enter a field before the liberation date, men defend their fields	In the rainy season, herders can be excluded to enter fields.
Alienation	In case an outsider wants to buy vacant land, the COFO, village community and the traditional chieftaincy decide the sale in common	Land is transferred within the community by the owner thereof; elder men, the village chief and often the religious leader are witnesses	Head of lineage decides about heritage/ purchase	<ul style="list-style-type: none"> Only when the woman is a widow with young children, she has exclusive alienation rights Usually, women do not take any decision nor talk to the village chief 	Even if land belongs to a woman, her husband decides about purchase/ heritage	

4.3.4 Access and usage rights to trees on farms

When it comes to usage and access rights to trees, we need to distinguish between economic and indigenous trees: The trees baobab (*Adansonia digitata*), neem (*Azadirachta indica*), guava (*Psidium guajava*), date (*Phoenix dactylifera*), mango (*Mangifera indica*), and lemon (*C. limon*) bear fruits which can be sold on markets. They are hence sources of revenue and of high economic importance, and they are perceived as *private property*. According to Islamic law, any property/ item can be bequeathed.¹²² In

¹²¹ As reported by a farmer the 09-22-09 in Garin Tsangaya, there is a seasonal difference in managing the household: During the dry season, the money earned by a family unit stays within the nucleus/ sub-unit (*kara min gida*). During the rainy season, the household income has to be shared within the family (*babban gida*).

¹²² Interview with the Maigari of Goulouske on land use and the COFO process, 10-01-09

my villages, only Baobab¹²³ and Neem are found. Families regulate internally on how to pass the economic trees from fathers to sons; the Koran regulates the share.¹²⁴ Women can own an economic tree too, but it would be managed and harvested by elder sons or male relatives. It is important to recall that rights to land and trees differ: One could own a baobab located on the private field of someone else. Only the tree owner would have exclusive use and management rights to the baobab. The owner of the field would have rights to the land (*droit à la terre*), but not to the tree. Farmers stated further that they would not need a permit to sell leaves or fruits from this tree.

Table 7: On-farm tree tenure box (both indigenous and economic trees)

Rights Holder Rights Bundles	State (forest dpt.)	Community	Women (and children)	Men (head of household)	Herders
Access	Controls and restricts access over on-farm trees	Everyone can cross fields and parklands without restriction			• Can access underlying fields in the dry season
Withdrawal	<ul style="list-style-type: none"> Controls, approves and restricts harvest of both indigenous and economic trees finest violation of usage rights 	<ul style="list-style-type: none"> Everyone can harvest fruits and other non-timber products from non-economic trees on all land use areas for private consumption The village chief (Maigari) supervises access and usage of trees within his territory 	<ul style="list-style-type: none"> Everyone can withdraw fruits and leaves from indigenous trees Women can own an economic tree in principle, but it would be harvested by male relatives Women can collect dry branches freely and without permission Women from GOU reported they could cut branches 	<ul style="list-style-type: none"> Harvest of non-timber forest products (fruits and leaves), whereby the harvest of economic trees is restricted to their owner 	Can use leaves and fruits (non-timber forest products) for their animals during the dry season
Management	<ul style="list-style-type: none"> Approves management of indigenous tree species 	<ul style="list-style-type: none"> Farmers shall inform the village chief if they see a dead or chopped tree on common land, who then decides about its use If there is a dead tree on a private field, the owner decides about the usage 	<ul style="list-style-type: none"> Trees are managed by the one cultivating underlying land, thus usually men If an economic tree belongs to a women, it would be managed by sons or male relatives 	<ul style="list-style-type: none"> Plant trees on own land make investments for resource improvement, e.g. protection of sprouts (by thorns or dry wood) or digging of holes around a tree for water infiltration Economic trees are usually managed by the owner thereof, even if the underlying field belongs to someone else light pruning and trimming of trees is a customary right according to the farmers 	Herders have no management rights
Exclusion	<ul style="list-style-type: none"> Licenses timber concessions 	The village chief controls both land and tree usage on common areas, and can by custom exclude outsiders from resource use	A widow has exclusion rights regarding planted fields	Exclude herders and territory outsiders from planted fields	Are excluded by law during the harvest season and, in case they arrive before the liberation date, by the owner/ cultivator of the underlying field
Alienation	The State sees trees as national heritage and claims absolute control rights to indigenous species, including alienation	Headed by the village chief, the community is in charge for the allocation of plots to cultivate	A widow may alienate economic trees to her children	<ul style="list-style-type: none"> Tree use/ management rights can be delegated by the field owner in case of land transfer within the community economic trees are bequeathed and cultivation rights stay with the owner in case of land transfer, unless the tree owner grants the cultivator use rights 	Herders have no rights to trees other than access and usage

¹²³ The Baobab is generally of high economic importance, as the leaves can be harvested up to three times a year during the rainy season (depending on the rainfall), and sold on local markets. They serve as basis for a sauce (which the author ate almost every day). Furthermore, the tree produces fruits which are harvested during the dry season and are used to produce juice or sweets for children. Source: Discussion with a farmer in Goulouske, 09-30-09.

¹²⁴ Ibid. Two thirds of an item is bequeathed to sons, one third to daughters. In case of trees, this is obviously not feasible. Thus, if a head of household has for instance three baobabs, he would bequeath two to his son, and one to his daughter.

The situation is different when we look at indigenous trees whose fruits are not of economic importance. Although farmers are aware of the fact that the State claims ultimate control rights over these trees (see 3.3.1), farmers state that trees growing on their fields, no matter which species and whether planted or naturally grown, would belong to the *owner of the land*.¹²⁵ The 'appropriation' of indigenous on-farm tree species seems to be a recent phenomenon and is not only expressed by the laws and customs developed to govern their use, but also by an increasing willingness to protect these from unauthorized cutting, which will be explained in the next section (Thomson 1982; pers. comm. with Lavigne Delville). Yet, certain parts of indigenous tree species determine usage rights for the village community, so that these trees can in principle be used by everyone: People from both villages stated that they can harvest fruits and leaves from anywhere within the territory, which in turn are used as feed for animals or to prepare food. For medical purposes, also bark or roots of some species are used.¹²⁶ But nobody should take more of a resource than needed for household consumption.¹²⁷ Those farmers owning the underlying field are in charge for the management of indigenous trees, such as light pruning or trimming. None of the interviewees would thereby ask for permission as required by the forest department. Secondary rights holders to land can be granted management rights to trees.

Looking at the use of on-farm trees, the question of timber is particularly interesting: Although leaves and fruit are very useful to the villagers, wood seems to be the most important forestry product. Wood is mainly used for household energy consumption and construction material, but also sold on local markets and thus serves as a source of revenue. Mainly women and unmarried children are in charge for its collection. They can take fallen branches from everywhere. A group of young women in Goulouske reported that they could even cut branches from trees.¹²⁸ However,

“if we cut more than half the tree we need a permit. But we wouldn't cut more than allowed as we could go to prison. The management and cutting of trees are old habits and we know our traditional rights. Trees come from nature and we use it.”

This statement is interesting, as all other focus groups reported that according to customary habit only light pruning was allowed. Another group of women from Goulouske stated that their husbands would collect small trees from their fields to be used as firewood.¹²⁹ The main species were Shabara (*Guiera senegalensis*), Kalgo (*Piliostigma reticulatum*), Marké (*Anogeissus leiocarpus*) and Adouwa (*Balanites aegyptiaca*). At the beginning of the harvest season, women assist their husbands in preparing the land:

¹²⁵ Participatory village sketch map exercise on 09-12-09 in both villages, where resource use areas and usage was discussed.

¹²⁶ Tree use matrix: A group of men in each village was asked to list tree species from their territory and assign usages, whereby they could chose among medicine, nutrition (feed and fodder), soil fertilization, protection against soil erosion, shadow, and economic use. The exercise was conducted the 09-14 and 09-19-09 in Goulouske and the 09-15-09 in Garin Tsangaya.

¹²⁷ Resource use decision grid with a group of men in Goulouske, 09-17-09. See Schoonmaker Freudenberger (1994).

¹²⁸ Resource use decision grid with a group of women in Goulouske, 9-22-09

¹²⁹ Seasonal calendar with a group of young women in Goulouske, 10-21-09

“We cut those branches which are close to the ground. We also remove weeds such as Kalgo, Shabara, Kaba, Runhu, Magaria, or Kurna, in a process called *Sasabé*. They will be all removed, as they are useless. Some weeds are burned. Another share is dried so that we can use them as firewood.”¹³⁰

While designing a seasonal calendar with women from Garin Tsangaya¹³¹ I learned that due to the reported reduction in tree cover over time in both villages, there was sometimes a competition around well burning woods such as *Bauhinia rufescens* (Hausa: Shishi), so that farmers even have to buy wood,

“mainly from local *bûcherons* [woodcutters]. Everyone in the village knows them. They go and cut wood in the night. Women don’t go in the nights, as they fear the darkness. It is kind of a new phenomenon that we buy wood, as we used to have enough in the past.”

