

**Thomas Falk**

**Communal Farmers'**

# **Natural Resource Use**

**and Biodiversity Preservation**

-

**A New Institutional Economic Analysis from  
Case Studies in Namibia and South Africa**



**Biodiversity  
Transect  
Monitoring  
Analysis in  
Southern Africa**



 **Cuvillier Verlag Göttingen**

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Biodiversity Preservation**

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**Thomas Falk**

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## Table of abbreviations

AIDS	Acquired immune deficiency syndrome
BIOTA	Biodiversity Monitoring Transect Analysis in Africa
BMBF	Bundesministerium für Bildung und Forschung (Federal Ministry of Education and Research)
CGIAR	Consultative Group on International Agricultural Research
CIFOR	Center for International Forestry Research
CRIAA SA-DC	Centre for Research, Information and Action in Africa - Southern Africa Development and Consulting
cs	cropping season
DED	Deutscher Entwicklungsdienst
DFID	Department for International Development
DLA	Department of Land Affairs

doE	direction of Epingiro
DoF	Directorate of Forestry
doN	direction of Nzovhu
doS	direction of Shihetekera
FAO	Food and Agriculture Organization of the United Nations
GDP	gross domestic product
H	Horongo
hh	household
HIV	Human immunodeficiency virus
ISNAR	International Service for National Agricultural Research
KfW	Kreditanstalt für Wiederaufbau
LAC	Legal Assistance Centre
LSU	Livestock Unit
LRC	Legal Resource Centre
M	Mutompo
mc	military camp
ncs	non-cropping season
MAWRD	Ministry of Agriculture Water and Rural Development
NDF	National Defence Force of Namibia
NGO	Non-governmental organisation
O	Okaboro
OECD	Organisation for Economic Cooperation and Development
P	Pandureni
PRA	Participatory Rural Appraisal
RoN	Republic of Namibia
RSA	Republic of South Africa
SADF	South African Defence Force
sign.	significance
SLSA	Socio-Legal Studies Association
SPP	Surplus Peoples Project
SSU	Small Livestock Unit
SWAPO	South West African Peoples Organisation
T	Tiervlei
tac	transaction costs
U(B)	utility of biodiversity
U(F)	utility of farming
UNDP	United Nations Development Programme
UN ECE	United Nations Economic Commission for Europe
UNEP	United Nations Environment Programme
wp	water point
WPA	Water Point User Associations
Y	income



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## 1 Introduction

There is growing worldwide awareness of the present and future values of biological diversity (OECD 2002: 85; BMBF 2004: 7; see Chapter 2.1.1). At the same time, however, extinction rates of species are currently between 1,000 and 10,000 times the historic rates (Blaikie & Jeanrenaud 1996: 4; O’Riordan 2002: 13; Lovejoy 2002: 33). South Africa as well as Namibia are biologically megadiverse countries (Young 2002: 169), but at the end of the 1990s, 11.5 percent of the total South African flora was threatened – which is one of the highest rates in the world (Tuxill 1999: 98). The causes of extinction are quite complex. Certain species have been intensively harvested (e.g. through logging). Habitats have been heavily destroyed through land conversion, degradation, pollution and habitat fragmentation (Ashley 1996: 4; Grimble & Laidlaw 2002: 1; Armsworth et al. 2004: 118f; Bochniarz & Bolan 2004: 80; OECD 2002: 72, 75). Wildlife is hunted as it competes with livestock for food and water (Ashley 1996: 4). A further threat for biodiversity is the introduction of alien species which invade and dramatically alter ecological systems (Young 2002: 171; Griffin 2002: 42; Armsworth et al. 2004: 119). In the long term, climate change in particular is likely to be an increasingly destructive factor for biodiversity (Armsworth et al. 2004: 119).

The costs of losing biological diversity can be hardly estimated. Nobody can predict how different species can be utilised in future. Numerous species have not even been discovered yet, making it impossible to estimate their different values. The long-term reliability on natural resource flows depends on the preservation of natural stocks and the continuing functioning of ecosystems. Biodiversity plays a major role in these systems (BMBF 2004: 10f). Science is not yet able to explain all links between different species and ecosystem functions which are crucial for the satisfaction of most basic human needs (Blaikie & Jeanrenaud 1996: 6; Raffaello 2001: 21; Armsworth et al. 2004: 127). Despite such problems of evaluation and measurement, the fact that biodiversity is a precious resource is clear just by looking at its present and regional benefits. The Namibian and South African economies are strongly based on mining, fishing, agriculture and tourism (GTZ 1998). All these activities depend on healthy natural resources. The conservation of biodiversity is therefore particularly important for the future of these countries (GTZ 1998).

In order to steer human behaviour towards maintaining biodiversity it is, however, very important to understand the interaction between people and nature. Obtaining and

communicating knowledge about the feasible and sustainable management of biodiversity in Southern Africa is the major objective of the research project Biodiversity Monitoring Transect Analysis (BIOTA) in Southern Africa (see also [www.biota-africa.org](http://www.biota-africa.org)). The project has been initiated and financed by the German Government/Federal Ministry of Education and Research (BMBF). It can be described as a cooperative network with goals, structures and activities jointly being defined by scientists, institutions and other stakeholders from Germany, Namibia and South Africa.

The BIOTA project uses standardised methodologies in order to enable a large-scale comparability of research results. An interdisciplinary team of natural and social scientists assesses changes of biodiversity and identifies the main factors influencing such changes. The research has been carried out along a rainfall gradient leading from the summer-rainfall area of northern Namibia to the winter-rainfall Cape region of South Africa (Figure 10). All major biomes of the region are covered along this transect (Jürgens *et al.* 2001).

This book represents a part of the socio-economic work during the pilot phase of BIOTA (2000-2003). The objective was to provide a broad understanding of the human impact on changes in biodiversity, and of changes in biodiversity on human livelihoods. In order to link the data of natural scientists with those of the social sciences the socio-economic working group was expected to provide an overview of the human impact on biodiversity as complete as possible. To achieve this, a wide range of social and economic factors has been assessed.

Research concentrated on four communal settlements in Namibia and South Africa. The focus on communal areas is justified on the one hand by the continuing scepticism amongst politicians and scientists as to whether a communal land management system can promote biodiversity preservation. On the other hand, communal areas are disproportional small areas of state land where the majority of black people live on a subsistence basis mainly under common natural resource management. Communal farmers' livelihoods strongly depend on natural resources. Therefore, particularly in communal areas, biodiversity maintenance is also an important aspect of poverty alleviation.

The four research sites represent four ecosystems and four ethnic groups of the region. The comparative case studies therefore, give a clear idea of the heterogeneity of ecological, social and economical conditions in communal areas along the BIOTA transect. It is difficult,



however, to make clear statements about how representative the presented study actually is, since BIOTA priorities forced the socio-economic subproject to work on research sites which are in particular representative for their ecological conditions but not necessarily representative for socio-economic ones. The main task was therefore to identify the main factors and linkages. The results of this highly explorative study are the basis for further in depth analysis during the second and third phase of BIOTA (2003 – 2009).

The first step of empirical research was an assessment of the main natural resource use activities. In a second step, the decision-making processes of communal farmers were analysed. Understanding the rationality of natural resource use decisions will help to predict human actions and to identify appropriate institutional incentives to maintain biodiversity. In order to achieve this, a conceptual framework has been developed to analyse communal farmers' decision-making. This "Capital-Need-Institution-Model" integrates different theoretical concepts of economic, social and psychological theory into one coherent framework. It describes the most important factors determining communal farmers' decision making. The starting point of the model is the availability of capital which provides opportunities but also constrains actors, such as farmers. The given capital set (financial, physical, social, human and natural capital) determines which action can be taken and which is constrained. Evaluating these options is the second step. Actors rank possible actions according to their potential to maximise individual utility. Since utility maximisation always occurs within a specific institutional framework, in the third step it is important to recognise that positive and negative institutional incentives alter the available choices (see Figure 1).

The methodology of the empirical research is thus based on the Capital-Need-Institution-Model. Capital access, internal motives and needs as well as institutional incentives of the four research communities were assessed based on interviews at a household level. Complimentary, a wide range of relevant documents were reviewed. All quantitative variables were analysed with descriptive statistics. As a significant number of variables only have an ordinal level of measurement, appropriate instruments have been chosen for correlation analysis and significance tests.

The overarching standardised BIOTA methodology and expectations of the natural science dominated BIOTA project restricted opportunities for socio-economic research and analysis. Socio-economic data had to be linked to the data of the natural scientists. Four settlements

were therefore prescribed as research units because natural scientists decided to work on the territories of these settlements. Each settlement has, however, only a low total number of households. These factors limited possibilities, e.g. the development of quantitative models.

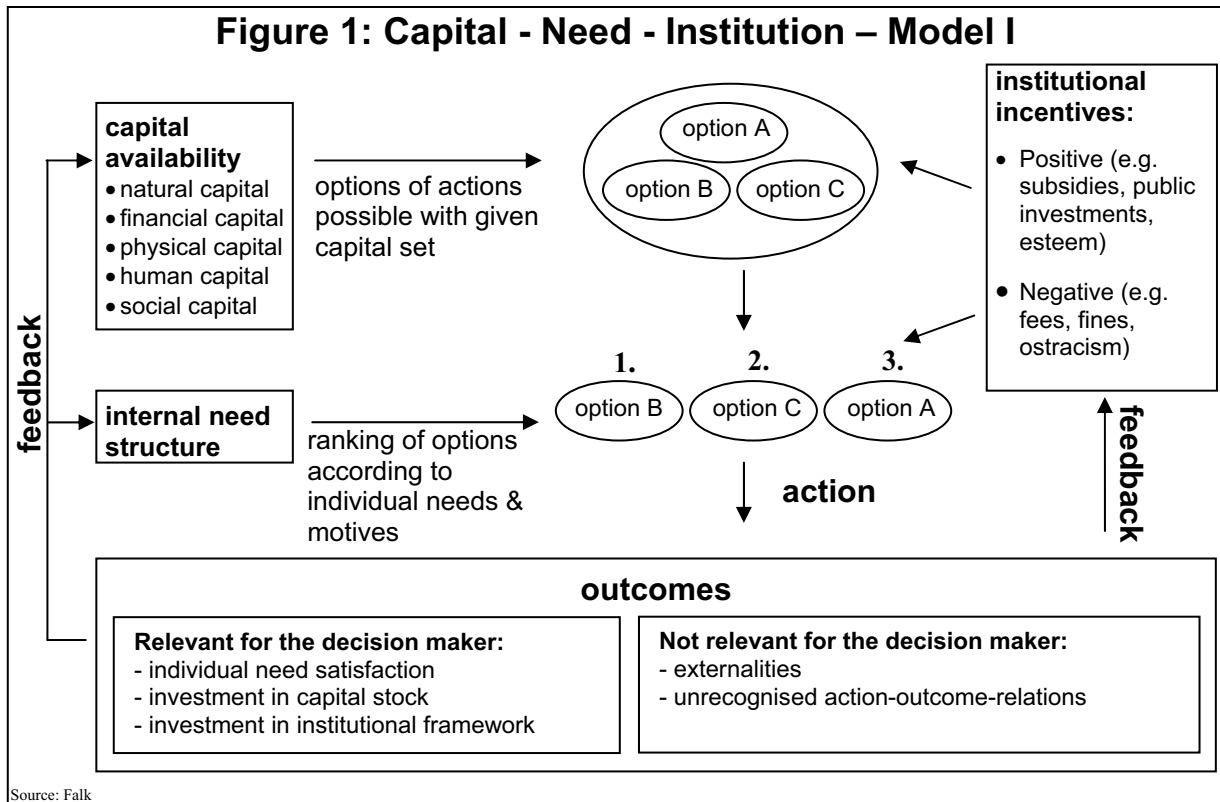
The following Chapter 2 will develop and present the Capital-Need-Institution-Model. Chapter 3 briefly describes the BIOTA project background and the methods and instruments of the theoretical and empirical research process used in this study. Based on the Capital-Need-Institution-Model, the decision making of communal farmers in four comparative case studies will be analysed in Chapters 4 to 7. Special emphasis will be placed on institutional incentives for biodiversity conservation. In Chapter 8 an inter-regional comparison will be made and results discussed. Conclusions are elaborated in Chapter 9.

## **2 Conceptual research framework: the Capital-Need-Institution-Model**

The conceptual framework clarifies the basic theoretical assumptions of the author about the decision-making processes of natural resource users. It provides a theoretical explanation for the reasoning behind the local actors' depletion of biodiversity or their behaviour conserving it. This Capital-Need-Institution-Model provides the logical structure for the empirical research. It will help to predict human actions and to identify appropriate institutional incentives in order to influence behaviour.

We assume that human beings are conscious entities that have the capacity to initiate and carry out actions intentionally under the presupposition of freedom of choice (Searle 2001: 83; see also Malsow 1987: 22). Resource users are seen as decision-makers with bounded rationality acting with rational intent, but only in a limited fashion (Williamson 1984: 197; Williamson 1997: 134; Aoki 2000: 13; Drobak 2000: 280; Brinitzer 2001: 151; Williamson 2002: 53; Brinitzer 2003: 25; Richter & Furubotn 2003: 4f). The limitations consist of a restricted ability to acquire and process information (Furubotn & Richter 1991: 4). People calculate the likely costs and benefits of any action before making decisions (Ostrom 1990: 33). The ultimate objective is the individual maximisation of need satisfaction, utility and happiness (Harsanyi 1977: 43; North 1984: 8f; Coleman 1990; Furubotn & Richter 1991: 4; Höffe 1992: 8; Hampicke 1992: 30; Williamson 2002: 53; Frey & Stutzer 2002; Gesang 2003: 17). For something (e.g. biodiversity) to be important it must be desired by someone (Sen & Williams 1982: 6). The source of action is self-interestedness and the central principle of rational action is the maximisation of individual utility (North 1984: 8f; Coleman 1990; Furubotn & Richter 1991: 4; see also Hampicke 1992: 30, 37; Williamson 2002: 53; see also the neoclassical assumptions of utilitarianism and rational individual behaviour: Hampicke 1992: 30).

The starting point of the Capital-Need-Institution-Model (CNIM) is the availability of capital, which provides opportunities but also constrains actors, such as farmers. The given capital set (financial, physical, social, human and natural capital) determines which action options may be taken. The choice of these options is the second step of the model. Actors rank possible actions according to their potential to maximise individual utility (see also Burling 1962: 108). A classification of needs is used in order to illustrate the multiple dimensions of utility functions. Since utility maximisation always occurs within a specific institutional framework,



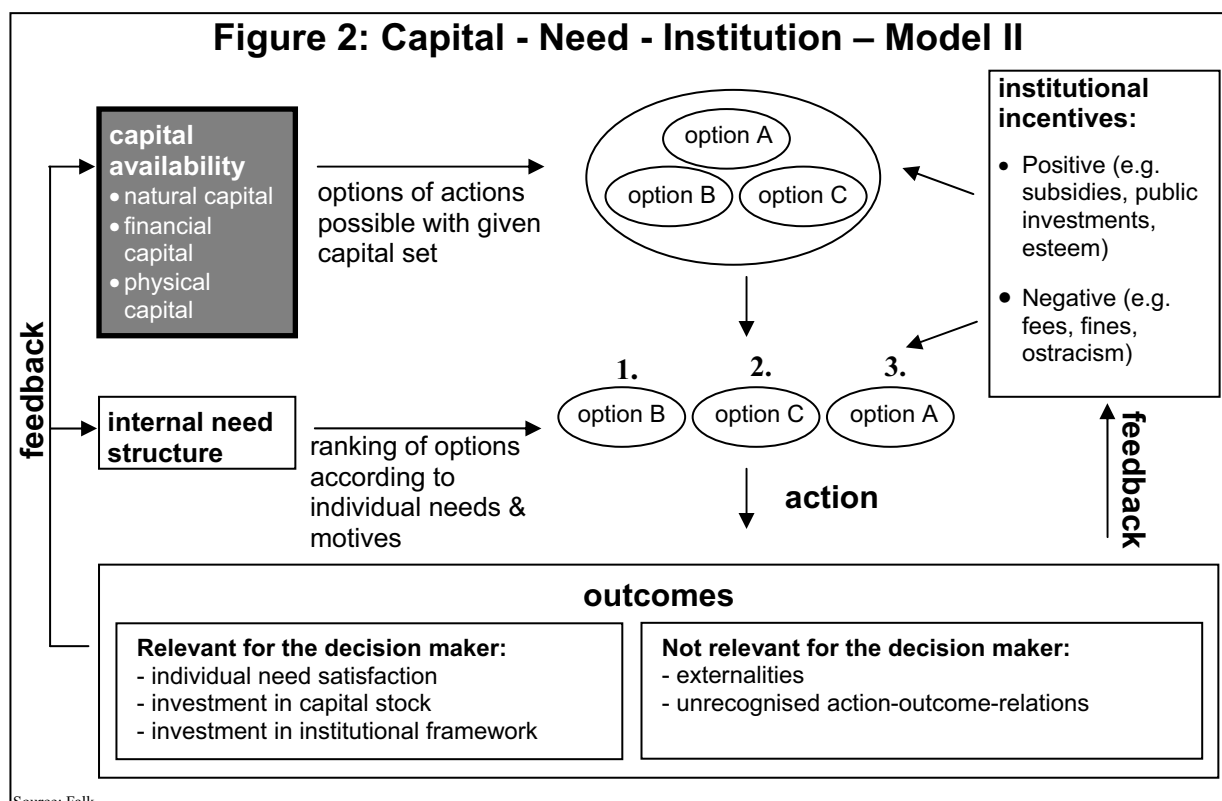
it is important to recognise that institutions alter the available choices (North 1990: 6). Institutions provide positive and negative incentives which might enlarge or reduce the availability of capital; these mechanisms influence possible action options. Further institutional incentives can directly influence need satisfaction. Accordingly, the main factors which control a person's behaviour are a) capital access, b) internal motives and needs and c) institutional incentives (see Figure 1).

Outcomes of an action may, apart from the direct satisfaction of needs, affect future decision situations. Important feedbacks are changes in the capital stock and influences on the existing institutional framework. However, not all action-related outcomes affect only the decision-maker. Externalities occur if costs (negative externalities) or benefits (positive externalities) are experienced by other persons than the actor responsible for costs or benefits (Bromley 1986: 37; Richter & Furubotn 2003: 109; compare with the neoclassical assumption of the invisible hand: Hampicke 1992: 31). These may present hazards to nature and society. Reductions in the totality of genes, species and ecosystems usually lead to externalities. Those externalities which cannot or will not be internalised are, in turn, incentives for resource exploitation. Therefore, the major function of institutions is to internalise externalities by ensuring that a person causing costs is also responsible for them, while also guaranteeing that a person receives all benefits accruing from her/his investments.

## 2.1 Categorising forms of capital

The basic idea of economics as a science is to understand and explain how human beings use scarce resources to achieve their ends (Becker 1976a: 3; Heath 1976: 3). A scarcity of resources inherently constrains utility maximisation. From an actor's point of view, productive resources are commonly seen as capital. In everyday usage, the term "capital" is strongly connected to monetary or at least tangible capital. In this context, it is understood rather in the sense of a "Sustainable Livelihoods Framework". According to this approach, people require a range of different capital endowments in order to achieve positive livelihood outcomes. Five categories of capital have been identified: natural, physical, human, financial and social capital (DFID 1999; Ellis 2000; see also Bochniarz & Bolan 2004: 88; Moseley 2004: 125; Buchenrieder et al. 2004: 2). These five forms of capital generate a basis for increasing the output of production: they can be exploited, developed and invested for future production (DFID 1999; Ellis 2000).

Some assets must always be used in order for capital to be maintained (e.g. social capital) and may be used indefinitely without any reduction in quantity or quality. Other assets are renewable (e.g. wood), but many are non-renewable (e.g. raw materials, biodiversity). Changes in capital availability strongly affect the sustainability of a production system. According to the Brundtland Report, sustainable development "meets the needs of the present



without compromising the ability of future generations to meet their own needs” (UN 1987: 24; Kirk 1999: 151). The Technical Advisory Committee of the Consultative Group on International Agricultural Research (CGIAR) describes sustainability as “the ability of a system to maintain productivity in spite of a major disturbance, such as caused by intensive stress or a large perturbation” (Ehui 1993: 282). If, however, assets are exploited in such a way that fewer action options are available to people in the future, one can argue that such capital use is unsustainable.

### **2.1.1 Biodiversity as an important component of natural capital**

Natural capital consists of divisible resources such as land, water, trees, pasture, and wildlife as well as intangible public goods such as atmosphere and biodiversity (DFID 1999; Howlett et al. 2000; see also Rowthorn & Brown 1999: 315). Biodiversity, in turn, consists of diversity among species of plants and animals, as well as within species and among ecosystems (UNEP 1992; Blaikie & Jeanrenaud 1996: 3, 15; OECD 1999: 34; O’Riordan 2002: 9; Coenen et al. 2004: 19; RSA 2004c: sec. 1).

Biodiversity has a productive use value and is an important asset (Blaikie & Jeanrenaud 1996: 8; OECD 2002: 47; Seidl et al. 2003: 334). The long-term reliability on natural resource flows depends on the preservation of natural stocks and the continuing functioning of ecosystems. Biodiversity plays a major role in these systems. It is an important indicator of sustainability and strongly affects the wealth of future generations (BMBF 2004: 10f). These various values of biodiversity are discussed in greater detail in Chapter 2.2.1. Nonetheless, the negative impact of humanity on biological diversity has already become apparent (see also BMBF 2004: 7ff). Certain species have already been intensively harvested (e.g. logging). Habitats have been heavily destroyed through land conversion, degradation, pollution and habitat fragmentation (Ashley 1996: 4; Grimble & Laidlaw 2002: 1; Armsworth et al. 2004: 118f; Bochniarz & Bolan 2004: 80; OECD 2002: 72, 75). Wildlife is hunted as it competes with livestock for food and water (Ashley 1996: 4). For species unwanted by mankind, extinction was and even remains an explicit objective (Lovejoy 2002: 35, see also Nuding 2002: 190; Armsworth et al. 2004: 127; Bochniarz & Bolan 2004: 80). Human settlements have to live with snakes, scorpions, jackals, caracals, cheetahs or leopards which threaten people or livestock. Alien species which invade and dramatically alter ecological systems are a further threat for biodiversity (Young 2002: 171; Griffin 2002: 42; Armsworth et al. 2004: 119). In the long term, climate change is likely to be an increasingly destructive factor for biodiversity

(Armsworth et al. 2004: 119). Due to changes in temperature and rainfall, the Succulent Karoo of South Africa is for instance expected to be largely eliminated (Lovejoy 2002: 40).

The expropriation from local communities of their natural capital became a common instrument of attempts for nature conservation in the context of colonisation. No local use was (and often still is) allowed in nature reserves or newly created national parks, in an attempt to preserve an untouched natural state (Blaikie & Jeanrenaud 1996: 59; Pretty 2002: 61f; see also Ruck et al. 2003: 11). A direct consequence of this policy was increased pressure on the biodiversity remaining outside the nature reserves, which can be interpreted as an externality. This applies in particular to many communal farmers in Namibia and South Africa who have been and still are extremely dependent on natural resources, as colonial policies limited the land access of the non-White population. As a result, poverty was common in South African ‘homelands’ already in the 1930s which have been characterized by overgrazing, soil erosion, land fragmentation and declining crop yields (Mamdani 1996: 190; Young 2002: 170). Today, strong population dynamics increase the pressure on resources (O’Riordan 2002: 14).

### **2.1.2 Physical capital: the neoclassical explanation**

Physical capital is the traditional production factor “capital” in neoclassical theories (Hayek 1952: 7; Ahmad 1991: 3; Birner 2002: 1, 28), consisting of man-made means of production which have the purpose of yielding outputs and income (Hayek 1952: 7, 92ff; Ahmad 1991: 3, 5; Coleman 2000: 19; Birner 2002: 15, 29). Physical capital includes infrastructure, such as roads, irrigation works and electricity supply, as well as producer goods such as equipment, tools, machinery, buildings and factories (Hayek 1952: 3, 54; DFID 1999; Howlett et al. 2000; Birner 2002: 1). Physical capital can operate only in combination with human capital in terms of technological knowledge (see also Hayek 1952: 11; Ahmad 1991: 3), and its development depends on the formation of human capital through technological innovations.

There is an ambiguous relationship between biodiversity and the availability of physical capital. Physical capital of high quality and quantity can facilitate protective natural resource use but it can also enable the exploitation of the resources. Taking the Soebatsfontein case study (see Chapter 7.1.1) as an example, it is hoped that future village electrification can reduce the demand for firewood. It is, however, a common phenomenon in Southern Africa that previously untouched wildernesses become transformed by human impact as soon as water and road infrastructure are installed in the area (OECD 2004: 125; see also Raffaello 2001: 27, 43). Should the existence or increase of physical capital lead to situations where the

transaction costs of activities involving unsustainable resource use are no longer prohibitive, then institutional adaptations are required – which are not necessarily provided under all circumstances.

### **2.1.3 The role of human capital and perception**

Human capital describes the production capacity of people (Schultz 1971: 35; Richter & Furubotn 2003: 99). It is considered in neoclassical theories as the production factor “labour” (Schultz 1971: 26; Ahmad 1991: 7). Human capital is embodied in human beings and in the rendering of future services (Schultz 1971: 48). Human capital is a central asset because it is required to make use of and change any other type of capital (DFID 1999; Campbell et al. 2002: 126; see also Ziesemer 1987: 2). At the household level, human capital is determined by household size, education, skills, health, and the nutritional status of household members (Howlett et al. 2000; see also Schultz 1971: 35; Ostrom 2000: 175; DFID 1999). Low education levels and a lack of opportunities are major constraints for successful development efforts. This fact was often instrumental in the oppression of people, as in apartheid policies.

Human capital thus requires the satisfaction of the most basic physiological needs such as food and shelter (Schultz 1971: 30). It can be improved through health facilities, education and training (Schultz 1971: 36). Investments in acquiring skills and knowledge, in general, enlarge the range of choices available to people (Schultz 1971: 25f). The improvement of a decision-maker’s human capital takes time and requires complementary physical, financial and social capital (OECD 1999: 62). Individuals invest in human capital only if the marginal gains from such investments are higher than their marginal costs (Heath 1976: 77; Esser 2000: 144; Richter & Furubotn 2003: 4). If this is not the case, it is more beneficial to economic agents to act on the basis of imperfect knowledge (Heath 1976: 77).

Katz (Katz 1974: 91) distinguishes between technical, social and conceptual skills. Technical skills refer to the understanding of methods, procedures and techniques. They involve specialised knowledge, analytical abilities and facility with the use of tools. Land users’ knowledge about proper resource-preserving farming practices is crucial for any maintenance of biodiversity. The achievement of the second set, social skills, is of high importance for institutional performance. The ability to work in a group, to understand other people’s points of view, to reflect these perceptions, to communicate in a constructive way and to increase cooperation (Katz 1974: 91) have a strong impact on the creation and permanent transformation of resource-protecting institutions (Turner 2000b: 168). Conceptual skills, as



the third set, refer to the ability to see a system in its totality. These include the recognition of the various functions of a system as well as their interdependencies (Katz 1974: 93). The still imperfect knowledge about the components of biodiversity, its interactions on different geographical scales and the pressures it is exposed to, allow us only to speculate about the benefits we receive from various species.

No human being can claim to understand reality perfectly. Most decision-making situations are marked by high complexity and uncertainty. However, individuals have only a limited cognitive ability to reason and decipher the structure of complex environments (Ostrom 1990: 25; Coleman 1990: 503f; see also North 1990: 111; Williamson 2002: 53; Richter & Furubotn 2003: 4). Williams claims that any “external” reason for an individual to act must somehow become internalised to her/his motivational set in order to be motivating (Williams 1981: 101ff). In general, only those capital constraints, needs and institutional incentives which are recognised by a decision-maker have an impact on the decision. People make systematic mistakes regarding the predicted extent to which actions can make them happy (Frey & Stutzer 2002: 14, 22f). This often leads to the conclusion that people act irrationally against their own interests (Coleman 1990: 510). For decision-makers, given the information they have and based on their perception, such actions are rational. It is also probable that an outside observer simply fails to understand all the deeper interests and purposes of the decision-maker (Sen & Williams 1982: 4, 9; Coleman 1990; Scott 2000; Vanberg 2000: 17, 20; Searle 2001: xv, 58). It is difficult to determine who better understands the real costs and benefits for the decision-maker. The more realistic the assumptions, the more accurately the expected outcomes match the real outcomes. Therefore, decision-makers make efforts to improve their information base and their perceptions. They adjust their assumptions as part of the learning process (North 1990: 23, Ostrom 1990: 34). Better information is a necessary precondition for better decisions (Reid 2002: 313; see also OECD 1999: 101).

This discussion is highly relevant in the context of biodiversity. It is simply impossible to evaluate all present and future, local and global as well as private and social benefits of biological diversity (Blaikie & Jeanrenaud 1996: 16, 22; OECD 1999: 20, 75, 101; Rowthorn & Brown 1999: 327; Schubert & Dietz 2001: 22; Vermeulen & Koziell 2002: 1, 15ff; Weikard 2002: 20; OECD 2002: 44; Schwoerer 2003: 5; OECD 2004: 17, 68; Trousdale & Gregory 2004: 281). Science cannot even clearly explain the relationship between biodiversity and ecosystem services and productivity (Blaikie & Jeanrenaud 1996: 6; Raffaello 2001: 21; Armsworth et al. 2004: 127). In particular, the option value of all as-yet

unpredictable possible future uses of species and ecosystems is difficult to assess (Hampicke 1992: 362; OECD 2002: 75). Institutions which should internalise biodiversity externalities (see Chapter 2.3.3) depend on subjective assessments of costs and benefits by those agents providing the institution. Only those externalities which are in fact recognised will be considered for internalisation (see also North 1990: 97). Although the estimations of the value of biodiversity will never be accurate, there is a need to learn more about the long-term productivity of ecosystems and the impact of their destruction on human welfare and development (O’Riordan 2002: 4; see also Ashley et al. 1997; Myers 2002: 54, Younge 2002: 174). What cannot be quantified is easily disregarded (OECD 2002: 9, 17). The more biodiversity is valued and the more its value can be transformed into economic entities, the more resources will be available for biodiversity preservation (Rowthorn & Brown 1999: 316). This creates incentives for agents who have an interest in biodiversity preservation to increase their knowledge base and disseminate environmental awareness to those whose actions directly affect the ecosystem (OECD 1999: 21, 38, 57; Wardell-Johnson 2000: 32; Pretty 2002: 72, see also Younge 2002: 185; Tarr 2002c: 52f). Regardless of its shortcomings, the monetary and quantitative assessment of biodiversity benefits is a valuable tool for decision-makers (Blaikie & Jeanrenaud 1996: 16; OECD 1999: 13, 27; OECD 2002: 19, 21; see also Ashley et al. 1997), helping to directly compare the benefits of alternative resource uses (OECD 2002: 140; Vermeulen & Koziell 2002: 70). Techniques to determine the economic values of biodiversity include methods based on actual, surrogate and simulated market prices (OECD 1999: 108; for different methods see also Anderson & Bishop 1986). Monetary evaluations will, however, seldom cover all of the benefits of alternative actions (OECD 1999: 27; OECD 2002: 44; Trousdale & Gregory 2004: 281). One should be aware that huge classes of benefits cannot be ignored only because of a lack of proper assessment instruments. In order to find sustainable solutions, it is important to appreciate different stakeholders’ understandings of causes, pathways and consequences (OECD 1999: 12; see also O’Riordan & Stoll-Kleemann 2002: 302). This requires a synthesis of traditional and scientific knowledge (Pretty 2002: 66). Improving decision-makers’ human capital and simultaneously increasing their awareness of their insufficient information are important preconditions for sustainable development and biodiversity preservation.

#### **2.1.4 Financial capital and its multiple functions**

Financial capital consists of stocks of money or other savings in liquid form and regular monetary income. In the context of societies in developing countries, it not only includes financial assets such as pensions, government transfers, and remittances but also easily-

disposed assets such as livestock (DFID 1999; Howlett et al 2000). Here as well, money is a means of exchange and payment, a unit of accounting and store of value (Issing 2003: 18f; see also von Mises 1912: 3, 11f, 15; Keynes 1930: 3; Hayek 1952: 31).

Money is used as means of exchange because it decreases transaction costs (Richter 1989: 115; Ralf 1991: 3; Issing 2003: 27, 33, 35; see also Mill 1863: 95; Coulombe & Davidson 1982: 1, 10; Ostrom 2000: 174). It reduces the number of exchanges and therefore the information, negotiation, monitoring and enforcement costs of contracts (Ralf 1991: 3; Issing 2003: 35f). Money can help exchange, store and evaluate goods and services which have the potential to satisfy human needs, although it is not essential for the satisfaction of such needs. Any commodity may become a means of exchange if it reduces the transaction costs of exchange and is readily accepted (Issing 2003: 36; see also Keynes 1930: 14). The reduction of transaction costs of exchange is an important precondition for the internalisation of externalities (see chapter 2.3.3) and therefore crucial for biodiversity preservation.

Money is further a means to store capital (Richter 1989: 99) for the potential satisfaction of needs. Any economy may include different means of storing value. The main criteria for fulfilling this function is that the good is durable and resellable (Issing 2003: 46, 49). Any means of storing value allows an individual to postpone investment and consumption, to accumulate wealth, to avoid storing goods and to overcome uncertainty about future preferences (Issing 2003: 43; see also Hayek 1952: 29). A time difference exists between the moment when the potential for need satisfaction or capital transformation is acquired and the moment when the actual need satisfaction or transformation occurs (see also Ralf 1991: 1). Even if decision-makers implicitly conceive such future satisfactions and transformations, they are very difficult to evaluate. This is the reason why utility is measured in monetary terms: It is much easier to assess the potential for need satisfaction than actual need satisfaction (see also Heath 1976: 80).

Money is also used as a unit of accounting, in order to reduce the transaction costs of comparing the relative prices of goods (Hayek 1952: 31; Issing 2003: 42). By using money, one need not know the relative prices of any combination of goods on the market but only the relative prices of those goods sold or bought in relation to the “exchange good” – money (Richter 1989: 115). The main criterion which can render a good a unit of accounting as well as a means for value storage is the relative stability of its price index (Hayek 1952: 30f; Issing 2003: 42).

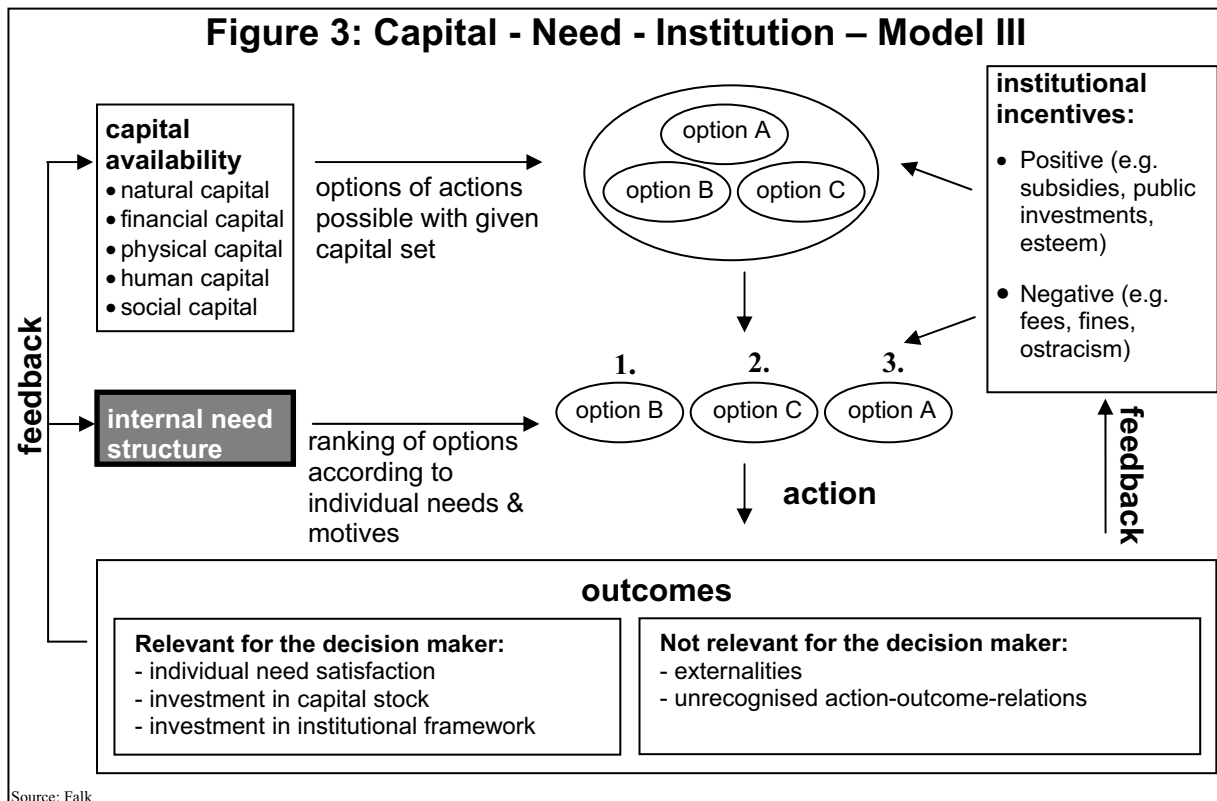
This overview shows that very different goods can even simultaneously fulfil the different functions of money. In a world with transaction costs, high complexity and uncertainty, money is a valuable instrument to improve decisions such as those regarding biodiversity preservation (see also Chapter 2.1.3)

### **2.1.5 Social capital and institutions**

Social capital consists of shared values, norms, rules, contracts, laws and organisations (Moseley 2004: 125; see also Ensminger 2000: 158; Bochniarz & Bolan 2004: 90) which are valuable assets for societies. It includes the ability to call on friends or kin for help in times of need, to receive support from trade or professional associations (e.g. farmers' associations), and to make political claims on chiefs or politicians to provide assistance (Howlett et al. 2000). Through social capital, individuals gain access to one another's natural, physical, human, financial and even social capital. Becker talks about social income as the sum of a person's own income plus the value of the characteristics of others which are relevant to that person (Becker 1976b; see also Richter & Furubotn 2003: 12). Social capital is productive because it enables the achievement of desired ends (Coleman 2000: 16, 19; Turner 2000a: 95; Serageldin & Grootaert 2000: 47; Ostrom 2000: 176) and increases the productivity of social systems (Stiglitz 2000: 65f; Richter & Furubotn 2003: 99). Institutions create incentives for the overall maximisation of wealth in society. Cooperative behaviour creates obligations and expectations which can be conceived as credit slips (Coleman 2000: 20). However, due to its strong connection to the institutional sphere, social capital will be discussed in detail in the Capital-Need-Institution-Model in chapter 2.3.

## ***2.2 The motivating ends of human action***

The ultimate end of human motivation is to realize individual utility (Vroom 1964, Searle 2001, Becker 1976a, Coleman 1990). Utility explains the choices made by individuals between alternative actions (Frey & Stutzer 2002: 19). Hedonism assumes that people select from alternative possibilities the course of action which they believe will maximize their pleasure and minimize their pain (Vroom 1964: 9). Since resource users usually cannot choose all options due to capital restrictions, they must rank the alternatives according to their suitability for maximising their utility function. As a result of the deliberation process, a person defines preferences which refer to the relative strength of their desires for different outcomes (Vroom 1964: 15; Searle 2001: 30f). The utility of actions varies among individuals due to varying preferences, e.g. for biodiversity preservation or resource exploitation. Biodiversity is preserved if a person perceives that preservation yields more than destruction.



Many theories assume one-dimensional utility functions which can be measured in monetary terms. The higher the financial gains of an option, the more it will be preferred. According to such approaches, scarce resources must be allocated and combined in such a way that the pecuniary outcome is maximised. Money is seen as an essential requirement for need satisfaction. Only the individual who is able to pay can satisfy her/his needs (Luhmann 1996: 61, 202). It is considered an indicator of development if people define their happiness in terms of monetary values (Turner 2000a: 103). To use money as an indicator for utility maximisation is tempting, as money is easily measurable. In Chapter 2.1.4 it was mentioned that money is an instrument that reduces transaction costs of exchange, storage and evaluation. In the absence of alternative measurement instruments, money often seems to be the easiest estimator of utility. One should, however, never forget that most pleasures in life are not for sale and are not priced (Frey & Stutzer 2002: 21, 74, 81). Subsistence farmers demonstrate that one can satisfy several needs without monetary input. Goods are to a large extent exchanged directly and food, for instance, is stored in granaries as savings and risk-reduction instruments. Monetary income is not equal to utility but is only a means (see also Heath 1976: 13; Max Neef et al 1991: 16, 25).

A common way of dealing with non-pecuniary income in economics is to work with the concept of leisure. Leisure represents all non-pecuniary income which enters a person's utility function. Leisure and income substitute each other (Alchian & Demsetz 1972: 780, see also Becker 1976a: 94; Frey & Stutzer 2002: 29, 38). Leisure generates "psychic" income. The highest possible income can be subdivided into two parts: that which a person actually receives for her/his work, and that which is lost because she/he would prefer to enjoy leisure time instead of working (Becker 1976a: 94f; see also Weber 1905a: 13). Different people have different preferences for the use of their time (Heath 1976: 77). Working to receive money is utility maximisation as long as the marginal utility of the goods and services purchased for money is higher than the marginal utility of alternative uses of time. Such alternatives include household or subsistence production (Frey & Stutzer 2002: 38) and voluntary work (Frey & Stutzer 2002: 105f), but also need satisfaction independent from material goods and purchased services. This discussion leads back to the question of what people are looking for when they maximise utility.

One popular answer is happiness. Happiness is not identical to utility but an approximation which captures people's satisfaction with life (Frey & Stutzer 2002: 179; see also Gesang 2003: 29). The basic assumption of the happiness approach is that happiness is the ultimate goal in life (Frey & Stutzer 2002: 3; see also Höffe 1992: 15). How do pecuniary utility and happiness correlate? Higher income increases the opportunity for need satisfaction (Frey & Stutzer 2002: 73). Research all over the world has proven that people in poor countries are rather less happy than those living in wealthier ones. This correlation exists, however, only for the comparison of the very poor with wealthier societies. As soon as a certain income level is reached, a higher per capita income has no marked impact on happiness (Frey & Stutzer 2002: 9, 74f). Employment, health and marital status make people much happier than income (Frey & Stutzer 2002). Once basic needs are satisfied, aspects of life other than available financial capital determine individual well-being.

In Frey & Stutzer's studies, the endogenous variable of happiness is measured by individuals' expressions of their subjective well-being (Frey & Stutzer 2002: 26). As exogenous variables, a large number of determinants of happiness have been identified. These include personality as well as socio-demographic, economic, contextual and institutional factors (Frey & Stutzer 2002: 10). Their approach describes how different characteristics in people's lives influence their overall happiness. In this way it can be assessed whether changes in life characteristics actually lead to the expected happiness effects. Such an approach is helpful in determining

policy measures. Objective interests, such as those derived from happiness research, often contradict with subjective perceived interests (see Chapter 2.1.3).

The objective of the research presented here is to explain peoples' behaviour as it influences biodiversity preservation. In order to understand decisions relevant to biodiversity, it is more important to assess the decision-makers' expectations and perceptions about cost-benefit-relations resulting from their actions. For this reason, the Capital-Need-Institution-Model relies on subjective judgements (see also Gesang 2003: 22, 27f). In deciding what is good and what is bad for individuals, the ultimate criterion can only be their own wants and preferences (Sen & Williams 1982: 9).

### **2.2.1 Classification of needs**

Which factors determine the attractiveness of alternative actions? In order to understand the structure of decision-making and also the functioning of different institutions, it is important to identify underlying goals. These should not be contextually connected to a certain action but rather be overarching objectives. Utility is defined as the degree of need satisfaction (Gesang 2003: 28; see also Frey & Stutzer 2002: 179). Maslow presented a well-known concept for the classification of needs (Maslow 1987). His concept refers to the strength of desires or aversions for large classes of outcomes (Vroom 1964: 15). Identifying general human needs as deeply rooted motivators for people's actions gives the Capital-Need-Institution-Model a very powerful tool to explain behaviour in very different situations. No matter whether one wants to understand the actions of a politician, a researcher or a communal farmer in Namibia – they all long for the satisfaction of needs. Groups of needs are labelled and the classification is comprehensive enough to incorporate any fundamental need. Any motive for human action can be incorporated into one of the groups. The needs of different categories are relevant in various cultures and times, though their strength, character and means of satisfaction may differ (Max Neef et al 1991: 18, 27). In the following chapters Maslow's different need categories will be critically discussed and compared with alternative approaches. At the same time, the order of the categories will be purposely altered in order to emphasize that the Capital-Need-Institution-Model does not apply Maslow's principle of progression, which could never be proved.

As with capital restrictions, any need satisfaction has its status quo. Actions can improve or worsen this state. In comparison to capital restrictions, the status of need satisfaction constrains possible actions only inasmuch as the productivity of the decision-maker as a

dimension of human capital is not seriously in danger. Physiological needs in particular must be satisfied to a minimum degree. Poverty drives people to overexploit natural resources and leads to the breakdown of regulatory institutions including conservation ethics (Jones 1995: 1; O’Riordan 2002: 14). Any human need that is not adequately satisfied reveals human poverty and may overshadow any other need (Max Neef et al 1991: 18, 49). Poverty increases discount rates. One who is simply trying to survive the near future does not care about long-term effects, e.g. on biodiversity (OECD 2002: 35).

### **2.2.1.1 Physiological needs**

Physiological needs refer to the maintenance of physical health, which is an important aim of most people (Becker 1976a: 9; Gesang 2003: 105). Indicators for unsatisfied physiological needs are hunger, thirst, sleepiness, exposure and sexual desire (Maslow 1987: 16; see also Smith 1789/2004: 33f; Becker 1976a: 5, 90; Heath 1976: 125, 139; Max-Neef 1991: 32; Höffe 1992: 22; Demsetz 2000: 69; Searle 2001: 120; Gesang 2003: 30, 105). Frey and Stutzer showed that health and happiness are highly correlated (Frey & Stutzer 2002: 56; see also DFID 1999).

The satisfaction of physiological needs strongly depends on natural capital, including biodiversity. Agriculture, forestry, hunting, water and fuel supply, fisheries and recreation all are strongly affected by the state of biodiversity. Apart from direct use values for production and consumption, there are also indirect ones. The provision of clean water, fuel, pollination, waste processing, resistance to pests, stimulation of resilience, flood control, maintenance of soil health, prevention of erosion, cycling of carbon, nitrogen and sulphur as well as the stabilisation of the oxygen supply contribute to the value of ecosystem services. Biodiversity also has value as a source of genetic knowledge for pharmaceutical, bio-technology and body-care industries (Stevens et al. 1991: 390; Barbier & Rauscher 1994: 76; Blaikie & Jeanrenaud 1996: I, 7, 9; Loomis & White 1996: 198; Deacon & Murphy 1997: 2; Naumann 1998: 5f, 56; Nader & Mateo 1998: 181ff; OECD 1999: 29; DFID 1999; Montgomery et al. 1999: 3; Tuxill 1999; Shackleton et al. 2001; Schubert & Dietz 2001: 12; Melchias 2001: 7f; Raffaello 2001: 6, 15ff, 26; Grimble & Laidlaw 2002: 3, 7; O’Riordan 2002: 3f, 10, 143; O’Riordan & Stoll-Kleemann 2002: 295; Nujoma 2002: 3; OECD 2002: 26f, 42, 144; UNEP 2002: 14, 26; Weikard 2002: 20; Egler 2002: 135; Weikard 2002: 20; Vermeulen & Koziell 2002: 12; O’Riordan 2002; Brock & Xepapedeas 2003: 1598; Heal 2003: 553; Scherr 2003: 3; OECD 2004: 17, 64f, 72ff, 80f, 87; BMBF 2004: 9f; Coenen et al. 2004: 20; Trousdale & Gregory 2004: 280; Armsworth et al. 2004: 126; Deke 2004: 3). The loss of biodiversity diminishes



the capacity of ecosystems to reproduce themselves and to meet human demands for environmental goods and services (O’Riordan 2002: 7, 10). Particularly the poor, who derive all or an important part of their livelihoods from resource-based activities, are the first to suffer from the degradation of biodiversity (Blaikie & Jeanrenaud 1996: 21, 33; DFID 1999; Scherr 2003: 3). In this context, poverty is not only a cause of the loss of biodiversity but also an outcome (O’Riordan 2002: 5; Myers 2002: 54; Scherr 2003: 3; Adams et al. 2004: 1).

### **2.2.1.2 Belongingness and social needs**

The satisfaction of needs for love, affection and belongingness are extremely important for human beings (Maslow 1987: 20; see also Max-Neef 1991: 32, 33; Höffe 1992: 48; Damren 2002: 95; Frey 2003: 25; Gesang 2003: 105ff). Frey and Stutzer distinguish between physical and social well-being (Frey & Stutzer 2002: 31, see also DFID 1999). Enjoying enduring intimate relationships, friendships and companionship; having children and relatives; and being part of a group all contribute to happiness (Frey & Stutzer 2002: VII, 52, 57f, 66; see also Bentham 1789: 83; Weber 1905a: 30; Maslow 1987: 20; Gesang 2003: 30). An important factor in satisfying the need for belongingness is identification with a reference group which shares symbols, customs, norms and values (Maslow 1987: 20; see also Max-Neef 1991: 33).

Closely related to the need for belongingness is the need for esteem. Maslow introduces this need as a separate category, which includes the need to be respected by others (Maslow 1987: 21). Esteem needs include the desire for status, honour, reputation, respect, prestige, approval, recognition, fame, glory, attention and appreciation (Bentham 1789: 62, 83, 95; Becker 1974; Becker 1976a: 5; Maslow 1987: 21; Max-Neef 1991: 32; Searle 2001: 120; see also Heath 1976: 44, 171; Frey & Stutzer 2002: 172, 173; Brinitzer 2003: 320; Frey 2003: 24f). Since all these needs have an external reference to social relations, they are subordinated in the CNI-model under the need for belongingness. Someone will value the esteem only of those people whose opinions matter to her/him. One opportunity to increase status is to generate high capital assets such as income or livestock (Frey & Stutzer 2002: 81ff). Efforts to preserve biodiversity can also generate social respect (see chapter 2.3.4.3; see also O’Riordan & Stoll-Kleemann 2002: 303).

### **2.2.1.3 Self-esteem and self-actualisation needs**

The satisfaction of the next set of needs is fully internalised and generally independent from external incentives. It comprises the desire for dignity, pride, self-esteem, self-respect, meaning, regret, strength, achievement, confidence and self-actualisation (Mill 1863: 89; Rawls 1982: 162; Williamson 1984: 201; Maslow 1987: 21; Max-Neef 1991: 32f; DFID

1999; Searle 2001: 120; Frey & Stutzer 2002: 172f). North observes a trade-off between wealth and those values related to ideologies or religious beliefs. Acting according to the rules of such commitments must somehow maximise the utility function of people – even at the expense of material possessions (North 1990: 42). People want to feel useful and needed within their world. They want to meet challenges and express and fulfil themselves (Maslow 1987: 22; Frey & Stutzer 2002: 154). Self-actualisation is understood as the determination to follow an overall life objective. People also live for personal and psychological growth and development (Frey & Stutzer 2002: 24f; Gesang 2003: 105). For volunteers it is, for instance, very important to feel less selfish, to gain a sense of personal achievement and to act according to religious beliefs (Frey & Stutzer 2002: 106). Many people satisfy self-esteem and self-actualisation needs by preserving biodiversity (see also Chapter 2.3.4.4).

#### **2.2.1.4 Cognitive needs**

Maslow stresses that human beings have a need for understanding and curiosity (Maslow 1987: 23). They have a genuine interest in the world and derive a deep satisfaction from venturing into the world (Maslow 1987: 23). There are deeply rooted impulses to satisfy curiosity, to wonder, to know, to explain, and to understand (Maslow 1987: 23; Max-Neef 1991: 32; DFID 1999). In addition, people enjoy aesthetic pleasures by using their senses (Gesang 2003: 30, 105). They love to laugh, play, relax (Gesang 2003: 106) and be entertained with games and spectacles (Max-Neef 1991: 32).

Cognitive needs play an important role in biodiversity preservation. One motivation of people to preserve species is the wish to see and experience them or just to know that they exist (Loomis & White 1996: 198; Rowthorn & Brown 1999: 315, 327; Coenen et al. 2004: 20; Bochniarz & Bolan 2004: 79; Swanson 2003: 457; Heal 2003: 560). Biodiversity has aesthetic, recreational, spiritual and existence values (Ashley 1995: 6; Blaikie & Jeanrenaud 1996: I, 8, 9; OECD 1999: 30, 32; Montgomery et al. 1999: 3; Wardell-Johnson 2000: 37; Ballance et al. 2001; Schubert & Dietz 2001: 12; Raffaello 2001: 16; Grimble & Laidlaw 2002: 3; OECD 2002: 47; O’Riordan & Stoll-Kleemann 2002: 295; Tarr 2002b: 11; Mauney 2002: 26; O’Riordan 2002: 21; Weikard 2002: 20; Brock & Xepapedeas 2003: 1598; OECD 2004: 17, 24, 28, 86f; Trousdale & Gregory 2004: 281; Deke 2004: 5). People enjoy wondering about diverse ecosystems and species (Loomis & White 1996: 198; O’Riordan 2002: 26). Low-impact, nature-centred tourism is based on cognitive needs and provides strong market incentives for biodiversity preservation (see also O’Riordan 2002: 9; Tarr 2002b: 11; OECD 2004: 28, 56; Armsworth et al. 2004: 126). The regulated harvest and trade

of exotic hardwoods, ornamental fish, exotic birds or ivory can be an incentive to protect respective resources (see chapter 2.3.3; see also OECD 1999: 29). Letting people pay for cognitive need satisfaction internalises externalities and provides incentives for biodiversity maintenance.

#### **2.2.1.5 Safety needs**

Certain facts in the world which influence the outcomes of an action, such as the availability of future capital or need satisfaction, are subject to developments which are often not predictable for a decision-maker (Heath 1976: 7). The availability of any type of capital, and the state of needs and institutions, are constantly changing. Limited predictability creates uncertainty and vulnerability. Vulnerability has a direct impact upon people's asset status, their opportunities and their livelihoods (DFID 1999). Food security, in particular, is of major importance (DFID 1999). Uncertainty about the future availability of capital results in incentives to overuse assets. It is a general phenomenon that people value today's need satisfaction higher than that of the future (Hampicke 1992: 283). Whether or not a person invests in capital therefore depends strongly on the time preference of a decision-maker. People will be prepared to deplete biodiversity if its future discounted benefits are not expected to be higher than present ones. Additionally, people balance out the present satisfaction of needs against future risks and opportunities (Searle 2001: 131). Will today's investments, e.g. in biodiversity maintenance, be for the benefit of the investor in future? Someone who satisfies present needs by harvesting all the hardwood in an area reduces the future availability of natural capital. But the long-term preservation of the trees might not be of use for the person if there is a high risk that uncontrolled bush fires destroy the trees or that other people will exploit them. Under conditions of uncertainty, decision-makers can only operate with the likelihood that a particular act will be followed by a particular outcome (Vroom 1964: 17). Rationality in uncertain and risky situations is a matter of increasing the probability of reaching a higher step on the preference ladder (Searle 2001: 168).