Farmers from Goulouske stated that sometimes they also had to buy wood, but they did not talk openly about the sources.¹³² A group of men from Garin Tsangaya explained that firewood would be collected mostly by those having wood-selling jobs. Yet, given the women’s statement and of other interviewees also from Goulouske, there is reason to believe that but a few people possessed an official license from the forest service (3.3.1). The term *bûcheron* thus most likely refers to both authorized and illegal woodcutters. A licensed cutter, selling wood once a week in Zinder, explained the procedure:

“I can’t tell you how much wood I sell in total. That changes from week to week. But per bundle of wood (*fagot*), which means 30 to 35 small sticks, I earn 250 to 300 CFA. I do need any allowance to sell. Earlier, I had to go to Mirriah every week in order to get a permit. Recently, the forest department set up a post in Garim Makari where I can buy the license. It costs 1500 to 2000 CFA per week.”¹³³

The purchase of wood on local markets seems lucrative, particularly of exotic species. I came to know that single branches of the fast growing Neem (*Azadirachta indica*) could be sold for up to 10.000 CFA (~15,40€), which is a little fortune for most Nigerien farmers.¹³⁴ In Garin Tsangaya, some farmers sell parts of a ‘dead’ tree from their field to woodcutters. For *Faidherbia albida* (Gao), farmers received 10.000 CFA, and 5.000 CFA for *Balanites aegyptiaca* (Adouwa).¹³⁵ The cooperation between farmers and woodcutters thus seems to benefit both. Yet: The prospect of short-term benefits from selling wood might prompt some farmers not to wait until a tree has naturally died, whereby the resource stock might suffer. If a farmer from Garin Tsangaya finds a ‘dead’ or illegally chopped tree on the field he cultivates, he needs to inform the Maigari who then authorizes the farmer to use the wood.¹³⁶ Apparently, this rule is not respected by everyone. In Goulouske, in turn, the field owner alone decides about the usage of wood in this case.¹³⁷ In both villages, the village chief must be informed when a

¹³⁰ Seasonal calendar with a second group of women, Goulouske, 10-21-09. The mentioned trees are: *Piliostigma reticulatum* (Kalgo), *Guiera senegalensis* (Shabara), *Hyphaena thebaica* (Kaba), *Cassia singuena* (Runhu), *Ziziphus mauritana* (Magaria), and *Ziziphus spina-chriti* (Kurna)

¹³¹ Seasonal calendar with a group of women in Garin Tsangaya, 10-23-09

¹³² Respective statements were made to my research colleagues Lisen and Juliana when conducting interviews on firewood.

¹³³ Interview with an authorized woodcutter, 10-13-09, Garin Tsangaya. When talking to the departmental head of the forestry brigade in Mirriah I learned that this informant is the only authorized woodcutter from my study villages. Four times per month, he gets a cutting and selling permit for 8 m³ of wood. Yet, it might be that others received a license from one of the forestry posts (see 3.3.1) and were not registered at departmental level. To locate Garim Makari see Annex 4. 656 CFA are 1 €.

¹³⁴ Talk with two farmers on the role of baobabs, 09-30-09, Gouloukse

¹³⁵ Review of 20 household interviews in Garin Tsangaya

¹³⁶ Interview with cousin of village chief, 10-27-09, Garin Tsangaya

¹³⁷ Resource use decision matrix in Goulouske, 09-17-09

dead/ chopped tree is found on communal land.¹³⁸ Last but not least, there is a seasonal difference in wood availability, which might lead to problems with herders:

“During the rainy season, it doesn’t take long to collect wood. You can take it from everywhere. However, you need to wait until branches fall down. During the cold season we have to go farer to get firewood. Herders are then in the area and feed their animals with leaves. They leave branches behind which are then collected by women. Herders take the branches mainly during the night time, so we cannot hinder them.”¹³⁹

4.4 The impact of land tenure arrangements on the management of on-farm trees

The previous section revealed that although the bundles of rights to the resources land and on-farm trees differ, they cannot be regarded separately from one another. To understand the day-to-day resource management of sedentary farmers in both villages, the description of ‘substantive operational rules’ is not sufficient. Thus, I am further interested in the factors impacting the sustainable management of on-farm trees and especially the role of secondary rights to land. The following analysis will consequently be based on the hypothesis outlined in the method chapter: “*Tenure types in land influence the management of on-farm trees*”. In chapter 1.2.4.3 I presented the so called logistic regression model and explained the background for its emergence. Initially, each of the 40 randomly selected heads of household should state the amount of fields cultivated and their respective tenure arrangement. This resulted in 135 fields or 3.35 fields in average per household, where the correlation between land rights and tree management was based upon. The distribution was as follows:

Loan	Lease	Purchase	Inheritance
20	30	22	62

The selection of variables was described, too: In my opinion, sustainable tree management practices comprise the (a) use of manure; (b) planting and (c) protection of trees. These are the dependent variables. As outlined in section 1.2.4.3, protection thereby relates to the qualitative answers to the question whether farmers would exceptionally *care* for a planted or naturally grown sprout in order to keep it intentionally on the field(s) he cultivated. The variable must not be confused with the *guarding* of trees from in-field cutting by third persons. I ran the model and tested which impact the following explanatory variables had on tree management: (1) type of village (Goulouske or Garin Tsangaya); (2) land tenure type (for reasons of simplicity I used only two tenure types, i.e. possession (heritage, purchase) and non-possession of land (loan, borrowed); (3) distance of a field from the user’s house (compiled in minutes); and (4) age of the user. As pronounced in the method part, I added the variable (5.1) possession of a chart (yes/ no) in the analysis of manure use. The statistical output of the logistic regression model can be found in Appendix 2. For a better intelligibility of the results, graphs were generated which integrate the statistically relevant results. These will be explained in the next sections.

¹³⁸ Interview with the village chief of Goulouske, 10-31-09

¹³⁹ Focus group interview on the importance and use of trees with a group of men in Garin Tsangaya, 09-23-09

4.4.1 Application of manure

The first correlation shows that the application of manure is dependent on the farmer's age, the field distance and the land tenure type, whereas the latter factor has the highest impact or "level of significance."¹⁴⁰ Figure 6 shows the probabilities for the use of manure under the influence of these three variables. The dotted lines in the graph stand for 'loan', the continuous lines for 'possession'. The different colours highlight the field distance, as indicated in the key. One can clearly see how the combination of all three independent variables decreases the probability of manure use: The probability for the use of manure is thereby highest (99%) when the farmer (1) owns the field, (2) is 30 years old and (3) needs to walk only five minutes to his own field. The same farmer would use manure with a probability of some 92 % if the field was loaned, which is still incredibly high. Yet, given the farmer

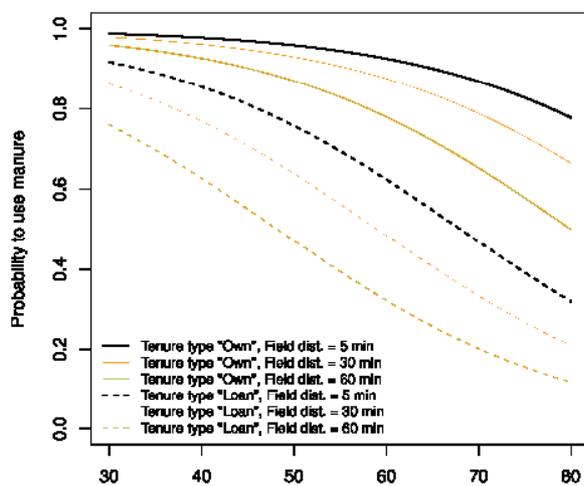


Figure 6: Application of Manure

would be 60 years old and his loaned field was 5 (60) minutes away, he would put manure with a likelihood of mere 62% (32%), compared to 93% (78%) if he owned the field. **The older the farmer gets and the further away the field, the lower the probability for manure use on a loaned field.**

The strong impact of land tenure is particularly interesting: In all cases of age or distance, manure would be put at a lower probability on a field the farmer does not have full ownership rights to.

Many farmers explained that they would not put as much manure on a loaned field because they

feared that the field could be reclaimed by the owner if the soil was too fertile. As discussed in the following, this may have an implication for on-farm trees, implying that this first correlation could support my hypothesis. Farmers of both villages hardly use chemical fertilizer; the vast majority applies dung of domestic animals. These in turn are fed, among others, with grains and fruits that have fallen down from field trees.

We can thus assume that the faeces contain matter that would indirectly contribute to the natural regeneration of trees. As I cannot back this analysis with soil samples and as I was furthermore not able to compare tree density and species distribution between inherited and loaned fields, I can but cautiously assume: **The less manure is put on a field, the lower the probability for natural regeneration.** The circumstance of lower manure use might have implications for the user himself. If he does not valorise a loaned field to the same extent as an owned one, the harvest might be smaller.

¹⁴⁰ The level of significance indicates the security of an estimate, hence: How explicit is the influence of an independent variable (based on my data)? See Appendix 2.

Secondary rights holders are furthermore at risk of losing access to land anytime, given a reported saturation and thus increase in land pressure (see 4.2).

4.4.2 Planting of trees

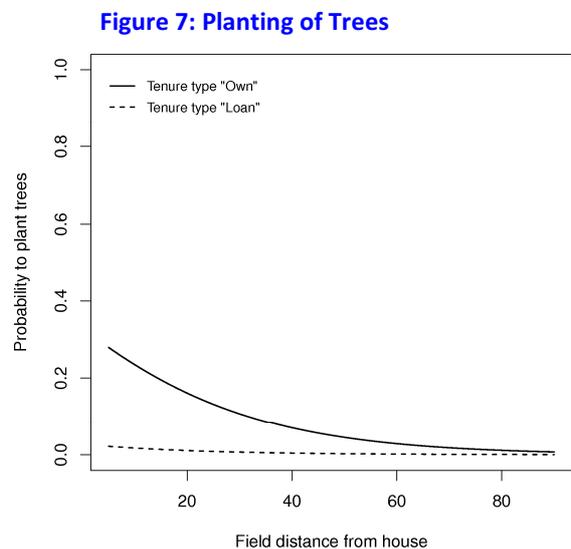
With regards to the planting of trees, both land tenure type and the distance of a field from the user's house have a limiting impact on the probability to plant trees. But tenure matters the most (see figure 8). Again, the dotted line stands for a 'loaned' field, the continuous for 'possession': If the field was 5 (30) minutes away, the farmer would plant a tree on his own field with a probability of 28% (11%). On a loaned field at the same distance, in turn, he planted a tree only at a likelihood of 2% (0.1%). Thus: **Farmers would hardly plant a tree on a field they do not own.** My hypothesis is once more supported.

The correlation makes perfect sense if we consider that the planting of trees can be seen as a form of

long-term investment, given the fact that trees are slow-maturing (Owubah et al. 2001). When asking the farmers which trees they would plant, they answered either the fruit bearing Baobab or the soil fertilizing Gao. Seedlings for both trees are costly and scarce working hours are required to raise and protect the nursery tree (Thomson 1986). During the dry season, they require daily watering (Tougiani et al. 2009). The investment in a tree could thereby not only establish long-term rights to the trees planted, as Place and Swallow (2000) found in their study on Eastern and Southern Africa,

but also to the underlying land as in the case of Malawi and Uganda (Place and Otsuka 2000). The planting of a tree on a loaned/ leased field might thus be understood as appropriating the resource, which may be customarily sanctioned as in the case of fertilization (4.4.1). When only holding secondary rights to land, the farmer furthermore risks losing his investment. One informant from Goulouske put it quite graphically: "If you borrow a car and the tire breaks so that you have to change it. Would you demand the tire back when returning the car?" The reduced willingness to plant trees with increased field distance from homesteads could signalize farmers' fear of not being able to properly control access to their investment: "Because others might cut without permission what field owners planted or protected, investments in future wood stock supply made little sense" (Thomson et al. 1986). If the field was closer to the village, trees were in plain view and everybody could have an eye on them during daily activities: **The further away the field, the less safe the investment.** Farmers from Goulouske explained:

"Trees have become scarce and hence more valuable. Although the modes of harvesting haven't changed over time, people have started to plant more baobabs as they can earn money. Today, we also leave the naturally grown trees, mainly in gardens and valleys. In these areas you don't have to look after the tree or care for it, as roaming goats defecate there and enrich the soil."



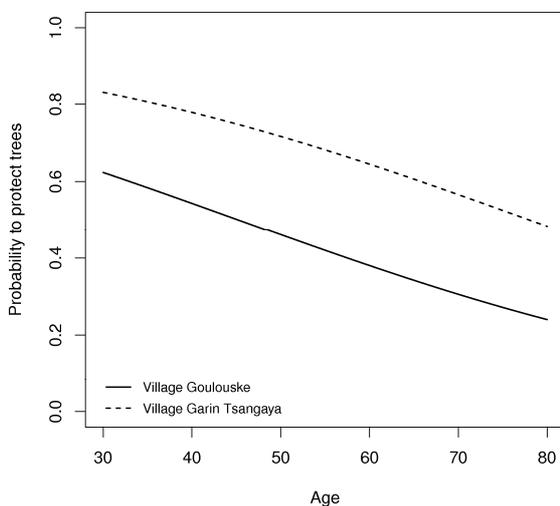
However, even if an own field was close-by, the probability to plant trees is relatively small. One reason may be the difficult access to water in both villages (Porsani 2010), which constrains the watering of seedlings. Yet, water access is best for those having fields close to the centre, and still only 28% of farmers would plant trees. Thus, there must be other reasons inhibiting the farmers from planting. Again, the feasibility of guarding an investment might matter strongly. The question of surveillance is thereby closely linked to the forest department and will thus be separately discussed at a later stage.

4.4.3 Protection of Trees

According to the third correlation, the **land tenure type does not influence the willingness to protect (i.e. care for) trees**. This could mean that my sample was too small to indicate a statistically relevant impact. Yet, as Hilhorst (2008) stated, secondary rights holders are supposed to protect trees on the fields they cultivate (see 4.3.1), which gives reason to believe that the willingness to protect trees is indeed independent from the land tenure arrangement. My hypothesis is thus *not* supported at this stage. In figure 8, the dotted line shows the probability to protect trees in Garin Tsangaya (GT), and the continuous one thus of Goulouske (GOU). At an age of 30, a farmer in GT protects trees with a probability of 83%, in GOU with some 62%. The influence of both age and village type is very clear: Was the farmer 60 years old, he would protect trees at a likelihood of still some 65% in GT and only 38% in

GOU. In other words: **The younger the farmer, the higher the probability to protect trees. And: The willingness to protect trees is higher in Garin Tsangaya.** The impact of the type of village is very interesting and cannot be easily explained on the basis of statistical analysis. In light of my reasoning regarding tree planting, the willingness to protect trees might again be dependent on the feasibility to secure an investment, in this case for instance labour for setting up fences. Owubah et al. (2001) argue that a farmer's willingness to conserve a tree was dependent on the *value* attached to that tree. The

Figure 8: Protection of Trees



value was thereby not only a reflection of its meaning to the (village) society. But “its value today arises from the contemplation of its value tomorrow” (p. 256). In other words, the benefits reaped from the protection or planting of a tree need to outweigh the benefit coming from alternative land uses, such as crop cultivation. This argumentation is in line with the statements of my interviewees and may also, at least partly, explain the influence of the factor age: Based on several focus group discussions,¹⁴¹ we can

¹⁴¹ Goulouske: Village chief and his brother, 10-01-09; Son of the village chief, 09-30-09; Resource use decision matrix, 09-17-09; Garin Tsangaya: Focus group interview, 09-26-09.

assume that the importance of trees has generally risen over the past two decades, which can be attributed to governmental sensitizing campaigns and perceived agricultural or economic benefits from trees (see 4.3.4 and 4.7). Besides, due to a saturation of farmland and small field sizes per capita, particularly younger men need to search for alternative income sources (4.2). This would explain why the Baobab (Hausa: *Kouka*) was considered one of the most important trees during the household interviews and support the argument of Owubah et al. (2006): Although the baobab is said to compete with crops in occupying valuable 'space' (soil) and to take up much water,¹⁴² its economic value is obviously perceived higher by many than potentially lost space or other negative attributes. The attitude towards the Baobab was generally more positive in Garin Tsangaya.¹⁴³ Furthermore, as the baobab can be owned and inherited (compared to other indigenous species, 4.3.4), and thus exclusively used and controlled, the willingness for protection seems to be high (pers. comm. with Lavigne Delville). Beside the Baobab, the Gao was perceived the most important and 'useful' tree due to its soil fertilizing characteristics. Many farmers stated they would particularly protect this species or at least not remove it, compared to other indigenous trees such as Adouwa or Shishi perceived to be 'useless' (see 4.3.4). The high interest in Gao for agricultural development can also be explained when recalling the governmental legislation on land, i.e. that fields can be withdrawn by the COFO if they are not valorised (*mise en valeur*) and thus prone to degradation. A farmer from Garin Tsangaya stated: "You can profit from the trees. So it is important that you protect them." From this reasoning follows that the **value attached to a tree** (species) as well as the **perception of 'ownership'** seem to be **crucial factors for the farmers' willingness to protect trees**.

4.5 Villagers' perception of tree degradation

The examination of customary resource use and management rights highlighted that most on-farm tree species have the characteristics of common pool resources, which means that (1) their consumption is separable: One consumer of tree resources automatically reduces the availability of this resource to others ('subtractability', Williams 1998); (2) it is difficult to prevent users from gaining access ('excludability', *ibid.*), and (3) the use of indigenous on-farm trees can become rivalrous, as an increasing scarcity of certain species could lead to competition among resource users (Thomson 1996a). Competition and even conflicts around the resource thereby do not only take place between farmers, but potentially also with people from outside the village territory or 'territory outsiders'.