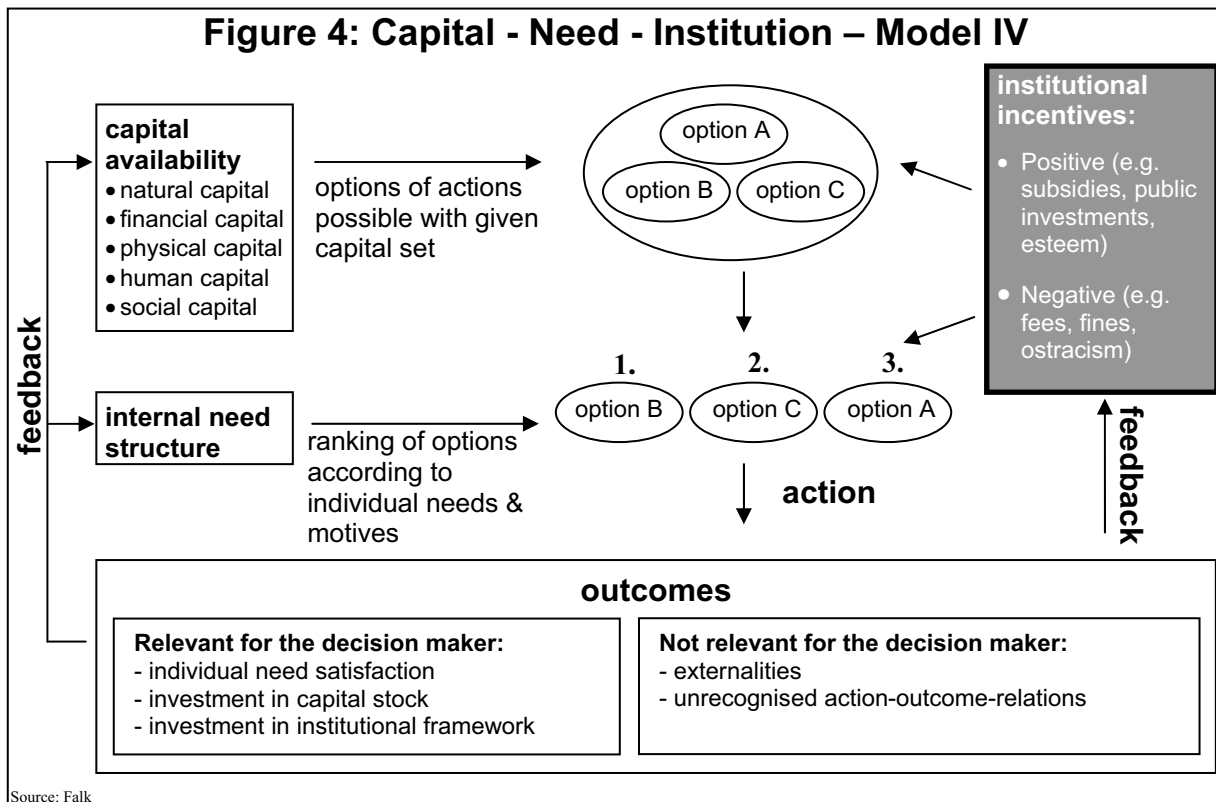
Satisfying safety needs is one of the fundamental human needs with the objective of stabilising decision-making situations. People satisfying safety or protection needs are longing for safety, stability and the desire to be free from anxiety, fear and chaos (Maslow 1987: 18; Max-Neef 1991: 32, see also Heath 1976: 171). Investments in capital storage (e.g. savings) and insurance are common reactions to uncertainty (Maslow 1987: 18; Max-Neef 1991: 32; see also Ostrom 1990: 88). Stability and predictability can be enhanced by institutions (Maslow 1987: 19; North 1990; Ostrom 1990) and investments in human capital.

The satisfaction of safety needs is of high importance for biodiversity preservation. High levels of biodiversity dissipate risks particularly for the poor, who can diversify their resource utilisation (Wardell-Johnson 2000: 35). Furthermore, mankind still does not know the consequences of the loss of more and more species for their livelihoods and future choices. Optional or quasi-optional values are difficult to estimate (OECD 1999: 29; see also Ballance et al. 2001). The preservation of biodiversity is therefore also motivated by the wish to be on the safe side. We invest in the survival of species “just in case” we may need them in the future, when preferences can change or additional knowledge and other capital will be available. But certain ways of satisfying security needs can also increase the pressure on natural resources. One of the most important livestock functions is their value as insurance. People stabilise their livelihoods by maximising herd sizes, thereby challenging biodiversity under existing conditions.

### **2.3 *The role of institutions***

The opportunities of a society are strongly influenced by its institutions (Demsetz 2000: 69). Understanding the impact and mode of functioning of institutions is central for the analysis of decision-making situations. According to North, institutions are “... the rules of the game in a society or, more formally, are humanly devised constraints that shape human interaction” (North 1990: 3). The institutional environment includes formal (laws, polity, judiciary) and informal (customs, mores, norms) rules of the game (North 1984: 8; Furubotn & Richter 1991: 2; Aoki 2000: 12; Williamson 2002: 49; Brinitzer 2003: 29; Richter & Furubotn 2003: 7). Organisations are closely related to institutions. They are “...created as a situation-oriented operationalisation of institutions” (Kirk 1999). In the case of scarce resources, the need satisfaction of one person affects the satisfaction of others. To manage such situations, institutional arrangements are necessary in order to constrain resource extraction (Richter & Furubotn 2003: 87). Institutions shape, redirect and constrain actions of utility maximisation (Coleman 2000: 14; see also Benda-Beckmann 2002: 48, 66; Richter & Furubotn 2003: 3; Bochniarz & Bolan 2004: 83). They create expectations about the behaviour of people, provide stability in an uncertain world (North 1990; Ostrom 1990; Aoki 2000: 18) and reduce transaction costs (e.g. bargaining and information costs) (Heath 1976: 70; Aoki 2000: 18; Brinitzer 2003: 30).

An important instrument for narrowing or broadening opportunities is the distribution of property rights. Property rights are socially enforced rights to define the accepted array of uses of an economic good (Libecap 2002: 140). They ensure that today’s investments will



generate future returns (OECD 2002: 49, 52; Meinzen-Dick & Pradhan 2002: 1; Richter & Furubotn 2003: 93f) and are therefore long-term incentives for maintaining resources (OECD 1999: 38, 80). Property rights systems consist of a bundle of separate rights (de Alessi 1990: 8; Furubotn & Richter 1991: 6; Allan 1997: 107; Birner 1999, Werin 2000: 47; Brousseau & Glachant 2002: 22; Libecap 2002: 140ff; Meinzen-Dick & Pradhan 2002: 6; Okoth-Ogendo 2002; Richter & Furubotn 2003: 90; OECD 2004: 27, 53). One can distinguish the right to transfer, the right to use, the right to exclude, the right to obtain benefits and the right to receive compensation for damages (Birner 1999). Property rights are determined by legal structures as well as by norms and values, and they directly define the capital assets of an individual (North 1990: 33f). The more secure rights are, the lower the discount rate. The more that property rights can prevent uninvolved parties from benefitting from an asset without bearing the full costs of their actions, the higher the value of that asset (North 1990: 31; Libecap 2002: 143).

### 2.3.1 Utility maximisation and institutions

Rational decision-making essentially involves the adjudication of conflicting desires, obligations, commitments, needs, requirements and duties (Searle 2001: 125, 253f). Institutions provide incentives and disincentives which are created by individuals or organisations to influence behaviour (North 2000b: 38; Richter & Furubotn 2003: 7; see also DFID 1999, Pretty 2002: 72; Brinitzer 2003: 30; OECD 2004: 105f). These are motives which

provide an agent with a reason for an action (Searle 2001: 183). If farmers, for instance, extract too much firewood then they might be punished by neighbours, while there could be rewards if a smaller portion is used. Institutional incentives can be positive (rewards) or negative (punishments) (see also OECD 1999: 37; Bochniarz & Bolan 2004: 85). Positive incentives include compensation, grants, tax breaks for donations or subsidies that encourage environmentally friendly practices (Tarr 2002a: 5; Seidl et al. 2003: 347; OECD 2004: 27, 106). Such measures can render the preservation of biodiversity more attractive and compensate for economic losses which result from less-intensive use practices. Unfortunately, many positive incentives actually promote resource-exploitive behaviour (OECD 1999: 11; Tuxill 1999: 111; O’Riordan 2002: 14; OECD 2004: 106, 117, 119). Negative incentives include fines, fees, levies or special taxes for unsustainable resource use (Tarr 2002a: 5; OECD 2004: 106, 116). The challenge is to find an institutional setting which encourages people to act in their own interest in such a manner as to minimize damages to biodiversity (Ashley 1996: 1; Long et al. 2002: 8; Bochniarz & Bolan 2004: 85). In an institution-free world, such as an open access situation, it might be the best option for farmers to extract as much firewood as possible in order to maximise their utility. A non-exploitive alternative approach would not significantly increase their future utility because of other people’s resource use. If one wants to change farmers’ actions, one must modify the relationship among alternative pay-offs. Through the provision of rewards or punishments, the non-exploitive action must promise a higher utility than the exploitive one if the farmers are to change their behaviour. Only if the relative benefits of the options are transformed is the institution effective (Opp 2000: 50; Ziegler 2000: 65, 83). Norms therefore become more relevant if the costs of norm compliance are low (Diekmann & Preisendörfer 2000: 360, 363). Any institutional incentive either influences the capital availability or the need satisfaction of the norm addressee. The strength of institutions is based on the anticipated satisfaction or dissatisfaction of human needs to which they are expected to lead (Vroom 1964: 15f).

The more that biodiversity maintenance can connect the users’ livelihoods to restored and enhanced biodiversity (e.g. through crafts, tourism, hunting, viewing, eating), the more effective it will be (O’Riordan 2002: 9). An uncompensated expropriation of stakeholders’ (e.g. local communities’) property rights to natural resources will only lead to a backlash against conservation measures (Stoll-Kleemann 2004: 150). Such a reaction increases the problem of monitoring and enforcing the protection measure. Conservation works best if key stakeholders benefit from it (Pretty 2002: 63, 65). Additionally, incentives for exploitation must be replaced and those for conservation strengthened (Ashley 1996: 1,3f, 11).

Institution providers must have an interest in providing institutional arrangements and settings. Following the same rational considerations as in any other decision-making situation, they must expect an overall higher utility from providing an institution than from the option of not providing it. Organisations adopt new institutions for exchange and property rights when the net benefits of new institutions, including transaction costs, exceed the net benefits of existing ones (see also Coase 1960; Zelder 1997: 72; Demsetz 2000: 69; Swallow & McCarty 2000: 11; Swallow & Kamara 2000: 251). Agents establish institutions which steer human behaviour in their interest. One should consider that different players may have different interests. In this case, each of them may provide incentives which conflict with other players' institutions (Ziegler 2000: 78, Ostrom 1990: 56; see also OECD 1999: 113). People may belong simultaneously to different groups, the norm sets of which may not necessarily fit together (Stiglitz 2000: 60). The more effectively all affected agents can participate in the process of formulating institutions, the more sustainable the solution will be (Ostrom 1990: 93). Active participation gives stakeholders an opportunity to find institutional solutions which they regard as appropriate for their culture and aspiration. Where formal participation rights and options are missing, protest and resistance are common ways to influence or undermine the institutional framework (O'Riordan & Stoll-Kleemann 2002: 102). However, participatory processes can increase the transaction costs of formulating new institutions (O'Riordan & Stoll-Kleemann 2002: 106, Steelman 2002: 162, Younge 2002: 175), though they also reduce the costs of running them.

The use of the term "incentive" makes clear that norms are not narrow programs which individuals follow unconditionally (Esser 2000: 154; Heath 1976: 3, 176; compare with Vanberg 2000). The existence of choice and free will is the presupposition for rational decision-making (Searle 2001: 13f). An institutional incentive need not be the most important reason for an action, but sometimes the extra incentive tips the balance between alternative actions (Heath 1976: 92). A person will be willing to break a rule if the expected marginal utility of breaking this rule is higher than the expected marginal cost (Brintzer 2003: 314; Gesang 2003: 31, 52; see also Hampicke 1992: 43). For this reason, as many incentives as possible are included in the analysis. Each incentive adds to the utility function and can widen or close the utility gap between unsustainable and sustainable actions (OECD 1999: 11).

### **2.3.2 Transaction costs of institutions**

Apart from the utility expectations of institutions, their costs are also highly significant. Costs of institutions are commonly called transaction costs. These include the costs of establishing,

running, changing and abolishing institutions. Of special importance are information costs, control costs and enforcement costs (North 1984: 7, 9f; Bromley 1986: 40; Ostrom 1990: 10, 16; North 1990: 4, 27, 48; de Alessi 1990: 7f; Furubotn & Richter 1991: 8f; Allan 1997: 107; Zelder 1997: 86; Libecap 2002: 146; Brinitzer 2003: 29; Richter & Furubotn 2003: 12, 57ff, 63ff, 1054). Bribery and losses due to imperfect monitoring and enforcement of institutions are also understood as transaction costs (North 1990: 68). Enforcement costs arise from the employment of police, guards or watchmen or the installation of alarms and fences (Becker 1968). Because of monitoring and enforcement costs the monitoring and enforcement may be ineffective and it is uncertain that persons receive rewards or punishments for compliance or non-compliance in institutions. Therefore, this probability will be considered consciously or at least unconsciously in the decision-making process (see also Becker 1968). Any institution will only function if monitoring and enforcement is ensured (OECD 2002: 42). Particularly in developing countries, the constraining factor in biodiversity management is thus not the formalisation of rights but the degree and intensity of monitoring and enforcement (Deacon & Murphy 1997: 18; OECD 1999: 12; Raffaello 2001: 48; O’Riordan 2002: 4).

It is important to see transaction costs not simply in monetary terms. The broadening of the understanding of capital supports a view which recognises the time spent for actions, distances which have to be covered, information which needs to be acquired and social capital which is required in decision-making processes. Transaction costs depend very much on situation variables. The larger a management unit, the greater the travelling and communication costs and the more difficult is it to monitor rule compliance (Meinzen-Dick et al. 2001). This is one reason why the enforcement of property rights to natural resources is so difficult (Deke 2004: 3). Transaction costs increase rapidly if the actions of many people affect each other. Large numbers of stakeholders increase the costs of bargaining, monitoring and enforcement (Olson 1965: 6; North 1990: 13; OECD 1999: 27; OECD 2004: 35). Theoretically, it would be the responsibility of each stakeholder to negotiate with all the others (see also Bromley 1986: 39). Too often the transaction costs of such contracts are, however, prohibitive. A common solution is that groups with similar interests organise themselves in multiple layers of nested enterprises and negotiate with one another (Ostrom 1990: 189). This reduces the number of contracts.

### **2.3.3 Externalities and biodiversity conservation**

The preservation of biodiversity is strongly dependent on the internalisation of externalities. In the context of biodiversity conservation, negative externalities exist if, for instance, present



resource users tolerate the extinction of plant and animal species without recognising the benefit of these species for future generations. In this case the descendants pay part of the price of biodiversity loss. If these costs were internalised by making the users pay for the future generation's lost utility, these activities would be much less appealing. Insufficient internalisation increases the attractiveness of resource exploitation and undermines incentives for long-term investments (see also Demsetz 2000: 69). But it is not only unsustainable resource-use practices on a local level that cause disastrous disturbances of ecosystems (Lovejoy 2002: 35). Air pollution and the emission of greenhouse gases by the wealthier part of the world population lead to climate change (Lovejoy 2002: 39; Schalkwyk 2002: 2; see also O'Riordan 2002: 14; Tarr 2002a), with strong impacts on the livelihoods of the poor (UNEP 2002: 21). The possible elimination of the Succulent Karoo due to climate change (Lovejoy 2002: 40) not only leads to a loss of biodiversity but also affects the farming opportunities of the local population. Such costs have not been included in the prices of fridges, petrol and aerosol sprays.

Whether an externality is defined to be positive or negative depends on the initial distribution of property rights (Bromley 1986: 39, 52ff; see also Coleman 1990: 800ff, OECD 1999: 37). Biodiversity is a good example which shows that the distribution of property rights has an impact on the distribution of wealth (compare with Coase 1988: 172; see also Libecap 1989: 6; Allan 1997: 111; Libecap 2002: 140, 144; Richter & Furubotn 2003: 113f, 136). The public would benefit (receive positive externalities) if subsistence farmers stopped using resources in order to preserve biodiversity. But the farmers would pay the costs (OECD 1999: 27; Scherr 2003: 4), although it can be argued that rural communities' stewardship of biodiversity has maintained it at the current level (Melchias 2001: 187). Exclusionary conservation strategies, with the aim of preserving a natural state untouched by people, often give the impression that the provision of enjoyment for modern society takes priority over the satisfaction of the physiological needs of local communities (Jones 1995: 6; Tuxill 1999: 109; Melchias 2001: 189; Grimble & Laidlaw 2002: 9, 12; Pretty 2002: 61f; Kepe et al. 2003: 8; Adams et al. 2004: 1). The benefits of maintaining biodiversity most frequently accrue to governments, foreign tourists, national elites or the global public – and are scarcely enjoyed by the residents who manage natural resources (Ashley 1996: 1, 9; Blaikie & Jeanrenaud 1996: 61; Montgomery et al. 1999: 2; Vermeulen & Koziell 2002: 1, 16f; Ruck et al. 2003: 11; Falkenberg 2003: 20; Swanson 2003: 457, 458; Adams et al. 2004: 1; OECD 2004: 13). It is often the poorer countries and communities who control areas with comparative advantages in species and habitat, while the wealthier groups of world society see the highest value in

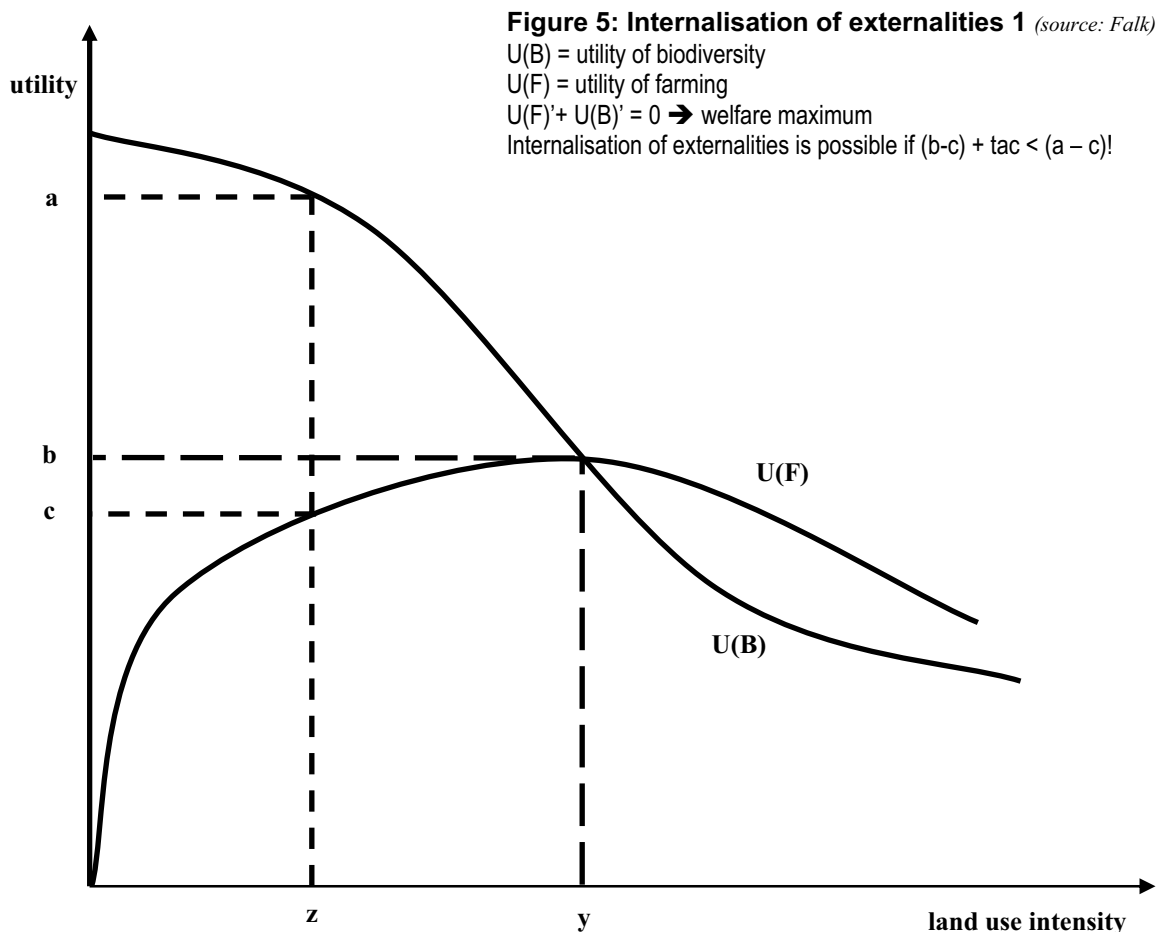
biodiversity preservation (Rowthorn & Brown 1999: 327; Tuxill 1999: 111; Schubert & Dietz 2001: 21; Melchias 2001: 8; Raffaello 2001: 35; Brown 2002: 218; Adams et al. 2004: 1; Deke 2004: 1). But who determines whether biodiversity belongs to a local community or to the world population as a whole? What is a fair distribution of the costs and benefits of biodiversity maintenance (see also Blaikie & Jeanrenaud 1996: 10)? Can we simply forbid any action which might cause species extinction, since the offenders can never compensate the world's population, or must we pay compensation for conservation efforts? The justification of the global distribution of property rights for biodiversity is a very moral and ethical question which cannot be answered only theoretically (Bromley 1986: 42; Loomis & White 1996: 205; Tietenberg 1986: 80f; Rowthorn & Brown 1999: 327; Richter & Furubotn 2003: 87, 136; OECD 2004: 13, 107).

No one can be excluded specifically from the existence and the option value of biodiversity. One person's awareness that biodiversity exists and can also be used in the future does not influence the knowledge of another person. At least some of the benefits of biodiversity therefore have a global public good character (Tuxill 1999: 111; Vermeulen & Koziell 2002: 1, 4; Grimble & Laidlaw 2002: 1, 13; OECD 2004: 25). Cross-border spillovers make international or even global compensation necessary (Raffaello 2001: 46, 51; Deke 2004: 1ff). This requires coordinated global conservation strategies which recognise the interest of various global stakeholders (Tuxill 1999: 111; Schubert & Dietz 2001: 24; UNEP 2002: 26; Vermeulen & Koziell 2002: 4; Adams et al. 2004: 1).

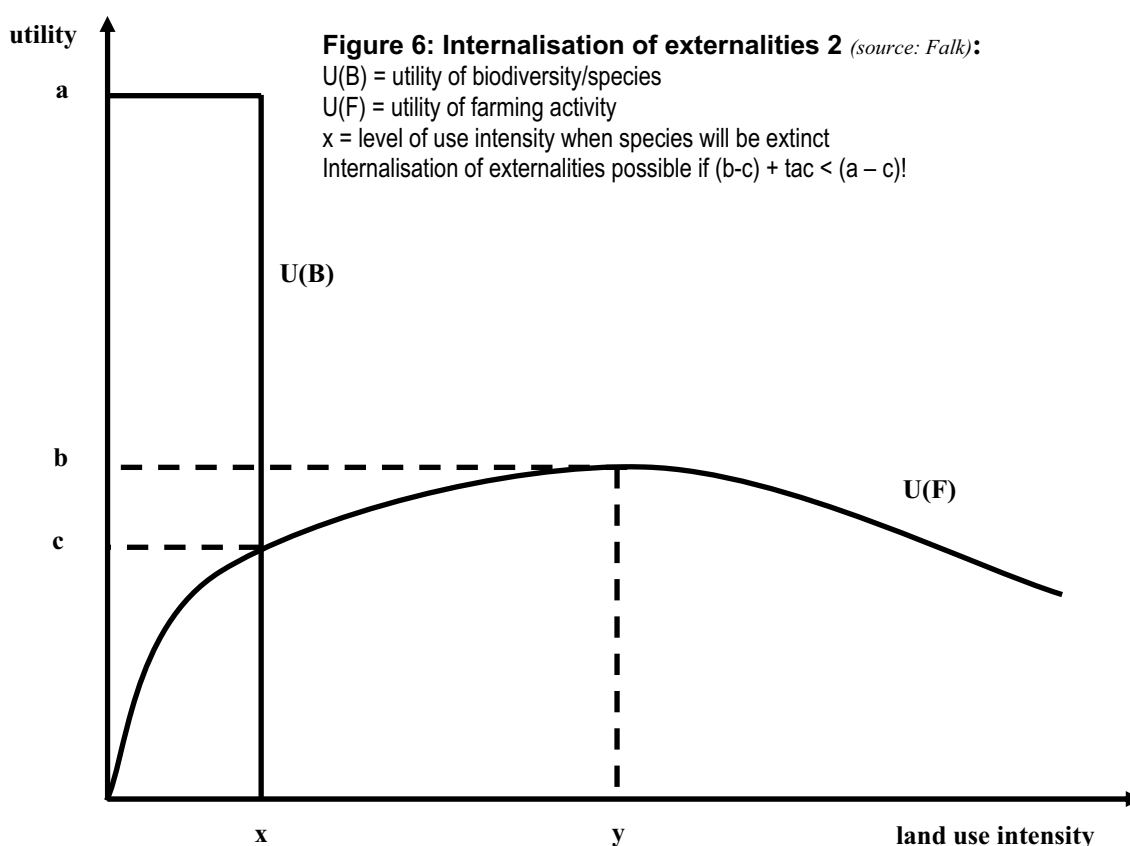
As already noted, the internalisation of externalities to avoid inefficient resource allocation and to provide incentives to invest in the resource base are a major function of institutions. The biodiversity of the future strongly depends on institutional interventions today (OECD 1999: 9; see also O'Riordan 2002: 8). Depending on the mode of internalisation, one can distinguish between a) market b) hierarchical organisations and c) hybrid ones which can be modelled in between these extremes. Each organisational form has its own advantages and disadvantages (Coase 1937; Coase 1960; Williamson 1991; Williamson 2000: 51).

The Coase Theorem says that in a regime without or at least with low transaction costs, contractual arrangements between parties lead to maximum social welfare, no matter how property rights are distributed (Coase 1960; Schweizer 1988: 263; Coase 1994: 10; Allan 1997: 107; see also Williamson 2000: 51). Figures 5 and 6 demonstrate how such contractual arrangements work. Examples relevant to biodiversity have been chosen. It is important to

emphasise that the curves drawn in Figures 5 and 6 are hypothetical and exemplary. The curve  $U(B)$  represents the utility function of biodiversity (e.g. potential for tourism, ecosystem functions, food supply). Curve  $U(F)$  shows the utility function of a particular land use activity, e.g. farming. All utility functions show net benefits, which means that the costs of the actions are included. The farmers' curve  $U(F)$  increases up to a maximum point (b) beyond which the resources are used in an economically unsustainable way. An autonomous farmer would maximise his utility by using the land at an intensity  $y$ . At this point, however, a significant loss of biodiversity can be observed. Reducing land use intensity would result in a significant gain of biodiversity utility but also a small reduction of the farmer's utility. Farmers could be motivated to reduce intensity of use if they were compensated for lost utility ( $b - c$ ): the opportunity costs of conservation (Raffaello 2001: 46; OECD 2002: 138ff). For the beneficiaries of biodiversity maintenance, this makes sense as long as the compensation which has to be paid for reducing land use intensity is lower than the gains in biodiversity. The point of optimal compensation ( $z$ ), which is at the same time the Pareto-efficient welfare allocation, is reached where the total of the gradients of the two utility curves is zero (Coase 1960; Richter & Furubotn 2003: 110f). A contract can be agreed as long as the utility gains of preserving biodiversity are higher than the compensation to be paid plus emerging transaction costs ( $(a - c) > (b - c) + TAC$ ) (see also Coase 1960; Zelder 1997: 71).



For further discussions a second example is presented (see Figure 6). This time the shape of the utility function is based on the state-and-transition theory. This theory assumes that ecosystems do not change continually but stay relatively stable up to a certain threshold of disturbance and then shift from one state to another (Westoby et al. 1989). Once a certain threshold has passed, the impacts are irreversible, as in the case of species extinction or ecosystem collapse (Blaikie & Jeanrenaud 1996: 20; OECD 1999: 26; Raffaello 2001: 18, 22; OECD 2002: 76; BMBF 2004: 13; Bochniarz & Bolan 2004: 89; Deke 2004: 12). Let us interpret  $x$  in Figure 6 as a specific level of disturbance at which this shift occurs and the species becomes extinct. The curve  $U(B)$  is the utility function of the respective species. Its level is high ( $a$ ) as long as the species survives, but suddenly becomes zero if it becomes extinct. The closer  $x$  is to zero, the more sensitive the ecosystem. In the extreme case, any human resource use destroys biodiversity (O’Riordan 2002: 25). Curve  $U(F)$  is again the utility function of a land use activity. Without considering biodiversity, farmers maximise their utility at the point where the relevant species disappears ( $y$ ). The farmer would have to be compensated with  $b - c$  in order to be motivated to reduce his or her use down to level  $x$ , below which the species can survive. The net utility between  $b$  and  $c$  is the utility gap between sustainable and unsustainable resource use (OECD 1999). Since the utility increase of saving the species is much higher than the losses of a less-intensive level of farming, it is rational for



all those who benefit from the species to pay compensation to the farmer. In this special case not even the absolute value of the species is important as long as it can be proven that it is higher than the farmer's losses plus transaction costs ( $a - c > (b - c) + TAC$ ). However, no matter what kind of capital assets or need satisfaction is exchanged, the transaction will only proceed if both sides believe that it improves their utility (Heath 1976: 19).

Market or contractual solutions internalise externalities best where property rights are well defined (OECD 2004: 28; see also OECD 1999: 79; Libecap 2002: 140). Clear property rights matter for two reasons: a) they ensure that investors in maintaining biodiversity receive long-term benefits from their investments; b) they guide decision-makers to consider the social costs of their actions (Libecap 2002: 140). Farmers should have the opportunity to transfer use rights to tourist operators who can use the resource more profitably and, at the same time, with lower intensity. Those who obtain the highest benefit from biodiversity are willing to pay the highest price (OECD 1999: 32; see also Schulz 2000: 352; OECD 2004: 28). New markets have developed for animals and plants or their attributes, which before were used only for subsistence purposes (Lovejoy 2002: 35). Such markets can internalise at least some of the utility of species for the world population, taking into consideration the global satisfaction of physiological, self-esteem, safety and cognitive needs. They can under certain circumstances siphon off the highest profit from sustainable resource use, enhancing the long-term maintenance of biodiversity (OECD 1999: 85; see also Trousdale & Gregory 2004: 279).

Tourism is one opportunity to transfer global biodiversity benefits to those who can bear the costs of conservation (OECD 2004: 77). Eco-tourism depends on the existence of biodiversity. Therefore, it creates strong market incentives for biodiversity preservation (see also O'Riordan 2002: 9; Tarr 2002b: 11; OECD 2004: 28, 56, 80; Armsworth et al. 2004: 126). Tour companies with environmentally and socially responsible business policies are increasingly favoured by tourists. (Tarr 2002d: 56). Certification and eco-labelling create a market for biodiversity-friendly products and services (OECD 1999: 11, 57). These instruments provide information to consumers who otherwise could not distinguish between goods produced in a sustainable and non-sustainable way (Seidl et al. 2003: 334f; OECD 2004: 36, 41, 74, 134ff). Consumers who satisfy their esteem needs by protecting biodiversity will generate higher utility from a product or service which preserves biodiversity (see also Trousdale & Gregory 2004: 280). Additional utility due to a more positive environmental impact can be siphoned off by the producer with higher prices, which are an incentive for producers to choose biodiversity-friendly production methods and to compensate for

economic losses due to less-intensive resource use (Seidl et al. 2003: 348). Exactly the same mechanism works for green investment funds (see also OECD 1999: 70; OECD 2004: 140). “Green” investors can generate a higher utility from environmental friendly production while losing utility for unsustainable production. These utility differences allow “green” investors to accept lower dividends than are possible on the “ordinary” capital market.

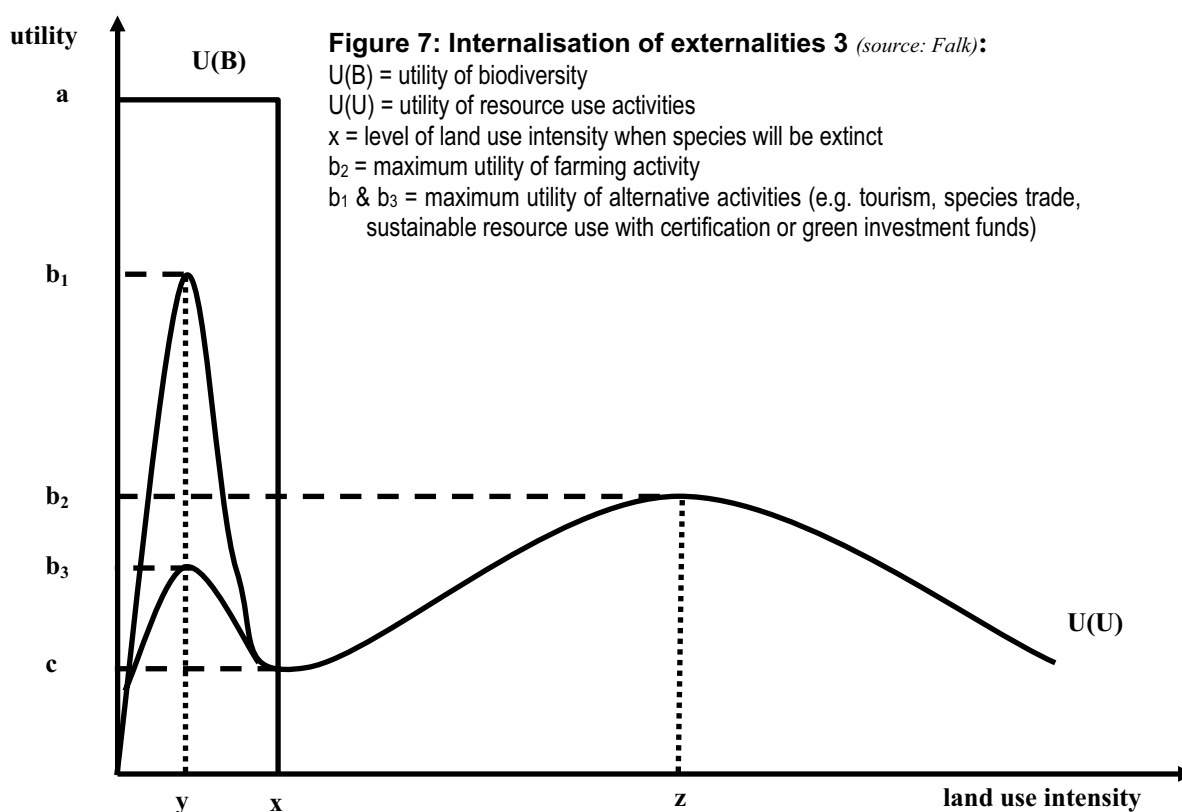
Another way of internalising global biodiversity externalities are donations to environmental organisations (Raffaello 2001: 17). The donations can be used, for instance, by the organisation to purchase timber logging rights, but without exercising the right to extract wood (OECD 2004: 28, 56). The internalisation requires that donations are transferred to those who pay the various costs of conservation in order to motivate them to continue preserving biodiversity. It is common that people who maximise the satisfaction of their physiological, esteem, cognitive and safety needs through the existence of biodiversity contribute in this way to the preservation of the natural environment. Environmental organisations also play a crucial role in developing the mechanism of debt-for-nature swaps. Donations and tax revenues from developed countries are paid to developing countries as a compensation for nature conservation efforts (Deacon & Murphy 1997: 1ff; OECD 2004: 143ff). This is an internalisation of global externalities.

In addition, benefit-sharing agreements between pharmaceutical, agrochemical or cosmetic companies and local communities help to internalise externalities. These provide market incentives which increase the utility of biodiversity conservation activities. Such agreements recognise the discovery, use and maintenance of biological resources by local communities as intellectual achievements (Tuxill 1999: 112; UNEP 2002: 27). Companies increasingly recognise these intellectual contributions and compensate for their use either through direct transfers or investments in nature conservation (Nader & Mateo 1998: 181ff). Such compensation rewards and encourages local communities to maintain biodiversity. In cases of insufficient compensation for using local knowledge and insufficient protection of intellectual property rights, positive externalities decrease incentives to preserve biodiversity (Blaikie & Jeanrenaud 1996; Tuxill 1999: 113; Krugmann 2001: 6; Seiler 2003: 8; Gettkant 2003: 12).

Any sustainable market for biodiversity, whether it is based on trade in species, tourism, certification or green investment funds, adds another peak to the utility function of the resource’s use, as long as the goods and services produced are in the long run dependent on biodiversity preservation. People pay for the preservation of biodiversity, which means that

producers on these markets have the highest gains when species are not extinct and resources are used with intensity lower than  $x$ . This is symbolized by the peaks  $b_1$  and  $b_3$  in Figure 7. In the case of  $b_1$  it is rational for the resource users to change their use activity and reduce intensity. Where sustainable use is privately profitable and biodiversity is adequately protected, no further intervention is needed (OECD 1999: 35). It becomes rational for the users to maintain biodiversity even if they cannot acquire the full benefits which result from their behaviour (see also OECD 1999: 79f). Often enough the share of benefits of sustainable resource use which can be easily privatised is insufficient to render a more sustainable use form profitable (see  $b_3$ ). If a sustainable resource use does not promise higher profits which can be privatised, and additional benefits flow to third parties, supplementary measures such as compensation or fines are required (OECD 2004: 35). These should close the gap between  $b_2$  and  $b_3$ , motivating the user to practice alternative behaviour.

In order to encourage a land user to shift to use intensity  $y$ , the user must own the property rights to benefit from this shift. The privatisation of Namibian wildlife is an excellent example, which shows that the transfer of property rights can be sufficient to stimulate biodiversity maintenance (OECD 2004: 40f, 45). The more efficiently property rights prevent uninvolved parties from benefiting from biodiversity without bearing the full costs of their actions, the higher the value of biodiversity for the rights holders – and the stronger their



incentives to protect biodiversity. Biodiversity benefits must be distributed to those who bear the costs of conservation (Loomis & White 1996: 204f; OECD 2002: 69). Giving people secure property rights on biodiversity means allowing them to reap the private benefits from using it (OECD 1999: 26).

In perfect markets, transactions must reflect fully the value of biodiversity benefits or the costs of biodiversity loss (OECD 2004: 29, 133). Absent and imperfect markets which only insufficiently internalise externalities are a prevalent cause of biodiversity loss (OECD 1999: 20; Raffaello 2001: 26; Lovejoy 2002: 35). Unfortunately, it is a persistent fact that the exchange values of biodiversity represent only a tiny proportion of their total value (Antoci et al. 2004: 1). Non-internalised externalities reduce the costs of unsustainable resource use, rendering such action more attractive. There are various reasons why markets often do not sufficiently internalise externalities: ignorance or uncertainty of causal links between actions and outcomes, costs of collecting and transmitting information, costs of coordination and negotiation, costs of monitoring and enforcement, and insufficiently defined property rights (OECD 1999: 74). Transaction costs are crucial for internalising biodiversity externalities. Market solutions only work if transaction costs are not too high to counteract the benefits of the contract (OECD 2004: 31, 35). Therefore, the availability of required information is crucial (Bromley 1986: 42). However, the estimation of the utility function of biodiversity alone is extremely expensive if not completely impossible (see Chapter 2.2.1). In addition, the utility function of farmers is ill-defined. Markets as yet possess only limited opportunities to consider non-monetary utility components and to measure an appropriate amount of compensation (see also Becker 1968; OECD 1999: 77, 101; Raffaello 2001: 16; O’Riordan 2002: 14). Difficulties in determining levels of utility encourage agents to manipulate the perception of their functions in order to minimise compensation to be paid or to maximise compensation to be received (see also Bromley 1986: 40). Approaches which also attempt to capture self-esteem, self-actualisation, cognitive and safety values (see Chapter 1.2.1) measure individual preferences for biodiversity, e.g. through the notion of willingness to pay (Loomis & White 1996: 198; OECD 2002: 41, 144; OECD 2004: 28). Therefore, mechanisms must be elaborated which transform as many values as possible into effective incentives for natural resource management (OECD 2004: 21, 24, 28).

Should market organisations fail, alternative internalisation strategies exist. Pigou claimed that externalities lead to a waste of resources unless remedied by government intervention (Pigou 1932; Schweitzer 1988: 245). In this case a superior ruler/agent redistributes costs and



benefits in order to reach maximum welfare. This logic is similar to that of Coase. In this case it is only the government which initiates redistribution and compensation. It can ask for a fee from biodiversity beneficiaries (e.g. tourists), which then is redistributed to resource users in order to motivate them to reduce use intensity. Positive incentives from governments to encourage resource-preserving behaviour include compensation, subsidies, tax advantages and the funding of environmental-friendly activities (OECD 1999: 37, 77, 90, 94f;). The Namibian Game Products Trust Fund is one example of government internalisation of externalities. It is an instrument to compensate farmers who face crop losses caused by elephants and to promote sustainable wildlife management. Compensation is paid from export income, e.g. of ivory (Schalkwyk 2002: 12f; Lindeque 2002: 34).

Alternatively, one can introduce negative incentives such as taxes, charges or fees on unsustainable practices. Such measures increase the costs and decrease the utility of unsustainable practices (Jones 1995: 10; OECD 1999: 76, 79). Farmers can, for instance, be fined if they use land more intensively than  $x$  in Figure 7. Fines have some advantages compared to compensation. The users who violate the restrictions pay at least part of the transaction costs of the institution (Becker 1968). In an ideal case, three goals can be achieved simultaneously: First, the public can be compensated for the social loss from an overly intensive use of resources. Second, the offender has negative incentives to violate a rule because of the expected fine (Becker 1968). Third, the transaction costs of the contract can be covered. Unfortunately the scheme seldom works because most offenders are unable to compensate for the harm and transaction costs they cause (Becker 1968). Who pays fees and who receives subsidies depends again on the distribution of property rights.

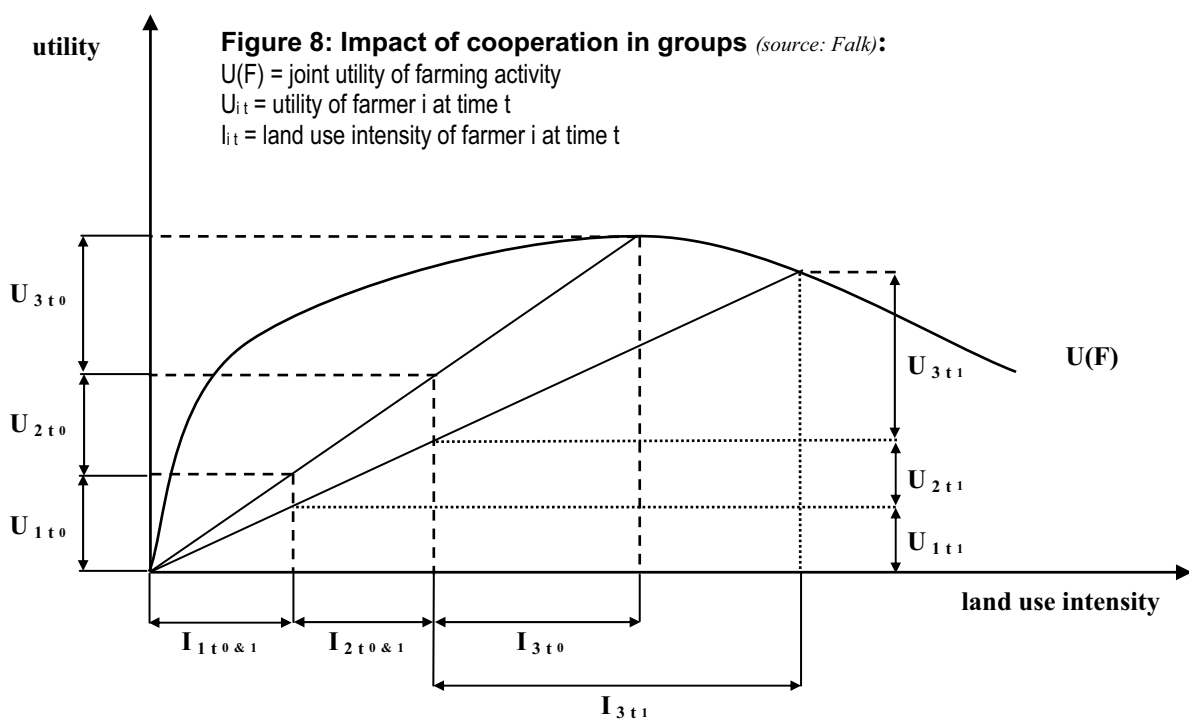
Permits, quotas and restrictions limit activities that might exert pressure on biodiversity (OECD 1999: 33; OECD 2004: 29, 116f). Trade restrictions such as those introduced in the frame of the implementation of the Convention on International Trade in Endangered Species of Wild Flora and Fauna (CITES) are a reaction to market failure. The restrictions support biodiversity maintenance by rendering unsustainable harvesting practices less attractive. It is, however, important to ensure that restrictions of imperfect markets do not also reduce the value of biodiversity used in a sustainable way, thereby decreasing incentives to protect resources (Nuding 2002: 196; OECD 2004: 28, 41; see also Tuxill 1999: 110).

State or hierarchical internalisation of externalities can, therefore, realise economies of scale and scope when collecting and transmitting information, negotiating compensation and

enforcing institutions. It can also take into account the benefits for those who cannot express their own interests (e.g. the rural poor or future generations). Nevertheless, the estimation of the value of resources is very difficult in the absence of a market. In many cases the transaction costs of state intervention are much higher than those of markets.

Hybrid organisations combine the strengths of both organisational principles in order to reduce transaction costs. The variety of hybrid organisations is immense and one can argue that almost any actual organisation contains elements of markets as well as hierarchies. The Collective Action (CA) approach analyses one form of hybrid organisation which is also relevant to the research presented. The approach describes preconditions for the invention of institutions within groups. Especially in rural communities collective actions play an important role with regard to encouraging investments, representing group interests, and developing and maintaining traditional institutions and organisations.

Figure 8 demonstrates the specific problems of inventing use-regulating institutions within groups. So far we have assumed that farming activity was undertaken by only one individual agent with whom negotiations are directly possible. What happens, however, if there is more than one farmer? In the example presented we assume a group of three farmers sharing one piece of pasture under a common property regime. The welfare maximum of the group is determined by the utility function of the farming activity  $U(F)$ . This maximum utility ( $U_{1t0} +$



$U_{2t_0} + U_{3t_0}$ ) is distributed proportionally to the individual use intensities of the three farmers ( $I_{1t_0}$ ;  $I_{2t_0}$ ;  $I_{3t_0}$ ). The achievement of this point cannot be taken for granted. Additional rules must be introduced and enforced, such as the regulation of access (Richter & Furubotn 2003: 122f). At time  $t_1$ , Farmer 3 behaves opportunistically and increases her/his use intensity to  $I_{3t_1}$ . She/he now receives the utility  $U_{3t_1}$ , which is higher than  $U_{3t_0}$ . The overall utility ( $U_{1t_1} + U_{2t_1} + U_{3t_1}$ ) has decreased because the group has moved to the right of the curve  $U(F)$ . Farmers 1 and 2 experience negative externalities due to the actions of Farmer 3 and lose more than Farmer 3 has gained. One reaction of Farmers 1 and 2 is to increase their use intensities as well. This leads to a further move to the right on curve  $U(F)$  and the three lose even more welfare. If institutions are in place, Farmer 3 can be punished, e.g. by being charged for the social costs she/he caused, in order to motivate her/him to move back to  $I_{3t_0}$ . In order to internalise externalities within groups, the following must be defined: Who must reduce her/his use intensity, and to what extent? What happens e.g. if in Figure 8 the poorest Farmer 1 wants to increase her/his use intensity? Who receives compensation if paid? Who will be punished if the group exceeds the prescribed intensity? All these questions are highly relevant in the context of the research presented here.

Internalising the externalities of biodiversity is one of the most difficult tasks. The interests of various groups of stakeholders (landowners, landusers, NGOs, conservationists, ecologists, researchers, media, consultants, commercial companies, biodiversity prospectors, politicians, international organisations), some of them not even born yet, must be considered in order to reach a welfare maximum (see also OECD 1999: 25; Pretty 2002: 89). Each individual impact on a species might be small, but the total effect of all disturbances is huge (OECD 1999: 74). Nonetheless, the problems with internalising biodiversity-related externalities should not discourage such attempts. In a world of high transaction costs, many institutions aim only to provide effective incentives for resource-preserving activities and against destructive ones. They do not really try to fully internalise externalities (OECD 1999: 78). The highest priority should therefore be given to cases where it is inexpensive to prove that the benefits of biodiversity are higher than the benefits of unsustainable resource use and where the benefits of biodiversity can somehow be transferred. The privatisation of wildlife in Namibia is a good example of this. The individual benefits for the landowners are sufficient to let them shift their management from livestock farming to biodiversity-friendly wildlife management. As a result, Namibian habitats have been maintained and transformed into a more natural state (OECD 2004: 40). The mechanism works even though many more people benefit from the farmers' actions than pay for it (see also OECD 2004: 109).

### **2.3.4 Categorisation of enforcement instruments**

It has been pointed out that institutions always work through influencing either the capital availability or the need satisfaction of actors. Based on a broadened understanding of the terms *capital* and *need*, the following chapter discusses different monitoring and enforcement options. The categorisation of enforcement instruments will help to analyse the efficiency of alternative institutions in the researched communities.

#### **2.3.4.1 Third party enforcement**

Traditionally, institutional incentives are understood as the implementation or abolition of an administrative act by a third-party authority, e.g. a state, church, firm or international organisation (Williamson 1984: 208; North 1990: 33; OECD 1999: 73). Common forms of third-party enforcement are, for example, monetary rewards, corporal punishment, imprisonment, torture, execution, restrictions of movements and occupation, loss of citizenship, fines, dismissal, or suspension of licences (Becker 1968; Ziegler 2000: 67; Turner 2000a: 106f; Barzel 2000: 214; Damren 2002: 101; Brinitzer 2003: 315). In a biodiversity context, third-party enforcement may include, for instance, the establishment of strictly protected areas, such as national parks, regulations for erosion control, subsidies for conservation farming, economic incentives for habitat protection or environmental taxes (Pretty 2002: 72). Regulations, standards and access restrictions can help to conserve the most threatened elements of ecosystems.

The better the monitoring of violations, and the greater the potential punishment in relation to the benefits of the offence, the more effective is the enforcement. One advantage of government enforcement is that the enforcers are responsible for monitoring and enforcement of a large number of institutions. This can provide savings from economies of scale and even of scope (Barzel 2000: 230f; see also North 1990: 58). It is often mentioned that legal systems enforce in a knowledgeable, sophisticated and low-cost way. In particular, the costs of establishing third-party institutions are, in comparison to instruments presented later, rather low. Even if one considers transaction-cost-intensive procedures of law-making in modern democracies, it is easier to create a law than to establish a reliable friendship or internalise a value (North 1990: 6; North 2000a: 8; see also Düsing 2002: 28). Nonetheless, one should be aware that such institutions can create high transaction costs. Information problems may occur if heterogeneous institutions are monitored with standardised methodologies. Monitoring third-party institutions, informing the police, investigations by external persons, trials at courts and the enforcement of fines may be very expensive (Williamson 1983: 519ff;

OECD 1999: 14, 50, 90; see also Hampicke 1992: 43; Derman 2000: 23) and beyond the means of poor land users in Southern Africa.

#### **2.3.4.2 Self-enforcement through reciprocity, hostages and physical force**

Self-enforcing contracts are effective because opportunistic behaviour promises lower gains than cooperation. No third-party enforcement is needed and under certain conditions the transaction costs of contract enforcement can be reduced (Batenburg et al 2000: 385; see also Williamson 1983: 520f). In this context, a relatively cheap form of self-enforcement is the use of hostages and pledges (North 1990: 54, Furubotn & Richter 1991: 22, 25; Garibaldi-Fernández 2000: 267; Menard 2000b: 241; Porsch 2000: 94; Richter & Furubotn 2003: 27, 184, 187, 527). Similar to third-party enforcers, contract partners can also use physical force as punishment against opportunism (Richter & Furubotn 2003: 528f). Another common self-enforcing institution is reciprocity. Specific reciprocity refers to the simultaneous exchange of items of roughly the same value (Pretty 2002: 70; Richter & Furubotn 2003: 367). Repeated and long-term contracts do work because all contract partners threaten to deprive benefits from future interactions (Klein 1985: 595; Furubotn & Richter 1991: 22; Barzel 2000: 218; Richter & Furubotn 2003: 182, 369, 528; see also Hampicke 1992: 45).

One transaction-cost-efficient enforcer of repeated contracts is reputation (Solow 2000: 8, Stiglitz 2000: 61; Barzel 2000: 213; Levi 2000: 142; Klocke-Daffa 2001: 322; Malin & Martimort 2002: 168; Brinitzer 2003: 45, 320, 325; Richter & Furubotn 2003: 27, 129, 184, 277, 527). Any analysis of rational behaviour must recognise the payoff-expectancies over a relevant period of time and can often not be understood on a case-by-case basis (Vanberg 2000; Klocke-Daffa 2001: 284). Reputation can be unspecific, which can be of advantage if the situation is uncertain and explicit and binding contracts are too expensive (Batenburg et al 2000: 386, Pretty 2002: 70). If A cannot ensure that B is satisfied with the unspecified outcomes of a contract, B will not do business with A again. Reputation can be transferred into social networks. In this case it provides a powerful mechanism to enforce agreements even for long-distance and impersonal transactions (North 1990: 54). The reciprocity logic is the same as in direct exchange relations: If A cheats B then all current and potential contract partners (B till Z) will not do business with A ever again. The sanction applied is then exclusion from the network (Ziegler 2000: 67). The past behaviour of A gives her/his potential business partners an idea of A's utility function (Esser 2000: 142) and her/his reliability. In this context, enforcement by reputation becomes more effective if reinforced by internalised norms (see Chapter 2.3.4.4; Klocke-Daffa 2001: 356). A's reputation renders

her/his future behaviour more predictable and B till Z can act on such predictions (Schofield 1985: 12). Any other potential contract partner learns whether A has strong values against non-cooperative behaviour. In this way, reputation creates trust (Stiglitz 2000: 65). As a consequence, the reactions of B till Z will have an impact on A's outcomes, and A must consider these reactions to her/his action. It is important for A to be aware of the knowledge potential partners have about her/his preferences (Schofield 1985: 12). The monitoring costs in social networks may thus be relatively high, because exchange partners need to learn whether a person has cooperated in the past (North 1990: 12, 54; Richter & Furubotn 2003: 409). Costs can, however, be shared within the network. They can be further reduced by using past rewards and punishments as indicators (Ziegler 2000: 67). Enforcement through reputation becomes less effective the smaller the probability of a planned repetition of the transaction and the higher the discount rate of the players (North 1990: 56).