In order to reveal potential reasons for the degradation of on-farm trees and sources of conflict, I conducted various focus group interviews and PRA exercises in both villages. Of particular interest are statements made during the 40 household interviews mentioned above, and during a so called force

¹⁴² Review of 40 household interviews

¹⁴³ *Ibid.*

field analysis.¹⁴⁴ While the interviews served to reveal farmers' general opinion about the reasons for tree degradation and stories about potential conflicts, the latter exercise was undertaken to approximate the *strength* of factors influencing the vegetation- either positively or negatively (table 9).

When looking at the results of the household interviews, where several reasons for tree depletion could be stated, we can observe a clear trend: The vast majority of farmers in both villages said that illegal cutting of trees would be the main factor, mainly by woodcutters (*bûcherons*) and herders. Few farmers from both villages also mentioned women and children. As farmers were very reluctant in blaming fellow villagers, most stated that people cutting trees came 'from outside the territory'. The third most stated answer was 'natural reasons', such as strong winds, the natural life cycle of a tree, or the lack of rainfall (table 8).

Table 8: Reasons for tree degradation

Villages	Natural death	Lack of rainfall	Wind	Wood-cutters	Herders	Women	Children	Not specified
Goulouske	2	2	3	12	11	1	1	2
Garin Tsangaya			5	13	6	2	1	1

Source: 40 household interviews (more than one answer was possible)

Human action was also the strongest negative force during the force field analysis, followed by natural reasons (table 9). Although the role of the government, mentioned both as negative and positive force, will not be discussed at this stage (see 4.6 *et seq.*), the exercise is referred to here as it revealed an interesting difference between the villages: Whereas the interviewees in Garin Tsangaya specified the factor 'human action' with the 'cutting of trees for economic purposes', farmers from Goulouske mentioned foremost the 'clearing of land for farming'. This statement was already made when talking about the willingness to plant trees (see 4.4.2) and by female focus groups when usage rights to on-farm trees were discussed (see 4.3.4). There is thus reason to believe that the removal of tree seedlings at the beginning of the sowing season was a common practice in this village. As land per household is more abundant in Goulouske (see 4.2), this could indicate that agriculture was the main source of revenue, whereas land-poor farmers from Garin Tsangaya diversified their income by cultivating (economic) trees (see 4.4.2) or selling wood. However, this assumption cannot be verified.

The cutting of trees for economic purposes was frequently stated by farmers from both villages. As outlined in section 4.3.4, wood thereby seems to be cut either illegally or by those possessing an official authorization from the forest department. Although the head of the departmental environmental ministry (DDE/ LCD) explained that licensed woodcutters could but draw and sell dry wood, i.e. fallen branches, the praxis seems to be different.¹⁴⁵ Many farmers stated that also 'green

¹⁴⁴ During a force field analysis, one should normally draw arrows whose lengths will determine the strength of influence of a factor, either positively or negatively, that leads to a certain outcome. I modified the exercise and asked the villagers for factors influencing the stock of on-farm trees. They named several factors which were noted and commonly ranked by the villagers. The exercise was conducted the 10-02-09 in Goulouske and the 10-03-09 in Garin Tsangaya.

¹⁴⁵ Interview on the 10-05-09 in Mirriah.

branches' would be withdrawn and sold. Yet, as outlined, some farmers cooperate with woodcutters in selling parts of 'dead' trees from their fields to them. While a few people thus benefit from the purchase of wood, the resource stock might suffer in the mid-term. As outlined above, most farmers do want to sustain their resource stock and illegal cutting to stop. It can thus be assumed that woodcutters were a source of conflict.

Table 9: Force Field Analysis on tree cover reduction

Garin Tsangaya	Goulouske
Negative forces	
<i>(ranked after strength, with the highest influence at first)</i>	
1. Human action (Cutting trees for economic purposes)	1. Human impact (clearing for farming, illegal chopping)
2. Wind erosion	2. Drought periods/ lack of rain
3. Lack of rainfall	3. Lack of enforcement of governmental programs
4. Worms	4. Strong winds
	5. Worms and natural life cycle of trees (<i>same strength</i>)
	6. bush fires (<i>"not in Goulouske, however"</i>)
Positive forces	
governmental laws, sensitizing campaigns and rising awareness	

According to table 8, herders were the second most mentioned reason for tree degradation. The accusation cannot be left unexplained: As outlined in sections 2.2 and 4.3, farmers and mobile groups traditionally share a mutually beneficial relationship. Yet, the situation changed during the last decades, as farmers have been constantly extending their fields into corridors and grazing land, areas traditionally reserved for herders.¹⁴⁶ The expansion was cautiously confirmed in both study villages.¹⁴⁷ Besides, many farmers do not leave any crop residues on their field, as it has been done for generations. They argue that due to the reduced field size per capita and thus small yields, they need every single residue for their nutrition. These have been the main source of feed for herds, though. The outlined development may have an impact on the vegetation cover: Due to the reduced space for herders' livestock, herds of up to several hundreds of animals necessarily need to enter fields along the grazing area. Thereby, little trees are likely to be trampled. Besides, given the lack of residues to feed animals, tree sprouts and (green) branches can be considered the necessary alternative. Yet, as fields are a common pool resource during the dry season, herders' action can hardly be controlled. Although the chiefs from both villages denied any conflicts in their territories, the outlined developments must necessarily lead to disputes between the resource user groups.¹⁴⁸ Some farmers admitted 'minor' conflicts, but did not want to talk openly about this issue. Men from Garin Tsangaya said it was "a waste of time" to talk on land and explained that herders could "use the area beyond the village territory."¹⁴⁹ The deteriorating relation between farmers and herders has another dimension: Due to lack of fodder and also water, herders

¹⁴⁶ In Garin Tsangaya I visited the corridor and came to know that just some three cows can walk next to each other.

¹⁴⁷ Interview with the village chief of GOU, 10-24-09, and historical land use exercise in GT with women, 10-27-09

¹⁴⁸ Due to interviews with several sections of the COFO, the NGO 'CRAC/ GRN' and the herder association 'AREN' it can be assumed that conflicts between farmers and herders around land and trees happen frequently, also in my study region.

¹⁴⁹ Resource use decision grid with elder men, Garin Tsangaya, 09-23-09

usually do not stay for longer than two days in both village territories.¹⁵⁰ Consequently, land is less naturally dunged during the dry season:

“In the 1980’s and 1990’s, there was enough water, trees and herbs, bushes and grass to feed our animals. The pastoralists could stay on the grazing area and had enough food to wait until the fields were liberated. In the dry season, they sometimes even stayed for a couple of weeks. But in recent years, the rains have diminished and we farmers need to hurry up with the harvest, as the herders can no longer stay outside the fields. There is nothing to feed their animals. Yet, there are no conflicts.”¹⁵¹

This short section shows that the reported depletion of trees is likely to have various sources, though the impact of each cannot be estimated. Yet, due to their short stay in both territories, there is good reason to believe that the action of herders was less detrimental to the resource stock than (illegal) cutting and purchase of wood, particularly regarding bigger trees (see 4.1).

4.6 The resolution of conflicts

The behaviour of the resource user groups outlined in the previous section as well as the potential removal of seedlings lead us back to the question for the feasibility to guard the tree stock (see 4.4). Several authors state that in case the demand of forest products is higher than their supply and institutional structures regulating resource access and usage are inadequate, these can become “open access resources” and prone to over-exploitation (Hardin 1968; Ostrom 1990; see 1.1). Thus, it is crucial to examine whether the “procedural operational rules” (Thomson 1996a) that regulate rule enforcement, monitoring and sanctioning can be considered appropriate in both villages (1.2.5). At this stage it shall be explained which strategies farmers from both villages developed to control and sanction the usage of land and on-farm trees and how the resolution of conflicts around both resources is influenced by local traditional and governmental authorities.

4.6.1 Resolution of conflicts related to land

As mentioned in section 4.2, land is said to be saturated in both villages. This leads to a higher value of and rising conflicts around the resource. In order to secure their landholding and prevent future conflicts, many people wish for a title deed,¹⁵² i.e. an official and written proof of ownership from the tenure commission (COFO): “For the average farmer, the interest of having a paper proof of ownership lies in the protection it yields against predators with hostile claims to his land” (Benjaminsen et al. 2008: 31). In Goulouske, 16 percent of the fields examined during my household interviews have been bought, compared to 6 percent in Garin Tsangaya. Yet, none of the farmers possessed a formal title. As for the first village, all sales took place before the introduction of tenure commissions and were possible due to close ties between the buyers and governmental officials.¹⁵³ By now, “bureaucratic obstacles”, high costs and the time needed for travelling to Mirriah deter the most from taking this step.¹⁵⁴ Besides,

¹⁵⁰ Review of 40 household interviews

¹⁵¹ Interview with the village chief of Goulouske on the development of the grazing area in the village territory, 10-24-09