#### **2.3.4.3 Social enforcement**

The recognition of a complex utility function (see Chapter 2.2.1) leads to the question of whether institutions can be further enforced on the basis of belongingness and status needs. Ziegler recognises sanctions that affect the social approval of the norm addressee (Ziegler 2000: 66f; see also Peters 2000: 12). As already elaborated, most contracts are embedded in social relations and networks (Macneil 1985: 542; Furubotn & Richter 1991: 20; Richter & Furubotn 2003: 185, 189, 323, 520; see also Brandt 1967: 214). They are regulated by trust, solidarity and respect (Bowles & Gintis 2003: 76). People strive for praise and avoid blame. Therefore, social control and pressure are effective enforcement instruments (Richter & Furubotn 2003: 166). Nature gave human beings the desire to be liked within their social environment (Smith 1789/2004: 171f, 176, 193; Klocke-Daffa 2001: Klocke-Daffa 2001: 329). Love, friendship and respect are the highest reward for our deeds (Smith 1789/2004: 252) and a forceful insurance against opportunism (Richter & Furubotn 2003: 35, 188).

In the course of social interactions, diffuse feelings of personal obligations, trust and thankfulness develop. Trust exists if person A has reason to believe that person B cares about A and that these incentives of B lead B to act in A's interest (Levi 2000: 139). Sympathy can be an important motive to act as well (Scanlon 1982: 116). These are important facts which create valuable expectations about the behaviour of other actors (Richter & Furubotn 2003: 321). A crucial role in social enforcement is played by the shared morals, culture, traditions and customs of a society (Brousseau & Glachant 2002: 22). The morals determine which actions are socially rewarded and which are punished in a community (Coleman 2000: 22f;

see also North 1990: 33; Richter & Furubotn 2003: 28). Such institutional incentives influence the expected utility of different actions. They rely on belongingness needs and the impact on social capital. Defecting members would experience social isolation (Hardin 1997: 270; Klocke-Daffa 2001: 329; Brinitzer 2003: 45, 120; Gächter 2003: 49) and would lose family, friendship and community ties (Coleman 2000: 17; Brinitzer 2003: 385), approval or status (Heath 1976: 4f, 56). This social punishment engenders feelings of loneliness, ostracism, rejection, friendlessness and rootlessness (Maslow 1987, see also Smith 1789/2004: 121; Becker 1974, Marinus 1998a: 104). Actions which lead to social censure therefore occur less frequently, even if, at first glance, they promise to yield high payoffs (Ostrom 1990: 35). Social institutions need not be formulated very precisely (Heath 1976: 56). Rather, they describe what is in general right or wrong (see also Krishna 2000: 77). What is used as incentive depends on what the institution addressee needs in the particular situation and what the institution provider can offer (Heath 1976: 57f). The flexible nature of rewards and punishments reduces transaction costs, especially in uncertain situations where it is difficult to create strict and explicit contracts (Richter & Furubotn 2003: 185f).

Social enforcement only works in personalised transactions. The contract partners must have established a social relationship and their utility must be affected by each other's respect and approval (Ziegler 2000: 67; see also Becker 1974; Levi 2000: 139, 152; Bidaguren & Estrella 2002: 130). Additionally they must have developed cognitive knowledge about the other's feelings, e.g. of love or friendship (Levi 2000: 139, 142). The ability to create approval is a valuable source of social capital (Katz 1974: 91). People feel obliged to follow the norms of the group with which they identify themselves. Identity and the sense of belonging, then, create the acceptance of norms (Gerhards 2000, see also Stiglitz 2000: 60). Uphoff (2000) describes three different connections in people's utility functions. In the case of "strangers", the utility of one person is independent from the utility of the second (Uphoff 2000: 223). Due to missing social connections, strangers will be more probably discriminated against in markets because contracts with them are more difficult to enforce (see also Heath 1976: 143). In the case of "enemies", one side derives satisfaction from creating dissatisfaction on the other side. As a consequence, social enforcement only works between "friends". In this case, the happiness of one person makes the other person happy as well (Uphoff 2000: 223).

The costs of enforcing compliance within social institutions tend to be lower than the costs of external enforcement (North 1990: 54, Ostrom 1990: 36, Levi 2000: 138, 151; Ziegler 2000: 67; Kirk 2000: 31). One reason is that the knowledge of the rules is shared by everybody in

the group and not entrusted to specialised experts (Benda-Beckmann 2002: 49). Social institutions must be externally monitored and enforced by the social environment. They require well-working social control (Ziegler 2000: 65). Nevertheless, the fact that social institutions are enforced in networks of people who have close contacts reduces monitoring costs (see also Ostrom 1990: 204). All members within the community are expected to help report and apprehend violators (Campbell et al. 2002: 52). The enforcement potential in social networks increases if the members are linked in multiple relations (Coleman 2000: 26). Multiple relations make possible more diverse rewards and punishments.

The establishment of social institutions usually takes time, and it is difficult to construct them through external intervention (Ostrom 2000: 173, see also Düsing 2002: 28; Pretty 2002: 73). A positive history of cooperation and the existence of local social structures are valuable preconditions for collective action (Meinzen-Dick et al. 2001). Due to the fact that social relations are fundamental human needs, they are often the by-product of social interaction and not purposely created (see also Coleman 2000: 35). Despite the fact that it takes time to develop them, they can erode both more rapidly and more easily than they are formed (Uphoff 2000: 227). Disturbing the morale of a social group managing natural resources can have disastrous consequences for biodiversity (O’Riordan 2002: 15). Social institutions can provide important incentives for internalising externalities (Heath 1976: 126). In many societies, social taboos and norms place limitations on resource use and play an important role in the management of common resources (Dovie et al. 2000: 343; Campbell et al. 2002: 50).

#### **2.3.4.4 Moral-based enforcement as internalised institutions**

The daily behaviour of people is not so much governed by laws or jurisdiction as by their values, customs and conventions. The cultural background and codes of conduct guide players, even though they could get away with violations (North 1990: 4, 33; Aoki 2000: 15; Searle 2001: 25; Richter & Furubotn 2003: 7). Behaviour which is motivated by a sense of duty does not even rely on the praise or blame of others but on the belief of the rightness of the action (Heath 1976: 2; see also Smith 1789/2004: 166). Such moral rules directly affect the satisfaction of the individual needs of self-esteem and self-actualisation (see also Frey & Stutzer 2002: 155; Brinitzer 2003: 68). People breaking rules will suffer even if no one learns about their actions (Smith 1789/2004: 179). Internalised institutions are independent from external monitoring and reinforcement (Brinitzer 2003: 34). The sanctions are self-blame and self-praise (Smith 1789/2004: 250; Ziegler 2000: 76). Acting against your values brings psychological costs, reduces self-esteem, utility or happiness and makes you feel shame and



guilt (Ostrom 1990: 35; Opp 2000: 57; Esser 2000: 138; Brinitzer 2001: 160; Frey & Stutzer 2002: 24, 28, 173, 181; Hart 2002: 184; Brinitzer 2003: 68, 316; Gesang 2003: 29, 43f, 119; see also Smith 1789/2004: 124ff; Mill 1863: 94; Heath 1976: 171; Searle 2001: 120).

Values do not have to be proven in daily life but are simply accepted (Solow 2000: 8). Often people are not even aware of them (Brinitzer 2003: 31). Every person has an idea of what is right and what is wrong (see also Smith 1789/2004: 14). Shared values, morals, convictions, common beliefs and internalised norms are crucial for the coordination of a society (North 1990: 14, 54; Herms 1997: 185; North 2000a: 7; see also Frey 2003: 22). Like any institution, they provide a reason to act (Scanlon 1982: 105). Knowledge about the morality of other people creates valuable expectations (see also Levi 2000: 139ff). Already, a person's membership in a certain social group which shares the same kind of education and socialisation creates expectations about the internalised institutions of this person (Pretty 2002: 70). Such expectations render people's behaviour predictable (Smith 1789/2004: 243ff; Schofield 1985: 13; Uphoff 2000: 219; Brinitzer 2003: 35, 45; Richter & Furubotn 2003: 128, 166, 519). This predictability reduces transaction costs. Positive expectations about moral arguments enable people who are all governed by the same morality to cooperate with one another (Scanlon 1982: 111; Uphoff 2000: 219).

It takes a considerable time to embed values and norms into a person. They cannot be bought and are slow to change (Aoki 2000: 12; Brinitzer 2001: 161; Hart 2002: 181; Brinitzer 2003: 31; Richter & Furubotn 2003: 103). Values, norms and beliefs are socially transmitted information, spread from one generation to the next via lengthy teaching and imitation (North 1990: 37; Ziegler 2000: 65, Solow 2000: 8; Brinitzer 2003: 74; Richter & Furubotn 2003: 519; see also Smith 1789/2004: 167f; Benda-Beckmann 2002: 68). Education which teaches the morals, ideology and culture of an organisation is expensive, but it is an important investment in the long run (Garibaldi-Fernández 2000: 256; Brinitzer 2001: 135; Richter & Furubotn 2003: 65, 103, 127, 317, 321; see also Mill 1863: 96; Scanlon 1982: 117).

Reinforcing institutions through norms, values and beliefs is often very efficient (Uphoff 2000: 228; see also Smart 1956: 171; North 1990: 138; Ostrom 2000: 178). It makes possible contracts which would be too expensive under third-party or market enforcement alone (Richter & Furubotn 2003: 327). One reason for this is that internalised institutions do not need any external monitoring or enforcement (Elster 1989: 131; North 1990: 40; see also Aoki 2000: 25; Pretty 2002: 70). People know whether they have done something right or

wrong according to their values. Sanctions are directly connected to the action (Esser 2000: 138f). Additionally, moral-based institutions are relatively unspecific. They can be applied more flexibly in insecure or uncertain situations where it is unprofitable to spell out the obligations in all the low-probability cases (Solow 2000: 8).

Why do people care about future generations who will never be able to punish or reward them in the present time? Why do they give nature a value in itself which exceeds ecosystem services and goods? Internalised institutions can help to answer these questions. A person who carries values which promote the well-being of future generations increases her/his utility by contributing to their happiness (Smith 1789/2004: 1; North 1990: 21; Ziegler 2000: 76; Uphoff 2000: 230; Becker 1974; see also Heath 1976: 60). The moral respect of the rights of future generations to natural assets is an important driving force against the destruction of nature (Stevens et al. 1991: 390; Hampicke 1992: 264; Loomis & White 1996: 198; OECD 2002: 75). Protecting the natural world heritage gives some people a feeling of belonging to a sensitive part of mankind which cares for neighbours and future generations (see also Hampicke 1992: 46ff; O’Riordan & Stoll-Kleemann 2002: XV; Tarr 2002c: 52f). Likewise, people who believe that biodiversity has moral, ethical, cultural and intellectual values increase their utility by protecting it (Blaikie & Jeanrenaud 1996: I, 7, 8, 10, 16f; OECD 1999: 9, 31, 34; O’Riordan 2002: 21; OECD 2002: 48, 85, 145; see also Lutzenberger 1998: 175; Rowthorn & Brown 1999: 315; O’Riordan & Stoll-Kleemann 2002: 295; Reid 2002: 311; OECD 2004: 21, 24; Trousdale & Gregory 2004: 280). They even recognise a moral obligation to protect species (Stevens et al. 1991: 390, 392, 396f; Deacon & Murphy 1997: 2; Schubert & Dietz 2001: 12; Raffaello 2001: 6; Grimble & Laidlaw 2002: 2, 7; O’Riordan 2002: 26; OECD 2002: 48; Tarr 2002c: 52; Gesang 2003: 106; OECD 2004: 21; Armsworth et al. 2004: 125). The loss of species makes people feel sad, ashamed, and guilty. Maintaining biodiversity gives them a feeling of fulfilment, pride and happiness (OECD 1999: 31, 67; OECD: 2002: 50, 66; O’Riordan & Stoll-Kleemann 2002: 295). People satisfy self-esteem needs by donating money for the preservation of wildlife that many of them will never see in their lives. Such markets for donations help to quantify the utility that biodiversity contributes to the satisfaction of self-esteem and self-actualisation needs.

Maintaining biodiversity is therefore also a question of enhancing respective internalised values (O’Riordan 2002: 16). Fighting the rapid depletion rate is to a large extent a call for proactive attitudes rather than the permanent enforcement of laws (Hinz 2000a: 161; Schubert & Dietz 2001: 22; Raffaello 2001: 27; OECD 2004: 29). The loss of species can only be

stopped if the internal values of people change (O’Riordan 2002: 4; see also Tarr 2002c: 52f). An intimate relation towards the environment is one reason to protect it (Pretty 2002: 67) whereas a culture of apathy and denial destroys it (Myers 2002: 46). It is important to take advantage of local cultures of stewardship for natural resources and environmental ethics (Steelman 2002: 148, 158). Strengthening values for biodiversity means raising people’s utility of biodiversity and increasing incentives to preserve it (see also Reid 2002: 312). Growing awareness of the causal links between people’s actions and biodiversity, and of the value of natural resources, can change people’s internalised norms.

#### **2.3.4.5 Supernatural enforcement**

In most societies, belief in a supernatural authority has evolved. Rules define what pleases and what displeases this authority, in order to avoid misfortunes such as disease, droughts and floods or in hope of supernatural support (Hamilton 1995: 123, 127, 138). People transfer control to a spiritual or moral authority they know only from imagination (e.g. Jesus) or the past (e.g. a parent long dead) (Coleman 1990: 504; North 1990: 33; Hamilton 1995: 114). Belief in a supernatural power provides order and structure to society (see also Hamilton 1995: 116, 140). A supernatural power controls, punishes and rewards (Smith 1789/2004: 248; Bentham 1789: 76; Höffe 1992: 26). Displeasing the power places a person in a situation of vulnerability and danger (Hamilton 1995: 124, 138). The fear of a supernatural power is a strong motive to act according to religious rules (Bentham 1789: 62f). Positive and negative events in one’s life are seen as a consequence of past positive and negative behaviour. To fulfil one’s duties means pleasing a supernatural power in order to improve the probability of being helped by it in future (Weber 1905a: 43; Klocke-Daffa 2001: 345, 356, 375). Rewards and punishments are expected not only in present life. The expectation of an afterlife in a Paradise or Nirvana is a source of happiness and an incentive to comply with rules. In contrast, afterlife in hell and eternal damnation are punishments for not following the rules (Smith 1789/2004: 137; Hamilton 1995: 116f; Hardin 1997: 162, 266; see also Bentham 1789: 76; Hampicke 1992: 43; Brinitzer 2001: 138; Frey & Stutzer 2002: 59; Brinitzer 2003: 39, 320). The use of witchcraft is another supernatural incentive. The threat of witchcraft-punishment is common in southern Africa and used to protect assets of individuals and to enforce social norms (Klocke-Daffa 2001: 332f). In all these ways, supernatural enforcement upholds ultimate values (Hamilton 1995: 117, 120).

It is obvious that monitoring and enforcement costs of supernatural institutions are very low (Brinitzer 2003: 325). Nothing remains uncovered and every action will be taken into

account. An all-knowing supernatural power which can see into the past, presence and future punishes and rewards behaviour even if no other human being knows about the deed (Smith 1789/2004: 258; Brinitzer 2003: 325). Depending on the strength of belief, these institutions can be very effective. Amongst people who believe in these values, behaviour becomes more predictable. Supernatural institutions can be unspecific, although many of them define behaviour in very concrete situations. Very high costs occur when supernatural institutions must be established in people's minds (Brinitzer 2003: 46, 74). As is the case with moral-based institutions, it is difficult to convince people to adopt beliefs. Innumerable missionaries sacrificed their lives to persuade African people to believe in their rules. High costs occur also when supernatural institutions have to be adapted to new circumstances (Brinitzer 2003: 46, 74). Usually only a few specialists, such as charismatic prophets, are agents of religious change. The priesthood has certain opportunities to interpret religious principles, but generally has the task of preserving tradition (Hamilton 1995: 140, 142).

Supernatural enforcement is highly relevant for biodiversity preservation, and the religious as well as spiritual values of a resource are important incentives to protect biodiversity (OECD 2002: 44; see also Tuxill 1999: 110; RoN 2001h). In many societies, nature has been created by some kind of God. One can read, for instance, in Namibian policy papers that forests are a gift from god (RoN 2001h). To conserve nature is for many people a command of transcendent origin (Hampicke 1992: 55). They protect it because they fear God's punishment (Hampicke 1992: 264). The demise of dozens of species per day is, in the eyes of the faithful, an offence to the creator (Myers 2002: 48).

### **2.3.5 The relation between different forms of institutions**

Table 1 summarizes in a simplistic way the advantages and disadvantages of different enforcement instruments. No enforcement instrument is perfect but all have their worth (North 1990: 35; North 2000a: 8). They have to be appropriate to local conditions and situation-specific variables (Barzel 2000: 211; Ostrom 1990: 90). Table 1 describes only the tendency derived from the theoretical assumptions presented above.

It remains a challenge to use the advantages and disadvantages of different institutions under different circumstances in order to find an effective institutional framework at lowest possible costs. A mixture of different instruments seems to be most promising. Exclusive third-party enforcement of conservation will fail to the same extent (Blaikie & Jeanrenaud 1996: 70) as exclusive social enforcement. Efficient agreements are, however, more probable if one is

embedded in the other (Barzel 2000: 212). Different biodiversity users will respond differently to particular instruments. It is the specific mixture of institutional incentives which influences the choices of decision-makers and hence, the preservation of biodiversity (North 1990: 53; OECD 1999: 10, 50; see also Marinus 1998a: 197; North 2000a: 8; Serageldin & Grootaert 2000: 54; Steelman 2002: 163). Three kinds of relations are possible between different institutions. They can be totally independent of each other, they can contradict each other and they can support each other. Where formal and informal constraints are not complementary (North 1990: 87) and de jure and de facto institutions are contradictory (Ostrom 1990: 51), certain actions are rewarded socially but punished by law, or vice versa (North 1990: 91; see also Smith 1789/2004: 270; Cousins & Hornby 2000: 26; Düsing 2002: 27). In such situations, incentives work against each other and become less effective (Opp 2000: 60; Ostrom 1990: 214; North 2000a: 8; Frey & Stutzer 2002: 182; Okoth-Ogendo 2002; Mamdani 1996: 136). Contradictory institutions increase transaction costs, whereas supporting ones decrease them (see also Aoki 2000: 17).

**Table 1:** Transaction costs of alternative enforcement instruments

	<b>costs for establishing institution</b>	<b>monitoring/control costs</b>	<b>enforcement costs</b>	<b>specificity</b>
<b>external impersonal enforcement</b>	low	high	high	high
<b>self-enforcement through reciprocity or hostages</b>	medium	medium	medium	medium
<b>social enforcement</b>	high	medium	medium	low
<b>moral-based enforcement</b>	high	low	low	low
<b>supernatural enforcement</b>	high	low	low	medium

Any acceptance of institutions is dependent on the natural, cultural and social context (OECD 1999: 69; Garibaldi-Fernández 2000: 254; Pretty 2002: 68; see also Düsing 2002: 27; Cousins & Hornby 2002: 5). Dülfer (1999: 219, 229) describes a general tendency: First there must be values which are strongly connected to the specific perception of the environment. Second, these deep-seated cultural values are preconditions for social relationships and institutions (North 1990: 91, Marinus 1998a: 114; Marinus 1998b; Dülfer 1999: 219, 229; Opp: 2000: 62; Richter & Furubotn 2003: 193; Bochniarz & Bolan 2004: 85). Third, social relationships are anchored in legal and political norms (Dülfer 1999: 219, 229; Bochniarz & Bolan 2004: 85; see also Macneil 1985: 545). Weber describes developments in the economic and political order as the result of changing religious and ethical norms (Weber 1905b). To encode customary practice into formal law is much easier than the other way around (North 1990: 43; Opp 2000: 53; see also Hinz 2000a: 24; Hinz 2000b: 46). Customs, values and norms can be established only over a long period of time, which is not necessarily the case for formal laws.

Institutions are created through existing ones and are therefore path-dependent (Opp 2000: 62; see also Brinitzer 2003: 86; Düsing 2002: 28). Because formal and informal institutions affect each other (Garibaldi-Fernández 2000: 255), a starting point for adjusting institutions should be social and internalised institutions. This avoids contradictions and promotes support. For these reasons, the formalisation of natural resource management regulations should be based on the de facto practiced distribution of property rights for natural resources (Cousins & Hornby 2000: 26; see also Hara et al. 2000: 71; Norman 2000: 78; Kössler 2003: 16).

Public policies which impose new rules without recognising existing social capital can destroy this capital (Ostrom 1990: 23, 184, see also Ostrom 2000: 182). Stiglitz worries about abundant examples where powerful governments disrupted local institutional structures without being capable of covering the transaction costs to replace them with anything functional (Stiglitz 2000: 67). Ignoring or degrading customary practices without creating acceptance for alternative ones is profoundly counterproductive in achieving sustainable biodiversity management (O’Riordan 2002: 8).

Nevertheless, norms and values do also respond and adapt to external stimuli (Okoth-Ogendo 2002, North 1990: 40, Dülfer 1999: 219, 228). Sometimes formal rules are purposely enacted to modify, revise or replace informal constraints (North 1990: 88). This usually happens if informal rules stand in the way of desired developments (North 1990: 47). It is naive to presume that traditional customs always support basic human rights (e.g. in the case of the corporal and death penalty) (RSA 1997a) or biodiversity preservation (O’Riordan 2002: 8, Pretty 2002: 74). Interventions are effective if the monitoring and enforcement of formal institutional incentives is strong enough. Nevertheless, one should be aware that the transaction cost of superseding norms, values and customs can be very high (see also O’Riordan & Stoll-Kleemann 2002: 106). Even in cases where values contradict human rights or biodiversity conservation, the closer the rules are to these values, the easier it will be to enforce them. Should the external rules not lead to a modification of social or moral-based institutions, the rule addressees will immediately shift back to their old practices as soon as the external rule loses its effectiveness (see also Pretty 2002: 72, 74). Rules based on social and moral-based enforcement are therefore institutionally more sustainable.

State as well as market institutions need to be supplemented by informal ones (see also Marinus 1998a: 115; Arrow 2000: 5; Krishna 2000: 77). The importance of social and internalised institutions becomes clear if one observes how differently similar sets of formal

rules perform in different societies (North 1990: 101; OECD 1999: 69; Düsing 2002: 28). Okoth-Ogendo (2002) emphasises that the principles of the Common Law of England embody the customary law of the English people. “Formal rules in even the most developed economies make up a small (...) part of the sum of constraints that shape choices. (...) Our daily interaction (...) is overwhelmingly defined by codes of conduct, norms of behaviour, and conventions” (North 1990: 36; see also Cousins & Hornby 2002: 5). Formal rules are too unclear to provide exact behavioural recommendations under conditions of uncertainty and incomplete contracts (see also Bowles & Gintis 2003: 75). Strict adherence to them leads to pedantry (Smith 1789/2004: 264). The state never makes the necessary daily adjustments which are required for the effective operation of social, legal and economic systems. Social and moral norms guarantee their stability and functionality (Richter & Furubotn 2003: 520; see also Fehr 2003: 11). Within the formal institutional frame, our internalised values and our social environment tell us how to behave (Smith 1789/2004: 268). Formal law will remain an unrealistic arbiter of disputes as long as it remains disconnected from the practiced institutions that frame the lives of people (Cousins & Hornby 2000: 24; Damren 2002: 104).

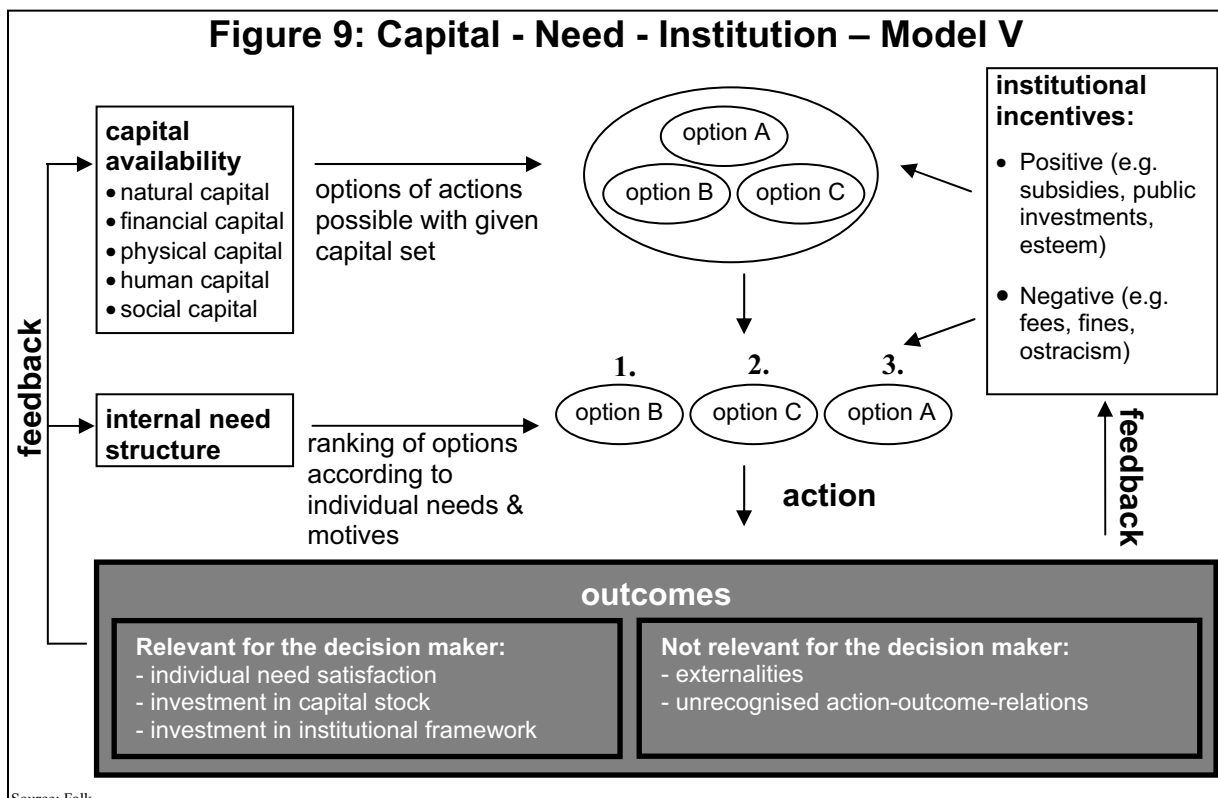
The low costs of monitoring and enforcement render social and moral-based institutions superior to formal ones in daily life. Social legitimacy provides the sanctions upon which formal institutions ultimately depend for their effectiveness (Owusu 1992: 382; Jones 1995: 7; Fuller & Turner 1996: 4f; see also Tyler 2003: 62; Bochniarz & Bolan 2004: 86). In the absence of informal institutions, expensive bonding and insurance devices are necessary (Coleman 2000: 17). Norms such as honesty and integrity reduce transaction costs (North 2000b: 41). In many instances the participants themselves can devise more satisfactory solutions to their disputes than can professionals limited to applying general rules on the basis of incomplete knowledge of the dispute (Galanter 1981: 4; Williamson 1984: 208; Goldberg 2002: 126; Williamson 2002: 52; Bowles & Gintis 2003: 78; Richter & Furubotn 2003: 169). In societies where all members share the same ideological framework, formal rules need not be defined very clearly and enforcement requirements are relatively low (North 1984: 11). Taking the values and moral of stakeholders into account reduces the costs of monitoring and enforcement and increases institutional efficiency (OECD 1999: 62, 65, 71f).

Nonetheless, in many instances informal institutions require external reinforcement (see also Uphoff 2000: 232, Frey & Stutzer 2002: 182). Socially enforced institutions, for instance, do not work with people who do not care about positive social relations with those who pay negative externalities (Ostrom 1990: 206). Biodiversity activists who cannot convince loggers

that their activities are a moral disaster must look for other arguments, such as external enforcement (Smith 1789/2004: 133). An exclusive reliance on values and social institutions is unrealistic. One can rely on low cost social and moral institutions as long as they are instrumental, and can guide and support them where needed, but more expensive external enforcement is required if the first fail (Steelman 2002: 159f; see also Düsing 2002: 252).

## 2.4 Outcomes of actions

Possible outcomes of human behaviour have been discussed within the Capital-Need-Institution Model already. Chapter 2.2 concluded that people act in order to satisfy various needs. Previous need satisfaction can influence future decision making. It is often assumed that the marginal satisfaction of a need decreases the more it is satisfied. The more we have of one thing, the less we value it (Heath 1976: 9). According to Engel's law, people with increasing income spend a decreasing percentage of their income on food. The marginal utility of consumption decreases with each additionally consumed good (Heath 1976: 9; Hampicke 1992: 51; see also Engel 1877). Maslow expresses with his deficit principle that needs are only motivating as long as they remain unsatisfied to a certain degree (Maslow 1987). Neither Maslow himself nor Lawler and Suttle could, however, empirically prove this assumption. Lawler and Suttle came to the conclusion that increasing need satisfaction does not reduce the importance of the need (Lawler & Suttle 1972: 283). Also Frey and Stutzer question such assumptions. At least in the long run, people get used to new circumstances and





levels of need satisfaction. Due to the adaptation process, the happiness generated from higher need satisfaction decreases and a still higher level is strived for (Frey & Stutzer 2002: 12, 78).

A common outcome of actions is a decreased capital base. Spending money to satisfy needs leads to a reduction of financial capital. Also physical and some social capital retrench when being used. Human capital rather needs to be regularly used to maintain its stock. Natural capital has the ability to regenerate to a certain degree as long as it is not overused. Not to overuse capital is a factor influencing the choices of decision makers. Generally, the behaviour of a decision maker is sustainable if her/his actions in a certain period of time do not diminish her/his capital stock in a way that her/his future action options are less than the ones she/he had in the past. But just maintaining the capital stock is not the only motivation of people. In Chapter 2.1, we learned that a motivation for people to act can also be to invest in their assets in order to improve their future opportunities. The production of means of production shows that people spend significant resources without directly satisfying needs. They do so because the produced physical capital enlarges their future action options and allows them to satisfy their needs in the long run to a higher degree. In the same way, not overusing natural capital and maintain biodiversity are investments in the future.

With the same intention people also try to change institutional constraints (North 1990: 79; see Chapter 2.3.1) in order to increase the future potential to satisfy their needs and to reduce the capital demand of future actions. For a person experiencing negative externalities due to other persons' actions it can be a motivation to change institutions in a way that her/his need satisfaction and capital stock is no longer negatively affected. Often, however, the intention is consciously to create externalities by promoting rules which guarantee that the decision maker will not have to pay all costs resulting from his behaviour.

Externalities which do not affect decision-makers are very hazardous for biodiversity maintenance. The internalisation of externalities is the mayor challenge of biodiversity preservation. Apart from externalities one also has to consider that decision makers often do not recognise all outcomes. How well real need satisfaction and capital investments correspond to expected ones strongly depends on the ability of the decision-maker to assess the decision-making situation realistically.

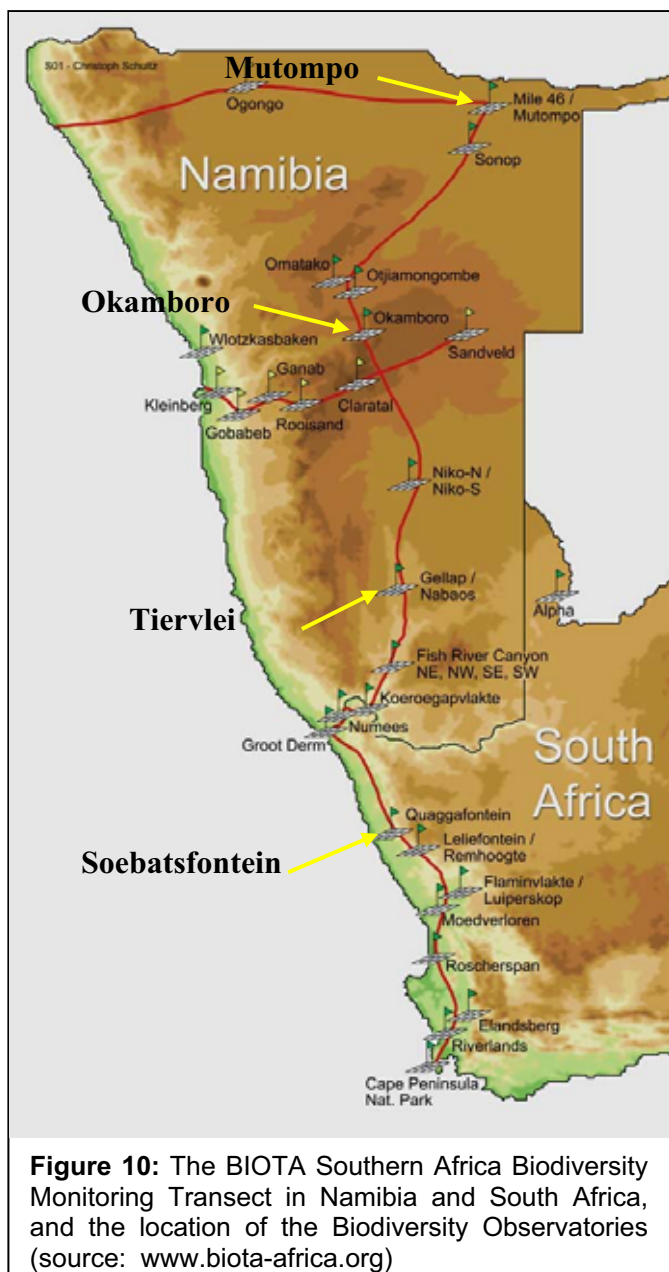
## **2.5 Summary**

The Capital-Need-Institution-Model helps to understand human actions from the decision-maker's point of view. To summarise this model, it can be said that a person's capital endowments determine her/his possible actions. Out of all possible options, she/he chooses the one which satisfies her/his needs in the best way. Complex capital dimensions and multidimensional utility functions are recognised. Natural, physical, human, financial and social capital can be distinguished. Fundamental human needs are physiological, belongingness, self-esteem, cognitive and safety needs. The awareness of complex utility functions is highly relevant in the biodiversity context, since many benefits from sustainable as well as unsustainable resource use cannot be compared simply in monetary terms. This fact aggravates the problem of internalizing externalities, with externalities being a mayor threat to biodiversity maintenance. Institutions can help to internalise them. They steer human behaviour by altering the attractiveness of options through broadening or constraining capital availability and changing expected need satisfaction. Alternative enforcement instruments influence distinct need categories and can be combined in order to provide the most effective and efficient institutions. Different stakeholders have different asset advantages for providing institutional services. The presented Capital-Need-Institution-Model will be the framework for the empirical studies which follow. Capital availability and utility function of communal farmers in four settlements in Namibia and South Africa will be analysed. Institutional incentives will be a major focus of the research because of their strong impact on biodiversity maintenance.

### 3 Project background and methodology

As it has already been mentioned, the presented research has been carried out in the framework of the research project Biodiversity Monitoring Transect Analysis (BIOTA) in Southern Africa, which has been initiated and financed by the German Government/Federal Ministry of Education and Research (BMBF). Apart from BIOTA Southern Africa, there is also BIOTA West Africa, BIOTA East Africa and BIOTA Morocco. The project can be described as a cooperative network with goals, structures and activities jointly being defined by scientists and institutions from Benin, Burkina Faso, Germany, Ivory Coast, Kenya, Uganda, Namibia and South Africa.

The major objective of the BIOTA Southern Africa project is to obtain knowledge for decision-makers about the feasible and sustainable management of biodiversity in Southern Africa (see also [www.biota-africa.org](http://www.biota-africa.org)). In order to acquire this knowledge, standardised tools for the long-term monitoring of biodiversity have been developed. The research applies standardised methodologies on 35 permanently marked so-called “Biodiversity Observatories” of one square kilometre each. These Biodiversity Observatories were established along a 2,000 km transect, covering the major biomes along the main rainfall gradient leading from the summer-rainfall area of northern Namibia to the winter-rainfall Cape region of South Africa (Figure 10) (Jürgens *et al.* 2001). On and around the observatories, inventories of flora and fauna, soil analysis, mycological



assessments, meteorological studies, remote sensing and socio-economic research were carried out. The standardised inter-disciplinary methodology pursued, enables a large-scale comparison of research results.

This book represents a part of the socio-economic work of BIOTA. The socio-economic working group aimed to provide a broad understanding of the human impact on changes in biodiversity, and of changes in biodiversity on human livelihoods. The working group concentrated its activities on the one hand, on modelling commercial farms in central and southern Namibia. The aim of this research was to demonstrate the long-term effects of different land use options on biodiversity preservation. On the other hand, intensive research was carried out in four communal settlements along the transect. This part of the research concentrated on communal areas, because of continuing scepticism amongst politicians and scientists as to whether a communal land management system can promote biodiversity preservation (see e.g. RoN 2001).

Out of 35 BIOTA-Observatories, six were selected for the research presented here. The main focus lies on four observatories in the Namibian communal areas of:

- a) Kavango (Mutompo, 18° 18' S, 19° 15' E),
- b) Ovitoto (Okamboro, 22° 01' S, 17° 03' E),
- c) Berseba (Tiervlei, 26° 23' S / 17° 59' E),

as well as one observatory in South Africa in

- d) Namaqualand (Soebatsfontein, 30° 13' S / 7° 33' E) (see Figure 10).

On the Mutompo as well as the Tiervlei site one observatory has been established on communal land and one on neighbouring government research farms. In Mutompo, the government farm is Mile 46 and in Tiervlei it is Gellap/Ost. It is therefore possible to observe fence-line effects in Mutompo and Tiervlei and to interpret biodiversity differences in line with socio-economic data. For interregional comparison along the BIOTA transect, natural conditions at the Biodiversity Observatories must be representative of the respective regions. In Okamboro and Soebatsfontein, such representative places could only be identified more centrally in the communal areas. It was therefore not possible to set up Biodiversity Observatories for alternative resource management systems of sufficient geographical closeness, in order to clearly relate variations of flora, fauna and soil composition directly to variations in land management.

For the socio-economic research in communal areas, the research units are the households forming the communities. In the researched countries, a community is broadly defined as a group of people inhabiting a common geographic area. In order to identify concrete research units, each Biodiversity Observatory was correlated with a respective settlement. In all four cases, it was possible to clearly associate the observatories with one settlement whose households utilize and determine the use of the natural resources of that observatory. As mentioned above, these settlements are Mutompo, Okamboro, Tiervlei and Soebatsfontein.

The research has the character of comparative case studies. The strong focus of the BIOTA project on natural sciences forced the socio-economic subproject to work on research sites which are representative of the ecological conditions but not necessarily representative of the socio-economic ones. As mentioned above, socio-economic data had to be directly linked to the inter-disciplinary data on the Biodiversity Observatories. This had a negative impact on how representative the results were and restricted opportunities for socio-economic research and analysis. Each settlement associated with one observatory only has a low number of households. In Mutompo, the land was used by 14 households only, in Okamboro as well as Tiervlei – 26 households, and in Soebatsfontein – 17 households respectively. The low population limited certain possibilities, e.g. the development of quantitative models.

The presented research was carried out during the pilot phase of the BIOTA project (2000 – 2003) during which investigations concentrated on basic information on biodiversity and the factors influencing its change. This is why an explorative research strategy was chosen. The focus was on first time discovery of main factors and connections. The results of this explorative study were supposed to be the basis for further in depth analysis during the second and third phase of BIOTA (2003 – 2009). The expectations and framework of the BIOTA project during the pilot phase and the resulting research strategy strongly influenced the character and methodology of the study. In order to explain the complexity of interactions between ecological and social systems, the assessment of a wide range of social and economic variables was required. Most of these variables are complex, interwoven and difficult to measure. A relatively qualitative research design has been chosen in order to assess them properly.

In addition, qualitative methods have been applied because the main aim was to understand actors' perspectives and their behaviour rather than to receive an objective portrayal (Flick 1999: 60). The theoretical basis for this approach is the assumption that human decision-

making is determined by perceived costs and benefits, no matter what the actual costs and benefits are (see also Düvel & Stephanus 2000). People's cognitive capability is limited (Ostrom 1990: 25; Coleman 1990: 503f; see also North 1990: 111; Williamson 2002: 53). They make their decisions regarding natural resource management on the basis of the capital constraints they see, the needs they feel, and the institutional incentives they recognise (Frey & Stutzer 2002: 14, 22f). Real but unperceived capital constraints, need satisfaction, and institutional incentives do not affect the decisions of resource users. This fact and difficulties in reliably measuring different capital, need and institution dimensions meant that most variables were not directly measured but were assessed on the basis of the respondents' perceptions. Nonetheless, as far as possible, secondary data have been used in order to compare perceived and real capital constraints, need satisfaction and institutional incentives. Such comparisons provide valuable information for interventions aimed at raising awareness and education. However, in the case of many variables the lack of available data and researchers' time constraints did not allow the cross-check and validation of the given answers reflecting resource-users' perceptions. The researchers' task during the following project phases was an in-depth analysis of the most important phenomena detected during the pilot phase.

The BIOTA-colleague Ute Schneiderat started the social-economic research of communal areas with a census of the resource users of four communities. Their livelihood strategies were studied and analysed. Additionally, the use practices of natural resources were observed for the communal areas as well as the reference areas on the government research farms. The impact of such practices as herding and firewood cutting in the vegetation around the households and the Biodiversity Observatories was researched in detail for different seasons of the year (Schneiderat 2004).

The research presented in this book comprises the second step of the study of communal natural resource use systems. The objective was to explain why communities use natural resources in the observed way. Understanding the rationality of decisions regarding natural resource use practices helps to predict human actions and to identify appropriate institutional incentives in order to internalise externalities.

The theoretical research process started with a familiarisation with the research issue. The available books, journals, internet sources, government publications, official statistics and legislations were reviewed, with special emphasis on publications produced by Namibian and

South African scientists. In addition, a wide range of theoretical literature was reviewed with special emphasis on publications in the field of New Institutional Economics. As a result of the theoretical analysis, the Capital-Need-Institution Model (see Chapter 2) has been developed as conceptual framework for the empirical research. The Capital-Need-Institution Model integrated different theoretical concepts into one framework. Therefore, the document analysis incorporated publications related to a wide range of fields of economic, social and psychological theory. In addition, material regarding historic and current ecological, social and economic phenomena of the geographic region of research has been collected. Due to a high heterogeneity of the research sites, even within one country, specific information for different ethnicities and districts have been analysed. The last part of the document analysis, in particular, has been continuously updated in order to guarantee that the book is not outdated.

The empirical research process started with the preparation of the surveys. Due to the small population of the researched settlements no sampling had to be done. The entire population of all four communities was interviewed at a household level. Personal interviews were chosen as the survey method. Working directly with the respondents gave them an incentive to answer the questions. The target group would not have been willing to fill in questionnaires on their own. Data obtained in face-to-face interviews is more detailed (Denscombe 2003: 8). It was also the only way illiterate respondents could answer the questions. If questions were not understood it was possible to explain. In addition, personal interviews offer some immediate means of validating the data. The researchers can sense if they are given false information (Denscombe 2003: 8).

The operationalisation of the theoretical constructs of the Capital-Need-Institution Model was a serious challenge. Different capital categories, needs and institutional questions had to be formulated in simple variables which are also easily understood by uneducated people. One also has to consider that questions and variables had to be understood by people living in four different ecological, social, economical and cultural environments. The respondents' relative inability to think in abstract terms limited opportunities of measurement. This is why most variables have a nominal or ordinal level of measurement. Only seldom, such as in the case of livestock numbers, was ratio measurement possible. As often as possible respondents were asked to rate their perceptions on a 1-to-5 response Likert scale. Variables' low level of measurement again limited the possible analysis, e.g. the development of quantitative models. Semi-structured questions were used to receive qualitative explanations of the given answers

and to obtain a detailed picture of a respondent's belief about, or perceptions of, a particular topic. Questionnaires were pre-tested in settlements neighbouring the research sites. After several changes they could then be used at the research sites.

Every head of household in each of the settlements was interviewed twice to four times. During the first interview, they were asked about the quality and quantity of indicators of their financial, physical, human, social and natural capital. During the second interview, motives for livestock ownership were assessed using a set of Likert scaled variables (see Appendix 1). This part of the research was not carried out in Soebatsfontein due to the very short farming history at this site and the fact that, at the beginning of the study, only very few residents owned livestock. During group discussions with members of all households of each settlement a PRA resource mapping was carried out. Additionally, BIOTA-colleague Ute Schneiderat developed GIS-maps of the village territories. On the basis of these drawings and maps, the third round of interviews was carried out. The village territory was split by the residents into distinctive areas. For each area the respondents were asked how they used the area, how property rights were distributed, according to their perception, and whether they recognised externalities. In Soebatsfontein and Tiervlei, intra-community institutional arrangements could immediately be identified related to the spatial management of pastures. This was more difficult in Mutompo and Okamboro. Therefore, at the latter two sites additional assessments of pasture distribution were carried out. Farmers were asked which impact the use of different pasture areas in different times of the year would have on their availability of capital and satisfaction of needs. Responses were cross-checked during participant observations as well as joint walks and drives. Data was preliminarily analysed and discussed during group discussions with members of all households.

The case studies' objective was also to test methods for later research phases. This is why a conjoint measurement was carried out in Mutompo. Conjoint Measurement is a tool for measuring the utility of attributes and attribute levels which contribute to the preference of attribute combinations. It is applied where the utility of an attribute level is difficult to measure in quantitative terms (for further information on Conjoint Measurement see Backhaus et al. 2000). The method was used to compare the utility of different subsistence-oriented activities which can not easily be evaluated in monetary terms.

Relevant stakeholders, such as traditional authorities, state representatives at national, regional and local levels, and local scientists were interviewed with semi-structured



questionnaires. Interview schedules were adapted to the respondent's field of expertise. The open interview schedules guided the interviews but gave respondents the opportunity to actively influence the direction the interview took and allowed them to introduce new issues.

During field research, from two to four BIOTA-researchers visited the settlements for a period ranging from one to six weeks. The group stayed in the settlements, usually camping. Settlements were revisited in turn. The average total research time in each settlement was approximately four months. The repeated presence of the researchers in the settlements over a period of three years positively influenced the level of trust between the researchers and the communities. Since the researchers automatically helped the communities resolve emergency situations (e.g. transport to hospitals or repairs of broken infrastructure) there was much goodwill amongst the respondents to support the research.

Residents of each settlement communicate in a different language. Therefore, interviews in most of the cases had to be carried out through interpreters. During a detailed briefing not only the formulation but also the concept of all questions and variables was explained to the translators. No more than two interpreters were used in each settlement in order to reduce the danger of bias. Nonetheless, in each settlement different translators had to be hired. In Tiervlei most interviews were carried out by the Namibian BIOTA-colleague Bernadette Bock in Afrikaans, the respondents' mother tongue.

The first step of data analysis was to summarise and simplify the large amount of data collected using descriptive statistics and graphics analysis. The basic features of the data were thus described by calculating and visualising frequencies and mean or median value. The second step of data analysis was to carry out significance tests. Wilcoxon Rank Sum Tests were used to compare the location of two variables in one settlement. This non-parametric test requires no assumptions about an underlying normal distribution can be applied to variables with an ordinal level of measurement and is especially appropriate for small populations as in the case of this study. The method employed is a sum of ranks comparison. In addition, Kolmogorov-Smirnov-Tests were used to compare the location of one variable between different settlements. The Kolmogorov-Smirnov-Tests is also a non-parametric test which requires no assumptions about an underlying normal distribution and which can be applied to variables with an ordinal level of measurement.

The third step of data analysis was to carry out correlation analysis to describe the degree of relationship between different variables. The method used was Spearman's Rho correlation. Spearman's Rho correlation uses a ranking system to assess the degree of correlation existing between two sets of data. The two sets of data are placed in rank order so that they can be compared statistically. Due to this methodology the instrument can be used for variables with an ordinal level of measurement. 163 variables were analysed in this way. No correlation matrixes have been presented in the book because of the large amount of variables. Significant correlations, which can be logically explained, have been cited in footnotes.

The chosen methodology therefore allowed the description of the relation between resource use and biodiversity in a very broad way, considering a wide range of aspects. Different factors limited, however, opportunities to develop a more quantitative methodology. These are the BIOTA expectation to explain the human-nature interrelation as completely as possible, the large amount of variables to be assessed, the linking to BIOTA observatories with small populations using the areas, the target group's low level of education resulting in low level of measurement of variables and few secondary data which could be directly related to the observed settlements.

## 4 Mutompo/Mile 46

The first researched settlement is situated in the Kavango region. Two BIOTA observatories have been established there in order to compare the state of biodiversity in relation to the management system. These are located approximately 65 km south-west of the regional centre Rundu. One has been set up on the territory of the communal settlement Mutompo, which belongs to the Kapako-constituency and the ethnic area of the Mbunza group. The second observatory lies on the Livestock Development Centre Mile 46. Both observatories are situated side by side, divided only by a fence.

The Okavango Native Territory was set aside as a reserve in 1937 (Yaron et al. 1992: 182). Colonial exploitation of forests began in the 1930s. Nevertheless, in the early 1990s, when large-scale commercial logging of high-quality wood ceased, Namibian forest resources were in a much better condition than those of neighbouring countries (Mendelsohn & el Obeid 2003: 67; Hailwa 2002). Only in the 1970s did the first permanent settlement evolve around the Mutompo area. At this time, land for grazing and crop cultivation was becoming more and more scarce along the banks of the Kavango River, where the settlers came from (see also Yaron et al. 1992: 87; Werner 2002: 15; Mendelsohn & el Obeid 2003: 82). The soils at the river had become increasingly depleted and yields were significantly higher further inland (Tapscott 1994: 3). Since the beginning of the 20<sup>th</sup> century, the Kavango population has increased by more than 40 times (Mendelsohn & el Obeid 2003: 12). Land became scarce at Mupini, a village close to the river west of Rundu. The husband of the current headwoman left Mupini in the early 1970s to investigate inland places around today's Mutompo settlement, which had not been settled previously due to a water shortage (see also Yaron et al. 1992: 41). Around Mutompo, ground water is difficult to access; borehole pumps were installed only later. Before the headwoman's husband founded Mutompo, no livestock had been kept and no fields had been cleared in the area, a fact confirmed by aerial photographs taken in 1972 (Mendelsohn & el Obeid 2003: 114). The place was not only suitable for cultivation and grazing livestock but was also a good hunting ground.

The main problem in the early 1970s was the water supply. At the beginning there were no pumps and only non-permanent water holes. Around Mutompo one still finds some so-called Ndombes, small ponds with clayey soil, where water stays a relatively long time. Due to the water shortage, the first land-use activities concentrated on rain-fed cultivation. Only oxen

were taken to Mutompo as draught animals. In the 1970s a water hole was drilled and a hand pump installed. In 1989 the supply further improved with the installation of a diesel pump and a water reservoir. In 1991 approximately 46 percent of all Kavango households had access to safe water (RoN 1995b: 8). According to the first Mutompo residents, this improved water supply attracted more people and the settlement has since grown rapidly. The increasing population density has led to a recognisable decline in wildlife numbers. With the installation of a water point in Mutompo, the pressure on riverbank land decreased but the transformation of almost untouched inland forest began.

Village life in the 1980s was affected by the liberation war between the South West African Peoples Organisation (SWAPO) and the South African Defence Force (SADF) (see also von Garnier 1986; Cole et al. 1998: 2). During this time, the preservation of the natural environment was of low priority (Hailwa 2002). The SADF regularly burned the forest in order to detect the trails of their opponents. Villagers report that the SADF even attacked the settlement in 1982 because it suspected it of being a guerrilla hide-out. After this event, all the people left the area for years with all their livestock and went back to the Kavango River. In 1986 the first residents returned to Mutompo, since the scarcity of land at the river had not improved (see also Eriola et al. 1990: 45).

Section 4.1 will briefly describe the situation at Mile 46 before a detailed assessment of the communal settlement at Mutompo is provided in Sections 4.2 to 4.4.

## ***4.1 Overview of the Mile 46 Livestock Development Centre***

The Mile 46 Livestock Development Centre was established in 1982. The farm borders on the territory of Mutompo in the east and is enclosed by a fence.

### **4.1.1 Capital availability**

For years the research farm “Mile 46” had no proper management. The infrastructure was poorly maintained. Due to damaged fences no rotational grazing was possible and livestock moved freely throughout the farm. Since 2003, the farm manger started to repair infrastructure. Fences have been fixed and new structures built. Stocking rates at Mile 46 are lower than in Mutompo. In 1993, 120 cattle were kept on 5770 ha land and in 2000 approximately 300 units (ISNAR 1993). This is equivalent to 90 ha/LSU in 1993 and 37 ha/LSU in 2000. The recommended stock density for the region is 9 ha/LSU (Mendelsohn et al. 2002)<sup>1</sup>. The research station staff recommends 17 ha/LSU. Exact farm records have been

lost, but representatives of the Directorate of Extension reported that since independence, stocking rates have always been at a very low level of between 100 and 250 animals.

#### **4.1.2 Objectives of the research farm**

The main objective of the Livestock Development Centre was and still is the improvement of local livestock breeds. Only at the end of the 1980s was the farm used to produce meat. In 2004 it was planned to raise breeding bulls in order to sell them at low prices to communal farmers to improve their herds. Alternatively, the farmers should have the opportunity to exchange one of their own animals against an improved breeding bull. In future, apart from breeding experiments it is planned to offer training courses for communal farmers.

#### **4.1.3 Institutional framework**

Mile 46 belongs to the Kahenge-constituency within the ethnic area of the Kwangali group. In 1982, the Hompa of the Kwangali agreed to establish the farm if it was used to support the community with breeding bulls. The administration of the farm was repeatedly transferred between different departments within the Ministry of Agriculture, Water and Rural Development. Since 2002, it has been managed by the Directorate of Research and Training. The farm manager receives an annual budget which is independent from his performance. The money from livestock sales is paid to the Ministry's account. There are no incentives to produce or sell higher numbers of high-quality livestock. Due to low sales numbers and purposely low prices, the farm can only be sustained through government support. Workers are only allowed to keep a few pigs in enclosures but no other livestock on the farm. In addition, they also collect firewood. The clearing of fields is forbidden. In 2003, three workers with their families lived on the research station.

In economic terms the station does not work efficiently; however, this is simply not the objective for its existence. When comparing the vegetation dynamics of the farm with the surrounding communal land one should, however, keep in mind that there are no incentives to use the research farm intensively.

The Mile 46 research farm management complains about unauthorised tree logging (see Chapter 4.2.1). There is further a high incidence of livestock theft. Since livestock is unattended on the farm it is easier to steal it here than on the better-protected surrounding communal lands. From July 2001 to July 2002, 78 cattle were stolen, which was approximately one fourth of the stock population.

## **4.2 Capital availability of Mutompo community**

### **4.2.1 Natural capital**

The dominant vegetation type around Mutompo is Woodland of the Northern Sandplains with medium-to-dense bush and forest (Mendelsohn & el Obeid 2003: 64f). The vegetation is very diverse, with 335 annotated plant species being observed around the BIOTA observatories alone. Based on this number it is estimated that approximately 380 species occur in the area (Strohbach & Strohbach 2004). This diverse habitat is home to a great variety of animals. Nevertheless, the diversity was even more impressive before people moved into this remote area. First residents from the 1970s reported that elephants, giraffes, gemsbok, kudus, damara dikdik, duikers, rabbits, monkeys, guineafowls and francolins could be found around Mutompo. Apart from these species, which were hunted for food, leopards, cheetahs, hyenas and jackals were feared. Even today elephants, giraffes, kudus, gemsbok, spotted hyena and wild dogs can still be found less than 100 kilometres south of Mutompo in areas which are still barely populated (Mendelsohn & el Obeid 2003: 71). According to the first settlers, by the end of the 1980s most wildlife had disappeared. This is explained by the fighting and later the population influx from the riverside (see also Mendelsohn & el Obeid 2003: 78f). Animals which still live around Mutompo are damara dikdik, duikers, aardvarks, monkeys, rabbits, guineafowls, francolins and many other birds. Most of them are hunted, as reported by 42 percent of the households. The main hunting ground is close to the BIOTA observatory. In some years thousands of pigeons and finches destroy the harvest. At the critical time of the year, field owners protect their crops with shotguns. Traps for birds as small as finches are found in many households. Even small birds are eaten (Eriola et al. 1990: 85). The manager of Mile 46 complains about leopards which attack calves on the research station, where livestock stays unattended during the night. However, jackals and leopards have not been blamed for livestock losses by communal farmers. Effective protection seems to be provided by keeping the livestock in kraals at night and herding it during the calving and lambing season. Mutompo residents are most afraid of snakes, and in 2001 one household reported that an ox was killed by a snake bite. As a consequence, snakes are killed whenever found.

The loss of local biodiversity is mainly induced by habitat loss. Worldwide, cultivation is the main threat for forests, accounting for fully two thirds of their annual loss (Barbier & Rauscher 1994: 75; Blaikie & Jeanrenaud 1996: 5; Myers 2002: 56; OECD 2004: 178). Also in Namibia deforestation is mainly the result of land-clearing for agricultural purposes

(Ashley et al. 1995: 3; see also Yaron et al. 1992; Ashley 1996: 17). An average rainfall of more than 500 mm generally allows dryland rain-fed cultivation around Mutompo. All but one of the households of Mutompo have fields (N=14). The most prevalent crops grown are pearl millet, sorghum and maize. Those are supplemented on mixed fields by groundnuts, peanuts, pumpkins, watermelons and cowpeas. Potential evaporation is high and rainfall is often inadequate for crop growth due to the unpredictability of precipitation (Mendelsohn & el Obeid 2003: 40ff, 92ff). Fields are not irrigated. Under such conditions there is a high risk of crop failure, which makes the Mutompo population vulnerable. In good rainfall years, crops are the most important livelihood component for subsistence and cash purposes (see also Cole et al. 1998: V, 16), though agricultural output is, in regional comparison, extremely low in the Kavango (Tapscott 1994: 2; see also Mendelsohn & el Obeid 2003: 92, 99). In bad rainfall years the stored crops do not last up to the next harvesting season (see also Cole et al. 1998: 16). In order to alleviate the consequences of droughts the Namibian government distributes drought relief, as in the growing seasons of 1997/98 and 2002/2003.

Between 1990 and 1995, the annual rate of deforestation in the Kavango region was estimated to be 0.3 percent (Hailwa 2002; see also Tarr 2002b: 11). The expansion of cleared land not only leads to direct habitat losses, it also intensifies the grazing pressure on the remaining forest. Aerial photographs indicate that the land cleared for crops increased between 1943 and 1996 by more than seven times, from 0.5 percent to 4.0 percent of the total Kavango area. (Mendelsohn & el Obeid 2003: 114f). The clearing of areas further than 50 kilometres away from the river mainly began in the 1970s. In 2004, 5.5 percent (app. 200 ha) of the estimated total Mutompo territory (3800 ha) was composed of existing or abandoned fields. New forest sections are regularly cleared for fields, and old fields are abandoned (Yaron et al. 1992: 41; Tapscott 1994: 3; Mendelsohn & el Obeid 2003: 94, 114f). Important factors in the expansion of fields are population growth and the depletion of soil nutrients on already cultivated ones. In years with a relatively “normal” rainfall, 73 percent of the interviewed households prefer to expand their fields every year (see Chapter 4.4.8.2). The main reason for field expansion is the previous year’s loss of productivity. The sandy, porous soil texture in most of the Kavango holds few nutrients and allows water to drain away rapidly (Mendelsohn & el Obeid 2003: 14, 62, 93). Already in the early 20<sup>th</sup> century, Kavango soils were deficient in humus (Werner 2002: 14). Land is and was, with very few exceptions, not fertilized – neither by manure nor ash (Werner 2002: 14; see also Yaron et al. 1992: 10; Tapscott 1994: 3; Ostermeier-Noczil 1997: 40; Hengua & Bovell 1997: 14; Mendelsohn & el Obeid 2003: 98).

Another important natural resource-based livelihood component is the keeping of livestock. In 2000, approximately 137,000 cattle and 64,000 goats grazed and browsed in the whole Kavango area. Cattle numbers increase on average by 4.0 percent per year and goat numbers by 8.0 percent (Mendelsohn & el Obeid 2003: 100). All but two Mutompo households (N=14) possess cattle and/or goats. The estimated size of the area under study is 3600 ha. In 2002, some 233 cattle, 226 goats and 12 sheep (total: 129 LSU) grazed and browsed in Mutompo (Schneiderat 2004).<sup>2</sup> Stocking rates are at 28 ha/LSU, which is below the carrying capacity recommended by the Mile 46 research station staff (17 ha/LSU). The low stocking rate is typical for the Kavango region, where the annual forage production routinely exceeds the feed requirements of the total livestock (Behnke 1998: 7). Small herd sizes result not from high numbers of animals sold or slaughtered, nor from proper stocking rate control, but rather from high animal losses (see also Eriola et al. 1990: 43). In 2002, 9.4 percent (22 animals) of the total cattle stock and 15.9 percent (36 animals) of the total goat stock were lost, stolen or died because of disease or carnivores (Schneiderat 2004). Many animals are lost, especially during the season when livestock is not herded. Residents remember years when large livestock numbers died of lung sickness and foot-and-mouth disease. Goats suffer from gastro-intestinal parasites. Cattle movements across the border to Angola make the region highly vulnerable to foot-and-mouth disease (see also Eriola et al. 1990: 43). Therefore all cattle are vaccinated annually free of charge by government veterinarians (Hengua & Bovell 1997: 2, 23). In 2002, an outbreak of black quarter was stopped by an immediate vaccination campaign. Although high livestock losses have a negative impact on the people's livelihoods, they also reduce pressure on natural resources.

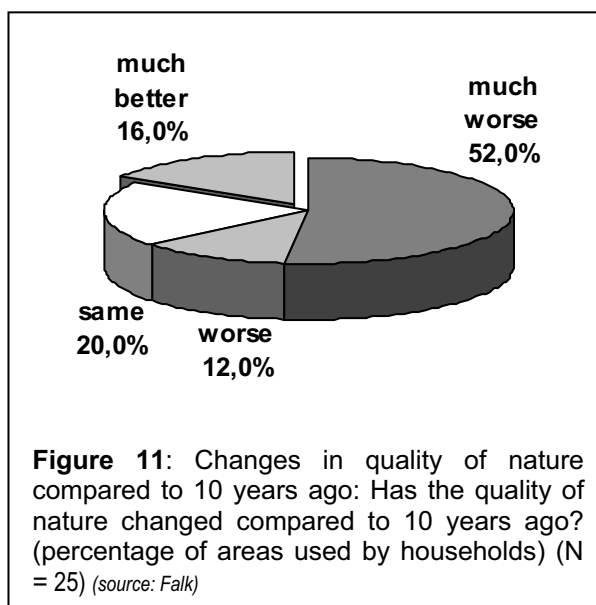
Apart from crop and livestock farming, natural resources in the Kavango are used in a variety of ways both for subsistence and the generation of cash income (Ostermeier-Noczil 1997: 21; Hailwa 2002; Mendelsohn & el Obeid 2003: 67). All households of Mutompo collect wood for building material and firewood, roof grass (especially *Eragrostic pallens*), wild fruits (e.g. *Strychnos* fruits) and caterpillars. 97 percent of the Kavango households use wood for cooking, 84 percent of the local houses have a grass roof and 92 percent are surrounded by walls made of wood and mud (Mendelsohn & el Obeid 2003: 82). Pounding blocks, sledges, canoes, tool handles and building material are the most important utilisations of trees. Medicine and spices are made out of roots, bark and resin. Bark fibres can be woven into women's hair and are used as strings (Eriola et al. 1990: 4f; see also Hailwa 2002; Mendelsohn & el Obeid 2003: 67). Especially in times of food shortage, wild fruits are



welcomed food supplements, livestock fodder and the base for home-made alcohol (Eriola et al. 1990: 4f; Matsaert 1997; Ostermeier-Noczil 1997: 21; Büschel 1998: 8; CRIAA SA-DC 1999: 9; Werner 2002: 26; Mendelsohn & el Obeid 2003: 68). The wild fruit and alcohol industry are important sources of income in the Kavango (Matanyaire 1997: 576; Cole et al. 1998: V; Büschel 1998: 12ff; Botelle 1999: 40; CRIAA SA-DC 1999: 9, 19; Mendelsohn & el Obeid 2003: 68; RoN 2003f: 26). These multiple use forms on the one hand provide incentives to preserve forest resources, but on the other hand they create strong pressure on these resources (see also Hailwa 2002).

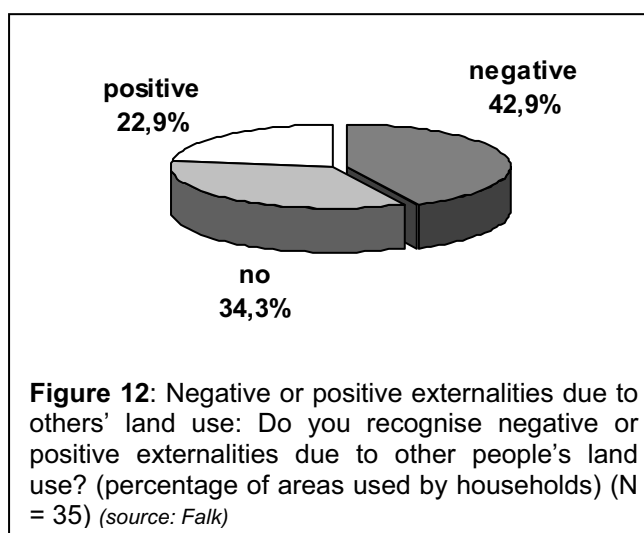
Mutompo farmers where asked whether they had seen changes in their natural environment over the last 10 years. Although the time span is relatively short, the majority of the respondents reported negative development. Deterioration was perceived in two thirds of the areas used by households (see Figure 11). People find fewer fruits (40 percent), grass (40 percent), trees (32 percent) and wildlife (12 percent) and think the forest has become more cleared (12 percent). They reported that in the past there were enough fruits to be sold in Rundu, which is difficult today. In the eyes of 48 percent of the farmers, the increased frequency of bush fires is the main reason for most changes. Bush fires belong to the natural equilibrium of this vegetation type but their present high frequency has disastrous consequences (Goldammer 2001). Fires are the most common damage to the

woody vegetation in the region (RoN 2003g). There are numerous reasons for this: natural causes such as lightning account for a small percentage only. Some farmers burn sections of the forest purposely shortly before the rainy season to promote grass growth. Fires often get out of control when fields are cleared and the remains burned (Goldammer 2001). Also, carelessly thrown away cigarettes are a problem (see also Trigg & le Roux 2001). Under unfortunate weather conditions, fires may cover large areas even far away from their point of origin. One fifth of the Mutompo residents believe that the increasing fire frequency, as well as the general depletion of natural resources, is related to population growth and the influx of migrants into the area (see also Hailwa 2002). Other mentioned reasons for resource



degradation are increasing livestock numbers (20 percent), cutting of trees (20 percent) and field enlargement (4 percent). Improvements of natural resources were usually not related to human impact. Examples are inter-annual rainfall variation or the abandonment of fields. Since no scientific monitoring of the vegetation around Mutompo was done in the past, it is difficult to confirm this perception of the residents. It is also possible that the described changes happened in fact over a longer period of time.

Farmers recognise mainly negative effects resulting from other people's resource use (see Figure 12). Explicitly mentioned was that non-residents cut a lot of roof grass and trees. This seems to be a problem throughout the entire region (see also Werner 2002: 26; Hailwa 2002; Impact 2003: 50). The grass is sold to tourist lodges as thatch. *Eragrostic pallens* is particularly abundant in the Mutompo area (Strohbach & Strohbach 2004). If the grass is ready for harvesting, it is too woody to be eaten by livestock. It further seems that this grass in particular provides a lot of fuel for bush fires, and cutting it when dry might weaken the impact of fires. If cut in a sustainable way, fresh palatable grass will grow again. The residents experience problems only if insufficient grass remains for their



own constructions. More serious is the cutting of trees, which are used for planks and carvings. At least three high-quality hardwood tree species are commonly found around Mutompo (*pterocarpus angolensis*, *burkea africana*, *guibourtia coleosperma*) (Strohbach & Strohbach 2004). Illegal loggers are usually small-scale pit-sawyers (Hailwa 2002). The woodcarving business has been promoted by the government since the 1960s. The traditional craft quickly penetrated the souvenir market (Dunn 1981), and the demand for carving wood increased during the 1990s with the expansion of the crafts market (Mendelsohn & el Obeid 2003: 67). Wood carvers worry already that a future supply of raw material is not assured (Kamminga 2001). The slow growth rate of indigenous trees is problematic, with an assumed rotation age of 90 years (Hailwa 2002). As a result of high harvesting intensity, residents have to walk further distances to get building wood or grass (see also Chapters 4.4.5 & 4.4.7).

Negative externalities are also mentioned in relation to livestock management. Farmers complain about high grazing pressure leaving insufficient fodder for their animals. Problems occur particularly for pastures which border adjacent settlements (Epingiro) and less frequently for grazing areas which are exclusively used by Mutompo residents (e.g. Horongo & Pandureni) (see Table 2). There is a positive correlation between the recognition of negative externalities for an area and the perception of negative environmental changes. Those who hunt recognise further negative externalities.<sup>3</sup>

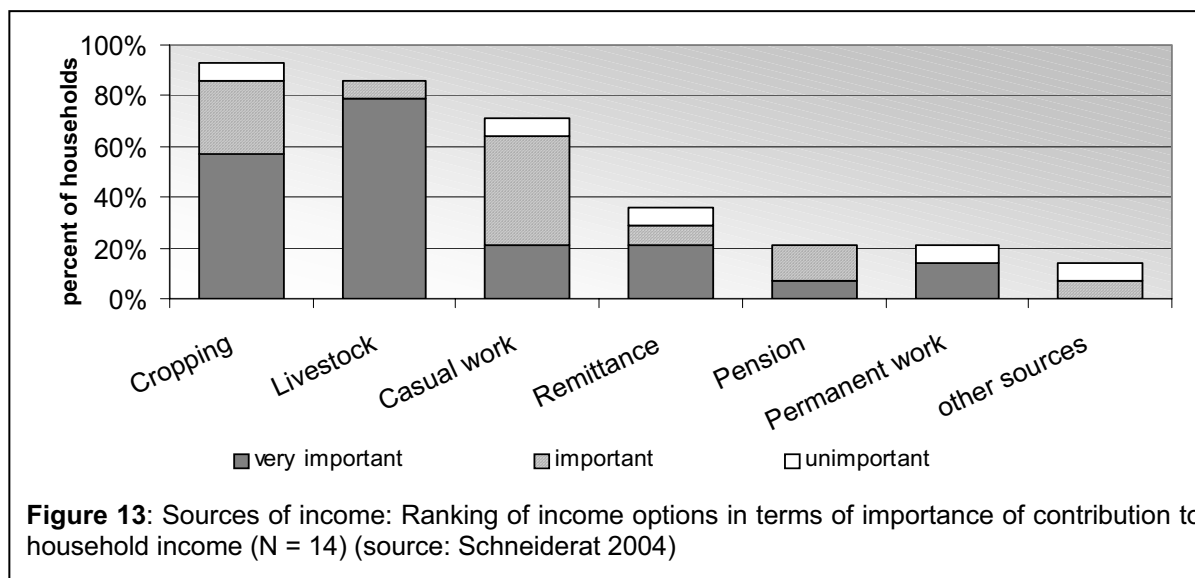
**Table 2:** Percentage of negative externalities of all mentioned impacts of other people's resource use for the main grazing areas of Mutompo (source: Falk)

Direction of Epingiro	Horongo/BIOTA-observatory	Pandureni
69 % (N=13)	25 % (N=8)	29 % (N=7)

Respondents also mentioned positive impacts of communal resource use for one fifth of the grazing areas used by the households (see Figure 12). People help each other, for instance by taking care of livestock. The more that livestock is perceived as an important source of income, the more those positive impacts from other people's resource use are recognised.<sup>4</sup> Further informal contracts between settlements exist. If farmers from other settlements graze their livestock in Mutompo, this means that Mutompo farmers can use the others' resources in times of need as well.

#### **4.2.2 Financial capital**

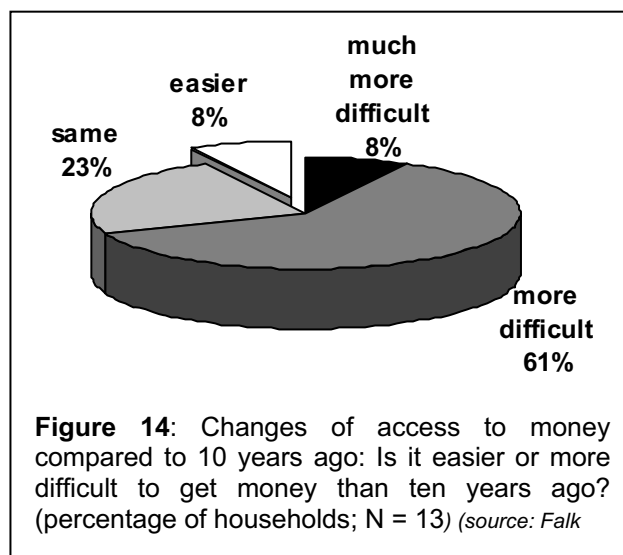
Human Development and Human Poverty Indexes indicate that the Kavango region is one of the poorest within Namibia (UNDP 1998: 13). The mean monthly cash income of a Kavango household is approximately US\$25, which is only 32 percent of the Namibian average. Eighty-eight percent of the Kavango households fall below the poverty line (RoN 2001m: 69, 76). Household heads of Mutompo were asked from which sources of income they make their living (see Figure 13). The term income is used here to cover cash plus subsistence income (see also Campbell et al. 2002: 19). Most respondents strongly rely on natural resources. Crop cultivation is practised by every household which has the necessary labour force. 57 percent said that cropping is a very important source of income generation. Most Kavango people farm for subsistence (Matanyaire 1997: 572). Total earnings from sales of crops are much smaller than those from livestock, though the first are more common (Yaron et al. 1992: 25, 50, 71; Matanyaire 1997: 586). Nevertheless, across rural households, crop production accounts for approximately one-third of total calorie intake (Yaron et al. 1992: 35, 54). This source of income needs to be ranked much higher if evaluated in terms of prices for buying alternative food (see also Yaron et al. 1992: 100).



Almost all respondents own livestock. According to 79 percent of the household heads, keeping livestock was perceived to be a very important source of income. This picture is not reflected in the low numbers of animals sold and slaughtered. Respondents stated that in 2002 2.6 percent (6 animals) of the total cattle stock and 3.1 percent (7 animals) of the total goat stock were sold. No slaughtering was reported. The sales numbers correspond well with the estimates for the whole Kavango region, with 3.5 percent off-take for marketing purposes (Behnke 1998: 12). Livestock is a minor source of monetary income in the region but a major source of capital formation and food security (Matanyaire 1997: 569, 578; see also Yaron et al. 1992: 83; Hengua & Bovell; 1997: 12; see also Chapter 4.3). The herds of Mutompo's livestock-keeping households have an average value of approximately US\$4000 estimated at market prices (Schneiderat 2004). Households owning a plough and oxen cultivate fields twice as large as farmers without draught power (Mendelsohn & el Obeid 2003: 94).

Mutompo residents engage in mainly casual work on the fields of wealthier households. Payments are usually made in kind. Remittances are received by few families who own little livestock.<sup>5</sup> For households who receive pensions, livestock becomes less important as a source of income<sup>6</sup> (see also Matanyaire 1997: 573; Mendelsohn & el Obeid 2003: 103). Other income sources include the hiring out of oxen and ploughs (see also Matsuert; Mendelsohn & el Obeid 2003: 94) and the sale of fruits and home-made alcohol. Only a minority of land users is permanently employed. Access to employment opportunities is the key factor determining whether or not a household is below the poverty line (Yaron et al. 1992: 33). Kavango households with cash income, for instance, cultivate 25 percent larger areas than those without (Mendelsohn & el Obeid 2003: 94).

One third of the interviewed households report having savings (N=14). In cases of monetary need, 92 percent sell parts of their harvest, livestock, fruits or self-made alcohol (N=13). 29 percent of the households think they could get a loan if needed (N=14). Other studies in the region showed that 12 percent of the population has already borrowed money (Matanyaire 1997: 580). Particularly household heads who do not live permanently in Mutompo perceive this opportunity.<sup>7</sup> They are the ones who can rely on regular employment income. Less optimistic are residents who only rely on casual work and remittances or who have few livestock.<sup>8</sup> These findings are in line with results for the whole region (compare with Matanyaire 1997: 580). Two thirds of the Mutompo farmers feel that it has become more difficult to get access to money in comparison to the early 1990s (see Figure 14).



The more commercialized use of natural resources can be a source of income diversification for Mutompo households. Sustainable harvesting of trees and grass are only two options. There is a demand for Manketti-nuts, which are at present a plentiful left-over from alcohol production (Prié 1998: 6; Botelle 1999: 40). In the Mutompo area *Bauhinia petersiana* is also widespread, the beans of which have economic potential on the Fair Trade market (CRIAA SA-DC 1999: 25; Strohbach & Strohbach 2004). Private investors see a market for liqueur flavoured with *Strychnos* fruits, which are also abundant around Mutompo (RoN 2003f: 26f). In addition, the commercial use of devil's claw could create new sources of income (see also RoN 2003f: 16). Apart from support training in marketing, sustainable harvesting practices and institutional use, regulations are needed in order to ensure sustainable management.

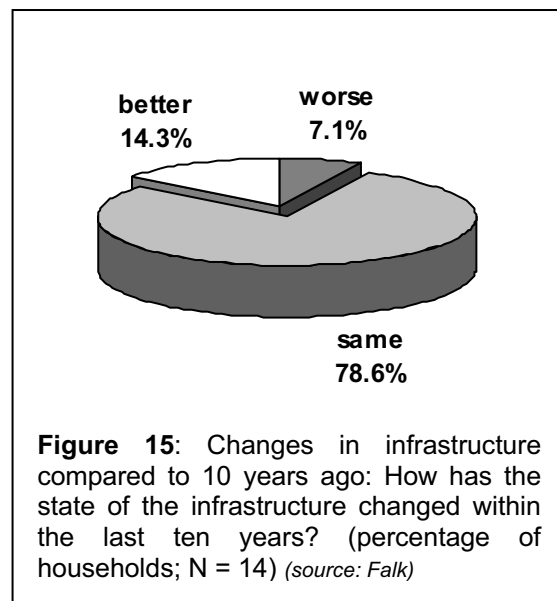
#### **4.2.3 Physical capital**

The interior of Kavango is characterised by an almost complete absence of infrastructure (Adams & Werner 1990: 138). Mutompo and Mile 46 are accessible only by dirt roads in bad condition. 57 percent of all households possess a means of transport (N=14). In seven of eight cases this means an ox. Households who do not own oxen hire them for transport or ploughing if needed. Only one non-permanent household head owns a car. In general, Kavango households with wage income are more likely to possess oxen and ploughs

(Mendelsohn & el Obeid 2003: 96). Transaction costs of getting from Mutompo to the regional centre Rundu are high for those who do not own a car. One has to walk approximately 10 km through deep sand to the tarred road and hope for a lift. A one-way lift to Rundu (app. 60 km) costs approximately US\$1.50. It takes at least one day to get to Rundu this way. Those who want to sell livestock must walk all this distance. Renting a car or truck to transport crops or livestock to Rundu costs between US\$25 and US\$60. The poor road infrastructure and slow means of transport increase the transaction costs for various market activities.

Lack of equipment is for Kavango farmers a major constraint when attempting to increase crop production (Yaron et al. 1992: 41). In the 1980s and later again in the early 1990s, Mutompo residents experienced the positive impact of enhanced production technology. During this time the government offered a tractor ploughing scheme: The agricultural extension service provided tractors, drivers and fuel at a price of approximately US\$4/ha and also subsidised the hiring out of private tractors (Yaron et al. 1992: 51). Some Mutompo residents benefited from this scheme and cultivated much larger fields. This had a positive impact on their food supply but also contributed to accelerated habitat destruction. The scheme collapsed in the late 1990s, as did a previous one in the 1980s (Adams & Werner 1990: 109). Since then farmers have again been reliant on oxen, ploughs and hoes. Even at subsidised prices, only relatively few farmers used the programmes and many of them struggled to contribute their share of the costs (Adams & Werner 1990: 139).

In 1991, 95 percent of the Kavango households had no electricity. In 2000, almost half of the Kavango households had no telephone and 20 percent no radio access (RoN 2001m: 64). At present, there is no electricity, telephone line or cell-phone network in Mutompo. Three fourths of the households possess a radio, which is their most important communication instrument. One can call the broadcast company to make announcements which are broadcast throughout the region.



The percentage of households having access to safe water increased from 48 percent in 1991 (RoN 1995b: 18) to 62 percent in 2001 (RoN 2001j). The water supply in Mutompo is provided by diesel pumps. The water is pumped into an open reservoir. For this reason the water quality is poor. In the perception of Mutompo residents, little has changed since the early 1990s with regard to infrastructure development (see Figure 15).

#### **4.2.4 Human capital**

The whole Kavango region has a population of about 202,700 people, which is 11 percent of Namibia's population living on 5.5 percent (48,456 km<sup>2</sup>) of Namibia's land area (RoN 2001j; Mendelsohn & el Obeid 2003: 11). Residents of Mutompo belong to a minority of less than one fourth of the Kavango population which does not live on a 10 km bend south of the Kavango River (Mendelsohn & el Obeid 2003: 12). Population density and resulting pressure on natural resources in most parts of the region is low (Okavango Challenge 2004). In Mutompo there are 2.2 people per square kilometre, which is half of the Kavango average (4.2 persons per km<sup>2</sup>) (RoN 2001j). Between 1991 and 2001 the annual population growth in the Kavango region was approximately 4 percent, which was above the total Namibian rate of 2.6 percent. Population growth is, however, slowing down due to declining fertility and decreasing life expectancy caused by HIV/AIDS (Mendelsohn & el Obeid 2003: 80f). Life expectancy at birth fell from 57 years in 1991 (RoN 1995b) to 42 years in 2001 (RoN 2001j).

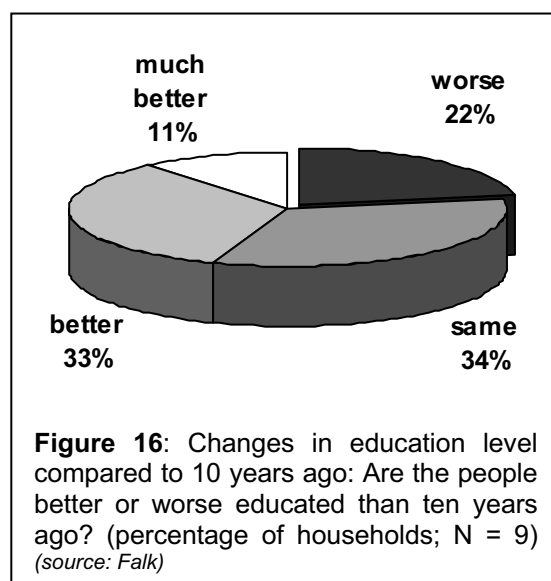
In 2003, 80 inhabitants lived in Mutompo. The majority of them (53.5 percent) were less than 16 years old. This is typical for the region, where 44 percent of the population is below the age of 15 (RoN 2001j; Mendelsohn & el Obeid 2003: 81). Children help in the households, on the fields and with livestock. In the mid-1990s the Kavango Region was the second most disadvantaged region in Namibia in terms of the Human Development Index. On average, Mutompo residents attended school for only 3.3 years (Schneiderat 2004). In 1991, one third of the population older than 15 had left school with a primary school education, 15 percent with secondary school, 1 percent with tertiary school, and 35 percent had never attended school (RoN 1995b: 47). Thirty percent of the adult Kavango population in 2001 was illiterate (RoN 2001j), evidencing an 8 percent decline in illiteracy since 1991 (RoN 1995b: 14). The education of the younger Kavango generation is slowly improving (Mendelsohn & el Obeid 2003: 88f). Almost 50 percent of the Mutompo respondents think that residents are better educated than ten years ago (see Figure 16). Improved education decreases the dependency on natural resource based livelihoods and can therefore reduce pressure on biodiversity. By 2001 the percentage of adults in the region who had never attended school had dropped to 25%.

(RoN 2001j). Ten years after independence, 76 percent of the boys and 78 percent of the girls between 6 and 16 years were attending school. The number of pupils in Grade 6 doubled and those in Grade 12 almost tripled between 1992 and 2002 in the whole of Kavango region (RoN 2001j). These grades, however, are not usually reached by Mutompo children. There is a school in the settlement where children receive basic education up to grade 3. Learning materials and conditions are poor. Although the professional

level of the teachers has improved since the late 1990s, frequent problems remain. Young teachers who have just finished the teachers' college in Rundu are sent for a whole year to Mutompo. As they are accustomed to town life, the living conditions in the settlement are difficult for them. As a result, all teachers who taught between 2001 and 2004 were repeatedly absent. Parents who want their children to be better educated send them to schools in towns such as Rundu (see also Mendelsohn & el Obeid 2003: 87). This, however, results in a crucial reduction of farm labour (Tapscott 1994: 5; Yaron et al. 1992: 84; Fuller & Turner 1996: 40).

Farming is learned by doing, without any professional training (Schneiderat 2004). Particularly in the interior of the Kavango region, production support and extension services are poor, due to the insufficient capacities of the Department of Agriculture (Adams & Werner 1990: 139). When asked what information was required for livestock production, most farmers answered that they know everything they need to know. Few of them mentioned that it is necessary to monitor the pasture and that they could use additional knowledge about animal health and livestock management. There are plans by the Veterinarian and Agricultural Extension Office to improve farming and resource use skills. By 2004, training programs had not yet reached Mutompo farmers. The intensive use of fruits, roots, barks and all kinds of animals indicates that indigenous knowledge still exists in the community. There are various indicators to predict the arrival of rain.

People in the Kavango region suffer from a variety of diseases. In 2002, the HIV prevalence ratio for pregnant women in the Rundu hospital was 22 percent, which is the Namibian average ratio (RoN 2002e). More than half of the Kavango population is treated against





malaria each year (Mendelsohn & el Obeid 2003: 83) and many Mutompo residents suffer from this disease. Between 1995 and 1999, diarrhoea was the third most significant disease leading to hospitalisation (Mendelsohn & el Obeid 2003: 85). In 2000, one doctor served 9571 people on average in the region (Mendelsohn & el Obeid 2003: 87). For 22 percent of the Kavango households, such as the ones of Mutompo, the next health facility is more than one hour walking distance away (RoN 2001m: 53). The nearest clinic is approximately 20 kilometres away from Mutompo and the nearest hospital is in Rundu. Apart from the modern health care system, a traditional one exists. Depending on the problem either a healer or a doctor is consulted (Yaron et al. 1992: 151). The increasing prevalence of serious disease has a direct impact on people's livelihoods and natural resource use. HIV affects the most productive age group of the population. More regular funerals have a negative impact on the time allocated for production. The tradition of slaughtering livestock at funerals leads to livestock reduction. In addition, demand increases for wood to make coffins and for medicinal plants. The head of the agricultural extension office in Rundu reports that medicinal plants are almost extinct in some areas, though they were common in the past.

### **4.3 Motives for resource use**

Namibian forests contribute much to subsistence activities but little to the National GDP (Hailwa 2002). The natural resources of Mutompo are used in various ways. People do cropping, keep livestock, collect fruits, hunt, and cut grass and trees. Most of the activities have the aim of satisfying physiological needs. They provide households with food and shelter, improve health or are investments in physical capital. There are few commercial uses of natural resources around Mutompo, though high-quality trees are harvested to a degree which is alarming. The wood is used for carving tourist souvenirs or making furniture and planks. Grass, in particular *Eragrostic pallens*, is cut by non-residents for commercial purposes. A substantial export industry for wooden souvenirs has developed (Mendelsohn & el Obeid 2003: 67; see also Jones & Mosimane 2000: 13; Goldammer 2001), putting pressure on resources and leading to conflicts (see also Kamminga 2001).

Small-scale farming is of special importance for most Mutompo households. Each household possesses on average 19 cattle and 16 goats, which is close to the Kavango average for 1999 (17 cattle & 12 goats) (Mendelsohn & el Obeid 2003: 100). According to 79 percent of the Mutompo farmers, livestock is a very important and for 7 percent an important source of income. However, the quantity of animals sold and slaughtered does not reflect this stated

importance. In 2002 2.6 percent (6 animals) of the total cattle number and 3.1 percent (7 animals) of the total goat number were sold. No slaughtering was reported (Schneiderat 2004). Mainly old and unproductive animals are sold (Hengua & Bovell 1997: 26). These facts emphasise the strong subsistence orientation of Mutompo farmers. In order to better understand the purposes of keeping livestock, a motive assessment was conducted.

In the first step, the household heads were asked their preference for selling animals, slaughtering them, or keeping them all in the herd. The respondent had to rate her/his preference for the three alternatives on an ordinal scale between -2 (don't like it at all) and 2 (like it very much). With almost no deviation, keeping the animals in the herd (median = 2) is much more preferred than slaughtering (median = -2) or selling (median = -2) them. Non-parametric significance tests prove this trend (see Appendix 2). As an indicator for the impact on self-esteem needs, respondents were asked how happy/unhappy they were when selling or slaughtering their animals. The results correspond with the preference data. Selling and slaughtering makes the farmer significantly less happy than keeping livestock (see Appendix 2). In order to derive a non-monetary, but metric utility function, an exploratory conjoint measurement was applied (see Chapter 1). In this case it was analysed how actions like the decision to sell a cow or to slaughter a goat affected the farmers' preference for a combination of actions. Two attributes were assessed: a) to sell b) to slaughter. Each of these attributes has 3 attribute levels: a) nothing b) a goat c) a cow. The combination of the two attributes with the three attribute levels gives  $3^2 = 9$  possible strategies (see Table 3). Each of these strategies was symbolised on a paper card. The respondents ranked the 9 cards according to their preference for the strategies. Many farmers said that they would not sell or slaughter unless there was an urgent demand for money or meat. Therefore they were asked to rank the cards as for a situation of exceptional need. Out of the respondent's rankings the relative importance of the two attributes and metric utility values for each strategy were calculated.

**Table 3:** The attributes (sell & slaughter), attribute levels (nothing, goat, cow) and  $3^2$  strategy combinations of the conjoint analysis (source: Falk)

		Slaughter		
		nothing	goat	cow
sell	nothing	neither sell nor slaughter	sell nothing but slaughter a goat	sell nothing but slaughter a cow
	goat	sell a goat and slaughter nothing	sell a goat and slaughter a goat	sell a goat and slaughter a cow
	cow	sell a cow and slaughter nothing	sell a cow and slaughter a goat	sell a cow and slaughter a cow

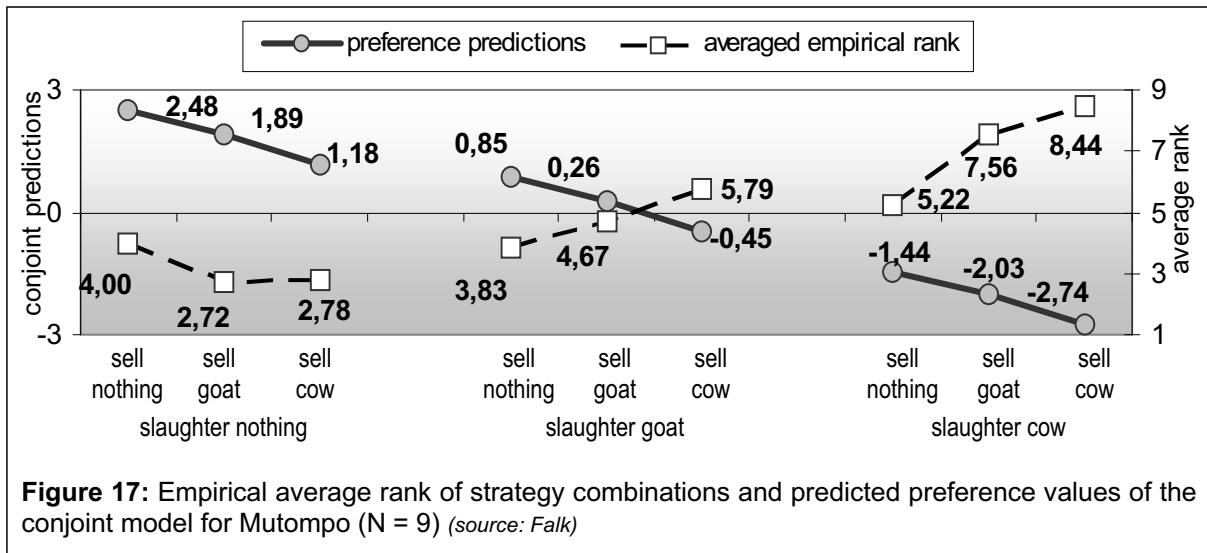
The results confirm that farmers believe that neither slaughtering nor selling maximises their utility (see Figure 17). The attribute *slaughter* has a much stronger impact on the preference

of a strategy than the attribute *sell*. Slaughtering is much less preferred than selling. To slaughter a cow is the worst the farmers could imagine (see Table 4). It does not make a difference whether a goat is slaughtered or sold. Both alternatives received moderate utility values.

**Table 4:** Conjoint utility values for all attribute levels (*source: Falk*)

	nothing	goat	cow	averaged importance
sell	0.63	0.04	-0.67	35.1
slaughter	1.85	0.22	-2.07	64.9

The predicted conjoint-preference values correspond well with the averaged empirical rank of the strategies. Strategies which were on average highly ranked also received the highest conjoint-preference values (see Figure 17). Testing the conjoint model with Pearson's correlation analysis shows that the model's predictions correlate perfectly.<sup>9</sup>



These results do not explain why households favour keeping livestock over selling and slaughtering. For a better understanding, the household heads were asked how the decision whether to slaughter or to sell affects the satisfaction of physiological, safety, belongingness and esteem needs as well as the availability of natural, physical, social, human and financial capital (for the variables' list see Appendix 1). Motive variables were measured in the same way as preferences. Respondents had to indicate on an ordinal scale between -2 and 2 the parameter value of the variables. To give an example: It was asked whether the selling of one head of livestock increased or decreased the perceived security of the household's livelihood. If the answer was yes, the respondents were asked whether the impact on security was positive or negative and how strong it is. The same was done for slaughtering and keeping livestock. Figure 18, Table 5 and Appendix 2 summarize the results of the analysis.

Keeping livestock is perceived to maximise monetary income. If the farmer keeps the animal it will give birth again or, in the case of an ox, can be hired out to other people. Livestock is a savings account and investment. The stock of animals of each livestock-owning household in Mutompo has an average value of US\$4,000 estimated at market prices. Selling or slaughtering is perceived to be a waste of money, because money generated will disappear quickly. Having cash or meat in the house will attract other people. Not sharing with them would make them angry and negatively affect one's social status. Even subsidising livestock prices in the Kavango had little effect regarding the promotion of sales (Yaron et al. 1992: 99). It is often assumed that wealthier farmers are more commercially oriented than poorer ones. Correlation analysis shows that farmers with larger herds have even a lower preference for selling.<sup>10</sup> Household heads with savings dislike slaughtering.<sup>11</sup> Those who think they can get a loan do not favour selling.<sup>12</sup> Pensioners as well do not prefer to sell or slaughter.<sup>13</sup> Respondents who have permanent work are more convinced that selling decreases their income.<sup>14</sup> This analysis has shown that wealthier residents with more diversified livelihood strategies prefer to maximise their pecuniary income by investing in herd size maximisation, while the poorer ones see selling as the best way to receive cash income. Livestock in Mutompo is slaughtered or sold only in cases if no other financial sources are available (see also Eriola et al. 1990: 44; Ashley et al. 1994: 20; Matanyaire 1997: 579, 582; Ostermeier-Noczil 1997: 29; Hengua & Bovell; 1997: 2, 15; Mendelsohn & el Obeid 2003: 105). Poverty is the main driving force for livestock reduction. The results are representative for the region. Kavango households with smaller herds sell more than those with larger ones (Matanyaire 1997: 569, 578; Behnke 1998: 14; see also Mendelsohn & el Obeid 2003: 105). Wealthier households have other monetary assets and are less dependent on livestock sales (Matanyaire 1997: 578). The fact that they have an even lower preference for selling or slaughtering has crucial implications. Income diversification with the aim of reducing the dependency on natural-resource-based livelihoods does not automatically decrease the pressure on resources. Wealthier farmers still have incentives to maximise their herd size.

Livestock is used as a means of production and transport. Oxen make daily work easier by pulling sledges and ploughs. Keeping livestock is seen as a long-term investment in physical capital. Oxen can work on fields and cows give birth to new animals for traction. Livestock also strongly influences available human capital. The meat from slaughtering or the money from selling can be used to employ casual workers. Employers buy maize meal or sugar for making alcohol. Alcohol, maize meal and meat are typical in-kind payments.

The impact of livestock on the satisfaction of physiological needs is obvious. Farmers think that the food supply decreases if livestock is sold or slaughtered. A living animal can give milk (see also Ashley et al. 1994); in addition, it can work on the fields or give birth to offspring. Slaughtering and selling improve the food supply temporarily, but long-term food security improves as herd size increases (see also Cole et al. 1998: IV). In particular, households who strongly rely on remittances believe that slaughtering reduces their food supply.<sup>15</sup> Livestock is the most important subsistence resource during poor rainfall years when crop yields will not last until the next harvest. Alternatively, it can be sold in order to purchase food (Cole et al. 1998: 17). Livestock further affects health status. Should household members suffer from serious disease, livestock will be sold in order to cover the costs of treatment. Furthermore, cattle fulfil important functions in magic and healing practices. When visiting a witch-doctor, one must slaughter cattle in order to strengthen the doctor's supernatural power (Eriola et al. 1990: 44).

The results for the variables “money”, “work load” and “food” indicate that livestock is kept as a long-term investment and insurance (see also Ostermeier-Noczil 1997: 29; Kamminga 2001; Okavango Challenge 2004). Livestock is sold particularly in times of stress and crisis (see also Eriola et al. 1990: 44; Ashley et al. 1994: 20; Matanyaire 1997: 569, 579, 582; Ostermeier-Noczil 1997: 29; Hengua & Bovell; 1997: 2, 15; Mendelsohn & el Obeid 2003: 105). During poor rainfall years, significantly higher numbers of animals are sold than in good ones (see also Mendelsohn & el Obeid 2003: 105). Mutompo residents perceive that owning livestock improves the future livelihood security of the household, while selling and slaughtering reduces it (see Figure 18, Table 5 & Appendix 2). It was only mentioned once that one could save the earned money, though one third of the respondents have monetary savings. It seems that savings typically do not stem from livestock off-take. Other studies in the region show that those who do not have jobs or other monetary assets strongly rely on livestock as insurance (Matanyaire 1997: 582). In Mutompo, better-educated household heads in particular believe that selling livestock negatively affects their future security.<sup>16</sup>

The specific social environment recognises good reasons to keep herds together. The results of the variables “relation” and “approval” indicate that relatives and other community members disapprove of livestock reduction (see Figure 18, Table 5 & Appendix 2), as especially the nuclear family's livelihood will be directly affected. The smaller the herd and the less secure the income sources such as remittances, the more household heads believe that

relatives and friends are happier and will further support them if they do not sell or slaughter.<sup>17</sup>

Large herds are a sign of wealth and increase the status of households (see also Eriola et al. 1990; Yaron et al. 1992: 83; Ashley 1994; Hengua & Bovell 1997: 15; Düvel & Stephanus 2000; Mendelsohn & el Obeid 2003: 105). Selling and slaughtering is seen as wasting own resources. Owners with many animals are perceived to be circumspective. As they care for the future of their families they are more respected. Other studies in the region indicate that status and wealth in general is not connected to an individual but to the family (Eriola et al. 1990). The status of wealthy farmers also increases because it is expected that they can help others in times of trouble. It is non-permanent residents with savings who recognise only minor impact on their status if they sell livestock.<sup>18</sup> Amongst those who have employment and live in towns, other status symbols seem to substitute the importance of livestock.

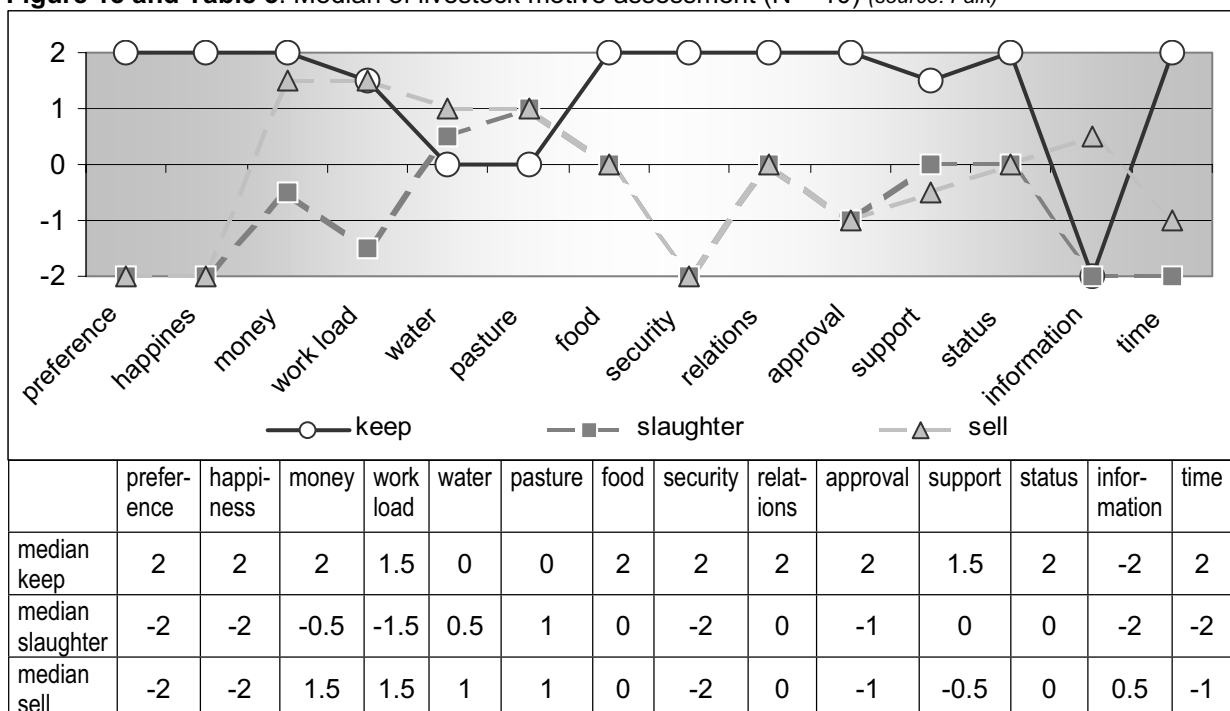
Does livestock reduction also affect the mutual support for households which sell or slaughter? The statements are ambiguous. In general, respondents think very much in terms of reciprocity. If person A has a large herd, person B expects on the one hand that A can help B in times of trouble. Therefore B helps A. Should A have slaughtered or sold in the past and given some meat and money to B, it will also be more likely that A will be helped by B. The expectations that money from off-take is shared with other people makes selling livestock an imperfect strategy to accumulate financial capital. Sharing the proceeds from off-take means, however, an accumulation of social capital. This contradicts with the thinking that A can help her/himself and will thus not be dependent on external support. Households which suffer because of limited resources will be supported as a result of their needy situation. Some, however, also argued that those who waste their resources will be helped less.

Most farmers recognise that a reduction in herd size will increase water and pasture availability. Even one animal less can make a small difference. Moreover, it was mentioned that the money from selling could be used to buy diesel for the borehole pump (see Chapter 4.4.8.2). Respondents who have an administrative or social function in the community recognise a stronger positive impact of livestock reduction on the water supply.<sup>19</sup> They seem to be more aware of the relation between water shortages and the payment of water fees.

It is often argued that market access is an important constraint for Kavango farmers when selling their livestock. The role of transaction costs was therefore also assessed. Different kinds and qualities of information are generally required if livestock is sold. One must find a buyer and be aware of prices. Nonetheless, market places are well-known and buyers often come from surrounding villages. Even the government marketing agency Meatco visits Mutombo regularly. Selling times depend to a large degree on events in the family rather than on changes in market prices. Transaction costs do not seem to be a major reason for the low selling and slaughtering numbers in Mutombo. Improving the marketing system would probably not significantly increase the commercialisation of livestock production in the region, as frequently assumed (compare Eriola et al. 1990 p.43). More important seems to be a substitution of the above-described major functions of livestock.

The results prove that livestock fulfils multiple functions in Mutombo and that a reduction of animal numbers will result in social disapproval. Herd size maximisation remains a dominant strategy, as in the whole region (Yaron et al. 1992: 91). The real value of livestock is not reflected by the monetary income farmers gain from it. In commercial terms, small-scale farming might be very unproductive (see also Mendelsohn & el Obeid 2003: 117). One should, however, consider that the various benefits farmers gain from it – such as food, draught power, savings, insurance, respect and self-esteem – can only be substituted at high cost. How appreciated and valuable these benefits are is underlined by the fact that employed people who do not depend on farming have an even lower preference for selling. Under such

**Figure 18 and Table 5:** Median of livestock motive assessment (N = 10) (source: Falk)



conditions, the reduction of marketing transaction costs or the decrease in dependence on livestock farming does not significantly reduce animal numbers. Since farmers show little inclination to reduce herd size on their own, and large herd sizes negatively affect biodiversity, there needs to be institutional incentives. Particularly those who can sustain their livelihoods without farming should be motivated to reduce their herds. The Communal Land Reform Act stipulates that communal land is supposed to be used in particular by the poor, who do not have alternative income such as employment (RoN 2002b: 17 (1); LAC 2003: XVII). Changing attitudes in combination with the introduction of informal or formal grazing regulations is necessary in order to reduce pressure on biodiversity.

#### **4.4 Institutions**

Mutompo communal farmers operate in a complex institutional framework. Customary and statutory laws rule their lives, involving different agents. The following chapter discusses how institutional incentives affect the farmers' natural resource management. The discussion starts with a description of the traditional authority system of the studied region, in order to understand its distinctive role regarding any natural resource use issues.

##### **4.4.1 Traditional authority systems of the Mbunza**

In the Kavango region, traditional authorities play a more important role than in most other communal areas of Namibia (Hinz 2000b: 123), fulfilling far-reaching functions in the community. Traditional authorities maintain peace in society by resolving conflicts such as theft, infidelity, abortion, fighting and violence, property damage, cases of witchcraft, rape and murder (RoN 2002a; see also Hinz 2000b: 123). The Traditional Authorities Act of 2000 further gives traditional authorities the duty to ensure that the members of their traditional community use the natural resources at their disposal on a sustainable basis and in a manner that conserves the environment and maintains the eco-system for the benefits of all persons in Namibia (RoN 2000b: sec. 3 (2)(c)). Parties in different conflicts can choose whether they want their case to be heard according to customary or statutory law. As long as the two institutional systems do not contradict each other, conflicts will not necessarily emerge. The fear that a case could be forwarded to the police indirectly enforces customary law.

The highest traditional authority of the ethnic group of Mbunza is the Hompa. On a more regional level, senior headmen and senior headwomen are responsible for a locality. Additionally, each settlement has a headman or headwoman. The terminology is not consistent (see also Hinz 1995: 36), but a clear three-level traditional government structure



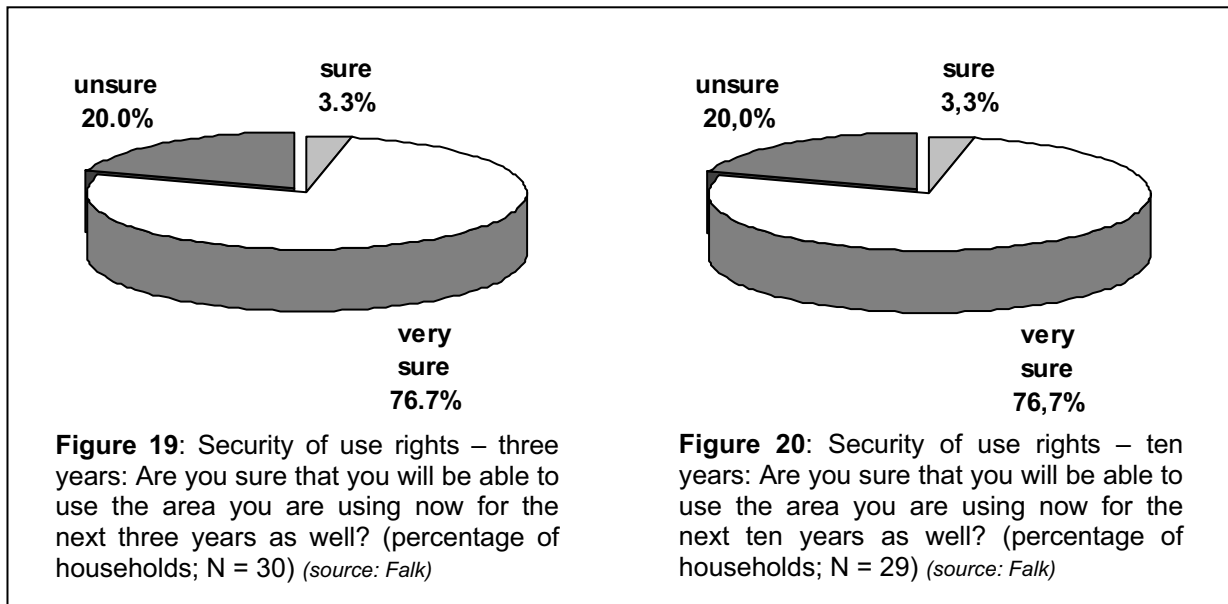
exists. Decision-making follows a strict subsidiarity principle. Only if lower level authorities cannot solve a problem will it be handled by the next higher one (see also Cole et al. 1998: 25). The majority of Kavango residents not only respect traditional authorities but also have a very positive attitude towards them (Katjaerua 2002: 9).