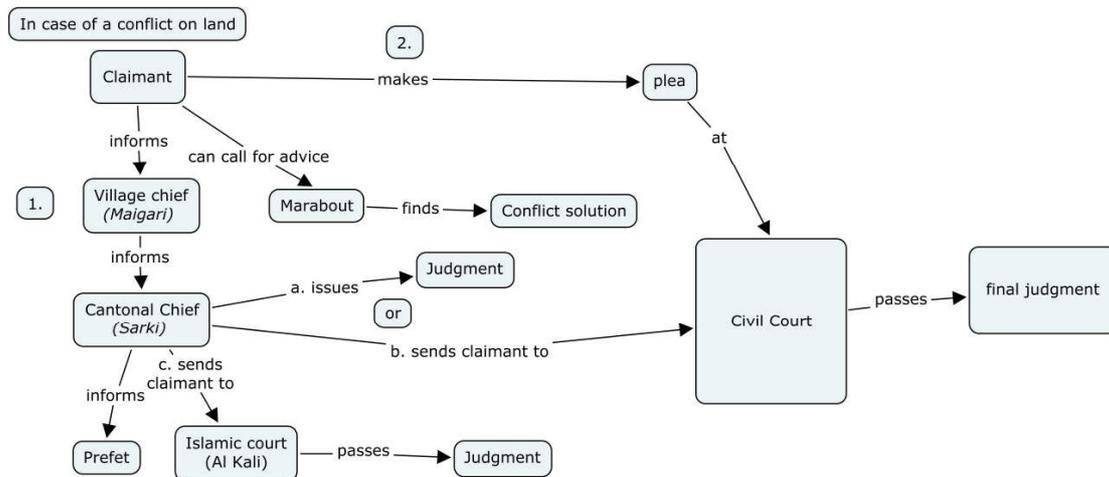
¹⁵² Review of 40 household interviews

¹⁵³ Household interview with a brother of the village chief, 01-08-09, Goulouske

¹⁵⁴ Interview with village chief of Goulouske, 10-01-2009

many people fear losing their land as soon as the State is involved and value local papers as well as the village solidarity system higher than cooperation with authorities. The same reasons were stated in Garin Tsangaya.¹⁵⁵ Yet, hardly any of my interviewees from this village even knew the COFO. To facilitate the issuing of papers and the resolution of annually repeating conflicts between farmers and herders, the village chief of Goulouske has applied for setting up a tenure commission on village level (COFOB).¹⁵⁶ In Garin Tsangaya, there is formally a COFOB in place, but in fact not functioning.¹⁵⁷ Possible implications of formalizing land on the conservation of on-farm trees will be discussed in chapter 5. At this stage, only the possible influence of authorities on local level matters.

Figure 9: Conflict resolution scheme for land



Source: Own representation, based on a discussion with the Maigari of Goulouske and the translator Mr. Ousmane, 10-01-09

The difference between the two villages in approaching either governmental or traditional authorities becomes clear when we look at the mechanisms to arbitrate conflicts around land (see figure 9). In this regard it is important to highlight that there are multiple authorities in charge. Le Roy (cited in Lavigne Delville 1998) speaks of “hybrid contemporary systems”: In case of conflict around land, the plaintiff can ask the Marabout (see 3.4.4) for advice or make a plea at the civil court. Normally, he would inform the village chief (*Maigari*) who either solves the conflict or calls in the cantonal chief (*Sarki*). In case the plaintiff is not satisfied with the Sarki’s judgment, he can choose which authority to approach next. The Sarki can address either the departmental administration (*prefet*), the civil or Islamic court (*Al Kali*). The Al Kali can judge and the decision will be morally binding, but cannot be refuted with State bodies. This variety of negotiation processes possible due to the legal pluralism outlined in chapter 3 is called ‘forum shopping’, i.e. parties base their claims on whichever source of legitimacy (statutory, customary or religious law) they feel best fitting their situation (Meinzen-Dick & Pradhan 2002; Lund 1997; Benjamin 2006). Lavigne Delville (1999: 6) finds that

¹⁵⁵ Review of 40 household interviews and Interview with the cousin of the village chief of Garin Tsangaya, 10-27-09

¹⁵⁶ Talk to the permanent secretary of the communal tenure commission (COFOCOM) in Mirriah, 10-30-09.

¹⁵⁷ Talk to the formal vice president of the COFOB and cousin of the Maigari, 10-27-09, Garin Tsangaya

“this leads to a situation where no arbitration can be recognised and accepted because a decision by one authority may be overruled by another. As a result, outcomes cannot be predicted and all forms of arbitration may be challenged, so conflicts escalate and lasting solutions are harder to achieve.”

As for Garin Tsangaya I learned that farmers would unanimously address customary authorities, not at last due to “personal problems” between the cantonal chief and the mayor of Zermou and a strong mistrust of villagers towards governmental bodies.¹⁵⁸ The Sarki of Zermou, in turn, fears losing his traditional sphere of influence and thus blocks any kind of cooperation with the COFO. In order to sustain his income, he arbitrates conflicts himself. In Goulouske I learned that although customary authorities are still considered important, more and more people address themselves to governmental bodies or directly to the civil court. In comparison to the *personalized* Al Kali, the legal court is *institutionalized* and considered more trustworthy.¹⁵⁹ Not only is the Sarki of Mirriah said to be more cooperative towards governmental bodies than the one of Zermou, which probably influences the attitude of the village chief and villagers of Goulouske.¹⁶⁰ Another reason for the greater openness towards state bodies may be the proximity to Mirriah and the history of state interventions (see 4.7).

4.6.2 Resolution of conflicts related to on-farm trees

The influence of governmental bodies on farmers from both the villages is also different when looking at the resolution of conflicts around trees: Although farmers have begun to appropriate trees, expressed by the statement that these would belong to the owner of the field, they are aware about the formal regulations of the forest department (see 4.3.4). They know that the State is in charge for controlling tree usage and fining the violation of duties. However, particularly farmers of Garin Tsangaya rely on customary rules and are sceptical towards the forest department when rules regarding trees on both private fields and grazing land are violated: Farmers tend to be “very tolerant and patient” and explained that they would not report anyone from the village to governmental bodies, as the fines from the State were “too high for the poor”.¹⁶¹ Yet, in case a farmer observes an illegal act, he would warn the person and advice to stop cutting and, in severe cases, report the offender to the village chief. In Goulouske, the procedure is principally the same. When facing illegal cutting, some farmers told me they would not say anything or denounce the person, as trust and social behavior were important pillars of the Hausa mentality.¹⁶² Yet, as reported from Garin Tsangaya, farmers would chase off would-be cutters and assert a personal right to trees by virtue of ownership of land on which they grow. Others would inform the village chief, who will then decide about the further procedure. Yet, and in contrary to Garin Tsangaya, “in severe cases” the forestry brigade is informed. If the woodcutter is caught, he will either be fined on site or taken to Mirriah and sanctioned.¹⁶³ Often, minor conflicts around trees are

¹⁵⁸ Discussions with the cousin of the village chief of GT, 10-27-09, and the SP of the COFOCOM in Zermou, 10-28-09

¹⁵⁹ Interview with the village chief of Goulouske, 10-01-09

¹⁶⁰ Interview with the permanent secretary of the communal tenure commission (COFOCOM) in Mirriah, 10-30-09

¹⁶¹ Resource use decision grid with elder men, 09-23-09, Garin Tsangaya

¹⁶² Interview with two farmers (36 and 40 years old) on the importance of baobabs, 09-30-09, Goulouske

¹⁶³ Discussion with the village chief of Goulouske, 10-24-09

solved directly between the conflicting parties: I heard about a case in Goulouske where the “son of neighbors” had cut roots of a farmer’s baobab so that the tree did not develop any fruits. The tree owner addressed the child’s father and regulated the case internally, without consulting the village chief.¹⁶⁴

4.7 Background on governmental interventions in the two study villages

The section on the resolution of conflicts has revealed that mainly in Garin Tsangaya farmers are very sceptical towards governmental bodies and rely on conflict arbitration by traditional authorities. In Goulouske farmers cooperate more often with authorities. This difference in attitude may be explained when looking at the history of interventions from governmental bodies in the villages. As on-farm trees are central to this thesis, only the impact of the forest department will be regarded.