The Kavango Hompas are traditionally elected by the community according to the rules of matrilineal descent out of the royal family (Okupa 2002: 4). The participation rate in polls is usually low, due also to the high transaction costs for voters (Proepper 2004). Any member of the group may vote, though particularly lower level traditional authorities attend the elections. Hompas must be recognised by the Namibian President (RoN 2000b: sec. 6) in order to execute the power given to traditional leaders by the Traditional Authorities Act and the Communal Land Reform Act. They stay in office for life. The community may remove a Hompa in accordance with customary law if people are discontented with her/his leadership (RoN 2000b: sec. 4(2); 8(1)(a); see also Yaron et al. 1992: 21; Adams & Werner 1990: 130). This important control mechanism is sometimes, however, undermined by the government. When in 1999 the community of one Kavango ethnic group voted for the removal of its highest traditional authority, the government did not recognise the referendum due to formalities (Allgemeine Zeitung 1999a; Allgemeine Zeitung 1999b; Namibian 1999b; Republikein 1999b). Not recognising the will of the community destabilises customary law and promotes the evolution of despotic leaders.

#### **4.4.2 Ownership of land and natural resources**

The entire Kavango Region is designated as communal land. Namibian communal land is "...vested in the State (RoN 1998a: 11; see also RoN 2002b: sec 17(1)). This state ownership is, however, only a restricted form of ownership (Hinz 1995: 17). The government must administer communal land in trust for the benefit of traditional communities residing on such land (RoN 1998a: 11; RoN 2002b: sec. 17 (1)). For communal lands, no freehold ownership can be granted or acquired (RoN 2002b: sec 17 (2)). This means that communal land cannot be bought or sold (Hinz 1995: 14, 29; Hinz 2000a: 70f; LAC 2003: XI). Local and regional stakeholders such as local residents, traditional authorities and government officials are aware of this fact. Nevertheless, the Communal Land Reform Act provides for the transfer of customary land rights, even if such rights do not generate ownership status (RoN 2002b: 38).

Mutompo residents feel very secure in their land use rights (see Figures 19 & 20) due also to the fact that they need not fear that anyone can sell their land. They all belong to the same



community, and as long as they do nothing wrong, no one will chase them away. Most residents are sure that they can use the land until they die. After their parents pass away, children who grew up and lived in Mutompo may stay without applying for permission. Nevertheless, for one third of the researched areas, respondents were not sure whether they could use the land in future. Farmers are the most afraid that other residents will privatise areas by clearing new fields. Such cases have to be discussed in the settlement and the headwoman has to give her permission. The Communal Land Reform Act introduced new rules for creating fields on communal land. The interests of other community members are recognised by the law (RoN 2002b: 21(a); 29(4)(b); RoN 2003a).

It can be concluded that the given ownership situation provides Mutompo farmers with relatively secure use rights. This feeling of security makes it more probable that users can benefit in future from any investment in the land, such as biodiversity maintenance.

#### **4.4.3 Regulation of access to natural resources**

One of the most crucial elements of sustainable communal resources management is the opportunity to exclude others from resource use. The need to govern land access in the region increases in times of rapidly growing population (see also Hinz 1995: 37). No person can occupy or use Kavango land on her/his own authority (see also Eriola et al. 1990: 29). The allocation of customary land rights for residential and subsistence farming purposes is done by traditional authorities (RoN 1998a: 12; RoN 2002b: sec 20, 21; LAC 2003: III). According to customary law and also the Communal Land Reform Act, grazing rights are directly connected to residential rights (RoN 2002b: 29 (1)). This linkage avoids a complicated

delineation of exact areas which may be used, in a situation where most boundaries are fuzzy. Most Mutompo villagers agree that use rights of the settlement's natural resources are restricted to the residents only. 82 percent (N=11) of the respondents stated that not everyone may use the place and 80 percent (N=10) mentioned that some people can be excluded from resource use. Amongst the households who rather see communal land as openly accessible, one finds mainly those who are weaker with regard to social and human capital. Respondents who have less confidence in obtaining support from others and who have little to offer relatives or friends believe more often in open access. Those household heads who stated that everyone can use the land have a rather lower education level.<sup>20</sup>

The traditional authorities in the Kavango region do not make independent decisions about granting residential and use rights. Customary law follows a complex registration procedure. Newcomers need a letter of personal record from the place where they lived before. Should they come from another region an additional letter is required from the Hompa or Chief of this region. These letters explain why the person left or had to leave the place. The headwoman/headman of the preferred residency will grant a piece of land only subject to the agreement of the residents (see also Yaron et al. 1992: 188; Hinz 1995: 37, 53; Mendelsohn & el Obeid 2003: 115). This veto right of local residents is a very important control mechanism for biodiversity maintenance. It ensures that benefits from the residents' investments, such as pasture improvements, cannot be appropriated by strangers. This security device is an incentive to improve range management. The residents also know best whether the natural resources can sustain another household and whether a new person will fit into the settlement. The Communal Land Reform Act of 2002 stipulates that under no consideration may fees, either in cash or in kind, be paid for the allocation of customary land rights (RoN 2002b: 42(1)). The Mbunza Hompa emphasised that such payments are not in line with custom and stressed that the land is supposed to be used by the whole community and not only by the rich (see also Yaron et al. 1992: 188; Hinz 1995: 38; Werner 2002: 7).

An important role in land management is played by the Land and Farming Committees. For instance, they discuss the allocation of land for commercial use purposes, such as tourism facilities (see also Yaron et al. 1992: 189; Mendelsohn & el Obeid 2003: 115). These committees exist only in the five ethnic Kavango districts. They have been functioning since 1991 through the initiative of the Ministry of Land, Resettlement and Rehabilitation (Hinz 1995: 30). The Mbunza committee consists of 12 members. The Hompa is the obligatory

chairman but all other members are elected by the community in a public meeting. Other government officials, such as the regional councillor, extension workers, representatives of the Ministry of Lands and teachers, also regularly become part of the committee (see also Hinz 1995: 39). The Land and Farming Committee has the responsibility to review applications for larger portions of land, to settle disputes, to develop plans for sustainable resource utilisation and to inform and advise the community as well as the Hompa. Recommendations made by the committee are usually implemented by the Hompa. A person who wants access to a large privately used plot has to submit an application to the Land and Farming Committee. The committee will look for a suitable location and discusses the application. Approval of the headwoman/headman and the people living at the place is a necessary requirement. There are a number of criteria which are crucial for granting exclusive commercial use rights. Most important is that applicants have the capacity to use the land. They must prove that they already have as much livestock as it can carry. Of further importance is the degree of grazing pressure at the place where they come from. People who live in areas which are overcrowded obtain easier access to land. Also the history and personality of the person plays a role. Ethnic affiliation, however, is not a criterion. After the decision of the residents, the Land and Farming Committee and the Hompa, the case will be approved and recorded by the Ministry of Lands, Resettlement and Rehabilitation. This avoids unlawful discrimination and the double-allocation of land. For the allocation of land for business purposes, an annual fee is paid to the account of Mbunza (Yaron et al. 1992: 188f). This account is used to pay guards, to organise meetings and even to invest in infrastructure. Expenditures have to be recorded and are controlled by the government.

In the distribution of subsistence land rights, Land and Farming Committees only become involved if appeals and conflicts arise. They review the case and discuss it with the relevant stakeholders before a final decision is made. If someone feels discriminated against in the application procedure, she/he can appeal at the Ministry of Lands, Resettlement and Rehabilitation. The Ministry looks for an acceptable solution together with the Land and Farming Committee and the traditional authorities.

The procedure of land allocation takes a long time. A lot of information is collected and discussed. Although this fact increases transaction costs, it also improves the quality of decision-making. The quite formalised screening process has the function of sparing the community from conflicts with newcomers. It provides regulatory instruments to control the

number of incoming livestock into a certain area. Especially people on the local level, who can best assess the current grazing pressure on their land, have the opportunity to exclude new incoming herds. In this context, the role of the traditional authorities is widely accepted. In an empirical study on traditional authorities, the majority of respondents said that traditional authorities should control and allocate communal land (Hinz 2000a: 88; Katjaerua 2002: 12).

Anyone who does not cooperate with fellow villagers is required to leave the settlement again. This is formalised in customary law regulations (RoN 2002a). In Mutompo two cases were reported when the residents, headwoman and Hompa forced a resident to leave the settlement. In both cases they were accused of disturbing the peace in the village with witchcraft. The new Communal Land Reform Act strengthens the power of traditional authorities to exclude persons from grazing resources. Grazing rights can be withdrawn if a person carries out actions which negatively affect other farmer's grazing rights (RoN 2002b: 29(4)(e)). Local residents, regional representatives of the Ministry of Agriculture, the Ministry of Lands, Resettlement and Rehabilitation, the Ministry of Environment and Tourism and the NGO Legal Assistance Centre agree that the land allocation process works well in the Kavango. Very few conflicts, e.g. due to double allocation, are recorded. The land allocation practice of traditional authorities positively affects the impression of secure use rights (see Chapter 4.4.2). Land which has been allocated to someone will not be taken away unless the user does not comply with the customary rules. This procedure has not fundamentally changed since the first half of the 20<sup>th</sup> century (Werner 2002: 7f).

Under the new Communal Land Reform Act the role of Land and Farming Committees in influencing and controlling the traditional authority's land allocation will be largely replaced by appointed land boards. Those will grant leasehold rights for commercial land use. Land boards are established by the Ministry of Lands, Resettlement and Rehabilitation and consist of a precisely prescribed number of stakeholders (traditional authorities, farmers' unions, government officials, women, representatives of conservancies) (RoN 2002b: 2(1), 4(1)). Should the leased land exceed 50 ha, the Minister must approve the matter (RoN 2003b: 13). Traditional authorities should consent to the allocation, but in the case of conflict, they must accept the decision of a jointly appointed arbitrator (RoN 2002b: 30(1), (4), (5)). Rents are no longer paid to the account of the Mbunza but to a fund controlled by the government for the purpose of regional development (RoN 2002b: 32(1)(a), (5)). The minister may designate communal land portions as areas where land boards can grant leasehold rights (RoN 2002b:

32(2)). This part of the reform in particular leads to a significant dilution of the jurisdiction of traditional authorities (Werner 2003a) and Kavango Hompas frequently complain about it. They are afraid that natural resources in the south of the region, which were not used under customary legislation, will soon be exploited when under government control.

The shortcomings of the present system of natural resource management (see Chapter 4.2.1) seem to render modifications and additional regulations of existing institutions necessary. Nonetheless, one should be careful of removing customary institutions. The new Act does not consider any role for organisations such as the Land and Farming Committees, which currently play an important role in the preservation of biodiversity. The functions they fulfil are costly to replace. Due to their wide acceptance, Land and Farming Committees can strongly rely on social and moral-based enforcement. This enables them to fulfil some of the land board's functions more cheaply in terms of transaction costs. Such potentials should be used in the interest also of biodiversity maintenance.

Traditional authorities may grant grazing rights to non-residents, independent of their residential rights (RoN 2002: 29(3)). They can also determine the kind and number of livestock on the land (RoN 2002: 29(1)(a)). Traditional authorities have the power to withdraw grazing rights from residents who have access to other land (e.g. private farms) or own more than 300 large or 1800 small stock animals (RoN 2002b: 29(2); RoN 2003b: 10). Should holders of customary land rights not comply with the environmental requirements of the Ministry of Agriculture, the land board and traditional authorities may suspend rights (RoN 2003b: 31(1),(2); 32).

Under the Communal Land Reform Act, traditional authorities' allocations of residential rights must be ratified by the responsible land board in order to achieve legal effect (RoN 2002b: 20, 21 (b), 24 (1); LAC 2003: XIV). The land board has the responsibility to control the allocation and cancellation of customary land rights (LAC 2003: XV). The fact that the Communal Reform Act neither mentions the role of customary law with regard to land allocation nor recognises the power of local residents to influence the granting of access gives traditional authorities more power than they had under customary law alone. The Communal Land Reform Act does not commit traditional authorities to the customary registration procedure. Land boards are the only structure to control them. It is questionable whether the boards will have the financial and human capacity to monitor customary land allocation in the

same way as under customary law. The failure to recognise residents' exclusion, access and use rights on a settlement's territory decreases incentives for sustainable resource management.

The Communal Land Reform Act further formalises the allocation of customary farming rights on land for cultivation (RoN 2002b: 21(a)). Farming units for cultivation of a size not exceeding 20 ha (RoN 2003b: 3) may be allocated by traditional authorities to individuals for exclusive use (RoN 2003a). Registering larger fields requires the approval of the Ministry (RoN 2003b: 3). In order to receive a legally effective customary farming right, the allocation must be ratified by the land board. Until March 2006 all holders of customary rights had to apply for the recognition of their rights in order to give them legal status (LAC 2003: 17). This means that any right which had not been recognised by March 2006 would revert back to the state and be expropriated from the holder (RoN 2002b: 28(1)(b), (13); LAC 2003: 16). The planned formalisation of customary farming rights is impractical, at least in inland Kavango areas. The average size of abandoned and currently used fields in Mutompo is 20 ha. At least three of ten households would need approval from the Minister in order to register their rights. The transaction costs of ministerial approval work as a constraint against agricultural intensification as promoted e.g. by tractor schemes. Regional agricultural extension workers expressed the view that policy-makers had the intention of limiting the expansion of fields. The transaction costs for the application of any extension of fields works as a disincentive to clearing more new forest (Bock 2005). However, the enforcement of the new rules has not yet been clarified, considering that each field extension has to be surveyed and registered. There is the danger that due to high transaction costs, local residents will continue to use their land on the basis of customary law without holding secure legal rights, even if this becomes illegal. Any communal land which is not individually allocated as a residential or farming unit belongs to the commonage. Ploughing and cultivating on the commonage is only allowed with written permission from traditional authorities and ratification of the board (RoN 2002b: 29(4)(b)). Contraventions of this provision may be fined with up to US\$500 or imprisonment for a period not exceeding one year (RoN 2002b: 29(5)). If local residents fail to apply for the recognition of their land rights, it will be possible for any external person to receive such a legally effective right from traditional authorities. If no other person registers as a user of a plot, the land board would have to ratify such an allocation and local residents would de facto be expropriated. This situation creates insecurity of use rights and disincentives for sustainable resource management.

Another problem lies in the fact that the registration of customary farming rights is limited to land for cultivation. The Act therefore opens opportunities for the privatisation of communal land, but only if the land is a field. This provides incentives to clear forests, although this was not the prime interest of those who wish to use the privatisation option, even with the agreement of residents, traditional authorities and the government. There must be an opportunity to register customary land rights independent from the plan for use of the land.

Since 1995, a conflict has grown between Kavango traditional authorities and illegal farmers who invade and fence off Kavango land without the permission of traditional authorities. Some of the invaders are high-ranking politicians (Namibian 2003b; see also Mendelsohn & el Obeid 2003: 100, 116). The responsible Kavango Hompa does not have the enforcement capacity to stop the invasion (see Chapter 4.4.5) and the government has been discussing the issue for a long time. The failure to stop the illegal invaders critically undermines customary and statutory laws regulating access to communal land. According to the Communal Land Reform Act, the invasion of communal land without the permission of the traditional authorities is clearly prohibited and legal actions may be instituted for the eviction of such invaders (RoN 2002b: 43(2); RoN 2003b: 10(3)). The undermining of these regulations might be understood as a precedence which demonstrates that open-access communal land can be disastrous for biodiversity maintenance. Traditional authorities require a more effective instrument to legally enforce customary land rights.

#### **4.4.4 Incentives for agricultural intensification**

As mentioned in Chapter 4.2.1, a major threat to biodiversity around Mutombo is deforestation for the creation of new fields. New fields must continually be cleared due to the rising population (Campbell et al. 2002: 114) and the low productivity of soils. Despite this fact, only very few farmers apply fertilizer to the land. They fear that manure damages crops (Yaron et al. 1992: 41). The Hompa encourages farmers to apply manure instead of clearing new fields. Agricultural intensification accompanied by an increase of inputs such as draught power, fertilizer or pesticides has the potential to increase the value of output per unit of land (Williams et al. 2000: 133). This can help to provide more food for a growing population and minimise the need for further conversion of natural areas (Lovejoy 2002: 40; Tarr 2002b: 11; OECD 2002: 145). Some observers believe that it is chiefly the absence of purchased inputs that leads to pressure on natural resources and low productivity (Tapscott 1994: 3). Nevertheless, intensification does not necessarily lead to sustainable resource use (Campbell et al. 2002: 128). It often supports further geographical expansion of agriculture (OECD 2004:



119). The technological innovation of ploughs in the 1930<sup>s</sup> did not only lead to the cultivation of larger fields but also contributed to a further decline in the humus content in the soil, due to increased oxidation. As a result, yields per hectare decreased and were only compensated for by the larger portions of land being put under cultivation (Werner 2002: 15). In general, traditional agriculture accommodates a higher level of biodiversity than intensive farming (Mohamed 2000a: 168; Krugmann 2001: 5; Welp et al 2002: 280). The homogenisation of crop species reduces genetic biodiversity and lowers the resilience of crops to influxes of diseases. Both increase farmers' vulnerability (see also Shackleton et al. 2000a: 61). In addition, agricultural intensification often leads to the introduction of alien species and increasing pollution due to pesticides, herbicides and fertilizers. Where trees and hedgerows are removed, erosion becomes more probable (OECD 1999: 51). Mutompo residents already experienced trouble with intensification when livestock entered the field of a farmer who used fertilizer. A number of cattle became sick or even died after ingesting the substance. It is also believed that the use of fertilizers stimulates weed growth, requiring additional mechanical weeding (Tapscott 1994: 4). In the 1990s the Namibian government hired out tractors and ploughs to subsistence farmers. As a result the farmers were able to plough larger fields, which improved their food supply but also increased the size of cleared forest with negative affects on biodiversity. Different government intensification programs in the region collapsed as farmers were not able to pay even a small contribution to the highly subsidised services offered by the government (Adams & Werner 1990: 109).

#### **4.4.5 Regulations for wood harvesting**

“Land, water and natural resources below and above the surface of the land (...) belong to the State if they are not otherwise lawfully owned” (RoN 1990: Art. 100). All natural resources in the Kavango are therefore owned by the government, although the Namibian government recognises the importance of communal resource rights for the protection of forests (RoN 2001h). Mutompo residents perceive an exclusive right to use the trees, grass, fruits and wildlife within their village territory (see also Cole et al. 1998: 22).

Until independence, concessions for wood harvesting were granted to private contractors (Adams & Werner 1990: 140). Today the Directorate of Forestry/Ministry of Agriculture, Water and Forestry is responsible for forest resources. It is forbidden to cut, injure, destroy, collect, take or remove any forest product without authority. Forest products include any wood, grass, wild fruits, roots, barks and resin. According to customary and statutory law, only local residents are allowed to use forest resources for domestic subsistence consumption

without a permit (RoN 1999a; see also Yaron et al. 1992: 195; see also RoN 1998b). Anyone else needs a permit – issued by the Directorate of Forestry with the involvement of traditional authorities – for harvesting, transporting, marketing or exporting wood. The issuing process starts with a letter from the headman or headwoman of the place of planned harvest. Without the agreement of local residents and the settlement's traditional authorities, neither the Hompa nor the Directorate of Forestry will issue any permit. The local right to control wood harvesting provides incentives to invest in sustainable management. Residents know best how many trees there are and can most cheaply monitor the logging rates in the area. If the Hompa also agrees, loggers receive a form from her/him. With this letter they receive a permit from the Directorate of Forestry to harvest at a particular place, during a fixed period of time, a specific kind and number of trees. The permit is not transferable and only valid for a specific person. Fees have to be paid to the Directorate of Forestry (RoN 1998b). Usually the Hompa also asks for a contribution to the account of the Mbunza. The traditional authorities and the Directorate of Forestry decide together how many permits will be issued in a certain period of time for certain areas.

The enforcement of customary and statutory law is well regulated on paper. A catalogue of fines exists for contraventions such as the felling of trees without permit (RoN 1999a). The Directorate of Forestry undertakes patrols and confiscates wood. Additionally, the traditional authorities encourage the community to control their territories and to report offenders to the Hompa or the government. It is the responsibility of a headman to check permits. In the absence of permits, the headman can confiscate wood and send the case to trial under customary law. Traditional authorities have defined customary law fines. Felling a tree illegally, for instance, incurs a fine of four heads of cattle or approximately US\$200 (RoN 2002a). According to customary law, cases are first heard by the headman or headwoman, but defendants can appeal to the Hompa. Those who are unable to pay their fines are supposed to work for the community under the Hompa. Confiscated wood is sold and the proceeds as well as fines are transferred to the account of the Mbunza. Depending on who arrests the offender, the case will be heard either by the government or the Hompa. Neither the Directorate of Forestry nor the Hompa see the need to try the case twice if the other side has already decided it. Representatives of both sides state that trials can be handed over from one authority to the other if both agree that the other one can handle it better (see also Hinz 2000b: 134). This cooperation does not always work well. A critical point is the fact that the party who identifies the case also receives the fine.

Transaction costs for commercial loggers to receive permits are immense. This is the disadvantage of a procedure which tries to involve all major stakeholders in forest management. High transaction costs are most probably one reason why so few permits are issued but trees are illegally cut. Within one year's time, four protected trees were illegally felled on the one square kilometre-sized BIOTA observatory in Mutombo alone. Living trees were cut in order to use trunks which were no more than three meters long (Strohbach & Strohbach 2004). Respondents perceive non-residents' cutting of high-quality trees as a negative externality (see Chapter 4.2.1). The current permit system is ineffective (Blackie 2000: 137). In comparison to the high costs of lawful behaviour, the costs and risks of illegal behaviour are quite low. There is a fundamental problem with customary and statutory law enforcement (Jones et al. 2001: 42; Namweb 2004). In 2000, for 43 percent of the Kavango households, such as the Mutombo ones, the nearest police station was more than one hour's walking distance away (RoN 2001m: 52). The risk of arrest for illegal loggers is low, and punishments provide insufficiently determent. Residents of Mutombo and neighbouring settlements approach loggers in order to check their permits. When no valid permits can be shown, the villagers try to convince them to leave the place. The residents do not have any enforcement power to stop the contraventions if persuasion is not successful, and offenders may even become violent. Often they or their employers are known. Nonetheless, even in many cases when their names were reported to the Hompa and the Directorate of Forestry, the villagers did not receive any support. Consequently, Kavango's traditional authorities complain about the lack of law enforcement, particularly in respect to the protection of forests (Hinz 1995: 42). Poor enforcement is to a large extent the result of insufficient administrative capacity. Although the Traditional Authority Act of 2000 gives these authorities the duty to assist in law enforcement (RoN 2000b: sec 3(2)(a)) they have been progressively weakened (Impact 2003: 50). After independence, all tribal police forces were abolished in Namibia. This resulted in an increase in crimes (Düsing 1999: 243). In the past the Hompas even had their own prison. In order to enforce customary law, the traditional authorities now can only rely on a few unarmed guards. These guards are responsible for stopping fights, collecting fines, informing people e.g. of customary court appearances, and, if necessary, taking people to court. In 2002, a couple of cases were reported where headwomen or headmen stopped the felling of trees. However, poor record-keeping makes it difficult to estimate the number of cases heard, although twice the Hompa became involved. The reporting persons were rewarded, which is a positive incentive for people who control and enforce rules. One has to consider that anyone who reports violations risks negative reactions from the loggers.

If the guards fear that offenders might escape or that they are armed, traditional authorities can call the government police and officers of the Directorate of Forestry. In 2003, five law enforcers of the directorate had to control an area bigger than the Netherlands. It seems obvious that they cannot prevent all breaches of forest-related statutory or customary law. The directorate urgently needs staff at a ranger's level (Impact 2003: 55). Representatives of the Directorate of Forestry at the national level admit that financial constraints prevent officials from carrying out all the necessary activities in the field. Particularly on communal lands, the existing legislation was neither properly enforced in the past nor is it now (Hailwa 2002). This fact is also emphasised by the Homba, who complained that the police often need too much time to come and act. Sometimes it is difficult to inform them because the telephone is not working or no cars are available.

The high transaction costs of acquiring a permit and the lack of enforcement reduce the costs of illegal logging, rendering it more attractive. As a result, incentives to overexploit resources increase. This counteracts sustainable management. Many forest resources in the Kavango at present are de facto openly accessible. Additionally, in a situation of a growing population, the uncontrolled harvest of wood for subsistence purposes increases pressure on natural resources.

The present system makes little use of local residents' opportunities as providers of institutional services. They could best monitor what happens in their territory due to their physical proximity and therefore provide the potential to reduce the transaction costs of controlling natural resources. Since local residents do not receive a share of permit sales and are not compensated for providing monitoring and enforcement services, their incentives to protect resources decrease. Residents as well as local and regional traditional authorities fulfil important functions regarding natural resource management in the Kavango region. The social and moral-based institutions which they provide are efficient instruments of monitoring and enforcement. For the people using them, no external enforcement is needed and the police can limit their efforts to those who stand outside these moral obligations. Nevertheless, in cases where social control becomes ineffective, external enforcement is indispensable. The Homba complained for instance that wealthier citizens and entrepreneurs do not accept customary law (see also Jones et al. 2001: 42; Shackleton et al. 2002; Campbell et al. 2002: 114). Particularly outsiders who do not feel bound by social enforcement challenge local resource-management institutions (Jones 1999b). Any statutory legal system is confronted with people who do not

accept the rules. The failure to enforce customary and statutory law means internalised rules are undermined. This reduces incentives to participate in the maintenance of biodiversity.

#### **4.4.6 Institutional measures to fight bush fires**

Between 1989 and 2001, on average 32 percent of the Kavango region burnt every year (Mendelsohn & el Obeid 2003: 68). Most of the Mutompo territory burned in seven of these years (NRSC 2002). Fires mainly occur during winter, when the grass is dry (see also Mendelsohn & el Obeid 2003: 68). There are numerous reasons for the high fire frequency. Farmers burn agricultural remains when preparing and clearing fields. Such fires often get out of control. Carelessly discarded cigarettes are also a problem. Some fires are set deliberately shortly before the rainy season to stimulate fresh grass growth (Goldammer 2001; UN ECE/FAO 2001: 28). Hunters and thieves try to lure livestock and wildlife to remote areas with fresh grass in order to steal or hunt it (UN ECE/FAO 2001: 28). Farmers report higher livestock losses after fires due to theft and carnivores. Lightning play a minor role (UN ECE/FAO 2001: 28).

Fires are a vital element in the dynamic of an eco-system (Hailwa 2002). They play an important role in the regeneration of grasslands (UN ECE/FAO 2001: 27). Suppressing fires leads to an accumulation of biomass which increases the intensity of destruction if the abundant vegetation finally burns. More regular moderate fires ensure creative destruction (Cole et al. 1998: 6; Kamminga 2001). Nevertheless, at least in the Kavango region, repeated and unplanned wildfires tend to lower rather than to improve the grazing and browsing quality (Hailwa 2002). The present fire frequency in the Kavango is much higher than in a natural fire regime. The most direct impact the fires have on the villagers' lives is a loss of pasture (Trigg & le Roux 2001; Kamminga 2001; Goldammer 2001). In the understocked Mutompo area, droughts have far less of an effect on the grazing availability than does an extensive fire. It is also problematic that young and even large trees are killed. A decline in these young trees of valuable timber species can be observed in the region (Mendelsohn & el Obeid 2003: 68; see also Goldammer 2001). High fire frequency and high shrub/grass biomass pose a serious threat to areas of wooded land by converting important areas of forest and wooded land into shrub land with very few mature trees. Additionally, the progression of shrub land to mature wooded land and the survival of many seedlings is prevented by frequent fires (UN ECE/FAO 2001: 27). Mutompo residents report that often fruit trees are burned. After fires, trees produce fewer or no fruits (Büschel 1998: 8; Cole et al. 1998: 18). Fires further reduce soil fertility. Sulphur and nitrogen are lost to the atmosphere. Leaf litter and humus that would

have decomposed into organic nutrients is burnt. Fires are also a threat to people, animals and households (Mendelsohn & el Obeid 2003: 68). In 2001, one Mutompo homestead burned down. Further, the global externality of carbon dioxide emission must be taken into account (Goldammer 2001; Mendelsohn & el Obeid 2003: 68).

The Forest Act of 2001 forbids causing a fire deliberately or accidentally. It is also an offence not to try to stop fires. The directorate's staff complains that it has very limited opportunities to control bush fires. It is difficult to find the people who started them; offenders are rarely reported to the government. Law enforcers of the Directorate of Forestry mentioned that they forward most fire cases to traditional authorities because these can handle them better. There are customary law fines for causing fires (five cattle) (RoN 2002a; see also Hinz 1995: 42; Hinz 2000a: 96). All residents of the place where the fire started are supposed to be punished (by one cow) if the guilty person cannot be found (RoN 2002a). Traditional authorities, however, struggle as well. Only few fire cases are reported to customary courts (Hinz 1995: 42). One should keep in mind that those who witness someone causing a fire are usually living in the same settlement and are often even related to the perpetrator. Reporting neighbours and family members has a direct effect on the satisfaction of social needs. Therefore additional incentives are needed to encourage people to report those who start fires. An alternative to the negative incentive would be a reward, such as a part of the fine.

Initially fire cases are heard by the responsible headwoman or headman. The Hompa only becomes involved if on the lower level no solution can be found. Representatives of the Directorate of Forestry can play an advisory role in customary court trails. Fines are paid in livestock or in cash (one head of cattle = approximately. US\$50). Customary court decisions can be appealed to government courts.

Apart from law enforcement, the Directorate of Forestry, with support from the Namibia-Finland Forestry Programme, has mobilised, trained and equipped communities to cut firebreaks in order to prevent the spread of fires in important forest reserves. This has resulted in a reduction of burned areas (UN ECE/FAO 2001: 30; Seppanen 2001; Kamminga 2001). Firebreaks are seen as an effective instrument for protecting pastures (Kamminga 2001). Providing communities with financial and technical assistance for labour-intensive firebreak construction and maintenance combines nature conservation with poverty alleviation (Kamminga 2001). Different government departments and traditional authorities have

indicated their support for such initiatives. Additionally, different stakeholders try to reduce the frequency of fires through awareness campaigns (Kamminga 2001; see also RoN 2001h). Activities in the frame of the “Integrated Forest Fire Management” campaign include radio programs, the distribution of posters and the production of school materials. The message is “manage fire wisely” rather than “stop fires” (Kamminga 2001). Particularly the Regional Councillor and the Directorate of Forestry approach the community.

#### **4.4.7 Regulations for wildlife, fruits and grass**

Since 1967 commercial farmers in Namibia have enjoyed regulated rights to use and benefit from wildlife on their farms. This has never applied and still does not apply to communal lands (Jones & Mosimane 2000: 8; LAC 2003: XIII), where the government is the owner of all natural resources (RoN 1990: Art. 100; Ashley et al. 1994: 5). For communal farmers, it is forbidden to kill any wildlife unless in defence of a human being or its property (Yaron et al. 1992: 193). Attacks will be investigated by the government. Officially determined victims can apply to keep the skin of the animal as compensation for their losses. If wild animals cause problems, the government sells permits to trophy hunters to shoot them. Traditional authorities or local residents are not involved in the sale of hunting licenses. The Hompa complains that the government can catch living animals in its territory without even consulting him. Also customary law does not allow the killing of animals such as kudus (fine of two cattle) (RoN 2002a; Hinz 2000a: 96). Nonetheless, the hunting of small game is common around Mutompo (see chapter 4.2.1). The protection of crops against birds, in particular, is tolerated (see also Eriola et al. 1990: 85; Mendelsohn & el Obeid 2003: 93). Hunting regulations for small animals are hardly enforced. The lack of rights for residents to control wildlife utilisation reduces incentives to protect it (Ashley et al. 1994: 1, 10).

The Ministry of Environment and Tourism is further responsible for medicinal plants such as “devil’s claw”. Those who want to harvest such plants have to buy permits from the government, which must be approved by the Hompa. Permits are valid for a particular locality only (Cole & du Plessis 2001: 42). In the Kavango one can find plants which are used by the pharmaceutical industry and sold on global markets (Schalkwyk 2002: 37; see also RoN 2003f: 16). Some high-quality medical plants can be cultivated and provide a potential alternative source of income also in Mutompo. The high economic value of these species, however, creates a need for innovative institutional structures to ensure sustainable utilisation. It is frequently reported from the Kavango that plants are unsustainably harvested (Prié 1998: 5; CRIAA SA-DC 1999: 25; Cole & du Plessis 2001: 29; Schalkwyk 2002: 37). The present

monitoring and enforcement of harvesting regulations seems to be ineffective (Cole & du Plessis 2001: 29, 43; Schalkwyk 2002: 37). The commercial collection of medicinal plants was not observed around Mutompo.

Grass cutting (e.g. *Eragrostic pallens*) for thatch is another important resource use. The increasing commercialisation of thatch grass puts growing pressure on these resources and leads to conflicts between local residents and non-residents with business interests. There is an urgent need to effectively regulate access to these resources (see also Jones & Mosimane 2000: 13; Kamminga 2001). Currently only traditional authorities offer instruments to control thatch grass utilisation. A newly introduced rule requires the purchase of an annual permit from the Hompa. The permit does not limit the amount of grass which may be harvested. It is again of importance that local residents agree with the issuing of permits. Cutting grass without permission from local and regional traditional authorities is fined at four head of cattle (RoN 2002a). It happened in Mutompo that non-residents harvested thatching grass without informing the headwoman. The residents chased them away and informed the Hompa. The veterinarian office becomes involved if grass is transported to the south of the veterinarian cordon fence, as this involves the danger that ticks which hide in the grass may transmit livestock diseases. The grass has to be kept in quarantine and sprayed with an insecticide before it may be exported.

Fruits on the Mutompo territory, however, belong to their settlement and are supposed to be harvested only by Mutompo residents (see also Cole et al. 1998: 22). Within Mutompo, those residents who come first can collect them. It is generally forbidden to fell fruit trees (see also Hinz 1995: 42; Cole et al. 1998: 20; Hailwa 2002) which are mostly used for subsistence purposes. The Hompa stopped a businessman who collected large amounts of fruits to commercially brew alcohol. After negotiations they came to the agreement that only local residents are allowed to collect the fruits and may sell them to the entrepreneur.

#### **4.4.8 Water: the scarcest resource in inland Kavango settlements**

Water is a very critical factor for all land use options in the region. In the 1990s, the inhabitants of the northern Namibian regions reported that the water supply was by far their most serious problem (Gatter 2002: 4).



#### **4.4.8.1 Namibian water policy and legislation**

Namibian water is owned by the state but is supposed to be used for the benefit of all citizens (RoN 1990: Art 100; RoN 2000a: 23, 38; RoN 2004: sec. 4). Prior to independence, the rural water supply in communal areas was heavily subsidised (Ashley et al. 1995: 12). Water infrastructure was established and maintained by the government (see also Yaron et al. 1992: 140, 144). The government further provided diesel to run pumps. After independence it was realised that the subsidised water supply led to waste (RoN 1993a: 1f; Bock & Kirk 2006: 342, 344). Based on three fundamental policy principles, the water supply system was reformed through: a) maximum involvement of users, b) delegation of responsibility to the lowest possible level and c) an environmentally sound utilisation of water resources (RoN 1993a: 18). A backbone of the reform is capacity-building related to water supply, operation, maintenance and conservation aspects (RoN 1993a: 29f). For communal farmers, this reform means stronger self-support and more responsibility for water facilities. They are supposed to own and operate their installations (RoN 1993a: 29). Users' payments should cover operation and maintenance costs, although the necessity was recognised to adapt this to the capacity of each community to cater for itself, in order to quantify needs for subsidisation (RoN 1993a: 7; RoN 1997a: 4; RoN 2000a: 26).

In 1997, it was decided that within ten years' time the responsibility for managing and paying for water services should be progressively devolved to community organisations (RoN 2000a). The legal framework for the implementation of the water policy reform is provided by the Water Resource Management Act (RoN 2004; Werner 2003a: 7). Amongst the fundamental principles of the act one can read that equitable water access for every citizen is recognised as a human right. Human needs and environmental ecosystems must, however, be harmonised, incorporating economic, environmental and social dimensions. An important instrument for achieving this is the cost-effective supplying of water. The act recognises the regional diversity of Namibia and mentions the need to decentralise responsibility to the lowest possible level of government, consistent with available capacities at this level. In order to involve important stakeholders in decision-making, it is necessary to create awareness and to develop human capacity (RoN 2004: sec. 3).

The act gives far-reaching responsibilities for national water management to the Minister (RoN 2004: Part II). A Water Advisory Committee must be established in order to advise the Minister on water-related matters (RoN 2004: Part III). Basin Management Committees are

set up to manage water basins involving different stakeholders (RoN 2004: Part IV). One function of the committee is to promote community participation in the protection, use, development, conservation, management and control of water resources (RoN 2004: sec. 13b). At the community level, Water Point User Associations (WPA) are established, consisting of rural community members who permanently use a water point. They operate and maintain the particular water point on a cost-recovery basis, in order to foster a sense of ownership. The association elects a water point committee in order to run the day-to-day management and financial activities. The WPAs of a constituency form a Local Water User Association to coordinate the water management of a supply scheme (RoN 1997a; RoN 2004: sec 16(4)). Community water user associations formulate a constitution and are registered by the Minister (RoN 2004: sec 20, 21). Water point user associations may decide about water use regulations. They permit and forbid water use according to the rules of the constitution and the management plan (RoN 2004: sec 19b, c; RoN 2001d: 6.2.2). The Water Point Committee is empowered to monitor and enforce the payment of fees and the compliance with regulations e.g. by introducing penalties. All WPA members are obliged to pay a fee and to abide by the lawful decisions taken by the Water Point Committee. Penalties are specified in the Management Plan (RoN 2001f). The ultimate punishment against any offence is the suspension of membership in the association (RoN 2001d: 6.2, 8.2, 9.2), which simply means exclusion from the water supply. In cases of conflicts, a mediator is appointed. Depending on the wish of the residents, this may be traditional authorities, government officials, church leaders or anyone else (RoN 2001e: 10). Such an approach allows efficient conflict resolution, because an authority is chosen which best represents the interests of the involved parties and whose decision is accepted. Social and moral-based institutions minimise the need for external enforcement. The standard leasing agreement between the Directorate of Rural Water Supply and the WPA mentions that the WPA can call on the law enforcement authorities in case of abuse, vandalism or theft of infrastructure (RoN 2001g). A registered WPA becomes a body corporate, a legal person with full capacity to sue in court (RoN 2004: sec. 16 (9)).

In this context, the role of traditional authorities and land boards in water management is rather confusing. The Communal Land Reform Act stipulates that “no person shall obstruct the approach to any watering place, or prevent (...) any person from drawing water from, or watering stock at, such a watering place” except with the written authority of traditional authorities and ratification of the land board (RoN 2002b: 29(4)(d)). This paragraph undermines the power of the WPAs.

#### **4.4.8.2 The water supply in Mutompo**

In the 1970s, a hand pump was installed in Mutompo and in the late 1980s a diesel pump. In the event of necessary repairs, the government was responsible for fixing the problem and replacing defective parts. The Mutompo pump has been regularly maintained, as records of the Directorate of Rural Water Supply prove. Diesel to run the pumps was also provided by the government and even trucked to the settlements. Since 1998 the amount of free diesel has been gradually reduced from 110 litres per month to zero. Since August 2002 the villagers have had to buy all diesel on their own. Mutompo water fees increased by 2004 to approximately US\$3 per month for livestock-owning households, independent of the number of livestock owned. Those without animals pay approximately US\$0.60. As a measure of reform, a water committee was founded. It is responsible for managing and running the facilities and collecting the fees. It is, however, de facto the headwoman who organises the water supply and who decides water questions together with the other residents. Since the monthly water fee is hardly enough to buy diesel and many households do not pay reliably, it is often the headwoman who pays the diesel from her pension. There is much confusion amongst the villagers over who should repair the infrastructure. According to representatives of the Rural Water Supply, reform is being implemented in three phases. In the first, the focus lies on capacity-building, including the introduction of regulations. In the second phase, which was supposed to end in 2003, users became responsible for minor repairs and routine maintenance. Only in the third one, ending in 2007, should all kinds of (re-)investments in water facilities be implemented by users, with the WPA given full ownership of the water point. In 2007 the Mutompo water point had not yet been officially handed over. The residents were not sure which rights and duties they had at that point.

By 2004 the residents of Mutompo had not seen any benefits from the new situation. Capacity-building was limited to technical training for the caretaker related to pump operation and maintenance. The Water Committee did not receive any management training (compare with RoN 1997a: 7). The fact that Mutompo residents can formally be excluded from water use did not affect their lives very much. Already in the past, only Mutompo villagers used the water point. If people from other settlements wanted to use the water they had to ask for permission and pay the monthly fee. The same applied if the pump in Mutompo was broken and Mutompo people had to go to water points of other villages. There is wide recognition of the disadvantages of the reform. Farmers complain about the high costs they face since water subsidies were cut. When the residents agreed with representatives of the Directorate of Rural

Water Supply regarding the transfer of ownership of the water point to the villagers, they were not aware of the costs that would arise for them and later felt cheated. The policy implementation does not ensure that the reform is based on the willingness and ability of communities to take responsibility and ownership of the water systems and to pay for water service (compare with RoN 1997a: 5).

Water fees are a serious burden. Low levels of water usage make it difficult to recover costs without charging excessive amounts to users (see also Goldin 2000: 390). Fixed and transaction costs make up a high percentage of the total costs. The money collected in Mutompo is hardly enough to buy fuel, and no funds for future repairs are saved. Since 2001, the government no longer transports diesel to the settlements. Villagers need to travel to Rundu to buy fuel. The plan to establish shops along the tarred road to sell parts and diesel was not implemented until 2004. People report selling crops and livestock in order to cover costs for water. This has multiple impacts on their livelihoods (see Chapter 4.3) and affects food security in a region where 28 percent of the children under the age of five were severely underweight in 2000 (Mendelsohn & el Obeid 2003: 85). The impact on biodiversity preservation is ambiguous. The reforms make farming in inland Kavango areas less attractive and therefore reduce pressure on biodiversity in these parts of the region. Through intra-regional migration processes, however, it can be presumed that the pressure has only shifted back to the areas close to the river where water is available for free.

Incentives to save water and to maintain infrastructure, however, have begun to take effect. Around the water tap in Mutompo, the villagers collectively built a fence to protect the tap from animals. In order to control water use and waste, the tap is kept locked except at specific times of the day. Thorn-bushes were placed around the open reservoir when some people started to take water directly from there. All these measures were insufficient. Two padlocks were broken and the thorn-bushes removed. The headwoman threatened to chase some households out of the settlement, but little happened. Nevertheless, interviews showed that awareness of the problem has been increasing and more and more residents accept the rule that only those who pay for water should obtain it. It is problematic that the person responsible for organising diesel sometimes misuses part of the money. Conflicts have also arisen in the water committee. Although the permanent residents are scarcely aware of the committee, there is one non-permanent farmer who is in disagreement with the headwoman. Currently, decisions over water questions are made by all residents, with the headwoman

playing a central role. In general, the sustainable water supply in Mutompo will strongly depend on the ability of the residents to introduce broadly accepted institutions. For this purpose, external support might be needed.

Two conjoint models have been calculated in this context to gain a better understanding of the residents' preception regarding the impact of the water reforms. The first assesses the situation in years with good rainfall and the second in years of grazing shortage due to bush fires or drought. The idea is to derive non-monetary, but metric utility values for different action options. In the first model for years with no grazing shortage, the following two attributes were chosen: "expansion of fields" and "reaction to grazing shortage". The first attribute assesses whether the decision to expand the field has an impact on the work load and future food supply of farmers as well as on habitat loss and biodiversity preservation (see Chapter 4.2.1). To expand a field by clearing part of the forest requires much more effort than merely cultivating an existing field. The investment promises, however, higher crop yields. The two attribute levels of the attribute "expanding fields" are a) expand this year and b) expand next year. As a second attribute the farmers were asked how they react to water shortage. They had three opportunities: a) to pay the fee as usual b) pay a higher fee c) or to leave Mutompo. As a result, six possible strategies can be chosen (see Table 6). Each of these strategies was symbolised on a paper card. The 6 cards had to be ranked by the respondents according to their preference for the strategies.

**Table 6:** Attributes, attribute levels and 6 strategy combinations of the conjoint analysis for normal rain years (source: Falk)

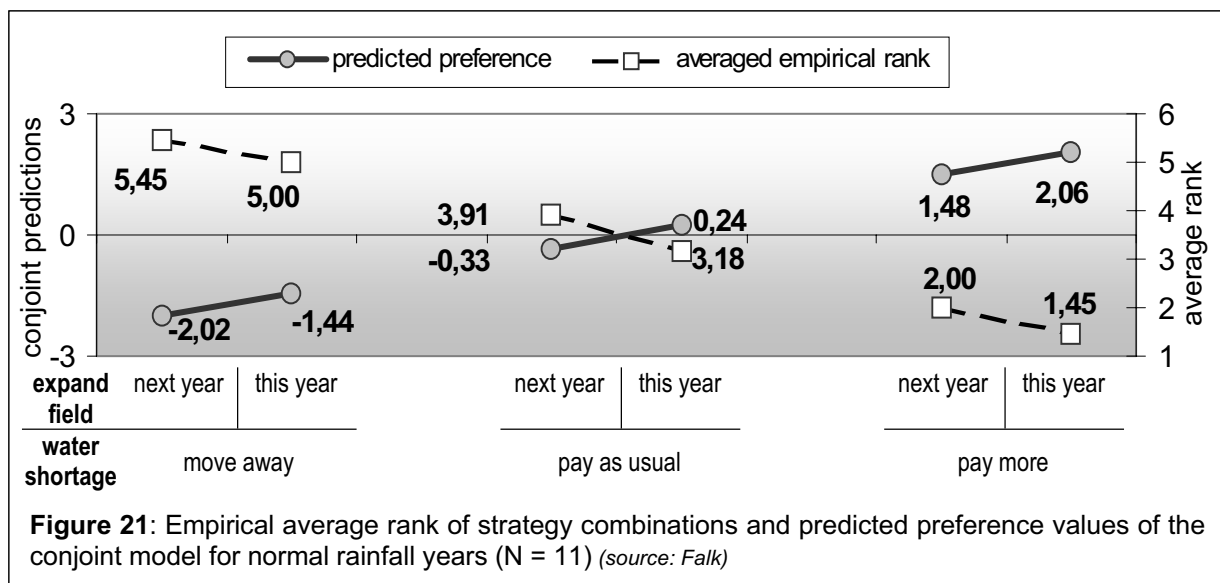
		reaction to water shortage		
		pay as usual	pay more	move away
expansion of fields	this year	expand this year, pay as usual	expand this year, pay more	expand this year but leave Mutompo
	next year	expand next year, pay as usual	expand next year, pay more	expand next year and leave Mutompo

The model calculations prove that the water question is perceived to be much more important (relative importance: 82.4) than field expansion (relative importance 18.6). Least preferred is the option to leave the settlement because of water shortage (utility = -1.73). The suggestion of some residents to move back to the riverside where water is available but grazing scarce must be therefore interpreted as a provocation. The more important livestock becomes as a source of income, the less desirable the exit option.<sup>21</sup> The lack of available alternatives and the pull of social ties were mentioned as reasons for staying. Paying the same amount for diesel despite a lack of water is more preferred than leaving but also not very much favoured

(utility = -0.05). The highest preference value is received for the option of paying higher fees (utility = 1.77). On average, farmers express a willingness to pay US\$8 in the range from US\$0 to 15. Correlation analysis shows that employed respondents are willing to pay most. The willingness to pay increases with the herd size of a household. Households which have savings and which participate in collective actions are more willing to respond to a water shortage with additional payments.<sup>22</sup> Those who rely on casual work as a source of income prefer to pay as usual.<sup>23</sup> These results indicate that willingness to pay is less a question of attitude but rather is strongly connected to the actual ability to pay (see also Bock & Kirk 2006: 350).

The reaction to a water shortage has a much higher priority than the question of whether to expand fields. To wait to expand until next year is less preferred (utility = -0.29) than clearing new fields already this year (utility = 0.29). Household heads that do not live permanently in Mutompo have a higher preference for expanding fields on an annual basis.<sup>24</sup> This might be related to the fact that they can employ workers and therefore do not face the work themselves. The predicted conjoint-preference values correspond well with the averaged empirical rank of strategies. Strategies which were on average ranked highly also received the highest conjoint-preference values (see Figure 21). Testing the conjoint model with Pearson's correlation analysis shows that the model's predictions fit highly significantly.<sup>25</sup>

A second conjoint analysis was calculated in order to assess the reactions of Mutompo farmers to a grazing shortage and to compare this with the importance of a water shortage. Both the high rainfall variability and frequency of fires have a strong impact on the available grazing



capacity of land as well as on the opportunity to cultivate. These factors are crucial for farmers' livelihoods. In the second model for years with a grazing shortage, the attribute levels of the attribute "water shortage" remained the same as in the model for good rainfall years. The attribute "field expansion" was not considered again. This time the respondents were asked how they behave when also grazing resources become scarce. Three opportunities were given: a) just stay in Mutompo b) open crop fields for livestock and c) leave Mutompo temporarily for emergency grazing areas (see Table 7). Opening fields is only done if rain is insufficient to promise any crop yields. To leave Mutompo is the last step farmers take. More than half of the households know of opportunities to take their livestock elsewhere in cases of serious grazing shortage.

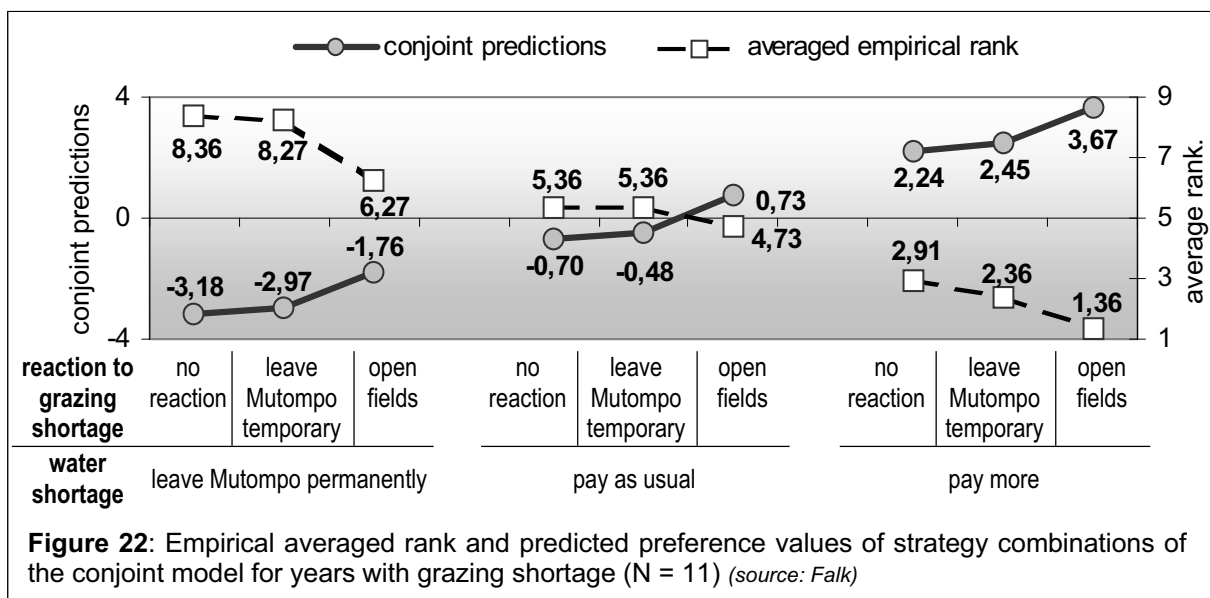
**Table 7:** Attributes, attribute levels and 9 strategy combinations of the conjoint analysis for years with a grazing shortage (source: Falk)

		reaction to water shortage		
		pay as usual	pay more	move away
reaction to grazing shortage	no reaction	no reaction to drought, pay as usual	no reaction to drought, pay more	no reaction to drought, leave Mutompo
	open fields	open fields for livestock, pay as usual	open fields for livestock, pay more	open fields for livestock, leave Mutompo
	leave Mutompo	leave Mutompo temporarily, pay as usual	leave Mutompo temporarily, pay more	leave Mutompo permanently

Even in times of grazing shortages, the importance of the water shortage dominates. The relative importance of the attribute "water" is much higher (relative importance = 75) than that for grazing (relative importance = 25). Again, farmers preferred to increase water fees in reaction to a water shortage (utility = 2.79) rather than to pay as usual (utility = -0.15). To leave Mutompo permanently was again the worst option respondents could imagine (utility = -2.64). Households who think they can influence what happens in Mutompo had a higher preference for paying more.<sup>26</sup> The results confirm again that households which rely on casual jobs do not want to increase their contribution.<sup>27</sup> Amongst the reactions to a grazing shortage, the opening of fields was most favoured (utility = 0.88). It seems to be the most conventional measure in times of emergency, independent of household characteristics. Neither staying in Mutompo (utility = -0.55) or leaving temporarily for emergency grazing areas (utility = -0.33) was particularly preferred. In particular non-permanent and employed household heads prefer to leave livestock in Mutompo during droughts.<sup>28</sup> They have better opportunities to bridge times of grazing shortage by buying fodder. Residents who have an administrative or specific social function in the settlement and who think they can influence what happens in Mutompo also prefer to stay even in times of trouble.<sup>29</sup> Those who prefer to leave Mutompo during

times of grazing shortage are less willing to pay for water.<sup>30</sup> Again, the predicted conjoint-preference values do correspond well with the averaged strategies' ranking (see Figure 22). Testing the conjoint model with Pearson's correlation analysis shows that the model's predictions fit highly significantly.<sup>31</sup>

This analysis shows that water policy has a significant impact on the livelihoods of Mutompo farmers. Especially the poorest amongst them are negatively affected. Poor management and maintenance are the result if insufficient attention is given to the capacity of water users to pay, if cost recovery is phased in too rapidly and if training remains inadequate (RoN 2000d: 20). The Ministry of Agriculture, Water and Rural development is aware of this problem and proposes intra-community cross-subsidies to satisfy the basic needs of low income users (RoN 1997a: 5, 7, 10; RoN 2001f). A study conducted for this Ministry concluded that most communities would not be able to cover water costs on a per-household basis but only on a per-head-of-livestock basis. Much depends therefore on the willingness of farmers rich in livestock to pay higher charges (Blackie 2000: 144). In Mutompo, transferring financial responsibilities from the government to end users runs counter to poverty alleviation measures and the objective of providing all homesteads with water at an affordable cost (RoN 1993a: 13). The management guidelines propose flexible payment schemes which allow payment in cash or in kind as well as labour-sharing agreements (RoN 2001f). The option that poorer households become more strongly involved in the maintenance and operation of the water infrastructure as their contribution to the water supply must be discussed.



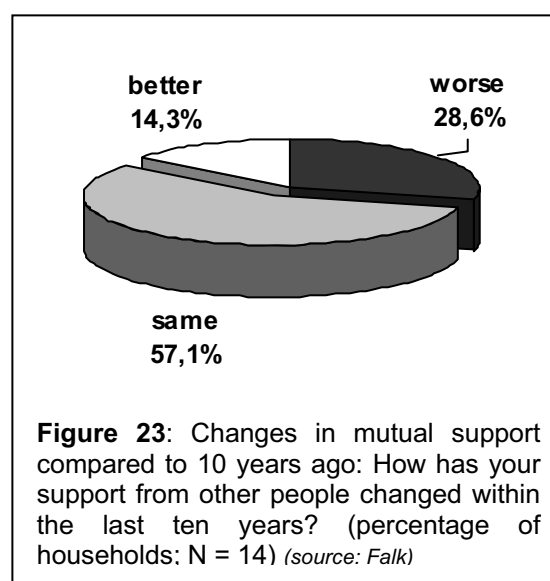


Water subsidies frequently provide incentives to waste scarce natural resources (see also OECD 1999). To reduce them is necessary in order to make water consumption more sustainable and to ensure that freshwater resources are available also in future (see also RoN 2000a: 15). The opportunities of many farmers are, however, limited and the reform must be backed by compensatory transfers explicitly supporting the poor. The government expects annual net savings through the reform (RoN 1997a: 15). In such a case, these savings are taken from the poorest of society. Positive incentives must be established in order to combine nature conservation and poverty alleviation objectives. External support is needed for the emergence of small-scale enterprises which lower the transaction costs of, for instance, the new water supply scheme. Opportunities for local contractors, workshops, spare outlets and diesel contribution services reduce the costs of water supply for users and improve the local economy (RoN 1997a: 8).

#### **4.4.9 Social capital and intra-community institutions**

Especially in times of trouble, social capital is an important asset. All but one of the Mutempo household heads mentioned that they expect to receive support from relatives, friends or neighbours in case of emergency (N = 14). One third of the households received regular remittances. For 21 percent this is a very important source of income. 85 percent stated that they also give crops, milk, meat or money to members of their extended family (see also Eriola et al. 1990: 33). In particular, household heads with higher education level mention reciprocity.<sup>32</sup> Reciprocity in such transfers is maintained over long periods of time and is not manifested in simultaneous exchanges alone. People receive and give depending on the availability of goods and the neediness of others. Few changes are perceived regarding mutual support within the community. The majority of the respondents think that people help each other as much as before independence. Nevertheless, fewer household heads thought that this support had increased than those who stated that it had decreased (see Figure 23).

71 percent of the household heads stated that they participate in activities which need to be done for the community. 43 percent gave examples of such actions. Apart from participating in meetings,



they mentioned helping to build and maintain water and school infrastructure. Those who participate in collective action are more likely to receive support from others.<sup>33</sup> One typical form of mutual help is practiced when a field owner invites a group of people to help her/him with ploughing, weeding or harvesting. As a reward, the owner prepares traditional beer for this helping group (see also Yaron et al. 1992: 61, 115; Cole et al. 1998: 20; Mendelsohn & el Obeid 2003: 96). Working and celebrating together strengthens social relations and improves the potential for socially enforced institutions among the residents.

Collective action can also be observed regarding rangeland management. Apart from mutual assistance, many households reported that they come to informal grazing agreements. After the first rains, when fresh grass is growing, the herders decide whether certain areas should rest for some weeks. No meetings are made and other households are informed only by word-to-mouth. Agreements are not formally enforced apart from social sanctions. These instruments do not always work. Some respondents complain that certain farmers simply use the place without respecting the rules. Most of the time, however, this does not happen and communal rotational grazing generates the desired impact on the pasture. Allowing farmers of surrounding settlements to use natural resources on Mutompo territory is seen as a kind of contract. Treating non-residents well in Mutompo increases the chance that one can use their resources in times of need as well. Another informal rule prohibits the establishment of fields in grazing areas. Before clearing a new field, investors are obliged to discuss the matter with the people living in the area and need permission from the headwoman. These informal rules to control the expansion of fields may be backed in future by the Communal Land Reform Act (see Chapter 4.4.3).

A couple of committees have been established in Mutompo by external agents such as the school administration or the Directorate of Rural Water Supply. One fourth of household heads hold a position in the community. The higher the education level, the more probably they hold such a position.<sup>34</sup> However, committees do not play an important role in village life. Decisions are made in informal talks. The headwoman has a high standing and after informal discussions it is her responsibility to decide. In the case of conflicts, higher traditional authorities can be called upon. The existing structures seem to provide important participation opportunities. 79 percent of the household heads think that they can influence what happens in the settlement. Residents who hold a position and who think they can influence village life have a higher preference for staying in Mutompo even in times of drought or water shortage.<sup>35</sup>

#### 4.4.10 Pasture distribution

The perception that “local communities have traditionally exercised minimal management of livestock (e.g. avoiding overgrazing)” (RoN 2001c) is still widespread. Reasons given for this “...are complex, but an important element is the communality of range resources (use it before someone else does)” (RoN 2001c). Such stereotypes ignore the fact that sustainable communal resource management is not the exception (Ostrom 1990).

Access to natural resources is regulated in Mutompo (see Chapter 4.4.3). Non-residents are effectively excluded from the use of grazing and water resources. Amongst the residents of a village, all unfenced and uncultivated land can be used for grazing, hunting and any other resource use (Hinz 1995: 37). No household uses the whole territory, however, but only particular parts. Five grazing areas can be distinguished in Mutompo: Horongo, Pandureni, the direction of Epingiro, the direction of Shihetekera and the direction of Nzovhu (see Figure 24). Pandureni and Horongo are bordered by the fence of the research station Mile 46 and are used exclusively by Mutompo residents. The BIOTA observatory is situated in this area. Although they are not marked, the territorial boundaries of the neighbouring settlements Epingiro, Shihetekera and Nzovhu are known to residents.

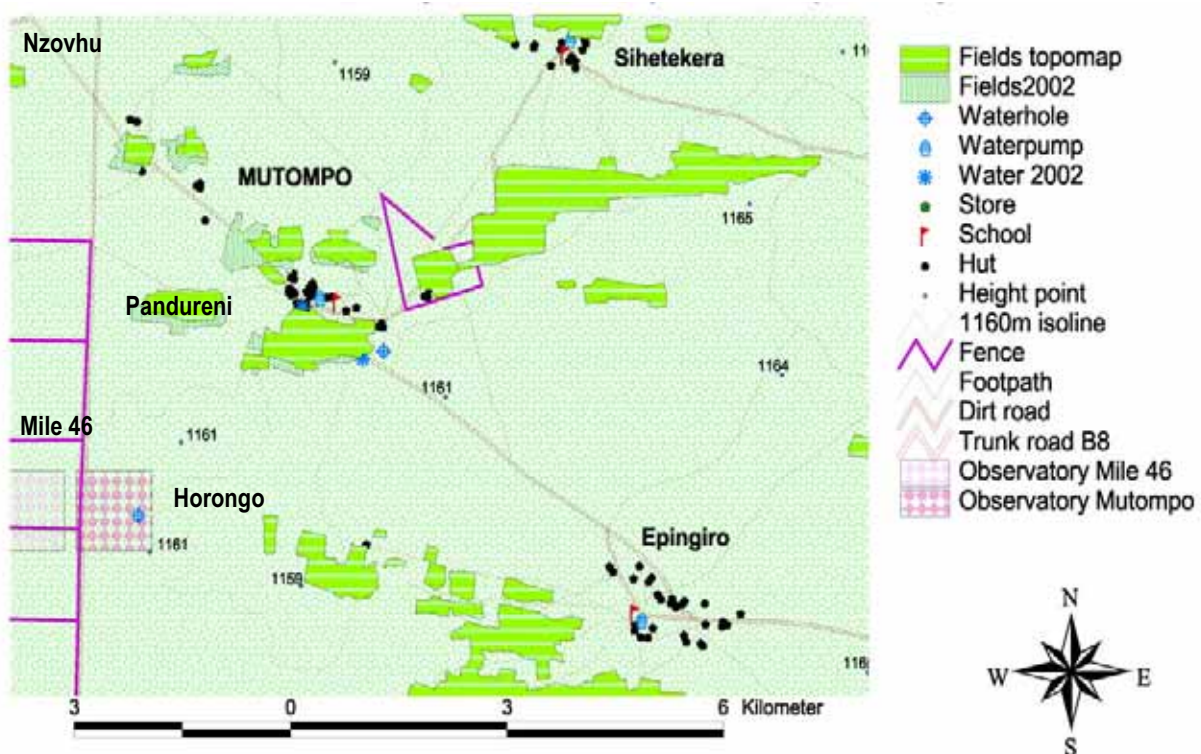
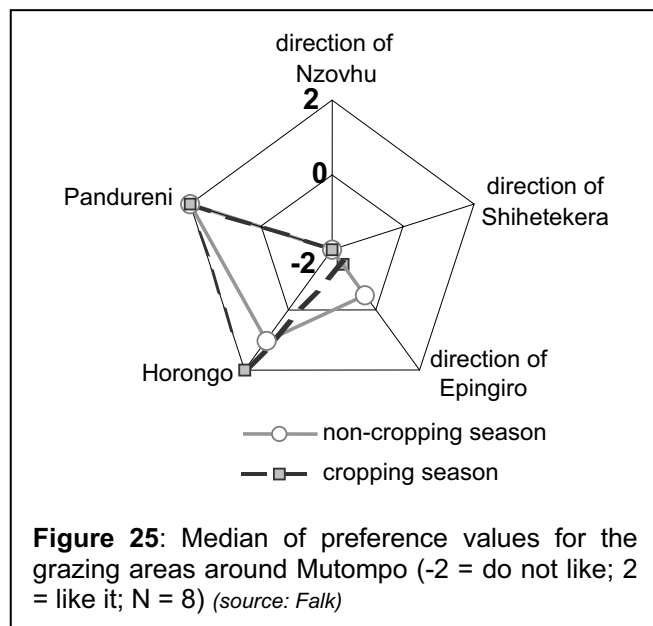


Figure 24: Grazing areas around Mutompo (source: Ute Schneiderat)

Pasture management differs seasonally due to variable water availability and the need to protect crops against livestock encroachment. During the cropping season, cattle and goats are herded in order to avoid their entering fields (see also Yaron et al. 1992: 41; Ostermeier-Noczil 1997: 23, 42f; Hengua & Bovell; 1997: 2). In the fallow season, livestock is no longer herded, as there is no risk of damaging crops. The sites where cattle graze are only vaguely determined by the direction in which the animals are sent and the areas where they usually go. If grazing becomes scarce, the animals walk far and even up to neighbouring water points. Farmers are afraid that livestock will get stolen at this time of the year.

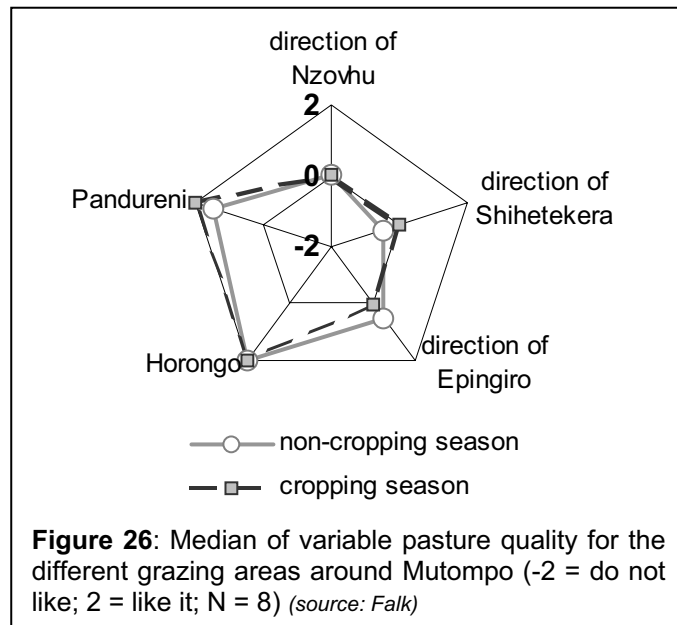
Household heads were asked to rate their preferences for the five grazing areas in both seasons on an ordinal scale between  $-2$  (do not like it at all) and  $2$  (like it very much) (see Figure 25). Both during the cropping and non-cropping season, most farmers prefer Pandureni and Horongo. Mainly in the fallow season, some households use the direction of Epingiro. Only two out of eight households take their livestock in both seasons also in the direction of Nzovhu. The pasture in the direction of Shihetekera is equally disliked. Wilcoxon significance tests prove that Pandureni and Horongo are significantly more favoured in the cropping season than the direction of Nzovhu and Shihetekera. Pandureni is also significantly more liked in the non-cropping season than the directions of Epingiro, Nzovhu and Shihetekera. In the non-cropping season, Horongo is less favoured and receives significantly higher preference values only in comparison to the direction of Epingiro (see Appendixes 4 to 7).



In the next step a detailed assessment of motives for using specific areas was carried out. The analysis is based on the CNI-Model and was done separately for the cropping and non-cropping seasons. Appendix 3 lists the assessed capital, need and institutional variables. Apart from the calculation of medians and significance tests, a correlation analysis was conducted. For this purpose, the values of each pair of areas were compared. Ten pairs of outcomes are possible. A new variable was introduced, which receives the value 1 if area A receives a

higher value than area B, the value 0 if both receive the same value and  $-1$  if area A receives a lower value than area B. This comparison was done for all variables and all area pairs. In this way, it was assessed whether the relative value of one variable (e.g. pasture quality) between area pairs correlates with the relative preference for the areas (see Appendixes 6 & 7).

The most obvious reason to prefer a pasture is grazing quality. Mutompo residents think that the animals find more and better food in Pandureni and Horongo (see Figure 26). Especially in the direction of Epingiro and Shihetekera, too many animals graze. Wilcoxon tests prove that the quality of pasture in Pandureni and Horongo is perceived to be significantly higher than for the direction of Epingiro, Shihetekera and Nzovhu (see Appendix



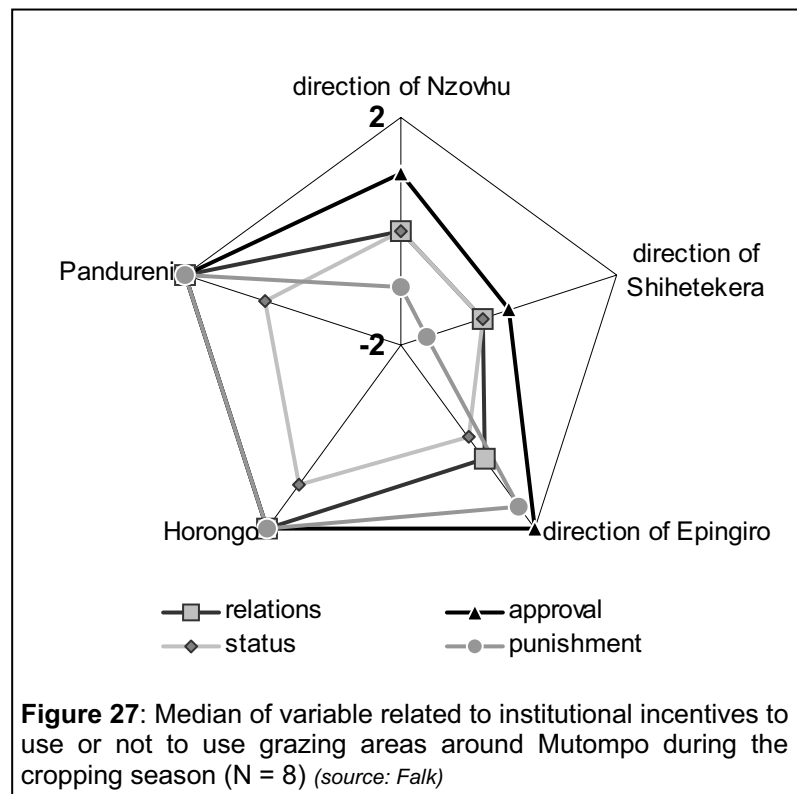
4). Few inter-seasonal variances are recognised, which indicate that the natural capital is usually sufficient also during the dry season (see Appendix 5).

The main water source for people and livestock in Mutompo is the borehole pump. After rains, some hollows with clayey soil fill with water. Especially in Horongo, these so-called Ndombes can be found. The water lasts at best for one month. Residents reported that the Ndombes silt up because the clay is removed to build the walls of houses. Ndombes do not play an important role in the attractiveness of grazing areas (see Appendix 6).

Pastures are more preferred the closer they are to particular households. This is especially important in the cropping season, when the whole family works on the fields and no time is left to take the animals to distant places. Correlation analysis proves that the areas in the direction of Nzovhu, Pandureni and Epingiro are more preferred the closer households live to the respective areas (see Appendixes 6 & 7). The connection between distances and preferences can be explained to a large extent by the transaction costs involved. The distance to grazing areas, for instance, plays a role regarding potential risks. If areas are further away, it is more difficult to control livestock. Farmers are especially afraid that livestock will get

lost or stolen. This problem seems to be relevant especially in the direction of Epingiro during the non-cropping season, when animals are not herded. Wilcoxon tests proved that safety needs are best satisfied when keeping the herd at Pandureni and Horongo, especially in comparison to the directions of Epingiro and Shihetekera (see Appendix 4). During the cropping season, farmers fear that their livestock could enter other people's fields, which leads to problems discussed below. Nonetheless, the distances of households from pastures are also a basis for the distribution of informal use rights within the community.

Institutional incentives based on social enforcement affect the choice of grazing areas. Four variables were assessed in order to detect formal and informal rules (see Appendix 3). In the cropping season, the social environment seems to be particularly pleasant and agreeable if households take their livestock to Horongo and Pandureni. In the directions of Shihetekera and Nzovhu, even punishments are significantly



more probable in comparison to Pandureni and Horongo (see Figure 27). The social environment disagrees with household heads and disrespects them if livestock is taken in the direction of Epingiro (see Appendix 4). In direct comparisons of the area pairs Nzovhu and Pandureni, Nzovhu and Horongo and also Nzovhu and Epingiro, those areas are always preferred where respondents expect no social punishments. Whoever believes that going in the direction of Nzovhu, Horongo or Pandureni negatively affects social relations prefers to avoid those places (see Appendix 6).

In general, significant correlations between preferences and social institutions can only be observed for the cropping season (see Appendixes 6 & 7). During the non-cropping season, livestock moves around unattended and nobody seems to complain if it walks into

neighbouring territories. Nevertheless, there was a concern that livestock could drink at another settlement's water point and one would then be obliged to pay the water fee over there. In the cropping season, farmers worry that livestock enters fields and damages crops or households. This problem was reported already in the 1930s (Werner 2002: 15). Victims can report the case to traditional authorities and demand compensation. There is an officially acknowledged customary law for dealing with such offences. The owner of the livestock has to pay approximately US\$1 per head of livestock which was on the field (RoN 2002a). This risk is the main reason why Mutompo residents avoid the eastern and northern grazing areas. The question remains why this problem is not so crucial in Pandureni, where many fields are also situated. One explanation was that the probability of livestock entering fields decreases if the animals know the area. It further seems to make a difference whether the conflict exists only within the settlement or between settlements. Within Mutompo the case can be negotiated more informally between the affected people. Inter-settlement conflicts almost immediately involve traditional authorities.

In order to protect fields, some better-off farmers erect fences around them. If this happens with the permission of traditional authorities, such fences are accepted. They do not strictly restrict the access to the enclosed areas and people can always pass through them. As long as fences are only built around fields they have little impact, because fields are anyway used on an exclusively individual base. Livestock owners even appreciate that the fences make herding easier for them. More frequent enclosure of fields is one reason why crop farming productivity is significantly higher in central-northern Namibia in comparison to the Kavango (see also Mendelsohn & el Obeid 2003: 99). The Namibian government recognises this fact and allows the erection of fences around homesteads and fields (RoN 2003b: 26).

The enforcement of pasture distribution between settlements is strongly affected by indirect problems. Only a few times was it mentioned that residents of other settlements might wonder or object if Mutompo animals walk too far into their territory. Nevertheless, informal rules make farmers keep their livestock on their side even if no problems happen. Such institutions, in combination with transaction costs, lead to a situation in which only a limited number of farmers use one area. Cooperation is more probable if a small number of farmers using one area live near one another. Agreements to let certain areas rest, as mentioned in Chapter 4.4.9, are easier to enforce because the transaction costs of negotiation and information decrease. The enforcement of such rules becomes even easier if social relations are more intense. It is

no wonder that especially in Pandureni and Horongo, certain sections rest from time to time. These areas are exclusively used by Mutompo residents, while in the directions of Epingiro, Shihetekera and Nzovhu, the herds of neighbouring settlements also graze. Mutompo people are connected through multiple relations. They use the same water point, have the same school, help each other with livestock, work together on fields and give parties. All these connections make social sanctions more effective and are the basis for various institutions. The analysis proves that in Mutompo, communal resource management institutions exist. Pasture distribution between households is not only related to the natural characteristics of an area and transaction costs. It is also based on informal institutions, which have a positive impact on biodiversity preservation.

#### **4.5 Conclusion**

Mutompo is a place with only very basic infrastructure. Development opportunities are very limited, particularly because of constraints in physical, financial and human capital. Due to these constraints, permanent residents in particular rely strongly on livelihoods based on natural resources. Poverty is reflected in the fact that many Mutompo residents regularly struggle to satisfy the most basic physiological needs. The resulting short time preference is a difficult precondition for attempts to make natural resource management more sustainable. A main threat to biodiversity is habitat loss due to extensive forest clearance. The speed of destruction can only be reduced by innovative farming technologies, the offering of alternative livelihood options and the implementation of use restrictions. Natural resources are used in numerous ways and particularly livestock fulfils multiple functions. These functions must be substituted in order to motivate farmers to reduce livestock numbers. The functions are appreciated also by those who are less dependent only on natural-resource-based livelihoods. Reducing dependency on natural resources will therefore only improve biodiversity maintenance if – in addition – functioning institutions regulate resource use. Resource users in Mutompo operate in a very complex framework of informal rules and formal customary and statutory laws. However, many of these are poorly enforced. Policy reforms should recognise the current and potential role of existing organisational structures in biodiversity preservation. Local residents and traditional authorities can, for instance, provide institutional services in many cases at lower transaction costs than the government. The legal recognition of local residents' customary rights to control access to and use of natural resources should be improved, in order to increase incentives to protect them in their own self-interest (see also RoN 2001c: 4f).



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- <sup>1</sup> Recommended stock density for the region: 50 kg/ha corresponds to 9 ha/LSU.
- <sup>2</sup> LSU = Large Livestock Unit = 450 kg bodyweight equivalent; 6 SSU (Small Livestock Unit) = 1 LSU.
- <sup>3</sup> *Spearman-Rho correlation*: “sum externalities” & “changes of pasture quality since 10 years ago”; coefficient: 0.564; sign.: 0.002; N = 24; “sum externalities” & “do you hunt”; coefficient: -0.601; sign.: 0.039; N = 12.
- <sup>4</sup> *Spearman-Rho correlation*: “importance of livestock as source of income” & “sum externalities”; coefficient: 0.534; sign.: 0.074; N = 12.
- <sup>5</sup> *Spearman-Rho correlation*: “importance of casual work as source of income” & “LSU of household”; coefficient: -0.624; sign.: 0.017; N = 14; “remittances as source of income” & “livestock as source of income”; coefficient: -0.548; sign.: 0.043; N = 14.
- <sup>6</sup> *Spearman-Rho correlation*: “casual work as source of income” & “LSU of household”; coefficient: -0.573; sign.: 0.032; N = 14; “remittances as source of income” & “LSU of household”; coefficient: -0.726; sign.: 0.003; N = 14; “pension as source of income” & “importance of livestock as source of income”: coefficient: -0.542; sign.: 0.045; N = 14.
- <sup>7</sup> *Spearman-Rho correlation*: “permanence household head” & “think can get a loan”; coefficient: -0.645; sign.: 0.013; N = 14.
- <sup>8</sup> *Spearman-Rho correlation*: “casual work as source of income” & “think can get a loan”; coefficient: -0.650; sign.: 0.012; N = 14; “remittances as source of income” & “think can get a loan”; coefficient: -0.471; sign.: 0.089; N = 14; “casual work as source of income” & “LSU of household”; coefficient: -0.573; sign.: 0.032; N = 14; “remittances as source of income” & “LSU of household”; coefficient: -0.726; sign.: 0.003; N = 14.
- <sup>9</sup> Pearson’s R = 0.902; significance: 0.0004; most empirical data for the conjoint models have been collected by Carsten Klink.
- <sup>10</sup> *Spearman-Rho correlation*: “herd size in LSU” & “conjoint preference to sell nothing”; coefficient: 0.675; sign.: 0.046.
- <sup>11</sup> *Spearman-Rho correlation*: “have savings” & “conjoint preference to slaughter goat”; coefficient: -0.688; sign.: 0.041; “have savings” & “conjoint preference to slaughter cow”; coefficient: -0.647; sign.: 0.060 (N=9).
- <sup>12</sup> *Spearman-Rho correlation*: “can get a loan” & “conjoint preference to sell nothing”; coefficient: 0.731; sign.: 0.025 (N=9).
- <sup>13</sup> *Spearman-Rho correlation*: “pension as source of income” & “conjoint preference to slaughter goat”; coefficient: -0.728; sign.: 0.026; “pension as source of income” & “conjoint preference to sell goat”; coefficient: -0.634; sign.: 0.066; “pension as source of income” & “conjoint preference neither to sell nor to slaughter”; coefficient: 0.632; sign.: 0.068 (N=9).
- <sup>14</sup> *Spearman-Rho correlation*: “permanent work as source of income” & “money income if sell”; coefficient: -0.694; sign.: 0.026; N = 10.
- <sup>15</sup> *Spearman-Rho correlation*: “importance of remittances as source of income” & “food slaughter”; coefficient: -0.805; sign.: 0.005; N = 10.
- <sup>16</sup> *Spearman-Rho correlation*: “education level household head” & “security sell”; coefficient: -0.707; sign.: 0.022; N = 10.
- <sup>17</sup> *Spearman-Rho correlation*: “LSU of household” & “relation keep”; coefficient: -0.751; sign.: 0.012; N = 10; “LSU of household” & “support keep”; coefficient: -0.612; sign.: 0.060; N = 10; “LSU of household” & “relation slaughter”; coefficient: 0.764; sign.: 0.010; N = 10; “importance remittances as source of income” & “relation slaughter”; coefficient: -0.766; sign.: 0.010; N = 10; “importance remittances as source of income” & “support slaughter”; coefficient: -0.599; sign.: 0.067; N = 10; “importance remittances as source of income” & “relation sell”; coefficient: -0.632; sign.: 0.050; N = 10.
- <sup>18</sup> *Spearman-Rho correlation*: “have savings” & “status keep”; coefficient: -0.654; sign.: 0.044; N = 10; “permanence of household head” & “status sell”; coefficient: -0.561; sign.: 0.092; N = 10.
- <sup>19</sup> *Spearman-Rho correlation*: “have a function in the community” & “water supply sell”; coefficient: 0.761; sign.: 0.011; N = 10.
- <sup>20</sup> *Spearman-Rho correlation*: “get support from others” & “can everybody use the land?”; coefficient: -0.671; sign.: 0.024; N = 11; “transfer to others” & “can everybody use the land?”; coefficient: -0.671; sign.: 0.024; N = 11; “transfer to others” & “can somebody be excluded?”; coefficient: -0.667; sign.: 0.035; N = 10; “education level household head” & “can everybody use the land?”; coefficient: -0.697; sign.: 0.017; N = 11.

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- <sup>21</sup> *Spearman-Rho correlation*: “importance of livestock as source of income” & “conjoint preference to leave Mutompo because of water in rainy years”; coefficient: -0.742; sign.: 0.009; N = 11.
- <sup>22</sup> *Spearman-Rho correlation*: “have permanent job” & “maximum willingness to pay for water”; coefficient: 0.634; sign.: 0.066; N = 9; “LSU of household” & “conjoint preference to pay as usual for water in rainy years”; coefficient: -0.687; sign.: 0.020; N = 11; “LSU of household” & “conjoint preference to pay more for water in rainy years”; coefficient: 0.632; sign.: 0.037; N = 11; “participate in collective actions” & “conjoint preference to pay more for water in rainy years”; coefficient: 0.764; sign.: 0.010; N = 10; “have savings” & “conjoint preference to pay more for water in rainy years”; coefficient: 0.620; sign.: 0.042; N = 11.
- <sup>23</sup> *Spearman-Rho correlation*: “importance of casual work as source of income” & “conjoint preference to pay as usual for water in rainy years”; coefficient: 0.814; sign.: 0.002; N = 11; “importance of casual work as source of income” & “conjoint preference to pay more for water in rainy years”; coefficient: -0.746; sign.: 0.008; N = 11; “casual work as source of income” & “conjoint preference to pay as usual for water in rainy years”; coefficient: -0.620; sign.: 0.042; N = 11.
- <sup>24</sup> *Spearman-Rho correlation*: “permanence of household head” & “conjoint preference to expand field this year”; coefficient: -0.530; sign.: 0.094; N = 11.
- <sup>25</sup> Pearson’s R: 0.999; significance: 0.000.
- <sup>26</sup> *Spearman-Rho correlation*: “can influence what happens in community” & “conjoint preference to pay more for water in dry years”; coefficient: 0.649; sign.: 0.031; N = 11.
- <sup>27</sup> *Spearman-Rho correlation*: “importance of casual work as source of income” & “conjoint preference to pay as usual for water in dry years”; coefficient: 0.697; sign.: 0.017; N = 11.
- <sup>28</sup> *Spearman-Rho correlation*: “utility to leave Mutompo in drought” & “permanent work as source of income”; coefficient: -0.664; sign.: 0.026; N = 11; “utility to stay in Mutompo in drought” & “permanent work as source of income”; coefficient: 0.653; sign.: 0.029; N = 11; “utility to leave Mutompo in drought” & “permanence of household head”; coefficient: 0.613; sign.: 0.045; N = 11; “utility to stay in Mutompo in drought” & “permanence of household head”; coefficient: -0.679; sign.: 0.022; N = 11.
- <sup>29</sup> *Spearman-Rho correlation*: “have a function in community” & “conjoint preference to stay in Mutompo in drought”; coefficient: 0.605; sign.: 0.049; N = 11; “can influence what happens in community” & “conjoint preference to stay in Mutompo in drought”; coefficient: 0.679; sign.: 0.022; N = 11.
- <sup>30</sup> *Spearman-Rho correlation*: “maximum water fee” & “conjoint preference to leave Mutompo in drought”; coefficient: -0.681; sign.: 0.043; N = 9.
- <sup>31</sup> Pearson’s R: 0.992; significance: 0.000; Data for the conjoint models were collected by Carsten Klink.
- <sup>32</sup> *Spearman-Rho correlation*: “education level of household head” & “transfers to others”; coefficient: 0.525; sign.: 0.054; N = 14.
- <sup>33</sup> *Spearman-Rho correlation*: “participate in collective action” & “receive support from others”; coefficient: 0.674; sign.: 0.016; N = 12.
- <sup>34</sup> *Spearman-Rho correlation*: “education level of household head” & “holding function in the community”; coefficient: 0.569; sign.: 0.034; N = 14.
- <sup>35</sup> *Spearman-Rho correlation*: “conjoint preference value for staying in village in times of emergency” & “holding function in the community”; coefficient: 0.605; sign.: 0.049; N = 11; “conjoint preference value for staying in village in times of emergency” & “think can influence village life”; coefficient: 0.679; sign.: 0.022; N = 11; “conjoint preference value for leaving village in times of water shortage” & “holding function in the community”; coefficient: -0.555; sign.: 0.076; N = 11.

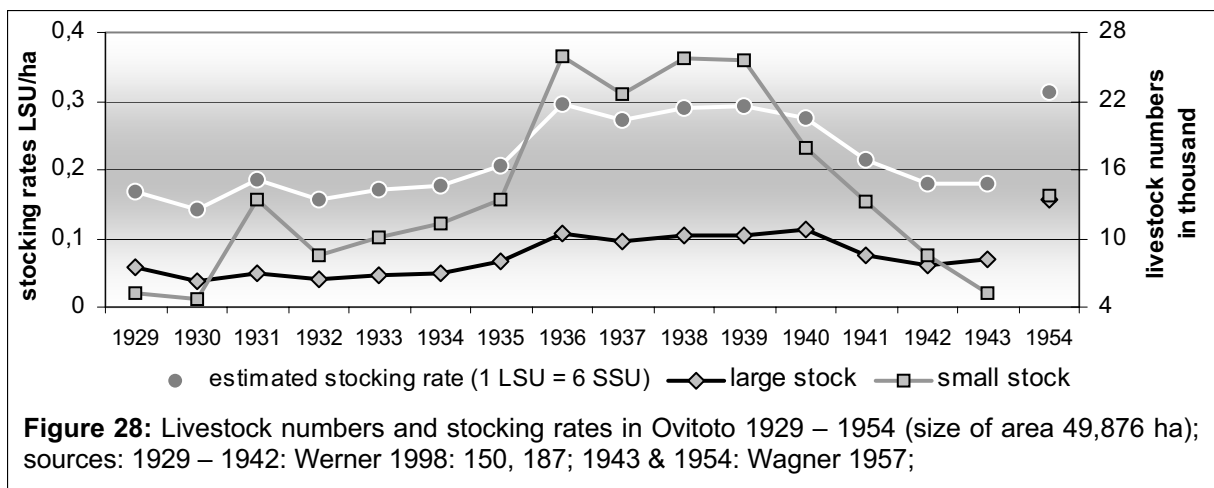
## 5 Okamboro

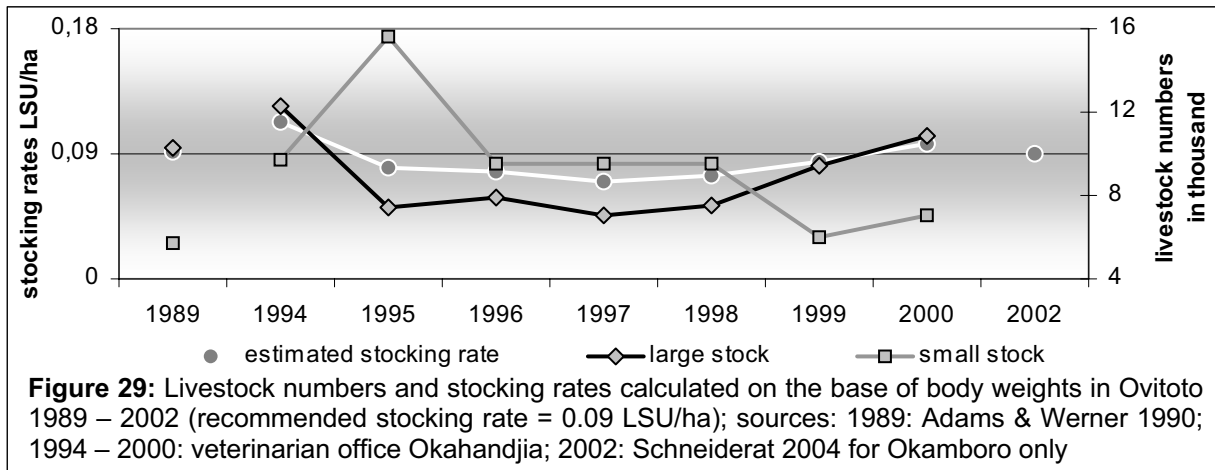
The settlement of Okamboro belongs to the Ovitoto communal area in central Namibia. It is situated approximately 75 km north of Windhoek in the Otjozondjupa region. Ovitoto belonged to the Herero reserves which the German administration established in the early 20<sup>th</sup> century. In 1920, the Ovitoto reserve was approximately 15,000 ha (Adams & Werner 1990: 19). In 1923, Ovitoto was proclaimed the Herero Native Reserve and the area was extended to 47,791 ha (Wagner 1957: 21). In the late 1960s, the territory was enlarged again to 61,192 ha. During all this time the place was and is mainly inhabited by Hereros. There are 21 settlements in Ovitoto.

### 5.1 The capital availability of the Okamboro community

#### 5.1.1 Natural capital

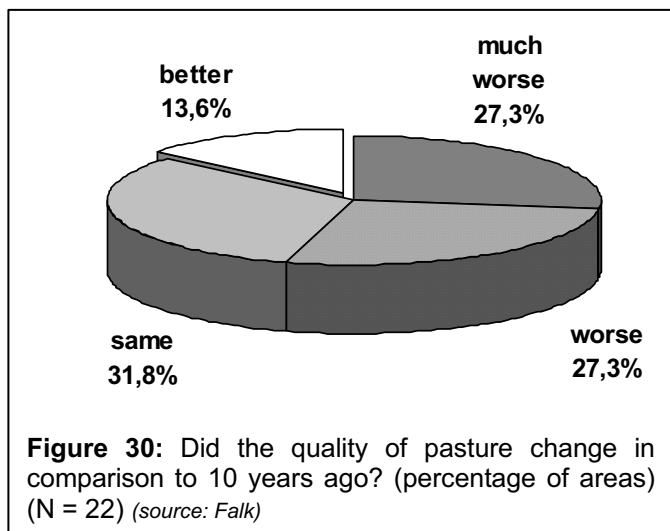
The vegetation type in Ovitoto is Highland Savannah. The average annual rainfall of the region is approximately 350 mm. Biological diversity as well as endemism is above the Namibian average (Mendelsohn & el Obeid 2002: 24), though increasing pressure on biodiversity has been reported since the middle of the 20<sup>th</sup> century. The colonial Ovitoto Welfare Officer estimated that in 1954 300 Kudu, 100 steenbok, 50 duiker and 20 ostriches lived in the reserve. Further guinea fowl and a large variety of other birds could be found. Numerous jackals and caracals as well as a few leopards were made responsible for livestock losses. These game numbers are approximately half of what was been reported in 1943. Game reduction was explained by disturbance by dogs, poaching by residents and habitat destruction due to overstocking (Wagner 1957: 8, 22). Kudus were spotted while research was taking place but no proper game assessment has been carried out. No respondent admitted hunting





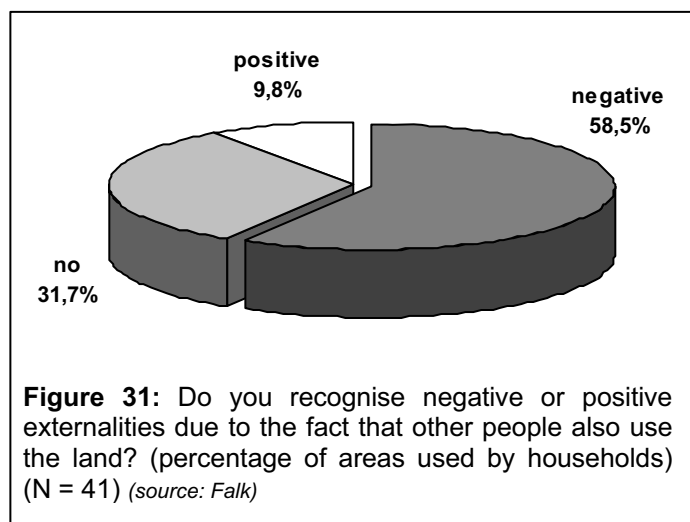
because it is forbidden. Quite probably, some of the interviewed heads of household heads in fact hunt but were afraid of being reported to the government.

Livestock keeping is the main natural resource use in Ovitoto. The area has a history of excessive grazing pressure (see Figure 28 & 29).<sup>36</sup> Especially in the 1930s, livestock numbers far exceeded any recommendation (see Figure 28). Also in 1994, stocking rates calculated on the base of measured body weights were at 0.115 LSU/ha, thus above the recommended stocking density of 0,088 LSU/ha (Mendelsohn et al. 2002). Due to years of poor rainfall, livestock numbers significantly declined in the mid 1990s. Livestock was taken to emergency grazing areas and respondents reported high losses as well. Another reaction to droughts is the purchase of fodder preferably financed by alternative sources of income or if necessary the sale of livestock. During droughts farmers expect government drought relief (see also Rao & Stahl 2000: 41, 43, 45). High rainfall variability is typical for the region. Under heavy resource use pressure this more probably leads to grazing shortage. Stocking rates only recovered slowly after the 1990's droughts and only in 2000 did they reach 0.010 LSU/ha which is above the recommended rate again. In 2002, 941 cattle, 623 goats, 157 sheep and 17 horses or donkeys foraged on approximately 5,700 ha of Okambo land. Considering the body weight of different animal classes this counts up to 537 LSU. During the time of research the stocking rate in Okambo was 0.095 LSU/ha and therefore near to the recommendation.



Heads of household have been asked whether the quality of natural resources has changed since the early 1990s (see Figure 30). Almost all of them connected perceived improvements and deteriorations exclusively to inter-annual rainfall variations. Some respondents complained that there are only annual but no more perennial grasses growing because of insufficient rain without seeing any connection to their natural resource management. Nevertheless, some farmers recognised that high value grasses like the locally called Ongumba grass grows more often in the less intensively used private camps (see Chapter 5.3.7). Different farmers reported that this much preferred grass became scarce on the commonage. The area is also affected by bush fires and erosion.

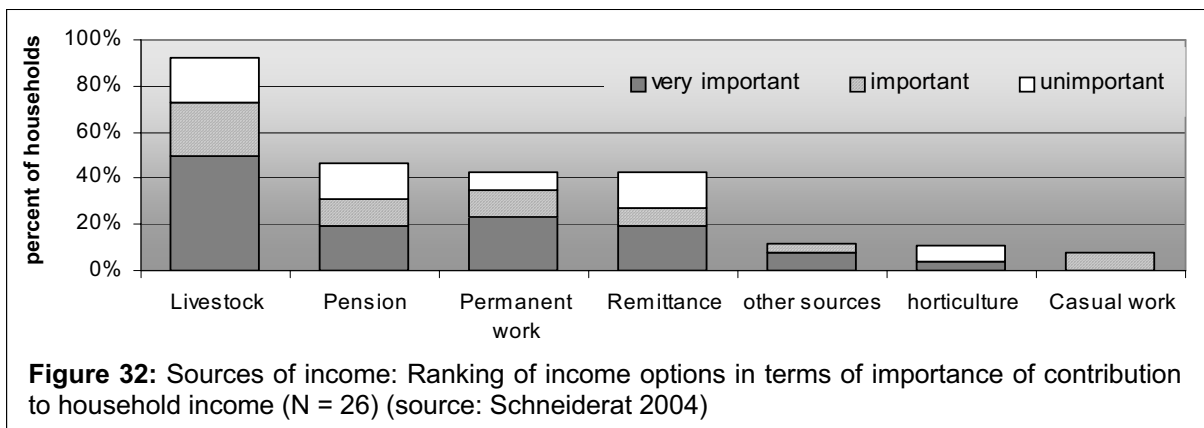
Most Okamboro farmers tend to blame resource degradation on factors which they have no control over. Even the disappearance of some tree species was related to the rain. Most respondents cut trees for domestic purposes. Many farmers stated that there are too many animals grazing on the land, leaving insufficient fodder for their own livestock. Only very few



of them cited insufficient co-operation between Okamboro residents as a reason for this situation. Much more often they complained that the commonage was too small for the number of people living on it (see Chapter 5.1.4). Okamboro farmers reckon that in more than half of their areas there are negative consequences due to communal land management (see Figure 31). The more negative the perception of externalities the more negative is also the view of natural resource developments.<sup>37</sup> But again, only few respondents deemed the farmers themselves to be somehow responsible for poor communal resource management. The majority believes that they can not do anything about high grazing pressure because Ovitoto is communal land. Since independence, the perception that farmers have no power to manage communal land seems to have increased. Respondents believe that a free Namibia is a country for everyone's use. Therefore Ovitoto farmers doubt they have the right to restrict e.g. anyone's livestock numbers (see however Chapter 5.3.3).

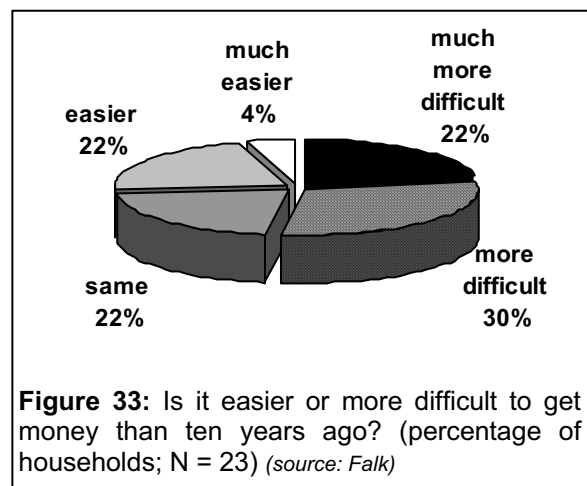
### 5.1.2 Financial capital

Livestock keeping is not only the most important natural resource use, it is also the most important source of income. 92.3 percent of the interviewed households keep livestock. Despite low selling numbers, three fourths of the respondents believe that livestock is an important or very important source of income. Nonetheless, Okamboro livelihoods are based not only on farming but on a diverse range of income sources (see also Mendelsohn & el Obeid 2002: 33). Pensions are the most often mentioned monetary income (46.2 percent of households). Many non-permanent residents are permanently employed (42.3 percent of households). For 34.6 percent of the respondents, salaries are an important or very important income. 30.7 percent regarded pensions in the same way. Especially households who do not have jobs and who stay permanently in Okamboro rely on remittances (46.2 percent).<sup>38</sup> Less important are casual work, horticulture and other sources of income such as brick making or transport services (see Figure 32). Other studies also reached the conclusion that Herero



communities rank livestock as the most important income source, directly followed by pensions and remittances (Fuller & Turner 1996: 32; Mendelsohn & el Obeid 2002: 33). This indicates a high dependency on natural resource based livelihoods which puts much pressure on natural resources.

In the 1950s, has been reported that Ovitoto residents basically had no savings. They sold livestock in order to buy food or to pay grazing fees. People preferred to invest in livestock than in bank accounts (Wagner 1957: 57). In 2002, more than half of the households (54.2 percent) reported savings. Savings, however,



do not substitute the investment in livestock. Especially households with large herds also save money. 58.3 percent of the respondents would sell livestock in case of monetary demands. One fifth thinks that they could get a loan. Those who have a permanent job and/or savings are more likely to believe that they could get a loan.<sup>39</sup>

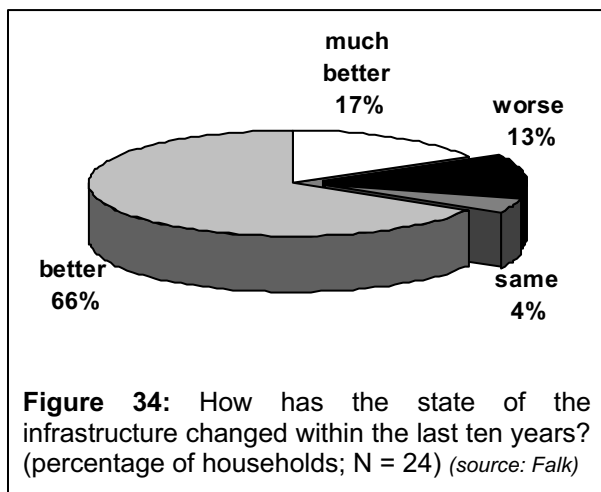
The majority of heads of household believe that it has become more difficult to get access to monetary income (see Figure 33). Only non-permanent residents think that it has become easier.<sup>40</sup> Positive developments regarding the access to financial capital happen more often outside of the communal area.

### 5.1.3 Physical capital

Okamboro can be reached on a relatively well maintained gravel road. Three fourths of the households (72 percent) have a means of transport. Almost half of the heads of household (48 percent) have a car. Those who do not own means of transport can get a lift on the well-frequented gravel road to the regional centre Okahandjia. A one-way trip costs between US\$ 0.60 and US\$ 2.50.

Okamboro has a little dam, a hand pump, an old and a new diesel pump. There seems to be enough water and it is adequate for human consumption (see further chapter 5.3.8). In 2002, a new diesel pump and a closed tank for storing safe drinking water were installed. This improved the quantity and quality of the water supply.

In 2001, 58 percent of the Otjozondjupa households had no electricity and 21 percent had no access to a telephone (RoN 1995b: 23; RoN 2001j; RoN 2001m: 64). Although there is a telephone line reaching Okamboro only three households (12 percent) have a working phone. Okamboro first had electricity in 2002 and 84 percent of the households are connected to the line. Three households own a television (12 percent) and 80 percent a radio. The radio is the most important means of communication to receive market information and news. Correlation analysis shows that capital is bundled in Okamboro.



Those who have a car are more likely to have electricity, a television, a telephone, a radio, savings and think they can get a loan. The larger the livestock herd of respondents the more likely they are to have a car, electricity and a radio.<sup>41</sup> Most households in Okamboro reported positive changes regarding the physical capital. Many had probably electricity in mind (see Figure 34).

#### **5.1.4 Human capital**

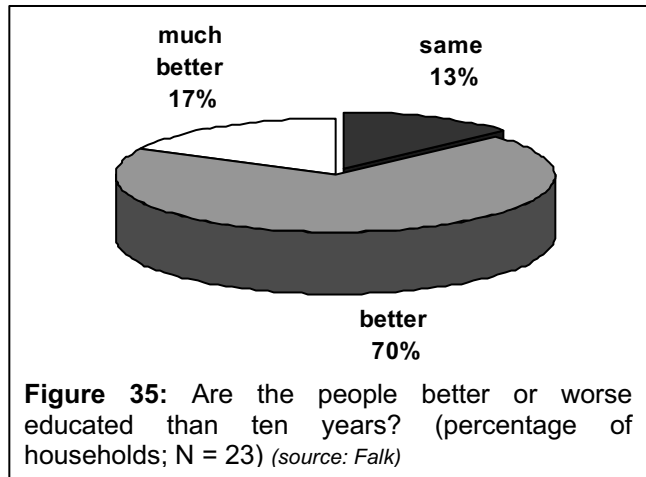
In 2003, 158 people lived in Okamboro (Schneiderat 2004) which is double the amount in 1954 (80) (Wagner 1957: 29). One third (30.4 percent) was under 16. The population density is 2.7 persons per square kilometre (Schneiderat 2004). This is almost seven times the average of the Otjozondjupa region Ovitoto belongs to (0.4 persons per sq. km) (RoN 2001j). Most of the region is sparsely inhabited commercial farm land. High population pressure around Okamboro results in high pressure on natural resources. Okamboro residents complain about the fact that their land is overcrowded, a perception which is supported by these statistics.

In 1991, life expectancy at birth was approximately 61 in the Otjozondjupa region (RoN 1995b: 9; RoN 2001m: 82). For 35 percent of the Otjozondjupa population such as the Okamboro one, the nearest health facility is more than one hour walking distance away (RoN 2001m: 53). There are a clinic in Okahandja and hospitals in Windhoek. Informations on HIV infection rates are not available for Okamboro. Infected people are treated in Windhoek where the prevalence rate increased from 4 percent in 1992 to 27 percent in 2002 (RoN 2002e).

In 1991, 71 percent of the boys and 75 percent of the girls between 6 and 16 attended school in the Otjozondjupa region (RoN 1995b: 23). Ten years after independence, the numbers increased to 76 percent for the boys and 78 percent for the girls (RoN 2001j). One third of the region's inhabitants over 15 are illiterate with no significant changes since independence (RoN 1995b: 47; RoN 2001j). In 1991, 35 percent of the Otjozondjupa population over 15 had never attended school, one fourth had only finished primary school, 27 percent secondary school, 3 percent had received a tertiary education (RoN 1995b: 47). In comparison to this data, 19 percent of the Namibian Herero population over 15 finished primary school, 22 percent finished secondary school and 1.6 percent received a tertiary education (RoN 1995b: 45). 26 percent of the adults have never been to school (RoN 2001j). On average, Okamboro residents attended school for 3.9 years. There is a primary school in Ovitoto. Annual school fees are approximately US\$ 25 and boarding fees approximately US\$ 40. Parents who want their children to attend secondary schools can take them to towns outside the communal area.



Age pyramids of the structurally closely related Okakarara, Otjinene and Otjombinde constituencies show that a large proportion of the 5 to 19 year old Hereros are living in towns and for the most part not present in rural areas (Mendelsohn & el Obeid 2002: 32). These numbers indicate that they strongly invest in human capital. Often these investments are paid with livestock sales which decrease pressure on natural resources (see also Fuller & Turner 1996: 30). Most Okambo residents recognise an improvement in their education compared to the early 1990s (see Figure 35) which is also the result of a government literacy-programme for the Ovitoto adults.



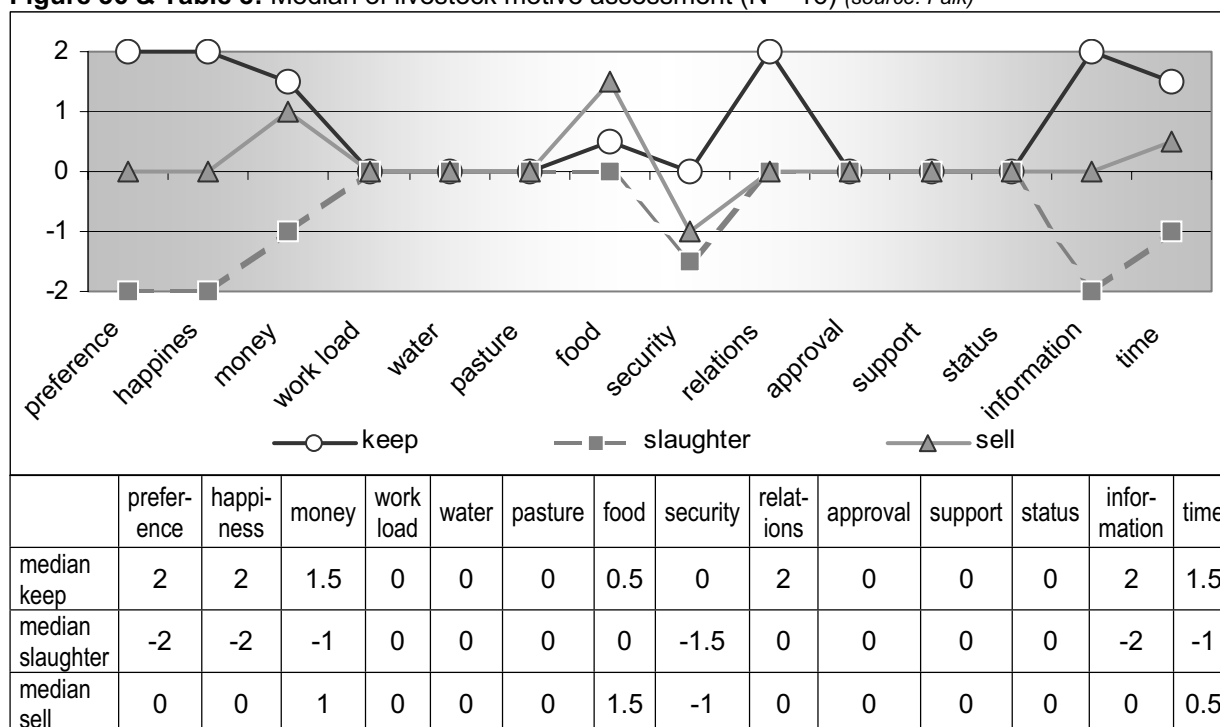
Farming skills are learned by doing from relatives and other farmers. Especially owners of large herds are eager to learn more about livestock disease, grazing conditions, weather expectations and political developments.<sup>42</sup> There is an agricultural extension office based in Ovitoto. The officer initiates trainings related to the prevention and treatment of disease, the use of supplements and stock record keeping. He assists farmers in their application for affirmative actions or Landbank loans. Veterinarians also visit the area regularly and give advice.