From several focus groups in Goulouske I learned that people’s awareness of the importance of trees has mainly come from the forestry department, which has a long history of interventions in the village: As outlined in chapter 3, the first Forestry Code came into being in 1974. The enactment of the Code went hand in hand with countrywide sensitizing campaigns on the importance of trees to counteract desertification: Since the 1970’s the then Maigari of Goulouske (father of the current one) had been invited regularly to Mirriah and been informed about the new legislation and protected species. The Maigari even got training on tree planting as well as allowed management techniques, which he conveyed to his villagers. The brother of the current village chief took part in the countrywide tree planting program *jeunesse pionnière* for 3.5 years, and later planted some 50 trees in and around Goulouske.¹⁶⁵ In 1974, the government provided the village with nursery trees to protect the soil, namely the fast growing and drought resistant species *Meina* (Neem) and *Turare Nasara* (no translation found). Soon after, people from Goulouske started buying and planting Neem saplings themselves, which they initially planted in courtyards and later transported to their farms:

“There had been sensitizing campaigns throughout the 1970’s as well as radio spots. These campaigns contributed to our realization of the importance of trees. Mainly during the big drought periods, people had understood that having more trees might have prevented this incidence.”¹⁶⁶

Today, the village chief is called to Mirriah only in case of legislative changes regarding trees, which he then reports to his village within an assembly.¹⁶⁷ Besides, he is invited to Mirriah every year when the forestry department celebrates the ‘day of the tree’ (August 3rd), even if he does not participate regularly.¹⁶⁸ In this period, nursery trees are either handed out for free or people from the government travel through the villages distributing small trees to be planted in the villagers’ courtyards. However, the governmental sensitizing campaigns were not the only reason for people from Goulouske to perceive trees as important: Some have been fined by the forestry brigade for cutting wood, which

¹⁶⁴ Interview with two farmers (36 and 40 years old) on the importance of baobabs, 09-30-09, Goulouske

¹⁶⁵ Discussion with the brother of the village chief, 10-01-09, Goulouske

¹⁶⁶ Discussion with the son of the village chief of Goulouske during a historical resource map exercise, 09-30-09

¹⁶⁷ Resource use decision matrix with a group of men, 09-17-09, Goulouske

¹⁶⁸ Discussion around a force-field analysis exercise with the Maigari of Goulouske, 10-01-09

scared off others from doing so. Besides, the rising shortage in land and thus its increasing value led farmers to seek for other income sources, such as cultivating economic trees.¹⁶⁹ Generally one can assume that the village has close ties to governmental authorities: Two brothers of the village chief have been working for the government in the past. And until today, many farmers seem to have relatives in the public sector, partly living in Goulouske.¹⁷⁰ In Garin Tsangaya, the situation is completely different. None of my focus groups reported on any governmental intervention as regards sensitizing or training. Besides, they never received any nursery trees from the State.¹⁷¹ There was a tree planting programme between 1974 and 1987 close to the village of Houk (see map 3), but nobody from the village took part. They furthermore said that the village chief had never been invited to Mirriah at the 'day of the tree'.¹⁷² My informants stated that people were scared when the forestry brigade patrolled in the area for the first time. Due to this policy they learnt about the fines for illegal cutting- as I heard in Goulouske, too. People's awareness on the importance of trees has been rising since the late 80's when, as they say, they realized a higher productivity of their fields due to the Gao, the protection of soils against erosion, and the economic benefits (Baobab).¹⁷³ Although not stated and thus not perfectly clear, I assume that farmers became aware of governmental sensitizing campaigns at least indirectly due to radio emissions and their weekly travels to Mirriah or Zermou on market days. Furthermore, many farmers started to perceive growing wood scarcity, which is expressed by their willingness to police cutting by outsiders. The lack of participation in governmental tree planting programs or tree celebrating days may be explained by the general scepticism of both the village chief and farmers from Garin Tsangaya towards the State. As mentioned elsewhere, the village is hardly passable and far away from bigger centres (1.5 hours of walk to both Mirriah and Zermou). Besides, the influence of the cantonal chief (Sarki) seems to be very strong. None of the farmers stated that he would have any closer relation to governmental officials.

4.8 Critique on current resource governance and villagers' suggestions

Despite their negative picture of governmental authorities, more farmers in Garin Tsangaya actively care for on-farm trees compared to Goulouske. Yet, farmers from both villages are reluctant to plant trees (see 4.4). Both factors are astonishing particularly regarding Goulouske, as the proximity of the village to Mirriah and the forest department's sphere of influence should theoretically foster the conservation of trees. As mentioned above, on-farm trees could become an 'open access' resource in case institutional structures regulating access and usage were inadequate. Consequently, the last section of this chapter shall examine villagers' opinion on rule enforcement and monitoring by the forest department in both villages.

¹⁶⁹ Resource use decision matrix with a group of men, 09-17-09, Goulouske

¹⁷⁰ Focus group Interview with men on nutrition during drought periods, Goulouske, 10-30-09

¹⁷¹ Historical timeline exercise, conducted the 09-07 and 09-12-09 in Goulouske and the 09-08 in Garin Tsangaya

¹⁷² Focus group with elder men, 09-26-09, Garin Tsangaya

¹⁷³ Ibid.

As explained in section 3.4.1, I was neither able to compare rule compliance between the villages by analyzing raised fines, nor to get an overview on the amount and routes of the brigade's patrols. Thus, in order to approach the question for the appropriateness of institutional structures, I have to rely on farmers' statements made during the 40 household interviews and the force field analysis outlined in 4.5. When recalling the latter exercise, informants from Goulouske integrated the impact of the government as the third most negative force, after 'human action' and 'lack of rainfall'. When asking for specification, the interviewees explained that the government "preaches the protection of trees such as the erection of fences around nursery trees, but does not provide us with the means for acting."¹⁷⁴ The informants stated further that the approach of the forestry department in sensitizing people on the importance of trees was good in principle. The forestry law was important as it prohibited illegal cutting and promoted the natural regeneration of trees. Yet, it needed to be properly enforced.

During the force field analysis in Garin Tsangaya, the policy of the forest department was not integrated. Consequently, I started to ask the villagers about its role. Farmers stated that the forest department was the main force to protect trees from illegal cutting and highlighted the importance of laws, just like those in Goulouske. However, the overall picture was rather negative. Farmers highly criticized the practice of granting authorizations for wood cutting. They said that the government should stop this policy, as it was not able to control its enforcement: Authorized woodcutters should, according to law, ask farmers for cutting wood on their fields and draw but dry branches. But frequently this would not happen and 'green' parts were taken, too. The logging permits were thus highly counterproductive. Besides, the brigade would hardly patrol at all in the area.

On basis of this critique, I asked the informants for suggestions to improve forest policy and stop the reduction of on-farm trees (table 10). In both villages, the farmers wished for more surveillance/patrols by the forestry brigade to assure the protection of trees and, implicitly, more personnel and means. Interestingly, a quarter of interviewees from Goulouske stated that as the State could not control wood cutting, the only option was to raise the Koran. This has been also stated by three farmers from Garin Tsangaya: The main *Marabout* would assemble the village and they all together would place a future Qur'anic prohibition on unauthorized harvesting of wood. The future offender would then be punished by Allah. A farmer from Goulouske explained: "Something bad will happen to him within one year after his accursed action." Some villagers told me they had raised the Koran already in early 2009.

Table 10: Suggestions for tree protection

Villages	More surveillance	Higher fines	Stop permits	Local village committee	Oath on Koran	Rights to Maigari	No suggestion
Goulouske	9	4	1	3	5		4
Garin Tsangaya	10			3	3	1	3

¹⁷⁴ Maigari and his brother, 10-01-09, Goulouske.

Three interviewees from each village wished for a surveillance committee on village level. I am aware that this answer might have been given in order to satisfy the researcher. Particularly as my colleague Juliana has been frequently asking for committees. Yet, I did not ask for this issue. This statement could thus also indicate farmers' willingness to create alternative control mechanisms, in order to fill the apparent gap of governmental surveillance and to reduce logging:

“Local people are...acutely aware of the need to adopt reciprocal, but regulated, access regimes and adaptive management strategies if they are to survive uncertain and hostile environmental conditions (Hesse & Trench 2000).

However, there are some inconsistencies: Whereas one group of elder men in Garin Tsangaya stated that there was already a surveillance committee in place, this information could not be backed by anyone else from the village. In Goulouske, in turn, I spoke to two members of the committee 'Hanna Dioua',¹⁷⁵ a subsection of the committee 'Haské'. The latter is in charge for the maintenance of both mosque and hydraulic pump as well as the general 'cleanliness' of the village.¹⁷⁶ The men explained that Hanna Dioua was a tree surveillance committee whose tasks were to control illegal cutting and raise awareness on the importance of trees by sensitizing the village population. Three members would be patrolling in the region. Simultaneously, the young men told me that there were 'generational disputes' in the village: Hanna Dioua had separated from the other committee (*Haské*) as village elders had a different attitude towards public education.¹⁷⁷ Although I could not get further information due to problems with the translation, there is reason to believe that elder men are rather believing in the faith of God (oath on Koran) and governmental action (more surveillance), compared to the younger generation which seems to be more 'pro-active'. This might explain why the interviewed heads of household wished for a surveillance committee, although apparently there is already one in place. Yet, it is also likely that the committee is not yet functioning properly, so that the statement of the elder men could be interpreted as a wish for improving the existing local control system. The apparent inter-generational difference could furthermore explain the finding from the statistical analysis – that younger farmers would be rather willing to protect trees.