Investments in general education and farming skills have direct and indirect implications on biodiversity maintenance. Livestock owners who are aware of different farming options and management methods are able to make more efficient use of natural resources. Correlation analysis showed that better educated farmers are more aware of the impact of farming practices on the state of natural resources. In addition, they have a more commercial farming perspective which tends to reduce pressure on natural resources.<sup>43</sup> As an indirect effect on biodiversity maintenance, better education increases the chances of finding non-farming employment. This reduces the dependency on natural resource based livelihoods which decrease pressure on biodiversity.

## **5.2 Motives of resource use**

The capital assessment highlighted that the main resource use of Okamboro land is livestock keeping. Livestock is still the most important source of income (see Chapter 5.1.1 & 5.1.2). Nevertheless, selling and slaughtering numbers are relatively low. In 2002, 36 head of cattle were sold (3.8 percent of the total cattle number) and 5 slaughtered (0.5 percent of the total cattle number). Nine goats were sold or slaughtered (1.5 percent of the total goat number); no sheep off-take was reported. Almost half of the households (46.2 percent) did not sell or slaughter at all (Schneiderat 2004). Cattle in Okamboro are mainly slaughtered at special events such as ceremonies or visits. For home consumption either sick or old livestock is slaughtered. These numbers indicate that Okamboro was little affected by a commercialisation trend of other communal areas which are dominated by Hereros. There are estimates that off-take rates in the Okakarara, Otjinene and Otjombinde constituencies reached 33 percent in the 1990s (Mendelsohn & el Obeid 2002: 40). Estimates for Ovitoto show a 20 percent off-take rate in the early 1990s (Werner 2000: 260). The case study of Okamboro does not support such results. On the one hand, the off-take numbers are lower but on the other hand, the perceived preference for keeping livestock is much higher than for selling or slaughtering (see Figure 36, Table 8 & Appendix 9). But why is farming perceived to be the most important livelihood strategy if monetary income maximisation is not the main interest of livestock keeping? Motives of livestock keeping have a strong impact on the way natural resources are used. This is why a motive assessment of livestock keeping has been carried out. The same variables as in Mutompo were used (see Appendix 1). For the methodology see Chapter 4.3.

Despite low off-take numbers, investments in financial capital are an important motive for livestock farming. Respondents believe that both keeping and selling livestock similarly improves the financial situation of the household (see Figure 36 & Table 8). Although keeping has a slightly higher median than selling, the Wilcoxon tests do not confirm a significant variance. Nonetheless, keeping and selling both promise a significantly higher monetary income than slaughtering (see Appendix 9). Only those who rely on insecure sources of income such as casual work and remittances believe that slaughtering brings cash to the household.<sup>44</sup> Correlation analysis highlight that perceptions regarding off-take's impact on financial capital are heterogeneous. Those farmers who think that selling improves the household's financial situation have a lower preference for keeping and the other way around.<sup>45</sup> Particularly worse educated farmers deem keeping to be the best strategy to

**Figure 36 & Table 8:** Median of livestock motive assessment (N = 16) (source: Falk)

maximise monetary income.<sup>46</sup> They, in particular, recognise few saving alternatives and see kept livestock as an investment and bank account. The average value of Okamboro herds is approximately US\$ 7,500. Such accumulated livestock wealth results in heavy grazing pressure. Most respondents sell only at times when there is an immediate need for money.

Money is needed, for instance, to buy food. This is why the majority of farmers satisfies physiological needs in terms of food supply rather with selling livestock (see Figure 36 & Table 8). Such responses indicate that Ovitoto residents are starting to become less subsistence oriented. Nonetheless, respondents are aware that selling and slaughtering only increases short-term food availability while keeping improves long-term food security. Again some stratification could be observed. Particularly worse educated and permanent residents with larger herds perceive that keeping maximises the amount of food in the house. They pay more attention to the fact that kept cows give up to 30 litres milk per day. Pensioners share the same opinion while employed people do not.<sup>47</sup>

The negative impact of off-take on long-term food security is one reason why Okamboro residents perceive that reducing livestock numbers makes their life less secure. The general livelihood security is perceived to be significantly higher for keeping than for selling and slaughtering (see Figure 36, Table 8 & Appendix 9). Livestock is a health, unemployment and retirement insurance. Many respondents stated that the money from livestock and meat sales

quickly disappears. Only a few of them manage to improve their security by saving money from take-off. There is no polarisation in Okamboro for the security variable regarding residential permanence, employment status or herd size. Livestock plays a stabilising role in most farmers' lives and satisfies safety needs. This is one important reason why herd size maximisation is, in general, greatly favoured. The more respondents perceive that off-take negatively affects their security, the more they prefer keeping to selling.<sup>48</sup> The lack of alternative insurance mechanisms partly explains the high pressure on Okamboro's natural resources (see also Chapter 8.2).

Nonetheless, farmers recognise that keeping also has its risks. Common threats connected to keeping are e.g. droughts. Particularly under high grazing pressure, low rainfall years lead more probably to grazing shortage. Many Okamboro farmers recognise that a reduction of livestock numbers would increase the available fodder and water for the remaining herd (see Appendix 9). Some of them stated that they can not increase the herd size because of limited grazing resources. Although such connections seem to be obvious there is no general agreement amongst the farmers. Pensioners rather ignore the negative consequences of high livestock numbers while younger, better educated, non-permanent and employed residents as well as committee members are aware of them.<sup>49</sup> The fact that particularly the younger generation and more powerful residents recognise the negative impact of farming on the grazing resources might be a reason for careful optimism. Their awareness might be a first step for improved management in the future. Changing attitudes alone will, however, not solve the problem. Farmers complain that reducing livestock numbers is of little benefit for the own remaining herd because animals of other farmers' will also get more feed and water. Such positive externalities must be internalised in order to increase incentives to reduce pressure on resources.

Livestock is in Okamboro not an important means of transport and production. Farmers perceive that any reduction of animal numbers makes their daily work more comfortable (see Appendix 9). Nonetheless, they recognise significant transaction costs in the process of sales. Farmers walk with their animals approximately 15 km to the marketing pen at the local centre Okanshira and stay there overnight. Most Ovitoto livestock is sold at so called 'permit day sales'. The farmers association advertises the availability of cattle and buyers from outside the region submit their price proposals. The buyer with the highest proposal is invited to the sales point to buy and load the cattle (Mendelsohn & el Obeid 2002: 40). Permit sales for cattle are

held monthly but for small ruminants it is only once a year. In addition, selling requires information e.g. about prices. No big differences regarding the transaction costs in terms of time and information were seen between selling and keeping. Only for slaughtering are such costs lower (see Figure 36, Table 8 & Appendix 9). Those who sold most in 2002 think that selling is time consuming and requires much information. Especially relatively commercially oriented farmers are much more aware of high marketing transaction costs.<sup>50</sup> Reducing such costs would increase the benefits from off-take and could motivate farmers to sell more livestock. High marketing transaction costs support the attitude of herd size maximisation.

The analysis so far show that, especially the saving and insurance function of livestock, in combination with high marketing transaction costs motivate farmers to maximise livestock numbers rather than cash profit. One must take into consideration that household members, relatives, neighbours and other community members in general disapprove off-take and prefer the keeping of livestock (see Figure 36, Table 8 & Appendix 9). Respondents who think, for instance, that selling negatively affects their livelihood security, expect the family to disapprove of selling livestock.<sup>51</sup> Off-take is only tolerated if there is a good reason and if it has been discussed in the family. In 2002, the more heads of household sold, the more they think that keeping has a positive impact on the contentment of relatives<sup>52</sup> (see Appendix 9). This has direct consequences because the majority of respondents believe that selling or slaughtering reduces the probability of receiving support in times of trouble (see Appendix 9). Such incentives influence decision makers' satisfaction of social needs.

Nonetheless, there are again contradicting opinions within the community. Respondents who believe that other people approve off-take more probably expect that these people help them in times of trouble if they sold or slaughtered in the past.<sup>53</sup> The more animals a farmer slaughtered the more she/he thought that slaughtering improves her/his chances of receiving help in the future.<sup>54</sup> Long-term reciprocity relations exist. If you gave others meat or money you will be helped by those in times of need. Support depends also on the neediness. Households with regular monetary income think that keeping negatively affects the willingness of the neighbours to help them in future.<sup>55</sup> While wealthier households are seen as being able to help themselves, poorer ones can more probably rely on assistance. Furthermore, farmers with big herds and savings mentioned that maximising livestock numbers is disapproved of by the neighbours. They felt that they should regularly sell or

slaughter in order to avoid this. The more respondents recognised that selling releases pressure on pastures, the more they expect that it increases their prestige.<sup>56</sup>

Such perceptions are in contrast to the common stereotype that Hereros keep livestock in order to increase their prestige rather than to make money. This explains why they maximise their herd size rather than the profit from farming. Okamboro households with larger herds hold more social capital. They more frequently hold positions in the community, are members of local committees, participate more often in collective actions and feel they have more of a say regarding what happens in the settlement.<sup>57</sup> Especially better educated non-permanent residents feel less respected when slaughtering.<sup>58</sup> Nevertheless, Wilcoxon tests did not prove that the social status significantly decreases after selling or slaughtering (see Appendix 9). It was stated that farmers are also respected when they make good profits. Many residents also emphasised that they do not care what others think. They are only interested in increasing their herd size so that they are better off.

The assessment shows that the social environment provides contradicting incentives to livestock owners. On the one hand, relatives disapprove of off-take. Furthermore, farmers perceive that off-take reduces their social capital. Such rewards motivate farmers to maximise livestock numbers which increases pressure on natural resources. Market prices do not fully reflect the benefits from livestock including food security, savings and insurance functions. In order to motivate farmers to reduce animal numbers these functions must be substituted. On the other hand, especially owners of large herds recognise that keeping many animals on the commonage is disapproved of. These incentives are not compelling motives to reduce grazing pressure. In order to improve the natural resource management it is important to weaken institutions which reward herd maximisation and to strengthen those which sanction it. Awareness campaigns and trainings are needed.

The analysis shows that there are two types of farmers in Okamboro. For households with farming-independent income livestock is more a business while pensioners and permanent residents satisfy basic physiological needs with it.<sup>59</sup> In 2002, especially farmers with larger herds, savings and a car sold and slaughtered a higher percentage of their herd.<sup>60</sup> Poorer households stated that only the rich can sell. Residents who serve in community committees had a rather lower preference for keeping but a higher one for selling. They also sold more animals in real terms.<sup>61</sup> Permanent heads of household favour keeping more than non-

permanent ones. The higher their level of education, the lower the preference for keeping and the less livestock slaughtered in 2002.<sup>62</sup> Wealthier, better educated and engaged residents with secure non-farming income and larger herds think more commercially. Okamboro is therefore an example that investments in human capital, a reduction of dependency on natural resource based livelihoods and the substitution of livestock functions can change communal farmers' attitudes towards more sustainable farming practices. One should bear in mind though, that off-take rates of wealthier farmers are as well rather low in Okamboro.

### 5.3 Institutions

One reason why changing attitudes do not necessarily lead to changing behaviour could be externalities that are not internalised. Farmers who invest in pasture improvements e.g. by reducing stocking rates will hardly benefit from these investments as long as all the other farmers continue to maximise herd sizes. Communal land management requires cooperation. Cooperation requires strong institutions. Investments in human capital, a reduction of dependency on natural resource based livelihoods and the substitution of livestock functions will contribute to biodiversity maintenance only if these measures are backed by institutional reforms. The following chapter analyses the impact of formal legislation and the role of traditional authorities as well as informal institutions have in natural resource management.

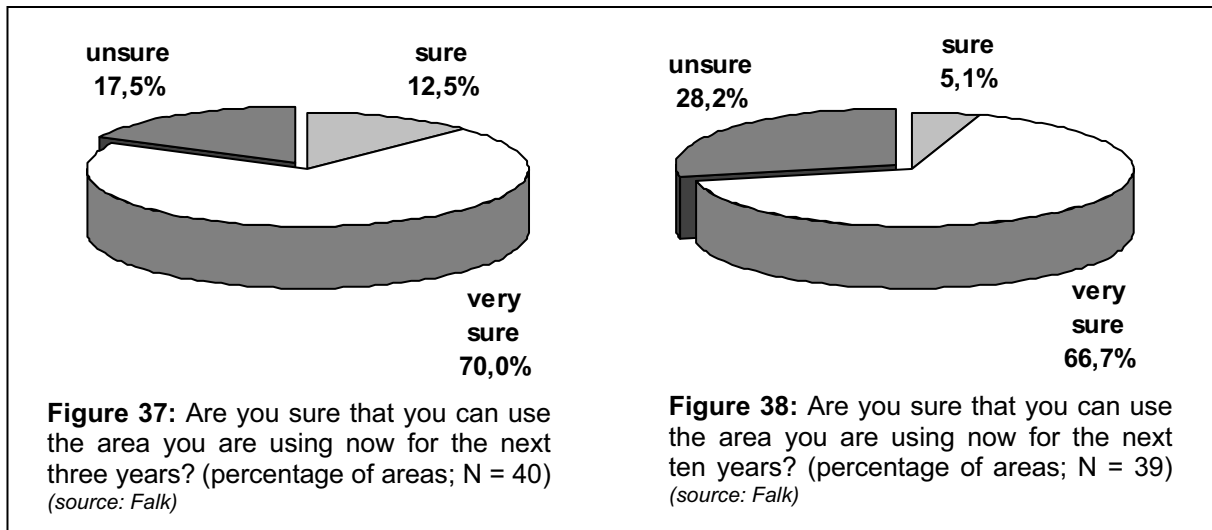
#### 5.3.1 Ownership and security of use rights

Prior to independence, ownership of the Ovitoto Native Reserve was vested in the hands of the South West African government. Today, Ovitoto is designated communal land and owned by the state in trust for the benefit of local residents (RoN 2002b: 17). Local residents, traditional authorities, regional councillors and representatives of the Ministry of Agriculture, Water and Rural Development agree that the land can not be sold or bought.

**Table 9:** Are you sure that you can use the area you are using now for the next ten years? (percentage of areas; N = 39) (source Falk)

	open communal land (N=23)	private camps (N=5)	military area (N=11)
insecure	13.0	60.0	45.5
secure	4.3	0.0	9.0
very secure	82.6	40.0	45.5

State ownership makes some respondents fear that the government could at anytime force them to leave (see Figure 37 & 38). This is one reason why the Herero traditional authorities are fighting for the right to control the land. They want it to be kept out of government jurisdiction (Düsing 1999: 130f). The Okamboro study shows, however, that the



majority of respondents, especially when it comes to general communal land, is very sure that they can use it for the next ten years (see Table 9). Particularly those who are born in Ovitoto and those who have been there for a long time believe that they can use the land until they die. The only source of insecurity was the rainfall, which can be indirectly interpreted as climate change. Some respondents mentioned that this could reduce their farming opportunities.

The fact that respondents felt unsure of their rights to use one fourth (28.2 percent) of their grazing areas is because the research also included private camps and a military training area. Since the 1990s, Ovitoto residents have been allowed to use a military training camp for grazing purposes. The area is only used for shooting exercises now and again. The military area does not belong to Ovitoto but the army administration allows Ovitoto residents to use it for grazing purposes. The right to use the military camp is perceived to be rather insecure because there is no formal agreement and the army could prohibit use of the area at any time. Farmers also perceive that use rights of private enclosures are insecure because the government disapproves of such fenced plots. For a detailed discussion on this topic see Chapter 5.3.7. It is still unclear whether the fences will have to be removed in future and many owners of camps feel irritated. The insecurity regarding the use of private enclosures and the military camp creates incentives to exploit resources. Especially in the case of the military areas, the lack of clearly communicated and enforced use rights provides few incentives for sustainable land management. It is surprising that no respondent fears that more communal land could be enclosed.

One important source of use right security is Ovitoto residents' awareness that they can control who may use and reside on their land. How access to Okamboro land is regulated will be described in the following Chapter.



### **5.3.2 Access regulation to Okamboro land**

Probably the strongest institution preventing, to some extent, the overuse of Okamboro land is the control of land access and exclusion from resource use. Up to the 1960s, it was mainly the communities of resource users who were the central authority regarding land management. The first settlers had special decision making rights. Traditional authorities played a minor role. Allocation of communal land and natural resource management were formally centralised in the reserve superintendent. Nonetheless, colonial legislation little affected the communities' rights to allocate water and grazing resources. Neither the superintendent nor headmen exercised any power in the allocation of land. Only in the mid 1960s, with the reforms introduced as a result of the work of the Odendaal Commission, did the government give traditional leaders power to allocate land which they did not have before (Werner 2000: 249-259). The allocation of land and control of livestock numbers became the responsibility of government appointed community authorities which consisted exclusively of headmen of the respective area (Werner 2000: 265).

Today the government is not involved in the land allocation of Ovitoto. Somebody wanting to move into the area has to ask residents and traditional authorities for permission. Ovitoto traditional authorities play an important role in the allocation of communal land in accordance with national laws (RoN 1998a: 12; RoN 2002b: sec 20). The highest traditional authority of Ovitoto is the Chief who resides in the local centre Okanshira. Additionally, each village has a traditional councillor who heads the respective settlement. The councillors are elected for life but can be challenged by the residents. All Ovitoto councillors meet regularly in order to decide about new residency permits, to solve conflicts and to discuss any recent problem. In case of conflict, the resolution follows strict subsidiarity principles. The councillors give rights to settle in a village only if the respective residents agree with this decision. This control mechanism is very important because the local residents know best whether the natural resources can bear another household. Whether somebody will be allowed to move in depends on the number of animals she/he possesses in relation to the available grazing. Relatives of present residents are more likely to be able to settle in the village. The overwhelming majority of respondents (96.7 percent) is convinced that only Okamboro residents can use Okamboro land. 90.6 percent assumed that somebody could be excluded from resource use. The fact that local residents can control access to the commonage increases the probability of them benefiting, in future, from or paying the potential costs of current management. This works as an incentive to manage natural resources in a sustainable manner.

Traditional authorities in Ovitoto are not officially recognised. They do not have the formal rights given to Namibian traditional authorities in the Traditional Authority Act and the Communal Land Reform Act. As a result, the government does not support them in the enforcement of customary law, the Chief can not apply for the recognition of a Community Court (Namibian 2003a) and Ovitoto traditional authorities are not represented in the regional Land Board. This lack of recognition weakens the traditional authorities. It hinders, in particular, the enforcement of rules which could e.g. help to protect natural resources. On the other hand, the lack of external third party enforcement, forces traditional authorities to be more accountable. Their decisions will only be respected if they take into account social and moral-based institutions in the community.

Access to the military grazing area is officially controlled by the National Defence Force of Namibia (NDF). In 1991, the NDF allowed communal farmers to use the area in the face of a drought. Since then grazing has been tolerated, though livestock may not officially stay there overnight. There is an arrangement between the Ministry of Defence and the traditional authorities of Ovitoto that the farmers can use the area as long as there are no military trainings. In the meantime, an informal settlement has emerged. Although the NDF is trying to convince the farmers to remove these households it has not threatened with concrete steps. Access to the camp was given to the community in general and not particular residents. Consequently, individual access is de facto regulated by traditional authorities of Ovitoto. Farmers who receive permission to settle in villages surrounding the military area are indirectly also allowed to use this place.

Most of the Okambo residents (81.3 percent) see the opportunity to take livestock to other places in case of grazing shortage. Mobility is still an important strategy to cope e.g. with droughts (Rao & Stahl 2000: 43). Most often the respondents referred to the communal areas of Okakarara, Otjinene and Otjombinde in the north-east of Ovitoto. Many Okambo farmers have friendship and family ties to the former Hereroland. Emergency grazing agreements are reciprocal. It was also reported that livestock from other regions was temporarily taken to Ovitoto for the same reasons. Few farmers mentioned that they rent camps of commercial farms. The more respondents sold and slaughtered in 2002, the more they probably had access to emergency grazing rights. Car owners more often decide to take livestock away in times of trouble.<sup>63</sup> One has to keep in mind that Okakarara and Otjinene are more than 200 kilometres away from Ovitoto.

### **5.3.3 Restrictions on resource use and use intensity**

Apart from regulations of land access, no formal control of livestock numbers on Okamboro land exists (see also Fuller & Turner 1996: 37). The Okamboro councillor emphasised that those who have residential rights in Okamboro are not restricted regarding their herd size. The high grazing intensity is the main threat for biodiversity in Okamboro. In the 1950s, the colonial administration had already introduced regulations such as livestock embargos, restrictions on the individual herd size, sales of surplus stocks and the prevention of stock concentration around dams. The government allowed for new stock to be brought in only exceptionally and with the approval of the Native Commissioner. Newcomers who wanted to keep livestock were encouraged to buy it inside of the reserve (Wagner 1957: 32, 36). A grazing fee was introduced in order to prevent residents from accumulating more stock than the reserve could carry. Proceeds were directly invested in the reserve's infrastructure (Werner 1998: 160, 163, 190). Nonetheless, farmers very often sought to evade grazing fees or simply refused to pay them (Werner 1998: 185). During the 1920s, the magistrate prohibited dairy production in Ovitoto because of water shortage (Werner 1998: 157). Other measures of resource management have been the division of the reserve into camps, the establishment of new water points as well as the encouragement of stock improvement and sales. Most of the approaches were not very effective. Farmers complained that the government restricts their wish to maximise herd size and were not willing to sell significant amounts of animals. In 1950, a limit of 50 large stock and 150 small stock per household was imposed. In order to avoid exceeding the limit, stock-owners register livestock in the name of poorer relatives (Wagner 1957: 32, 36f, 45ff; Werner 2000: 261). This experience shows how easy it is to circumvent formal rules and how important it is that the affected persons accept the institution.

Today Okamboro residents manage their natural resources like any other citizen of Namibia under national environmental legislation. The Namibian government emphasises this in the Regulations of the Communal Land Reform Act. Communal land must be managed in accordance with accepted farming practices. The land board and traditional authorities have the power to suspend customary land rights if holders of such rights do not comply with requirements of the Ministry of Agriculture or cause soil erosion (RoN 2003b: 31(1),(2); 32). It is, however, absolutely unclear how accepted farming practices or requirements of the Ministry are to be monitored or even enforced. Nothing similar has been observed during the time of research. Nonetheless, Okamboro residents believe that the government has to solve

the problem of high grazing intensity. The only government officials somehow involved in land management are extension workers of the Ministry of Agriculture, Water and Rural Development in Okanshira. Their only way to reduce the pressure on natural resources is encouraging farmers to increase sales. The regional councillor, as the local representative of the government, has even less influence on land management (see also Mendelsohn & el Obeid 2002: 9). Officers of the Ministry of Environment and Tourism responsible for Ovitoto are stationed in Windhoek. Representatives of the Ministry stated that they lack manpower in order to visit the area regularly. The Ministry's work is limited to awareness campaigns. Raising environmental awareness is an important instrument of biodiversity maintenance. Okamboro respondents who recognise environmental destruction are also more aware of use regulations.<sup>64</sup> In this way, transaction cost-efficient internalised social and moral-based resource use regulations can be established.

Traditional authorities feel as powerless as the government. Since the population is growing and expenses, e.g. for schools, health care and transport are rising, the traditional councillor stresses that the residents need more livestock in order to maintain their livelihoods. In his perception, the land is too small to force anybody to reduce livestock numbers. Traditional authorities demand more land, though they also admit that this would only temporarily solve the problem. Since there is no real co-operation a new area would also be under high pressure after a while. The Okamboro councillor doubts that co-operation has been better in the past. This can be partly explained by the fact that, at least part of Hereros have, for a long time shown a preference for a farming system which is based on private ownership rather than on collective management (Werner 1998: 222).

Today the most promising approach to reducing stocking rates is the affirmative action scheme. So called emerging farmers with larger herds are supported and encouraged to buy their own private farms in order to relieve grazing pressure from communal land (Werner 2003b: 12). At least three examples have been reported in Ovitoto. An Okamboro farmer with high employment income is also currently looking for his own farm. For more details on the affirmative action program see Chapter 5.3.4.

Bushfires are another threat to biodiversity. In Ovitoto they are not as disastrous as in other regions of Namibia. They are, when properly managed, even considered a natural instrument to avoid bush encroachment as a common form of rangeland degradation. Nevertheless,

farmers complained about big fires which resulted in grazing shortage. Okamboro residents are aware of restrictions regarding bush fires. Nonetheless, enforcement is a problem. Even residents have difficulty finding out who started a fire. Should an offender be caught, the case is first discussed amongst the residents and with the traditional councillor. Should they not find a solution, the case is handed over to the Chief or the government. Generally, neither Okamboro residents nor traditional authorities expect any compensation from offenders for damage to natural resources. The person is fined by the government or jailed. Under such conditions farmers have few incentives to enforce statutory or customary laws.

There are as well regulations regarding the protection of wildlife. Okamboro farmers experience losses due to endangered predators which represent a highly valuable tourism resource (see also Nuding 2002: 190). To the west, the village borders on a recreation area which attracts Namibian and international tourists also because of game viewing opportunities. There are also many private conservancies in the surroundings which make a profitable business with photo and hunting tourism. Leopards, hyenas, jackals and caracals can live there relatively undisturbed. They kill young stock regularly, in the communal area as well. In 2002, 24 goats and 7 cattle fell victim to predators in Okamboro alone. Because of this danger, certain grazing areas are avoided during the calving and lambing season. Especially the livelihoods of poorer households are negatively affected by such negative externalities. Transferring these costs to the direct beneficiaries of biodiversity (e.g. tourists) would be an incentive for the farmers to leave leopards, jackals and caracals alive. At present, predators are killed whenever found.

It must be assumed that also kudus and springboks are not very safe on Okamboro land, though no hunting was reported. Since 1967, commercial farmers in Namibia have enjoyed regulated rights to use and benefit from wildlife on their farms. In communal areas this is impossible. Restricted rights for communal farmers to use wildlife would provide incentives to protect game if they promise long term benefits. Respective incentives must be considered particularly in a situation where it is unrealistic to expect the government to protect game in communal areas.

#### **5.3.4 Affirmative Action Loan Scheme**

As mentioned above, the resettlement of strong communal farmers to private farms is one strategy to release pressure on communal natural resources. This is why the Namibian government introduced Farmland Loans for Empowerment in order to enable communal

farmers to acquire or rent commercial farm land (Harring & Odendaal 2002: 18). Loans are made available for a period of 25 years. Interest rates increase during the time of the contract up to 14 percent. The float of rate increase depends on the borrower's non-farming income. Only previously disadvantaged groups may apply for these loans. Furthermore, the applicant must own a minimum of 150 large or 800 small stock or the equivalent thereof (Agribank 2000: 13; Agribank 2001: 11f; Agribank 2002: 12f; Agribank 2003). Loans are only granted against security of a mortgage. Stock census records in the structurally related Okakarara, Othinene and Otjombinde constituencies estimate that approximately 350 stock owners possess more than 150 cattle (Mendelsohn & el Obeid 2002: 39). In 2002, in Okambooro at least two households met this requirement. This indicates that a considerably high number of Hereros qualifies for the scheme. Already in the 1940s an increasing number of Hereros expressed the wish to have their own fenced piece of land (Werner 1998: 222; Werner 2000: 259). In the 1980s, 30 Herero livestock owners benefited from a land loan scheme which promoted the purchase of farms under freehold title in 'white' areas. It was estimated that in 1990 8.3 percent of Herero stock owners qualified for this credit program (Adams & Werner 1990: 58ff, 108). The total number of granted affirmative action loans in the whole of Namibia increased from 207 in 1999 to 357 in 2002 (Agribank 2000: 13; Agribank 2002: 15).

It is a formal condition of the Agricultural Bank of Namibia that beneficiaries of the scheme may not keep livestock simultaneously on private and communal land. Loaners have to remove all their animals from the communal land and receive subsidies for slaughtering all their livestock in the communal area in order to enable them to buy new stock for the private farm (Agribank 2000: 14, 15; Werner 2003b: 13). The Communal Land Reform Act of 2002 also limits opportunities for farming on communal land for people who own or hire private agricultural land (RoN 2002b: sec. 23 (2)(c), 29 (2)(c); RoN 2003b: 10(2)). These measures shall ensure that the scheme reduces pressure on communal resources for the benefits of poorer communal farmers and the environment. Nevertheless, it remains a problem that the emerging farmers leave their livestock on communal land and furthermore benefit from the common natural and physical capital. The avoidance of formal requirements is simple. Emerging farmers just register the livestock under relatives' names. Therefore, traditional authorities and the communities must be involved in the monitoring and enforcement because they are best able to evaluate whether livestock has been really removed and if in doubt can use social sanctions. Social and moral-based institutions are even more efficient if backed by government enforcement.

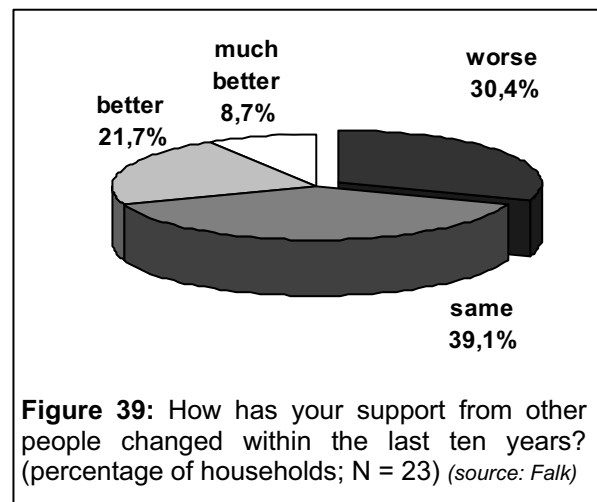
Critics sometimes point out that only the elite benefits from the Affirmative Action Loan Scheme. Particularly part-time farmers are on the Agribank's list of recipients (Agribank 2000: 4). The fact that many high government officials received loans raises concerns of corruption (Namibian 2003c). According to the Agricultural Commercial Land Reform Act, any Namibian citizen can benefit from the land reform if she/he has been disadvantaged by past discriminatory practices (RoN 1995c) even if she/he is not disadvantaged anymore (Werner 2003b: 7). Agribank's Chief Executive Officer emphasised that no person who met the requirements was rejected (Namibian 2003c). If one considers that many of the new commercial farmers struggle to pay their installments and to maintain the farm infrastructure, it is not surprising that especially better off people use the scheme. Non-farming income seems to be crucial for the success of a project since it can compensate for losses during the first years after acquiring the farm. One should also keep in mind that poorer subsistence farmers indirectly benefit if large herds are removed from the commonage. In order to make the Affirmative Action Loan Scheme a measure of poverty alleviation and natural resource preservation it is therefore extremely important to effectively enforce the removal of emergent farmers' livestock from communal land.

Although one objective of the affirmative action scheme is to reduce the pressure on common resources, in actual fact it creates incentives for herd size maximisation. The precondition that farmers can only apply for empowerment loans if they own large numbers of livestock is an incentive and justification to increase livestock numbers on communal land. Using communal land as stepping stone for emerging farmers deteriorates the conditions for improved natural resource management with negative effects on biodiversity maintenance.

Ovitoto traditional authorities are aware of the opportunities of the Affirmative Action Scheme. They mentioned that encouraging wealthy livestock owners to buy their own farms is the only relevant institutional instrument to reduce grazing pressure. Encouragement becomes, however, more difficult since many emergent farmers struggle on their new private farms. Some of them even try to return to communal land. The emergent farmers have never managed a farm commercially before and lack a lot of specific knowledge. Agricultural extension workers further express the need to change attitudes. Maximising the herd size in order to satisfy multiple needs as discussed in chapter 5.2 does not work on a commercial farm where regular expenses have to be paid.

### 5.3.5 Social capital and intra-community institutions

Social capital also plays an important role in Okamboro. Most of the respondents (87.5 percent) stated that they get support from relatives, friends and neighbours in times of trouble. Only the wealthiest farmers in possession of a car do not expect help.<sup>65</sup> Almost half of the households (42.3 percent) receive remittances regularly. The fact that 60 percent stated that they give goods and money to other people indicates that reciprocal exchange relations exist. Pensioners in particular said they give and receive.<sup>66</sup> Urban-rural-interdependencies have been observed. Money and purchased goods are exchanged for farm products. The bigger the herd and the more a household sold in 2002, the more likely it transferred something to friends and relatives who are often living outside of the communal area.<sup>67</sup> Cohesion amongst the residents seems to be rather weak since only few farmers (18 percent) mentioned benefiting from communal land use and mutual help. No tendency regarding the development of mutual help could be observed. The number of people who think that support has lessened is equal to the number of people who think it has increased (see Figure 39). The perceptions were independent from livestock numbers, employment or any other household characteristics.



45.8 percent of all households said they participated in local collective action and 20.8 percent were able to give examples of past contributions. Those were almost exclusively related to water infrastructure repairs (see chapter 5.3.8). Wealthier households have been especially collectively active and are represented in community organisations.<sup>68</sup> People who participate in collective actions feel more influential in the community.<sup>69</sup> Members of one fifth of the households (20 percent) are serving in a community committee and another 12 percent hold other functions in the settlement. Ovitoto for instance, has a Community Development Committee. Members are the Chief, the regional councillor, representatives of the school board and of the Directorate of Rural Water Supply. The committee discusses the development needs of the community. Furthermore, an elected water committee exists in each village (see Chapter 4.4.8.1 and 5.3.8). Respondents mentioned the farmers association as another important community organisation (see also Fuller & Turner 1996: 38). The Ovitoto association has 250 paying members and the annual member fee is approximately US\$ 6. It



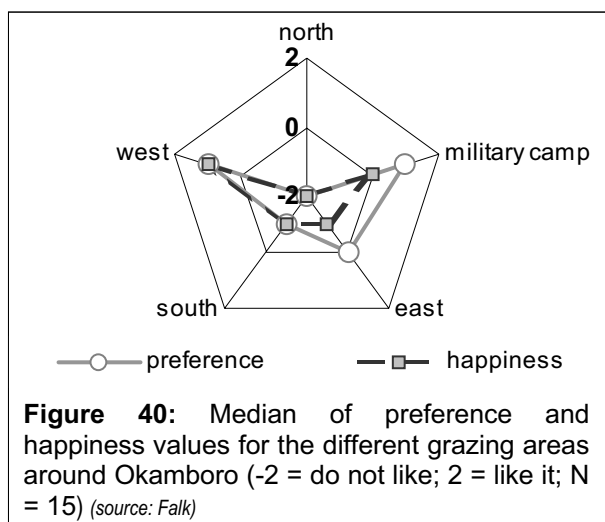
organises, for instance, livestock sales, vaccination campaigns and trainings in close co-operation with Meatco, the Ministry of Agriculture, Water and Rural Development and the veterinarian office. The farmers association further represents the interests of the farmers. In this way it improves the farmers' human, social and natural capital.

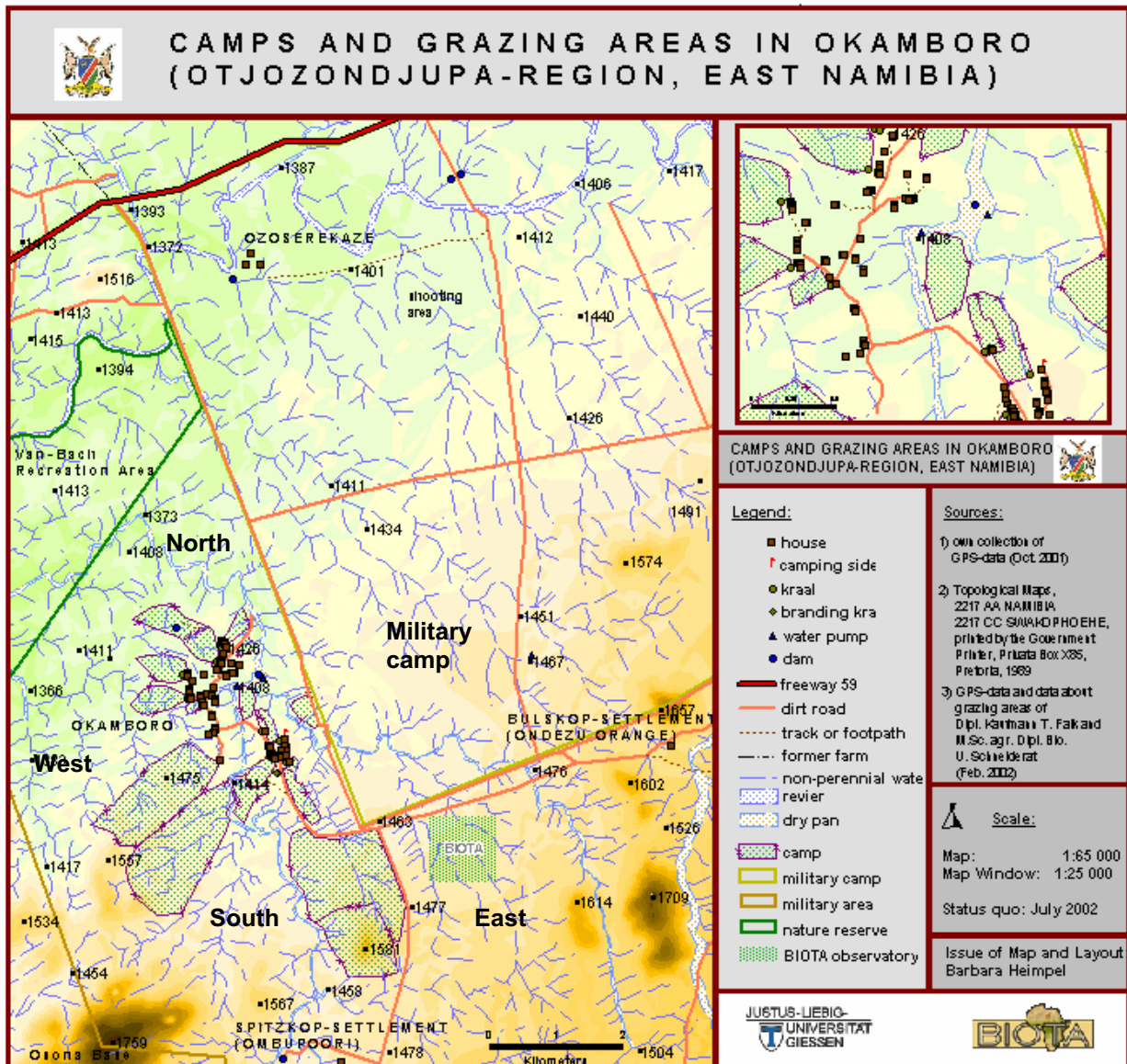
70.8 percent of the respondents believe that they can influence what happens in Okamboro, though only one third of the households is represented in local organisations. This indicates that the local decision making structures are able to represent the majorities' will. These structures are very valuable social capital and can be the base for improved natural resource management. Correlation analysis indicates that particularly the wealthier residents decide what happens in the village.<sup>70</sup> Poorer households are less represented in committees, feel weaker in local decision making but also participate less in collective actions.

### 5.3.6 The informal pasture distribution

When it comes to biodiversity maintenance, informal pasture distribution is another important intra-community institution. Such distributions are common in communal areas (see also Archer 1993: 15; Fuller & Turner 1996: 40). Not a single Okamboro farmer mentioned using the whole territory of approximately 5700 ha. Five main grazing areas could be identified. They are called in this chapter: the military camp as well as the northern, western, southern and eastern grazing areas (see Figure 41). Particularly the western border of the Okamboro territory is well defined by a fence. In the east, the village touches the military camp which is generally enclosed. The fence is, however, damaged and permeable. How far livestock enters the military camp is not controlled by natural or artificial borders. Most fuzzy are the village boundaries in the south and south-east such as around the BIOTA observatory. These areas are jointly used by all neighbouring settlements. In order to understand the informal pasture allocation, a motive assessment for the distribution of grazing areas has been conducted.

In a first step of the analysis the farmers were asked how much they prefer the different areas. They had to rank each area on an ordinal scale (-2 = do not like it at all;





**Figure 41:** The grazing areas of Okamboro (source: Barbara Heimpel, Ute Schneiderat)

2 = like it very much). As a cross-check they were further asked how 'happy' they would be if their animals were to graze in the different areas (-2 = very unhappy; 2 = very happy). Figure 40 shows that the majority of farmers prefers the military camp and the western grazing area. Less favoured are the south and the north. Wilcoxon tests show that particularly the north is significantly less preferred than the military camp and the west (see Appendix 10).

In a second step capital, need and transaction cost variables have been assessed for each grazing area. The catalogue of variables is listed in Appendix 3. In the Okamboro analysis the 'punishment' variable was not taken into account because of zero variation. The values of all other variables were compared between the areas based on the median and Wilcoxon significance tests (see Appendixes 10 & 11). In order to see differences between households,

a correlation analysis was carried out. For details regarding the methodology see the analysis of the distribution of grazing areas in Mutombo in Chapter 4.4.10.

The most obvious reasons to like or dislike a pasture are the grazing and water quality and quantity. Farmers stated that they avoid certain places because there are already too many animals belonging to other people. Such reactions are mechanisms which limit the grazing pressure of areas and distribute livestock more equally over the whole territory. Figure 42 and Wilcoxon tests show that the military camp and the western area are perceived to have the best grazing. Respondents perceive that both areas have significantly better pastures than the north, south and east. No significant variation could be observed between the military camp and the western area (see Appendix 10). From the military camp, much favoured grass species (e.g. Ongumba) were reported. Some respondents complained, however, about the fast growing number of people using this place. The fuzzy borders in the south and south-east also allow farmers from neighbouring settlements to use these areas. This increases the grazing intensity and has, in the eyes of most Okamboro residents, a negative impact on the pasture. Many farmers perceive that the southern area is difficult to access because it is almost entirely closed by private camps. The higher relative preference of areas cannot, in most cases, be explained by a relatively higher perception about the grazing quality. Only when comparing the east with the south can one conclude that the south is more preferred when the respondent perceived a higher grazing quality and the other way around (see Appendix 12). The fact that the relative preference does not usually correlate with the relative perception about pasture quality indicates that farmers are not trapped in cognitive dissonance, believing that the most preferred pasture also has the greenest grass. Other factors seem to be more important.

One possibly important factor is the water availability. Water is a scarce resource also in central Namibia. In Okamboro all people and livestock quench their thirst at central water points (see chapter 5.3.8). Water only stays in natural and artificial water holes and ephemeral rivers temporarily. The military camp has some dams and farmers perceive that there is significantly more water than in the western, southern and eastern areas (see

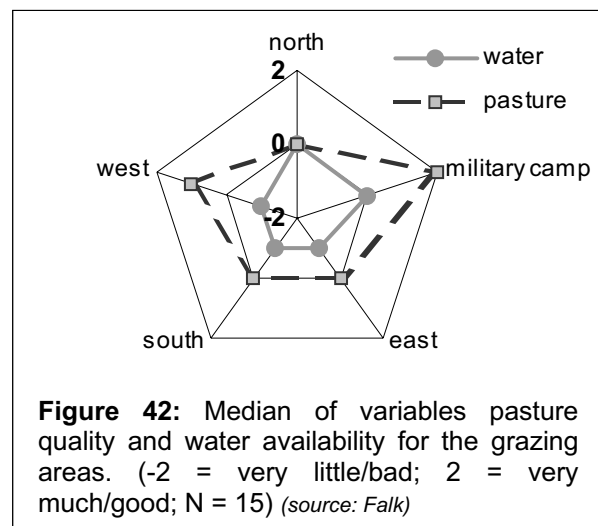
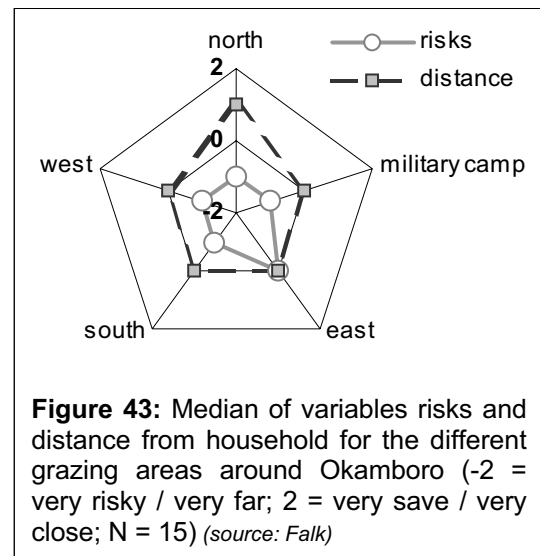


Figure 42, Appendixes 10 & 11). A big non-permanent river flows in the north. When comparing the southern, northern as well as eastern grazing areas the places which are perceived to hold more water are also more preferred by the farmers (see Appendix 12). The most probable explanation for this result is that farmers are best informed about the water availability in the areas they use.

The next tested factors are the risks for livestock. Farmers often mentioned the danger of livestock theft and predators as reason to avoid certain parts of the territory. Medians and significance tests indicate that only the eastern area is more secure (see Figure 43; Appendixes 10 & 11). In all areas the risks of theft, livestock losses due to predators and snakes, stony terrain as well as poisonous plants were mentioned. In the military camp, respondents are also afraid of their animals getting shot by soldiers. In the south, east and military camp only jackals and caracals hunt. In the northern and western areas which border to the van Bach recreation area farmers worry also about hyenas and leopards. For these reasons residents avoid taking calves and goats into these areas. No correlation between the relative perception about risks and the relative preference of area pairs could be observed (see Appendix 12). Although the avoidance of various risks is of high priority for the farmers, this factor does not determine who is using which area.



Another fair assumption is that households prefer pastures which are closer to their homesteads in order to reduce transaction costs. The Okamboro settlement is widely scattered and the existence of enclosures make different pastures unequally accessible for different households. Only the northern area is perceived by the majority to be significantly closer than the other places. For all other areas, no significant variances have been observed (see Figure 43; Appendixes 10 & 11). Correlation analysis shows interesting results for this variable. Comparing the eastern with the western grazing area indicates that people who live closer to one or the other area favour the respective place. The analysis for the southern and northern grazing areas shows similar results. Again the relative distance from the homestead and the relative preference correlate (see Appendix 12). These results support the assumption that the

household's location in the settlement influences the preference for grazing areas. In the process of land allocation traditional authorities and residents decide not only whether a person may settle in their village. They also decide where in the village she/he may build a new homestead. In this way, traditional authorities and residents distribute livestock amongst the different pastures.

But transaction costs are not the community's only way of enforcing pasture distribution. Informal enforcement mechanisms are used which affect the satisfaction of social needs. Directly asking farmers whether there is some kind of 'punishment' did not lead to any results. This institutional variable had no variance and all respondents agreed that no Okamboro resident can be punished for using any part of the Okamboro territory. It was repeatedly mentioned that this is communal government land and supposed to be used by everybody. Looking for more informal subconscious enforcement instruments, the variables 'relations', 'approval' and 'status' have been tested. Although the medians for these variables do not show any differences (see Appendix 11), the Wilcoxon test indicates a first general tendency. The majority of farmers think that other people would be happier if they took their livestock to the military camp rather than to the other areas (see Appendix 10). Furthermore, farmers perceive that other people would be annoyed with them and not respect them if they let the animals graze in the southern grazing area rather than, for instance, in the military camp or the eastern area.

Even more interesting are, however, the results of the correlation analysis. They indicate that there are heterogeneous opinions in the community (see Appendix 12). Particularly the western and the southern grazing areas polarise the settlement. Heads of household, who believe that other people will be more contented, respect them more and approve if they go to the western area, also favour the west. Should the livestock owner perceive that other residents are happier, more respectful and approve when their livestock is in the southern place than she/he prefers the south. The southern pasture is used by a group of farmers who belong to the same family. They also enclosed significant portions of this part of land. The picture looks similar when comparing the western with the eastern grazing area. Again the relative perception of the variables relation, approval and status correlate with the relative preference for the one or the other area. The variable status also significantly correlated with the area preference for the comparison of the southern grazing area and the military camp as

well as the southern and eastern area (see Appendix 12). Generally, people have to stay on their side and expect social sanctions if they start using places they are not supposed to use.

The assessment of the pasture distribution proves that the Okambo territory is distributed amongst the households. Who uses which part of it depends on the location of the homestead but more significantly on informal institutions. Tacitly and subconsciously, people know where their animals are supposed to graze and changing grazing areas makes them expect social sanctions. Some farmers stated they would ask the farmers in the other areas for permission to use their areas only in times of emergency. Similar arrangements are reported also from other Herero communities (see e.g. Stahl 2000: 328). Such informal institutions play an important role in natural resource management. They reduce the number of farmers using one area and clearly define the user group. A small and well defined user group has lower transaction costs for cooperation and collective action becomes more probable. If they manage to find cooperative agreements they have stronger incentives to maintain their natural capital because they can expect to benefit from their investments e.g. in stocking rate control. The group of farmers using the southern grazing areas developed, for instance, a specific management practice. They have a number of private camps which are used for sick, pregnant and young stock as well as in emergency situations. Together the camps also created an area which is relatively well separated and only used by them. Their homesteads are close together and farmers are related. These facts open many opportunities for joint management. The user group is well defined, it developed enhanced management options, has low transaction costs of co-ordination and any informal agreement can be enforced also through intra-family social sanctions. Such punishments are considered to be more effective than social control between unrelated neighbours. Even if Okambo farmers do not yet take full advantage of the potential of such institutions they are a starting point for management improvements.

### **5.3.7 Enclosing of communal land**

Fencing of communal land is a controversial subject of discussion in Namibia. With the Communal Land Reform Act of 2002, the government has a strong instrument against the erection of fences. Without the permission of traditional authorities and the relevant land board no new fences may be erected and all existing ones have to be approved by both authorities or must be removed (RoN 2002b: sec 18, sec 28 (2)(b), (8), sec 29 (4) (a), sec 35 (2)(b), sec 44; RoN 2003b: 7, 26; LAC 2003: XVI, 9). The Minister of Lands, Resettlement and Rehabilitation repeatedly stressed that illegal fences in communal areas must be removed (NAMPA 2003).

Fencing in Herero communal areas was already reported prior to independence and even promoted by the former government (Werner 2000: 264). Wealthier farmers picked up the idea of pre-independence government to establish 'economic farm units' and started to fence off individual farms on communal land (Adams & Werner 1990: 96f, 106, 162). The wish to manage one's own piece of land was growing with the increasing commercialisation (Werner 2000: 268). Many wealthier Herero farmers have already preferred a farming system based on private ownership rather than on communal management for a long time (Werner 1998: 222). Since the 1960s, the government has shifted many resource use management rights from the community to appointed authorities which consisted of traditional authorities. Those represented rather the wealthier class of farmers and permitted the privatisation of communal land via enclosures (Werner 2000: 265, 268).

Seven Okamboro households, which is 29.2 percent of all livestock keeping households, admitted to having private camps. It must be assumed that there are some more who tried to conceal it. Most of them are aware that the enclosing of communal land is illegal. Camps are usually close to the household and within the area which is used by the household anyway (see also Stahl 2000: 328).<sup>71</sup> One of the main purposes of camps is to protect young stock and high quality bulls from dangers such as predators and thieves. They compensate the increasing shortage of herders (see also Stahl 2000: 329ff). Livestock is perceived to be significantly safer in camps in comparison to the remaining pasture.<sup>72</sup> Enclosures are furthermore an instrument of breeding control because bulls are kept separately from the herd. Sick animals are separated and treated in camps in order to avoid epidemics. Most of the households have only relatively small camps for such purposes. There are, however, at least two camps of more than 150 ha around the settlement (for the distribution of enclosures see Figure 41, Chapter 5.3.6). These secure private seasonal grazing. Seventeen camps have been counted. Their size is 35 ha on average. This comes to a total of 520 ha which means that approximately 10 percent of the Okamboro territory is fenced. It was repeatedly mentioned that farmers save the fodder in the camps and use the remaining territory until the grass is finished on the commons. When this happens and all other farmers start to struggle, the camp owners can take their livestock to the camps where they may survive critical periods of the year (see also Matanyaire 1997: 582; Stahl 2000: 330f). Most respondents perceive the pasture quality of existing camps as being very good.<sup>73</sup> It was mentioned that the favoured Ongumba grass grows better in camps. Nevertheless, Wilcoxon tests did not prove that the camps are perceived to be of significantly better grazing quality than the open commonage.<sup>74</sup>

Within the community, it is accepted that the investments in fences are a justification for the exclusive use of the enclosure. This means that only those who have the capital to invest in fences have camps. The improved pasture management of camp owners has negative externalities for those residents who cannot afford to build a camp. With each new camp the pasture available to the poor, who are not able to build fences, becomes smaller and smaller (Twyman et al. 2000: 129; see also Quan et al. 1994: 28; Hangula 1995; Fuller & Turner 1996: 22; Werner 2000: 268; Stahl 2000: 319, 336; Corbett & Jones 2000: 4; Fara 2001; LAC 2003: XII). In Okamboro, some households mentioned not being able to use certain parts of the Okamboro land because fences limit their accessibility. Particularly permanent residents with large herds and highest marketing rates own camps. Especially the older generation and those who have a function in the community enclose communal land.<sup>75</sup> In the structurally closely related Okakarara region political patronage and close relationship to local political power is a prerequisite for erecting fences (see also Fuller & Turner 1996: 22). This indicates that apart from financial and physical capital social capital is also needed if one wants to enclose communal land (see also Mendelsohn & el Obeid 2002: 9).

Whether somebody may build a camp will first be discussed amongst the residents with the traditional councillor having the final word. They decide where a camp may be built and how big it might be. All Okamboro enclosures are authorised by traditional authorities. Camp owners do not have the feeling that their camp affects their respect and approval in the community.<sup>76</sup> How much the fencing is accepted is shown by the fact that people who damage fences are expected to repair them. If they refuse they can be taken to the traditional authorities who would treat the case like any other offence under customary law.

73.3 percent of the respondents believe that erecting new fences increases the fodder supply for their animals. Almost half (46.7 percent) think that it would improve the protection of livestock. Four fifths would be very happy if they could make a new camp. No formal punishments are feared, though 40 percent of the respondents expect disapproval and 46.7 percent serious loss in respect from the neighbours for installing new enclosures. Especially households who already have a camp believe that the other residents would disapprove if they made another one.<sup>77</sup> Some even mentioned that the community would not allow them to erect further fences. Fencing escalates if, as reported from the Okakarara area, so called 'defensive fencing' starts where people enclose pasture in order to prevent other people from doing so (Fuller & Turner 1996: 22f). At least one Okamboro farmer mentioned this as motivation for



making a camp. Defensive fencing can, however, also be done by a group of people in order to protect the grazing from privatisation (Twyman et al. 2000: 127; Mendelsohn & el Obeid 2002: 9). Cases from other Namibian communal areas have been reported where farmers fenced the village land in a collective action (Twyman et al. 2000: 127).