Table 10 indicates some more interesting factors: Firstly, although the force field analysis and other focus group discussions in Garin Tsangaya revealed that farmers' main critique to the governmental policy was the issuing of authorizations, this factor has not been mentioned by any of the interviewed households. Secondly, whereas farmers from Garin Tsangaya had stated that they would not denounce someone cutting illegally as the fines were too high, 4 people from Goulouske wished for higher fines. Social cohesion and understanding for the situation of the poorer share of the village thus seem to be stronger in Garin Tsangaya. Thirdly, one farmer from Garin Tsangaya stated that control

¹⁷⁵ Discussion with two members of the 'Hanna Dioua' committee, 10-25-09, Goulouske

¹⁷⁶ For details on the structure of committees in both villages see the work of my study colleague Juliana (Porsani 2010)

¹⁷⁷ Initially, Haské consisted of both elder (Malams) and younger men, but there were several disputes: whereas younger men wanted their children to go to public school more frequently, the elder men were reluctant and argued for the construction of Koran schools. Source: Son of the village chief, 10-23-09, Goulouske

rights over the resource stock should be devolved to the village chief, which again is a sign for the willingness to self-organize. One farmer from Goulouske suggested improved means of transportation: Back in time, foresters had patrolled by horses. Today, they use a car or motorcycle which woodcutters would hear from far- and had enough time to flee. Last but not least, two people from Goulouske made the following suggestion¹⁷⁸: Some villages of a territory would get an equal number of nursery trees and compete in the protection thereof. The village with the best results would be (financially) rewarded. They would wish for *positive incentives* to protect trees.

5. Summary and discussion of the findings

5.1 Summary of the findings

Despite an apparent increase in vegetation cover on a broader scale in Niger, this thesis presented two study villages from the department of Mirriah which report a constant decline particularly in bigger trees on farms over the past decades. In order to reveal factors that influence resource use and management on local scale, the analysis of the villages followed these research questions:

- (1) *How does the interaction between customary land use systems and formal institutions affect farmers' performance in managing on-farm trees?*
- (2) *How do property rights in land affect the management of on-farm trees in both study villages?*

Assuming the embeddedness of both villages into different levels of organization (Hanna & Jentoft 1997) – the community, locality, and state – this thesis has analyzed the

- (1) Environmental legislation in Niger and policy issues raised by the governance of on-farm trees, thereby focusing on the question of resource tenure and management responsibilities (chapter 3);
- (2) Rules governing use and management of land and on-farm trees that have traditionally been developed in both study villages (sections 4.3 and 4.4) and
- (3) Enforcement of formal rules by local resource governance institutions in the two study villages, their interaction with customary land use systems, and impacts on resource management (sections 4.6 *et seq.*). In this last chapter, the main findings of this thesis shall be outlined and implications discussed:

5.1.1 Mismatch between environmental legislation and customary practices

An in-depth analysis of current environmental legislation and its historical codification has revealed that agriculture and forestry are treated as separate land use systems, despite a gradual opening of the new Forestry Code of 2004 towards an agro-forestry approach. Following the French *droit de propriété* concept, where *property* is based on one single right defining and evaluating all other rights, the resources land and trees are regulated in sectoral laws which make partially contradictory statements on the ownership of on-farm trees. As natural resources are seen as national heritage, the scale for resource governance and control is set at the national level. Legal principles and the conception of

¹⁷⁸ Interview with Maigari and his brother, 10-01-09, Goulouske.

statutory law are thereby at clear variance, if not “profoundly alien” (Lavigne Delville 1998: 4) to customary principles and landholding practices of rural communities. As visualized with the so called ‘tenure boxes’, the customary tenure system is characterized by different rights *bundles*, thereby taking account of the heterogeneity of user groups (see 1.2.4.1, 2.2 and 4.3; Williams 1998; Benjaminsen & Lund 2001). In this light, Meinzen-Dick and Pradhan (2002: 7) stress the importance to differentiate between “the legal construction of rights from the actual social relationships that connect concrete right holding individuals, groups and associations with concrete and demarcated resources”. Besides, the establishment of the forestry department and land tenure commissions (COFO) at all administrative levels led to the “demarcation between public administration and traditional institutions” (Alinon & Kalinganire 2008: 1; see 3.1 and 4.6).

5.1.2 Inefficient forestry policy and the role of secondary land rights

According to customary practice, trees and land are managed interactively, with rights to land determining rights to most indigenous tree species. Economically valuable trees are privately owned and inherited. The interaction between land and tree tenure in the day-to-day resource management of farmers was tested by means of a logistic regression model which revealed that farmers would plant trees only if they owned the land (see 4.4). The possession of primary rights to land furthermore had a positive impact on the application of manure, which could indirectly increase the natural regeneration of trees. Particularly interesting was the finding that the land tenure type did not influence a farmer’s willingness to care for trees. The willingness to care for trees was particularly high in Garin Tsangaya and declined with increasing age of the farmer. This thesis showed further that although farmers from both villages seem to have recognized the importance of trees – expressed by the appropriation of trees and attempts to chase-off would-be cutters – and do wish to sustain their resource stock, particularly the Ana tree (*Faidherbia albida*) and Baobab (*Adansonia digitata*), less than one third would plant a tree.

The reluctant willingness for tree planting and the reported degradation in vegetation cover can at least in part be attributed to the governmental conceptualization of resource tenure and current forestry policy: As resource management, control and decision making rights stay with the forest department due to the villages location in ‘uncontrolled zones’, farmers seem to have little positive incentives to plant trees. They would not be able to reap the benefits of their investments (see 4.4). Moreover, farmers from both villages reported that they were not able to protect trees from theft or unauthorized in-field cutting, which seems to be a common practice in both villages and to mainly serve economic purposes. This situation was attributed to an ineffective governmental surveillance system, whereby enforcement is said to be effective if rules set by formal institutions were observed, violations properly sanctioned and conflicts eliminated (Behera and Engel 2004; Thomson 1982). At the same time, the governmental ownership in trees is likely to have prevented farmers from setting up own monitoring and surveillance systems, as the case of Goulouske illustrates. The seemingly inefficient

control system might thereby be less problematic for Garin Tsangaya due to its seclusion from paved roads and markets. Yet, wood cutting permits issued by the government seem to counteract tree planting and conservation efforts. Due to its proximity to main roads and Mirriah, Goulouske in turn might be highly prone to illegal logging.

However, current forestry policy and contradictory legislation may not only complicate or discourage the management and conservation of trees (see also Wezel & Rath 2002). Research by Thomson et al. (1986) in the department of Mirriah showed furthermore that farmers often removed trees already with tillage, in order to prevent fines by the forestry brigade in case of damage to a tree on their land. This phenomenon may still prevail and explain the statement of farmers in Goulouske on the removal of trees perceived to be 'useless' (4.3.4 and 4.4). Another explanation to this action may be the passage in the Rural Code stating that land could be temporarily withdrawn in case it was not valorized properly, whereby tree sprouts are often seen as 'weeds' and crop competitors.

The current situation leaves everyone worse off, as a reduction in tree cover is likely to increase the risk of soil erosion and, at the same time, might reduce the chance of soil fertility being reconstituted through natural regeneration. Yet, in light of high population pressure, saturation of farmland, and periodically occurring drought spells, rural communities do not only need to increase the productivity of land, but also reduce their dependency from rain-fed agriculture if they are to sustain their livelihoods. At the same time, one can assume that the value of and the pressure on wood will dramatically increase in the future. It has been argued that in case demand exceeds supply and rivalry around the resource occurs, institutional arrangements need to be changed (Williams 1998; Thomson 1996a). Which options exist to approach the current dilemma?

5.2 Discussion: Relationship of tenure rights and the implications for policy reform

5.2.1 Maintenance and reinforcement of governmental control

In order to counteract the lack of governmental surveillance, many farmers suggested the increase in forest brigade patrols (see 4.8). This option implies that control over the resource rests in the hands of the state (*res publica*), while resource users continue to use the resource at the forbearance of the forest department (see 3.3.1, 3.4.1; Bromley 1992). Given the size of both village territories and the distance of Garin Tsangaya from any forestry post, the personnel would need to be substantially expanded, while the costs of operation, i.e. rule enforcement, maintenance and sanctioning, would increase massively (e.g. Ostrom et al. 1993). Moreover, many foresters are said to engage in corrupt practices due to relatively low salaries (Thomson 1982). We have to consider that the forest department is self-financed, i.e. fines and cutting permits are used to pay staff, petrol and equipment. In order to manage necessary controls and provide adequate incomes, fines would have to be raised to an undue level. At the same time, it is highly unlikely that the forest department would abandon the issuance of woodcutting permits and therewith one of its main income sources. Besides, foresters are centrally

appointed civil servants and thus not accountable¹⁷⁹ for any rule violation towards local resource users (Bromley & Cernea 1989; Behera & Engel 2004). As outlined above and in section 4.4, the perception of ownership to a tree is likely to increase a farmer's willingness to plant trees. The reinforcement of the current system would not solve this problem. Last but not least, hardly any of the studies on centralized forest systems worldwide could show that this governance arrangement led to the preservation of the resource stock (e.g. Ostrom 1990; Bromley 1992; Thomson 1996a; Behera & Engel 2004; Chhatre & Agrawal 2008). It can thus be highly doubted that this alternative was suitable in the case of my study villages.

5.2.2 The privatization of land and on-farm trees

Another option which has been put forward at least since the publication of Hardin's "Tragedy of the Commons" (1968) is the privatization of a resource used in common (*res privatae*). Underlying this alternative is the assumption that vesting an individual with full resource ownership rights will give him/her strong incentives to manage the resource for sustained yield "because market demand...will cover costs and allow for profit" (Thomson 1996a: 181). The assumed positive relation between privatization and sustainable investment was also the reason for establishing the Rural Code in 1994. Tenure security, associated with a formal title deed to land, was thereby not only considered the precondition for rural development, but necessary to secure the resource against adverse claims (3.3.2; Lund 2001). According to Migot-Adholla and Bruce (1994: 19, cited in Lund 2001), tenure security exists when

"an individual perceives that he or she has the right to a piece of land on a continuous basis, free from imposition or interference from outside sources as well as the ability to reap the benefits of labour and capital invested in that land, either in use or upon transfer to another holder."

The formalization of land would thereby go hand in hand with the privatization of on-farm trees by the primary rights holder of the land, as article 16 of the Rural Code implies (see 3.3.2). The privatization of on-farm trees would have the advantage that the owner of the land alone would be in charge for their protection, whereby the costs of operation on the side of the forest department would be minimized. At the same time, labour costs would increase, particularly when it comes to distant fields. The privatization of land could furthermore be of advantage to tree planting programs, as the statistical correlation of land tenure types and tree management revealed (see 4.4). However, as outlined in section 4.3.4, traditionally only those tree species can be privately owned whose fruits are economically valuable. Certain parts of any other indigenous species determine usage rights for the village community and mobile populations, so that they can be considered a common pool resource. The appropriation of trees would thus have several negative consequences. Firstly, all those possessing secondary rights to land would be excluded from accessing trees and using non-timber forest products. This would be

¹⁷⁹ As mentioned in chapter 3, see Agrawal and Ribot (1999) for a detailed treatise on accountability in decentralization. Based on farmers' statements, there is good reason to believe that their attitude towards the State is rather negative, particularly in Garin Tsangaya (see 4.5 and 4.6).

particularly detrimental to the poorer share of the village community, as these farmers often possess little or no land (see 4.2). Besides, conflicts with herders around trees would very likely increase. Tenure security for one part of the community thus increased *tenure insecurity* and uncertainty for many others (Lund 2001; Lavigne Delville et al. 2001). Secondly, privatization goes hand in hand with an individualization of households, with autochthonous families increasingly living after their own rules (Boubacar 2000; pers. comm. with Lavigne Delville). This in turn might lead to mutual mistrust and social disruption within the village community (also Bromley 1992). Last but not least, there is reason to believe that the Rural Code's provision on the valorization of land might lead to agricultural development at the expense of tree cultivation (Lavigne Delville 1999; pers. comm. with Lavigne Delville). The endeavor to privatize and valorize land might thus be rather detrimental to the conservation of on-farm trees. This reasoning is in line with many authors arguing that private ownership was no guarantor for the protection of a natural resource but, on the contrary, often provided an impetus to a faster rate of resource depletion (e.g. Ostrom 1990; Bromley 1992). As Bellefontaine et al. (2002) put it:

“Land privatization can [...] be one way of ensuring land security, but it is neither the only option nor the best one [...]. At the same time, usage rights encourage people to safeguard trees growing on farmland. The challenge, then, is to ensure a land status which will guarantee rights in the long term without marginalizing the least privileged members of society, and at the same time enhance the value of land through the planting and maintenance of trees.”

Given the finding that the willingness to care for trees is independent from the land tenure type (4.4.3), any institutional arrangement that considers the importance of secondary usage rights and that promotes the natural regeneration of on-farm trees instead of their planting thus has the best chances to integrate all wealth strata within the community. A promising approach is thereby the program 'Farmer Managed Natural Regeneration' (FMNR), which has been presented in section 2.3.1 of this thesis.

5.2.3 The devolution of tree rights and the role of village committees

As neither the maintenance of exclusive resource tenure on the side of the government nor resource privatization seems a reasonable option, a third alternative would be the devolution of tenure rights to the two village communities. Based on the research on various resource systems used in common, Ostrom (2008) found that the right to alienate a resource (i.e. full *ownership*; see 1.2.4.1) was thereby not crucial to guarantee the long-term management of a resource. The most important rights fostering the preservation of the resource would be those of management and exclusion, i.e. the control of resource access and usage (Thomson 1996a; Alden Wily 2004; Mwase et al. 2006; Chhatre & Agrawal 2008). The right of exclusion would also substantially affect the capability of communities to establish village-based governance arrangements (Schlager 1994, cited in Ostrom 2008). My assumption on that the governmental 'ownership' in trees might have prevented farmers from changing local resource

governance mechanisms is fully in line with this reasoning. It thus seems imperative that farmers are granted control and management rights over on-farm trees in order to set up own surveillance systems.

The establishment of a community-based control system would have several advantages. In both villages solidarity, mutual trust and religious values (*informal rules*) are considered very important. A surveillance system based on customary rules and 'social sanctions' is thus more likely to distract potential woodcutters (at least those from the territory) than impending fines by the government. Instead of *negative incentives*, the establishment of committees on village level would grant rewards "in the form of honor within...families and the village community, and the preservation of the resource" (Thomson 1996a: 210). Compared to the forest department, residents possess greater familiarity with the village territory and a detailed knowledge of resource use patterns. This has been shown by various studies on community-based resource governance (e.g. Ostrom 1990; Thomson 1996a; Alden Wily 2004; Behera & Engel 2004). Besides, residents treat their resource system as discrete entity and not a single, national-level common pool resource. In this light, villagers could more easily monitor each other's conformance with a locally developed set of rules and norms or so called *design principles* (see 1.1; Ostrom, 1990, 2009a). Resource governance devolved to local bodies would potentially be more responsive to local concerns and better *fit* to the attributes of the resource system, resource units, and users (Hanna et al. 1997; Berkes and Folke 1998; Young 2002). Last but not least, a local self-governance body might be considered more *legitimate* by villagers than governmental authorities perceived to be inefficient, corrupt and not accountable towards local resource users (see 3.4.1; Thomson 1996a).

With the establishment of local management structures (SLG) in so called *controlled* zones and the gradual acceptance of local conventions as in the case of the FMNR, the Nigerien government clearly professes its willingness to devolve extensive tree usage and management rights to local communities (see 2.3.2 and 3.3.1). For these zones, the new Forestry Code of 2004 significantly improved the legal status of customary rights. As my villages are located in *uncontrolled* zones, however, a first step to approach the governance of on-farm trees would be to review and eventually redesign the country's forest management plans. Yet, as proponents of environmental institutionalism stress, there is no *panacea* or universal 'one-size-fit-all' institutional solution for environmental problems (Ostrom 2007, 2009b; Chhatre & Agrawal 2008). Any institutional reform or the design of new governance arrangements has to follow careful mapping of the particular situation, whereas social, economic and ecological characteristics need to be analyzed (Ostrom & Nagendra 2007; Benjaminsen & Lund 2001).

Concluding Summary

Following a general country background that comprised geographical and biophysical features as well as an overview on the variety of resource users and production systems in the West African Republic of Niger, this thesis has been embedded into the overall debate on the re-greening of the Sahel. In this light it was argued that on-farm trees did not only provide essential ecosystem services to both humans and animals, but moreover seem critical to counteract desertification. To this end, the present thesis examined the factors determining the management of on-farm trees in two study villages from the department of Mirriah, whereby the interaction between customary resource management practices and formal institutions built the center of analysis.

To organize and analyze the wealth of data gathered by means of Participatory Rural Appraisal (PRA) and semi-structured interviews within two months of field work in autumn 2009, the thesis followed the so called Institutional Analysis and Development (IAD) Framework. The IAD approach helped to understand the patterns of behaviour of resource users and both governmental and traditional authorities, and to categorize incentives for resource management into manageable groups: the attributes of the resource stock, the village communities, and rules set by customary and formal resource managing institutions.

The analysis of the two study villages revealed that the reported reduction in vegetation cover can mainly be attributed to an inappropriate policy by the forest department and generally legal provisions which are at clear variance from customary resource usage and management practices. The results show that farmers are apparently not able to guard on-farm trees from theft or illegal in-field cutting as the forest department, by law in charge of the control and sanctioning of wood use, does not possess the means to fulfill its role properly. At the same time, the issuance of woodcutting permits seems to counteract farmers' efforts to protect trees. There is moreover reason to believe that governmental tree ownership reduces the incentives for farmers to plant trees, as they are not able to reap the benefits from their investments. Last but not least, the lack of tree control and management rights has potentially prevented farmers from developing alternative resource governance mechanisms.

A shift in policy making and reconsideration of governmental resource ownership seems indispensable, and even more so as farmers appear to have recognized the importance of on-farm trees and do want to sustain their resource stock. In light of the apparent success of the community-based soil and water conservation (SWC) program Farmer Managed Natural Regeneration (FMNR), the most promising option is thereby the devolution of extensive resource management and control rights to local communities. Given the trend to privatize land, a program that builds on community responsibility for on-farm trees and the regeneration of trees instead of tree planting has the best chances to integrate all wealth groups within the community, particularly those possessing only secondary rights to land.

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