Enclosing of communal land is not unregulated in Okambo. The residents have the opportunity to control fencing. One should, however, keep in mind that poorer households, who are most negatively affected, feel less powerful in local decision making situations (see chapter 5.3.5). Negative externalities for the poor are partly internalised by the fact that people who do not have their own enclosures may use those of other people temporarily. Camp owners as well as non-camp owners mentioned this opportunity.

### **5.3.8 The impact of the water reform**

The management of and control of water points is a crucial element of natural resource management. Villages are organised around watering points and the village grazing territory is largely determined by the fact that cattle do not walk further than 7 km away from the water point (Werner 2000: 253). Okambo life is strongly affected by the changing water policy (see Chapter 4.4.8.1). There is an old borehole around the settlement and a new one was drilled in 2002. While the government remains responsible for the old pump until 2007, the new one was immediately handed over to the community. The community also received a closed water tank which improved the water quality for human consumption. It is government policy to repair all water points before they are handed over. When the new pump was broken in 2003 the government still repaired it.

The residents of Okambo have formed a Water Point User Association (WPA) and in the late 1990s a water point committee was elected. It consists of 12 members including the village councillor. The committee meets if water problems have to be discussed and decides together with the remaining community. For instance, committee members mentioned that some households still waste water and that more awareness amongst the residents is needed in order to save the scarce resource. Under the supervision of the Directorate of Rural Water Supply the WPA is supposed to formulate a water constitution which defines the regulations of water use. Representatives of the directorate's office in Ovitoto emphasised that rules and punishments should be formulated by the community itself in order to be adapted to the specific situation. The Directorate of Rural Water Supply only tries to sensitize the people. This approach increases the chance that social and moral-based institutions become effective.

Should these institutions prove to be inefficient in particular cases, the constitution gives the WPA the opportunity to take offenders to court. The threat of formal punishment supports the enforcement of informal ones. The fact that the villagers discuss the pollution and waste of water indicates that the new water policy promotes more sustainable water consumption. One fifth of the households mentioned that they helped to repair and maintain the water infrastructure which shows an increasing feeling of responsibility amongst the residents for the water point.

A care taker, responsible for daily operation and maintenance work, was appointed. He receives a monthly salary of approximately US\$ 6 paid from the water fees. Since 2002, the government has not subsidised diesel anymore and the Okamboro farmers have to collect their own money. It seems that this scheme works relatively well. Although the residents pay relatively high amounts for water only few complained about the new situation. By the end of 2002, they were paying US\$ 1 for each head of cattle per month. The collection of the water fee works well and there is even money in a bank account for future repairs. Paying water fees may have an interesting side affect. Other studies report that it is seen as sign of a person's right (Fuller & Turner 1996: 23). This influences biodiversity maintenance positively. Nevertheless, there are quarrels with some livestock owners who do not pay their fees. They and their workers are under high social pressure and risk their water supply being cut off. Until 2003, no case of such exclusion was reported.

It can be concluded that the new water policy showed positive affects regarding sustainable resource management in Okamboro. Most farmers seem to be willing and able to contribute to the water supply and a consumption dependent payment scheme was introduced.

#### **5.4 Conclusion**

The Capital-Need-Institution-Assessment discovered a wide range of factors influencing biodiversity maintenance in Okamboro. Many of the environmental problems in Okamboro are caused by insufficient regulation of use practices and intensity. Nevertheless, one must keep in mind that, the scarcer the resource the more difficult it is to introduce and enforce institutions. Constraints particularly in natural, financial and human capital result in high population density and strong dependency on natural resources. This creates high pressure on the land. The transfer of land on a private or communal basis is an instrument to reduce pressure on Ovitoto natural resources. Positive effects for the old territory can be realised if

local residents introduce their own locally adapted access and use control institutions as a precondition for the transfer of land (see also Rohde et al. 2001: 13). Any institutional improvements, no matter whether supported by land redistribution or not, require the governments' formal recognition and consequent communication of local residents rights in order to enable them to manage their land. Transferring rights to local residents can increase the probability of introducing urgently needed stocking rates control. Such institutions can and should be based on already existing structures. Initiative to reduce stocking rates must be aware of the multiple functions of livestock in the Okamboro community. Such functions must be effectively substituted if farmers and their social environment are to be convinced that more sustainable management strategies improve their livelihoods. Fences, when not creating negative externalities for poorer community members, can improve natural resource management.

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<sup>36</sup> When comparing figure 24 and 25 one has to take into consideration that figure 24 calculates the grazing intensity on the base of livestock numbers while figure 25 on on the base of measured body weights.

<sup>37</sup> *Spearman-Rho correlation*: „externalities” & „changes of quality of pasture since three years”; coefficient 0.304; sign.: 0.081; N = 34.

<sup>38</sup> *Spearman-Rho correlation*: „LSU of household” & „pension as source of income”; coefficient 0.448; sign.: 0.022; N = 26; „permanent work as source of income” & „permanence of household head”; coefficient -0.455; sign.: 0.020; N = 26; „permanent work as source of income” & „remittances as source of income”; coefficient -0.418; sign.: 0.034; N = 26; „ remittances as source of income” & „permanence of household head”; coefficient 0.469; sign.: 0.016; N = 26.

<sup>39</sup> *Spearman-Rho correlation*: „LSU of household” & „have savings”; coefficient 0.417; sign.: 0.043; N = 24; „think can get a loan” & „have savings”; coefficient 0.553; sign.: 0.011; N = 20.

<sup>40</sup> *Spearman-Rho correlation*: „permanence of household head” & „changes of access to money”; coefficient 0.623; sign.: 0.001; N = 23.

<sup>41</sup> *Spearman-Rho correlation*: „have a car” & „have electricity”; coefficient 0.419; sign.: 0.037; N = 25; „have a car” & „have television”; coefficient 0.384; sign.: 0.058; N = 25; „have a car” & „have a radio”; coefficient 0.480; sign.: 0.015; N = 25; „have a car” & „have telephone”; coefficient 0.384; sign.: 0.058; N = 25; „have a car” & „have savings”; coefficient 0.510; sign.: 0.011; N = 24; „have a car” & „can get a loan”; coefficient 0.612; sign.: 0.004; N = 20; „have television” & „have telephone”; coefficient 0.621; sign.: 0.001; N = 25; „LSU of household” & „have a car”; coefficient 0.533; sign.: 0.006; N = 25; „LSU of household” & „have electricity”; coefficient 0.416; sign.: 0.038; N = 25; „LSU of household” & „have a radio”; coefficient 0.500; sign.: 0.011; N = 25.

<sup>42</sup> *Spearman-Rho correlation*: „information keep” & „total LSU of herd”; coefficient 0.504; sign.: 0.046; N = 16.

<sup>43</sup> *Spearman-Rho correlation*: „ranking keep” & „education level of household head”; coefficient -0.610; sign.: 0.012; N = 16; „education level of household head” & „pasture keep”; coefficient -0.610; sign.: 0.001; N = 16; „education level of household head” & „water slaughter”; coefficient 0.489; sign.: 0.055; N = 16; „education level of household head” & „water sell”; coefficient 0.489; sign.: 0.055; N = 16.

<sup>44</sup> *Spearman-Rho correlation*: „money slaughter” & „casual work as source of income”; coefficient 0.452; sign.: 0.079; N = 16; „money slaughter” & „remittances as source of income”; coefficient 0.558; sign.: 0.025; N = 16.

<sup>45</sup> *Spearman-Rho correlation*: „money sell” & „ranking keep”; coefficient -0.467; sign.: 0.068; N = 16.

<sup>46</sup> *Spearman-Rho correlation*: „money keep” & „education level of household head”; coefficient -0.537; sign.: 0.032; N = 16.

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- <sup>47</sup> *Spearman-Rho correlation*: „food keep” & „total LSU“; coefficient 0.584; sign.: 0.017; N = 16; „food keep” & „permanence of household head“; coefficient 0.438; sign.: 0.089; N = 16; „food keep” & „education level of household head“; coefficient -0.501; sign.: 0.048; N = 16; „food keep” & „importance permanent work as source of income “; coefficient -0.514; sign.: 0.042; N = 16; „food keep” & „pension as source of income“; coefficient 0.805; sign.: 0.000; N = 16.
- <sup>48</sup> *Spearman-Rho correlation*: „ranking sell” & „security sell”; coefficient 0.495; sign.: 0.052; N = 16; „ranking sell” & „security keep”; coefficient -0.438; sign.: 0.090; N = 16.
- <sup>49</sup> *Spearman-Rho correlation*: „pension as source of income” & „pasture keep”; coefficient 0.428; sign.: 0.098; N = 16; „pension as source of income” & „pasture slaughter”; coefficient -0.492; sign.: 0.053; N = 16; „pension as source of income” & „pasture sell”; coefficient -0.492; sign.: 0.053; N = 16; „pension as source of income” & „water slaughter”; coefficient -0.752; sign.: 0.001; N = 16; „pension as source of income” & „water sell”; coefficient -0.752; sign.: 0.001; N = 16; „importance of permanent work as source of income” & „pasture keep”; coefficient -0.530; sign.: 0.035; N = 16; „importance of perm. work as source of income” & „pasture slaughter”; coefficient 0.560; sign.: 0.024; N = 16; „importance of permanent work as source of income” & „pasture sell”; coefficient 0.560; sign.: 0.024; N = 16; „importance of perm. work as source of income” & „water slaughter”; coefficient 0.624; sign.: 0.010; N = 16; „importance of permanent work as source of income” & „water sell”; coefficient 0.624; sign.: 0.010; N = 16; „permanence of household head” & „pasture keep”; coefficient 0.785; sign.: 0.000; N = 16; „permanence of household head” & „pasture slaughter”; coefficient -0.545; sign.: 0.029; N = 16; „permanence of household head” & „pasture sell”; coefficient -0.545; sign.: 0.029; N = 16; „permanence of household head” & „water slaughter”; coefficient -0.546; sign.: 0.029; N = 16; „permanence of household head” & „water sell”; coefficient -0.546; sign.: 0.029; N = 16; „education level of household head” & „pasture keep”; coefficient -0.610; sign.: 0.001; N = 16; „education level of household head” & „water slaughter”; coefficient 0.489; sign.: 0.055; N = 16; „education level of household head” & „water sell”; coefficient 0.489; sign.: 0.055; N = 16; „are in community committee” & „pasture keep”; coefficient -0.559; sign.: 0.024; N = 16; „are in community committee” & „water keep”; coefficient -0.537; sign.: 0.032; N = 16.
- <sup>50</sup> *Spearman-Rho correlation*: „time sell” & „LSU sold”; coefficient 0.735; sign.: 0.001; N = 16; „information sell” & „LSU sold”; coefficient 0.581; sign.: 0.018; N = 16; „information sell” & „LSU sold”; coefficient 0.581; sign.: 0.018; N = 16.
- <sup>51</sup> *Spearman-Rho correlation*: „relation sell” & „security sell”; coefficient 0.559; sign.: 0.024; N = 16.
- <sup>52</sup> *Spearman-Rho correlation*: „relation keep” & „LSU sold”; coefficient 0.509; sign.: 0.044; N = 16.
- <sup>53</sup> *Spearman-Rho correlation*: „approval sell” & „support sell”; coeff. 0.503; sign.: 0.047; N = 16; „approval slaughter” & „support slaughter”; coeff. 0.564; sign.: 0.023; N = 16; „approval slaughter” & „support sell”; coeff. 0.557; sign.: 0.025; N = 16; „approval sell” & „support slaughter”; coefficient 0.506; sign.: 0.046; N = 16.
- <sup>54</sup> *Spearman-Rho correlation*: „LSU sold” & „support slaughter”; coefficient 0.559; sign.: 0.025; N = 16.
- <sup>55</sup> *Spearman-Rho correlation*: „permanent work as source of income” & „support keep”; coefficient -0.683; sign.: 0.004; N = 16.
- <sup>56</sup> *Spearman-Rho correlation*: „approval keep” & „LSU of household”; coefficient -0.566; sign.: 0.022; N = 16; „approval keep” & „have savings”; coefficient -0.609; sign.: 0.012; N = 16; „status sell” & „pasture sell”; coefficient 0.651; sign.: 0.006; N = 16.
- <sup>57</sup> *Spearman-Rho correlation*: „participate in collective action” & „LSU of household”; coefficient 0.466; sign.: 0.022; N = 24; „have a function in the community” & „LSU of household”; coefficient 0.559; sign.: 0.004; N = 25; „are member of a committee” & „LSU of household”; coefficient 0.555; sign.: 0.004; N = 25; „can influence Okamboro life” & „LSU of household”; coefficient 0.451; sign.: 0.027; N = 24.
- <sup>58</sup> *Spearman-Rho correlation*: „permanence of household head” & „status slaughter”; coeff. 0.613; sign.: 0.012; N = 16; „education level of household head” & „status slaughter”; coeff. -0.569; sign.: 0.021; N = 16.
- <sup>59</sup> *Spearman-Rho correlation*: „ranking keep” & „permanent work as source of income“; coefficient -0.530; sign.: 0.035; N = 16.
- <sup>60</sup> *Spearman-Rho correlation*: „LSU sold” & „LSU total“; coefficient 0.587; sign.: 0.002; N = 26; „LSU slaughtered” & „LSU total“; coefficient 0.517; sign.: 0.007; N = 26; „percentage of total LSU sold” & „LSU total“; coefficient 0.436; sign.: 0.026; N = 26; „LSU sold” & „have a car“; coefficient 0.664; sign.: 0.000; N = 25; „LSU sold & slaughtered” & „have savings“; coefficient 0.413; sign.: 0.045; N = 24.

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- <sup>61</sup> *Spearman-Rho correlation*: „ranking keep” & „are in committee“; coefficient -0.559; sign.: 0.024; N = 16; „ranking sell” & „are in committee“; coefficient 0.513; sign.: 0.042; N = 16; „LSU sold” & „are in committee“; coefficient 0.485; sign.: 0.014; N = 25.
- <sup>62</sup> *Spearman-Rho correlation*: „ranking keep” & „education level of household head“; coefficient -0.610; sign.: 0.012; N = 16; „LSU slaughtered” & „education level of household head“; coefficient -0.418; sign.: 0.034; N = 26; „ranking sell” & „permanence of household head“; coefficient 0.785; sign.: 0.000; N = 16.
- <sup>63</sup> *Spearman-Rho correlation*: „LSU sold & slaughtered” & „emergency grazing opportunities”; coeff. 0.630; sign.: 0.009; N = 16; „have a car” & „emergency grazing opportunities”; coeff. 0.480; sign.: 0.060; N = 16.
- <sup>64</sup> *Spearman-Rho correlation*: „resource use restrictions” & „changes of resources last 3 years”; coefficient -0.463; sign.: 0.040; N = 20.
- <sup>65</sup> *Spearman-Rho correlation*: „have a car” & „support from others”; coefficient -0.411; sign.: 0.046; N = 24.
- <sup>66</sup> *Spearman-Rho correlation*: „pension as source of income” & „transfer to others”; coefficient 0.458; sign.: 0.021; N = 25; „pension as source of income” & „support from others”; coefficient 0.348; sign.: 0.096; N = 24.
- <sup>67</sup> *Spearman-Rho correlation*: „LSU total” & „transfer to others”; coefficient 0.482; sign.: 0.015; N = 25; „LSU sold” & „transfer to others”; coefficient 0.409; sign.: 0.042; N = 25.
- <sup>68</sup> *Spearman-Rho correlation*: „participate in collective action” & „LSU of household”; coefficient 0.466; sign.: 0.022; N = 24; „participate in collective action” & „have a car”; coefficient 0.497; sign.: 0.014; N = 24; „participate in collective action” & „have savings”; coefficient 0.510; sign.: 0.011; N = 24; „LSU sold” & „have function in Okamboro”; coefficient 0.443; sign.: 0.027; N = 25; „total LSU” & „have function in Okamboro”; coefficient 0.559; sign.: 0.004; N = 25; „have savings” & „have function in Okamboro”; coefficient 0.406; sign.: 0.049; N = 24; „have a car” & „are in a committee”; coefficient 0.520; sign.: 0.008; N = 25.
- <sup>69</sup> *Spearman-Rho correlation*: „participate in collective action” & „can influence what happens in Okamboro”; coefficient 0.406; sign.: 0.049; N = 24.
- <sup>70</sup> *Spearman-Rho correlation*: „total LSU of household” & „can influence Okamboro life”; coefficient 0.451; sign.: 0.027; N = 24; „have savings” & „can influence Okamboro life”; coefficient 0.514; sign.: 0.010; N = 24; „have a car” & „can influence Okamboro life”; coefficient 0.406; sign.: 0.049; N = 24.
- <sup>71</sup> median of variable „distance of camp from household” = 2 (very close).
- <sup>72</sup> *Wilcoxon significance test*: „risks in open commons” & „risks in existing camps”; Z-coefficient: -2.494; asym. sign.: 0.013; N = 12.
- <sup>73</sup> median of variable „pasture quality in camps” = 2 (very good).
- <sup>74</sup> *Wilcoxon significance test*: „pasture quality of open commons” & „pasture quality of existing camps”; Z-coefficient: -0.520; asym. sign.: 0.603; N = 13.
- <sup>75</sup> *Spearman-Rho correlation*: „have private camp” & „LSU sold”; coefficient 0.558; sign.: 0.003; N = 26; „have private camp” & „LSU of household”; coefficient 0.540; sign.: 0.004; N = 26; „have private camp” & „permanence of household head”; coefficient 0.365; sign.: 0.067; N = 26; „have private camp” & „pension as source of income”; coefficient 0.553; sign.: 0.003; N = 26; „have private camp” & „have a function in the community”; coefficient 0.449; sign.: 0.025; N = 26.
- <sup>76</sup> median of variables „status” and „approval when having a camp” = 0 (no impact).
- <sup>77</sup> *Spearman-Rho correlation*: „have private camp” & „approval of making new camp”; coefficient -0.591; sign.: 0.020; N = 15.

## **6 Tiervlei/Gellap Ost**

Marked fence-line contrasts are visible outcomes of the effects of different natural resource management systems existing in the dryland rangeland of southern Namibia. Within the framework of the interdisciplinary BIOTA Southern Africa project, comparative investigations were carried out on a pair of permanently marked BIOTA Observatories (see Chapter 3) at the Gellap Ost Research Station and the neighbouring Tiervlei communal land (Akhtar-Schuster et al. 2005). Both BIOTA observatories lie side by side only separated by a fence. Chapter 6.1 gives a short overview of the Gellap Ost research station and in Chapters 6.2 to 6.5 the situation on the communal research site is analysed in detail.

### **6.1 Overview of the Gellap Ost Research Station**

The Gellap-Ost Research Station is situated north-west of Keetmanshoop. In 1938, the pre-independence government bought the farm from a private farmer making it one of the oldest Namibian governmental research stations today.

#### **6.1.1 Capital availability**

The research station is 13 734 hectares, divided into 160 camps with 9 boreholes and 70 km of pipelines. The BIOTA observatory is located on the camp B1 which is 261 ha. Thanks to a sophisticated farm management system, the natural capital of the farm is in very good condition (see also Chapter 6.3.1). Since the early 1990s no changes in the phyto-diversity have been observed. Gellap Ost has electricity. Fourteen labourers are employed and live on the farm. The infrastructure of Gellap Ost provides good conditions for agricultural extension trainings (RoN 1992: 70). Guesthouses with approximately 30 beds can accommodate training participants. There is also a lecture hall, a kitchen and workshops. The station staff receives all-round training. Investment in the workers' human capital is of high priority.

#### **6.1.2 Objectives of the research farm**

The main objectives of the Gellap Ost research station are research and extension services in order to support the improvement of long-term productivity of communal as well as commercial farms. Research on the farm started with local cattle breeds. During the 1950's, the emphasis shifted to karakul sheep. In 2003, karakul made up 88% of the total heads of animals kept on Gellap Ost (Akhtar-Schuster et al. 2005). New research efforts concentrate on the breeding of a new type of sheep with stronger browsing habits. There used to be a programme to sell breeding rams at subsidised prices to communal farmers. The objective of

the project was to improve the breed quality of the communal farmers. Many communal farmers, however, bought animals at low rates only to sell them to commercial farmers at higher prices. Therefore the project was stopped in the mid 1990s. Breeding continued but today rams are sold at commercial rates to commercial as well as communal farmers.

New research projects may be initiated by the station staff, provided they are approved by the Permanent Secretary. Nowadays the focus of activities is increasingly shifting from research to extension services. Courses offered at the Research Station target communal as well as commercial farmers. The schedule is drawn up with the assistance of the Agricultural Extension Office. Every year about four courses are held, which means there are approximately 150 trainees every year. The training focuses on the breeding of karakul sheep. The Karakul Council, a farmers association, sponsors the training and provides trainers. It is organised by the Extension Office and the Karakul Council. Gellap staff may not charge for training services rendered to other organisations in Namibia or South Africa. They may provide consultancy services, but cannot receive remuneration for such activities. These constraints can be seen as a missed opportunity to generate revenue for the station and to make full use of the knowledge and experience of the staff.

The research and training objectives of the Gellap Ost research station have direct impact on biodiversity maintenance. There are no primary interests for either the government or the station staff to utilise the farm commercially in a cost-efficient way. Comparatively fewer animals are needed for research and training purposes than in order to achieve the objectives of communal or commercial farmers. There are no incentives for the research staff to exceed recommended stocking rates (see also Chapter 6.1.3). The objectives of the farm are therefore one important reason why the ecosystem on Gellap Ost is in a much better state than on neighbouring communal farms. However, considering unusual objectives Gellap Ost is not the most representative example of range management in the region.

### **6.1.3 Institutional framework**

The objectives of Gellap Ost are reflected in the institutional and organisational structure of the farm. Gellap Ost is owned by the government and run by the Ministry of Agriculture, Water and Forestry/Directorate Training and Development. The station management receives an annual budget from the ministry which is fixed and independent of the revenues received through station activities. All income generated from the sale of livestock or pelts must be returned to the ministry. Therefore the farm management has no incentive, economic or

otherwise, to fully exploit the carrying capacity of the station. This is the most important reason for the low intensity of utilisation of the Gellap Ost observatory which promotes rich biological diversity (see Chapter 6.3.1). Again, one has to take into consideration that the station is not representative of profit maximising commercial farms in the region.

Apart from the low utilisation intensity, the rich biodiversity on the farm is also promoted by a sophisticated management scheme. The camps are purposely under-stocked because of unreliable rainfall. A system to estimate the annual carrying capacity has been introduced. The farm management makes a plant census after the end of the rainy season and calculates the available biomass and carrying capacity. How much of the grazing capacity is used in each camp depends on regular inspections of indicator plants. Livestock on the farm receives supplement fodder.

Access to and utilisation of the land is effectively controlled by the farm management. Wood from the farm may only be used for home consumption by the workers. Illegal wood cutters who regularly cut wood on the communal land hesitate to do so on the government farm. Hunting permits must be obtained from the Ministry of Environment and Tourism and game meat sold to the farm workers. The station management has noticed that the number of game on the farm has declined compared to the past.

## **6.2 The Tiervlei farming units**

Tiervlei is not a coherent settlement. It consists of five farming units Nabaos, Nuwefontein, Beespos, Tiervlei and Middelputs which border each other. The BIOTA observatory lies on the Nabaos and the Nuwefontein units. The five units were chosen as research unit because they form a water point user association managing and using the same water infrastructure. For simplicity's sake all five units will be called Tiervlei farms in the following chapter. The Tiervlei farms belong to the Berseba communal area in the Karas region. This region is the most southern region of the country and is 161 215 km<sup>2</sup> (RoN 2001j). Nabaos, Nuwefontein, Beespos, Tiervlei and Middelputs are situated approximately 25 km north-west of the regional centre Keetmanshoop.

The Tiervlei farming units belong to what are commonly called 'Odendaal Farms'. These were commercial farms until the 1960s which were purchased by the government in order to consolidate the existing scattered 'native reserves' into one joint Namaland homeland (Fuller



& Turner 1996: 16; Rohde et al. 2000b: 335; Klocke-Daffa 2001: 46). All five observed units are fenced. Therefore the residents know the exact size and borders of their resource base. Fences also prove to be an efficient way of keeping non-residents' livestock out of the area. To this very day some of the camps have been used by the same family, increasing the sense of "ownership" and control over the plot (Fuller & Turner 1996: 16).

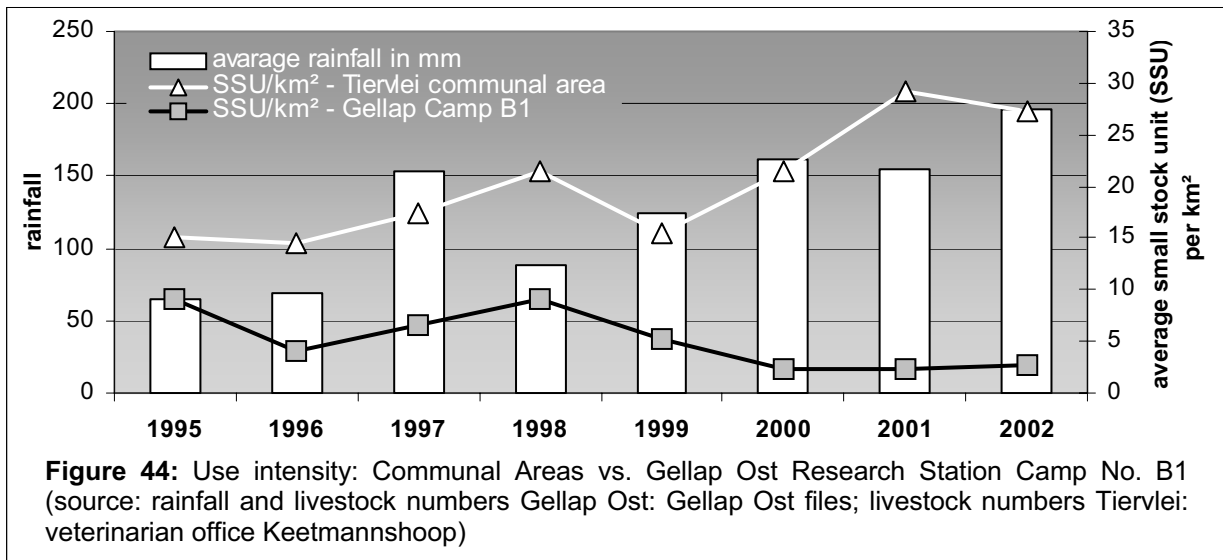
### **6.3 *The capital available to the Nabaos community***

#### **6.3.1 Natural capital**

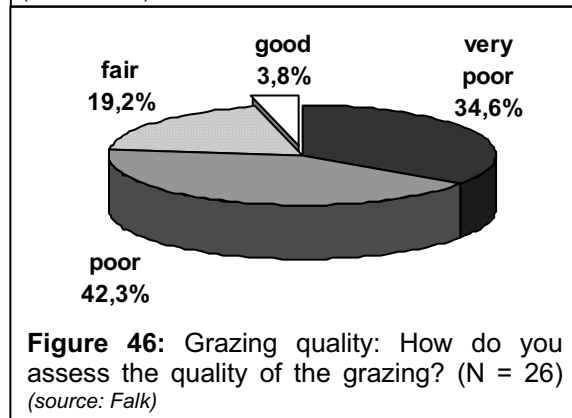
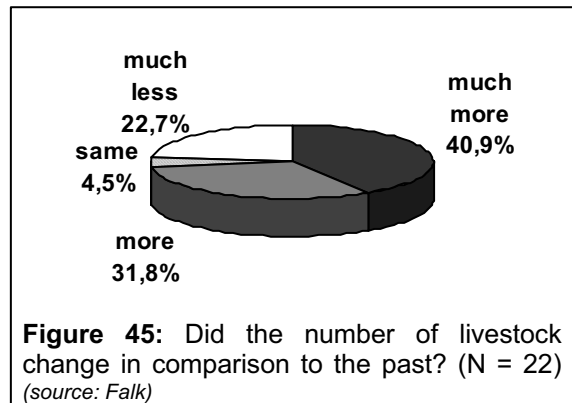
The vegetation type of the region is Nama Karoo. The soil composition indicates a similar abiotic environment for vegetation and animal life (Akhtar-Schuster et al. 2005). Due to denudation of the vegetation and excessive hoof action, the topsoil, particularly around homesteads and water points, has become powdered leading to wind erosion or compacted resulting in impermeability. Both factors make it difficult for vegetation to recover (RoN 1992: 54f). Average annual rainfall is only 142mm (Huysmans 2003). Rainfall variability in the semi-arid summer rainfall areas of southern Namibia is about 70% to 80% (Mendelsohn et al. 2002). Low and unreliable rainfall significantly limits resource use opportunities in the region and also affects the variety of species (RoN 1992; Akhtar-Schuster et al. 2005).

The most important resource use of the communal area is small stock farming. 77.8 percent of the interviewed households keep livestock. In 2003, 1837 goats, 225 sheep, 109 donkeys and 20 cattle grazed and browsed on 12 575 ha of the five communal camp units. Considering the bodyweight of different animals and animal classes this comes to 9.8 kg/ha. According to Mendelsohn et al. 2002 this would be the upper limit of carrying capacity in this region. It must be assumed, however, that the long-term intense resource use reduced the real carrying capacity of the Tiervlei land. Regional average numbers are too approximate in order to determine the real carrying capacity of the land (see also Adams & Werner 1990: 100). In order to interpret variances in biodiversity it is therefore not advisable to focus on recommended carrying capacities. Records of livestock numbers give an even clearer picture concerning the different use intensities on the two observatories. Figure 44 shows much higher use intensity on the communal side than on the Research Station camp B1. One head of livestock on the communal farm has on average only 16% of the pasture area available compared to one head of livestock in the Gellap Ost camp! The camp B1 is, however, not representative of the entire research station. In 2002, the average stocking rate of Gellap Ost

was 16 SSU/km<sup>2</sup> (6.25 ha/SSU) which is the recommended carrying capacity of the agricultural extension office.



Historic records indicate that the grazing intensity has increased in the Berseba communal area since the early 20<sup>th</sup> century. In 1913's the average stocking rate in the reserve was 6.4 SSU/km<sup>2</sup> (Adams & Werner 1990: 15). In 1956 this increased to 24 SSU/km<sup>2</sup> (Adams & Werner 1990: 35) which is already comparable to today's Tiervelei numbers. Asking the farmers whether livestock numbers have changed in comparison to the past, most of them (72.7 percent) perceived an increase (see Figure 45). This perception was particularly strong amongst owners of larger livestock herds and those who hold administrative functions in the community.<sup>78</sup> There are no significant variances between different camp units. The majority of respondents (76.9 percent) sees pasture quality of their camps in a poor or very poor condition (see Figure 46) and fodder shortage was mentioned as the most pressing problem. This negative view is shared, particularly by owners of large livestock herds and better educated respondents.<sup>79</sup>



Animal husbandry strategies prevalent in this semi-arid environment are harshly affected by

recurrent dry years and are thus risk-prone. Animal numbers on the Tiervlei farms strongly respond to inter-annual rainfall variability which is not the case on Gellap Ost (see Figure 44). Rainfall induced stock variations could be human-induced or due to natural occurrences, such as more animals dying during dry years, or higher reproduction rates with more lambs surviving in good rainfall years (Schneiderat 2004; Akhtar-Schuster et al. 2005).

Besides intense grazing and browsing (indicated by stripped off barks, and bitten off twigs), the woody vegetation at the Tiervlei site is also exposed to heavy wood cutting. Only one of the interviewed households (3.7 percent) declared they did not collect wood on the communal land. For 95 percent of the southern Namibian communal households, wood is the main source of fuel. Only those with higher incomes can use paraffin or gas since both require a starting capital for the stove and gas cylinder. Refilling cylinders is transaction cost intensive because it can only be done in town (RoN 1992: 26). Wood does not only cover the daily fuel requirements of the residents but is also a source of income for residents and non-residents. At least nine households (33.3 percent) cut wood in order to sell it. Furthermore, non-residents also collect fire wood in the area and further increase the pressure on the woody vegetation (see further chapter 6.5.5). Many respondents said that they only collected the dead dry branches lying on the ground, though wood cutters were frequently observed cutting off large branches from living shrubs and trees (Akhtar-Schuster et al. 2005). Quiver trees, a potential tourist attraction, can also be found in the area. This opportunity has not been fully explored yet. Living quiver trees are, however, removed and sold.

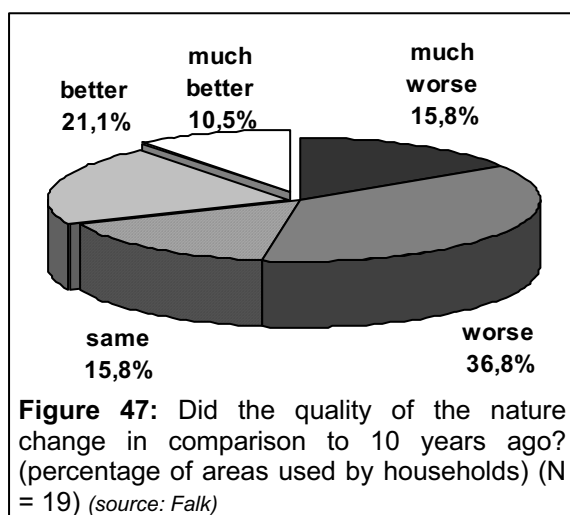
One fifth of the households (22.2 percent) have small gardens around their homesteads. Particularly owners of large livestock herds are engaged in horticulture.<sup>80</sup> Vegetables, fruits and lucerne as emergency fodder for times of grazing shortage are grown. Conflicts evolve regarding intensive water consumption for horticulture. The water point committee has restricted horticultural activities due to water shortages (see also Chapter 6.5.4).

One fourth of the households (25.9 percent) reported collecting wild fruits and vegetables as non-timber products which is representative for the southern Namibian communal areas (RoN 1992: 34). Nuwefontein, where parts of the BIOTA observatory are situated, seems to be an especially good area for wild fruits. Five out of eight households in this camp reported collecting fruits while only two out of the remaining 18 households collected something on the remaining land. Wild fruits are especially collected by those who stay in Tiervlei

permanently.<sup>81</sup> As a result of different land use activities, respondents report that the availability of fruits has declined over the last few years.

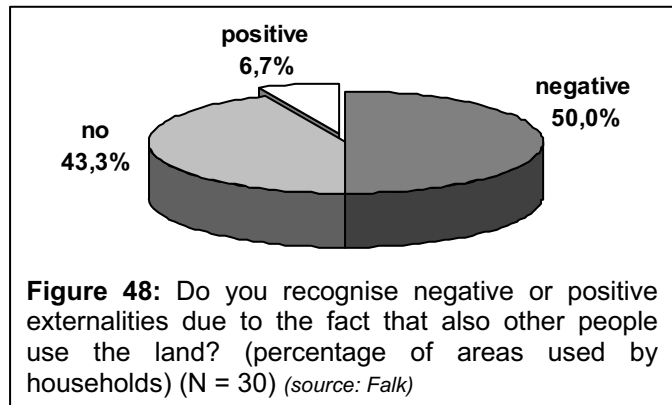
Hunting seems to be rather uncommon in the region. According to a MAWRD study only 9 percent of the southern Namibian communal farmers hunt (RoN 1992: 34). Wildlife in the Tiervlei area includes rabbits, springboks, steenboks, ostriches and less often kudus. Only one farmer mentioned hunting. He explicitly referred to problem animals like jackals and caracals, which are a threat especially for young stock. In 2003, farmers lost 6 percent (n = 110) of the total number of goats and 6.7 percent (n = 15) of the total number of sheep to carnivores (Schneiderat 2004). Farmers seasonally change grazing areas in order to protect their lambs from predators (Akhtar-Schuster et al. 2005). Some respondents believe that the density of predators is higher on the Gellap Ost farm and that jackals enter the communal land from this direction. The low use intensity and camp management without herding on the research station could therefore also have negative externalities for the farmers. Many Tiervlei residents perceive a reduction in game numbers. Hunting is in their eyes, however, not the main reason for this development. They believe that lack of grazing is more likely to be responsible for the absence of wildlife.

The majority of respondents think that the quality of pasture has declined since the early 1990s (see Figure 47). Changes in natural resources were mainly connected to inter-annual rainfall variations. A negative perception was often related to high grazing, browsing and wood cutting intensity. Especially pensioners, who probably had natural changes of an even longer time period in mind, saw negative developments.<sup>82</sup> Some



farmers, however, recognise direct positive affects of the land reform process. One respondent stated that pasture quality improved because an emergent farmer moved his herd out of the communal area to his new private farm. The higher the education level of the head of household the more positive the perception about natural resource dynamics.<sup>83</sup> 43 percent of the interviewed persons perceived neither positive nor negative consequences of communal resource use. Half of them complained about negative externalities (see Figure 48). These are

mainly related to increasing resource competition for wood, grazing and water. Commercial wood cutting by non-residents was deemed to be especially problematic. Only two (related) respondents saw any advantage in sharing the same camp with other farmers. This indicates that co-operation between Tiervlei farms is rather weak.

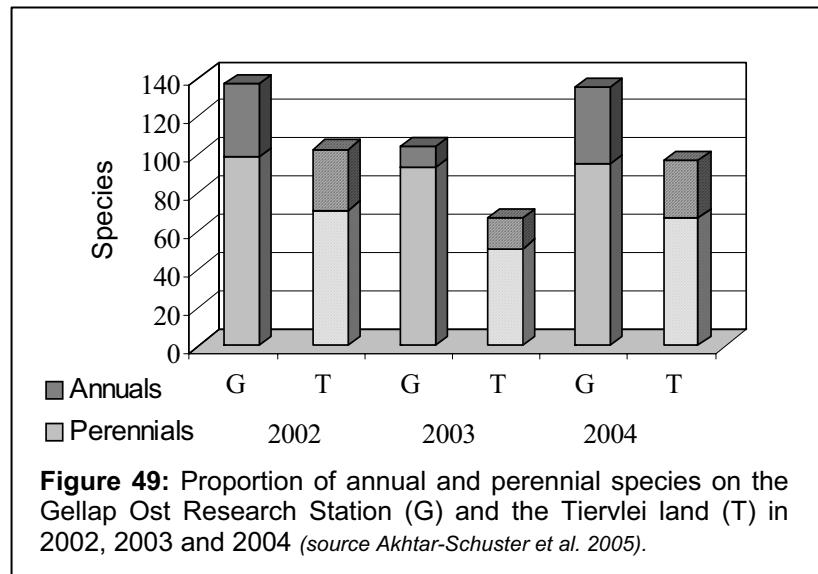


High pressure on communal natural resources is, to a large extent, the result of past apartheid policy. The non-white population was enclosed in overcrowded reserves. The population density on the Tiervlei land, 0.63 people per square kilometre, is significantly higher than the average of the whole Karas region (0.4 person/km<sup>2</sup>). In the Tiervlei area, 27 households with 89 residents have to share an area of 12,575 hectares, which amounts to about 465 ha per household. Commercial farmers in the south of Namibia have on average 7,300 ha per household and labourers available (MAWRD 2004). This limited access to land results in fierce competition for grazing, not allowing for any biomass to be left for times of drought. Especially for Tiervlei residents who do not own many assets other than natural resources, their survival depends on the immediate resource use. Poverty in combination with high population pressure are therefore two main reasons for resource exploitation of Tiervlei land (see also Fara 2001).

Biodiversity research shows the impact of different resource use practices on species richness. In order to differentiate between rainfall and human-driven impacts, research has to consider rainfall-induced changes to phytodiversity. Long-term field investigations in the biodiversity observatories have been subsequently carried out every year during the (possible) rainy season (Akhtar-Schuster et al. 2005).

Field recordings indicate a rainfall - influenced allocation in the total number of plant species. In years with approximately average and above-average rainfall (2002: 190mm, 2004: 126mm) the diversity at both observation sites was higher compared to a dry year (2003: 90mm) (Figure 49). Comparisons between the observatories indicate lower diversity rates on the Tiervlei communal land. The exposure to permanent heavy grazing, browsing and

trampling in the communal areas favours a higher proportion of annual grass species. This leads to higher inter-annual as well as seasonal variations within phyto-diversity, and also reduces the availability of biomass production (Akhtar-Schuster et al. 2005). The ecosystem function of



**Figure 49:** Proportion of annual and perennial species on the Gellap Ost Research Station (G) and the Tiervlei land (T) in 2002, 2003 and 2004 (source Akhtar-Schuster et al. 2005).

rangelands is thereby destabilised. They are further disturbed by a statistically significantly ( $P < 0.05$ ) lower mycorrhization of grasses on the communal observatory in 2002 and 2003 (Uhlmann et al. 2006). The observed *Arbuscular mycorrhizal* fungi are mutually symbiotic plants, supplying the host with water and nutrients (especially phosphate) and receiving organic carbon in return (Smith & Read, 1997). Termite numbers were also lower in Tiervlei than at Gellap Ost. This can be the result of the very little grassy vegetation on communal land. Termites provide the soil with organic components and increase the water infiltration rate which promotes vegetation growth. There was a smaller variety and number of small mammal species on the communal land, too. On the Gellap Ost observatory *Tatera leucogaster* was dominant, a species preferring a savannah environment, while *Gerbillurus vullinus*, a desert inhabitant prevailed on the Tiervlei site. The total loss of ground vegetation cover on the communal farms has led to a reduced food supply for small mammals. In addition, the disruption of habitat structure, cover and shelter leads to a higher risk of predators. The facts that there is little species diversity and desert species dominate in the Tiervlei area indicates that the practised land use system at the communally used site has caused ecological conditions to deteriorate (Akhtar-Schuster et al. 2005).

The different states of vegetation have a direct impact on land use practices such as herd compositions. On Tiervlei 87 percent of livestock herds are goats. In contrast, 88 percent of Gellap Ost animals are karakul sheep. The goats feed mainly by browsing. They consume about 60 percent of their daily ration from trees and bushes, and only about 40 percent from grasses and herbs. Under the same grazing conditions, cattle and sheep are 70-90 percent grazers (Oba et al. 2000). Goats are hardier than sheep (Adams & Werner 1990: 172;

Silanikove 2000). They are able to recover fairly fast after a drought period. However, goats kept in large numbers can have a destructive impact on the grassland as well as on bushes and shrubs (see also RoN 1992: 58).

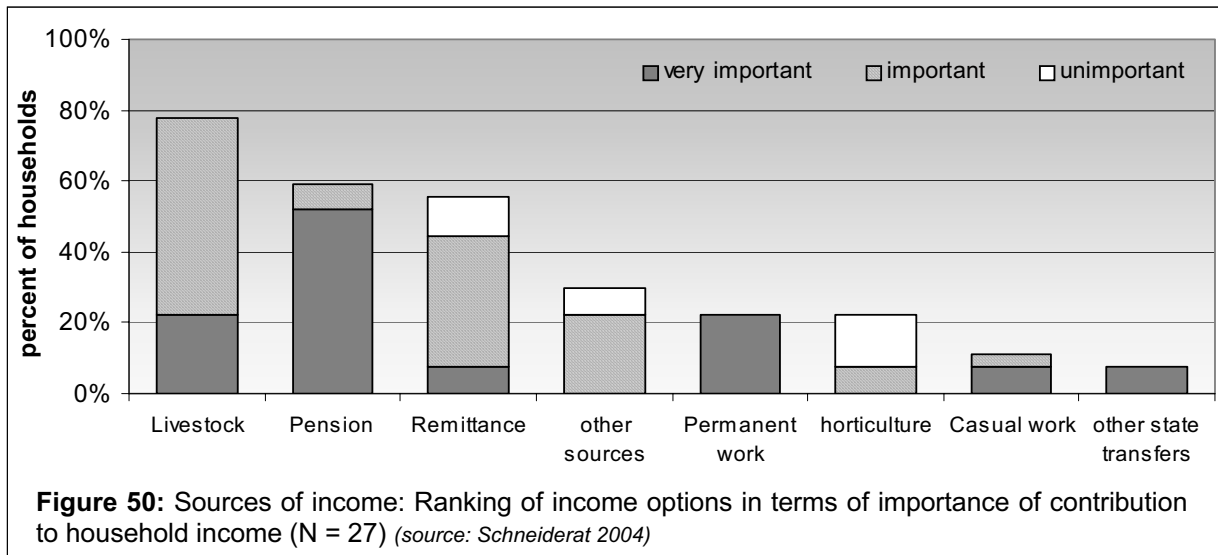
The question arises whether the process of land degradation can be reversed naturally. High germination rates of *Stipagrostis* grasses were observed on the bare soils of Tiervlei with the onset of the rainy season, though most of the individual plants were grazed or trampled before they could properly develop. In any case, the germination of grass on the bare plains indicates the existence of a soil seed-bank that still exists in the heavily grazed plains. It obviously also benefits from the input of wind-blown *Stipagrostis* seeds originating from the neighbouring 'intact' Gellap Ost site (Akhtar-Schuster et al. 2005). This creates a positive externality of the research station for the benefit of communal farmers.

The higher number of plant species and the higher proportion of perennial plant species on Gellap Ost is a consequence of the overall low stocking rates which are accompanied by a rotational grazing system (see also Chapter 6.1.3). Although grazing/browsing takes place, these grazing regulations seem to support a sufficient natural regeneration of pastures so that a comparatively dense cover composed of palatable, perennial grasses (mostly *Stipagrostis uniplumis*) can emerge. *Stipagrostis uniplumis* is an important grazing resource in the study area (van Wyk & van Oudtshoorn 2002). It can survive dry periods under the surface without producing any biomass. Only if the dry periods last longer than a couple of years will these perennial grasses die off (Akhtar-Schuster et al. 2005).

All zoological and botanical data indicate serious ecological disturbance on the communal land due to high use intensity. The effects on the residents are alarming. Loss of species diversity especially within the low-growing life forms has a considerable impact on the sustainable husbandry of domestic livestock, hence on the livelihoods of resource users (Akhtar-Schuster et al. 2005).

### **6.3.2 Financial capital**

The limitations of the natural resource base are reflected in the chosen sources of income of Tiervlei inhabitants. Figure 50 shows the available income options of Tiervlei households ranked according to their importance in contributing to household income. For instance a low rate of horticulture or fruit collection is the result of generally low rainfall and lengthy periods of droughts (Boonzaier et al. 2000; see also RoN 1992). The most common livelihood option



based on natural capital is livestock farming with four fifths of Tiervlei households owning goats, sheep and cattle. This represents exactly the average for inhabitants of southern communal areas enumerated in 1992 (RoN 1992). Tiervlei farmers' livestock off-take in 2003 was relatively high for communal farmers. Ten percent of the total cattle number, seventeen percent of the total goat number and ten percent of the total sheep number were sold in 2003. Monetary income, apart from livestock sales, is very low for most households of southern Namibian communal areas. In 1992, one third of the population had on average less than US\$ 15 disposable income per month and another fourth between US\$ 15 and 30 (RoN 1992: 32). Still in 2000, alarmingly 70 percent of the Karas households fell below the poverty line (RoN 2001m: 76). A striking feature in this context is a strong reliance on pensions and irregular remittances. A much higher proportion of respondents mentioned pensions rather than livestock as a very important source of income (see Figure 50). For the few who have a permanent job this source was, of course, the most important. An informal employment sector is practically non-existent in the region mainly as a result of a lack of access to markets, low population density and limited purchasing power among people. Self-employment mainly encompasses mobile shops (RoN 1992). Livelihood diversification must be seen as a risk-reducing strategy in an environment marked by extremely high rainfall variability. Each household mentioned on average 2.9 sources of income (Schneiderat 2004). The results correspond well with other studies in the region. A survey of the Ministry of Agriculture, Water and Rural Development revealed that the population of southern communal areas strongly relies on livestock and pensions (RoN 1992). Also according to Fuller & Turner livestock is the most important income source followed by pensions, remittances, horticulture and wages (Fuller & Turner 1996: 31).



Thirty seven percent of the households mentioned having savings. Especially residents who are in gainful employment save money. The larger the livestock herd of a household the more likely they are to save. Only two respondents (7.2 %) believe that they can get access to a loan. It is not surprising that residents with permanent jobs are more optimistic about getting credit than those without employment.<sup>84</sup> In case of new or sudden monetary demands 55.6 percent of the respondents would sell livestock. The more livestock an individual or household possesses the more likely she/he is to sell stock to get cash. Non-permanent residents resort to selling less often in order to cover immediate monetary demands.<sup>85</sup> They often have jobs and are therefore independent from livestock sales, for example, to buy food.

### **6.3.3 Physical capital**

The fact that southern Namibia is poorly developed in terms of physical infrastructure and access to transport, social services and markets means it is more difficult to reduce dependency on natural resource based livelihoods. It severely limits income generation opportunities (RoN 1992; Fara 2001). Tiervlei lies approximately 20 kilometres away from the regional centre Keetmanshoop and can be reached on a well maintained gravel road. Main roads inside the Berseba communal area are gravel or dirt roads in reasonable condition (RoN 1992). Donkeys and horses are commonly used as means of transport and 59.3 percent of the Tiervlei households have them (N = 27). This is also the average percentage for southern Namibian communal farmers. Donkey carts can reach 20 km/h on a good road which makes the local population fairly mobile (RoN 1992: 27). Free-roaming donkeys are, however, a hazard for natural resources because of their destructive grazing habits. Three Tiervlei households (11.1 percent) own a car, which is below the regional average (RoN 1992: 27). There are no public transport opportunities (Ron 1992). Hitch-hiking on the well frequented road to Keetmanshoop costs up to US\$ 1 one way.

Berseba livestock can be sold at the auction pen in Tses or Keetmanshoop (Huysmans 2003). The communal area is equipped with 25 crush pens and 15 dipping holes (Huysmans 2003). There are six water points on the Tiervlei farms which are run by windmills. All are suitable for livestock but only four of them for human water consumption. It is a common problem in the Karas region that borehole water has a high concentration of solids, nitrates, fluorides and sulphates making it unhealthy for people and animals (RoN 1992). Only a few households have tanks to catch scarce rainwater.

One of the most important advantages of communal land use is the sharing of costs for infrastructure such as boreholes (Blackie 1999: 3). In this way even owners of small herds can ensure cheap water supply. Tiervlei farms have a better supply with water points (2096 ha per water point) than the Berseba communal area on average (5433 ha per water point) but a worse one than Gellap Ost (1526 ha per water point). The fact that Tiervlei farms have a better water supply than the remaining Berseba land is one reason why stocking rates on Tiervlei are above the Berseba average. According to the livestock survey of the Directorate of Veterinarian Services in 2000 the mean stocking rate of the whole Berseba area was 14 SSU/ha. The five Tiervlei farming units were more intensively used with approximately 21 SSU/ha (see Figure 44).

In 1991, 59 percent of the Karas households had no electricity (RoN 1995b: 14). By 2001, about 50 percent of households had electricity. In 2001, 81 percent of households owned a radio (RoN 2001j) and eleven percent of the Karas households do not have access to a telephone (RoN 2001m: 64). None of the Tiervlei farms has electricity. A telephone line runs through the area but only two households are connected. Radios are important communication links in remote places (RoN 1992: 27). It is estimated that two thirds of the southern communal population lives in corrugated iron homes (RoN 1992: 25) which is also the main form of housing in Tiervlei. Tiervlei farmers belong to 25 percent of the Karas population which does not have toilet facilities (RoN 1995b: 14). Respondents are dissatisfied with the state of the infrastructure and do not see any improvements since independence.

The analysis shows the ambivalent impact of physical capital on biodiversity maintenance. Poor energy supply, on one hand, increases the demand for fire wood, thus putting pressure on vulnerable wood resources. On the other hand, investments in road and water infrastructure can decrease the transaction costs of unsustainable resource utilisation. The fact that stocking rates are higher where more water points are available indicates this. One has to be aware that reducing transaction costs of resource use by physical capital investments might require institutional changes.

#### **6.3.4 Human capital**

Another precondition for reducing the dependency on natural resource based livelihoods is proper education. In 1991, 84 percent of the boys and 87 percent of the girls aged between 6 and 16 attended school in the Karas region (RoN 1995b: 14). In 2001, only seven percent of the adults had never attended school. It is surprising, however, that ten years after

independence only 48 percent of the boys and 52 percent of the girls aged between 6 and 16 attended school (RoN 2001j). The literacy rate of the Karas region between 1991 and 2001 was relatively stable at approximately 87 percent (RoN 1995b: 14; RoN 2001j). On average, Tiervlei heads of household attended school for five years. There are some signs of improvement in the level of education of the Tiervlei population. Older residents, for instance, rather have a lower level of education when compared to younger ones (see also RoN 1992: 21).<sup>86</sup> Indigenous knowledge such as handicraft skills is, however, rather vested within the older generation (RoN 1992).

The nearest school of Snyfontein is situated approximately 20 km away from Tiervlei. Here pupils can go as far as grade 7. Nonetheless, most residents prefer to send their children to Keetmanshoop. They stay with relatives or in a hostel (RoN 1992). There is a common language problem since many children neither speak Afrikaans nor English when they start school. Young adults who want to upgrade their degree have the opportunity to do so in Keetmanshoop. Only few, however, make use of this chance due to financial constraints. School and hostel fees as well as costs for uniforms and learning materials are a serious burden for parents. Children often leave school because parents cannot afford to pay for their education (RoN 1992; see also Fara 2001). Nevertheless, the majority of farmers believe that investing in their children's education will improve the long term livelihood situation of the entire household (RoN 1992: 21).

Farming is learned by doing. Agricultural extension service was reported to be poor in the mid 1990s and practical formal training was uncommon (RoN 1992: 21). Thus, family and neighbours were and are the main source of advice (Fuller & Turner 1996: 34). Some respondents expressed their wish to improve knowledge about livestock and pasture management. Most interviewed persons, however, stated that they are experienced farmers who do not need much external support. Veterinarians only rarely visit communal areas and are seldom visited by communal farmers. Once a year the veterinarian office carries out a disease surveillance. However, a cost recovery fee must be paid for this treatment. The Agricultural Extension Office provides farmers with training courses on a quarterly basis at the Gellap Ost Research Station. Typical topics are livestock diseases and the maintenance of water infrastructure. Training related to water infrastructure operation and maintenance has also been carried out within the framework of rural water supply reforms.

The long-term development of human capital in the researched region is seriously affected by the HIV/AIDS pandemic. In 1991, life expectancy at birth was around 60 in the Karas region (RoN 1995b: 9). In 2002, the prevalence of HIV, at 16 percent, was relatively low in comparison to the Namibian average (22 percent). It is, however, important to point out that this is a very significant increase since in 1992 the figure only stood at three percent in the Karas region (RoN 2002e: 14). HIV/AIDS affects the most productive age group. The death of direct income earners is particularly problematic (Matanyaire & Timpo 1999: III, 13; Campbell et al. 2002: 115; ABCG 2002: 2). Pressure on natural resources increases if families lose income components based on active employment (ABCG 2002: 7).

#### **6.4 Motives of resource use**

The capital analysis showed that Tiervlei residents have few important livelihood options other than livestock keeping. Nearly eighty percent of households keep livestock (N = 27). Selling and slaughtering numbers are much higher than on the other research sites Mutompo, Okambo and Soebatsfontein. Ten percent of the total number of cattle and sheep, and seventeen percent of the total number of goats were sold in 2003. Additionally, eight percent of the total number of sheep and goats were slaughtered (Schneiderat 2004). In the following chapter, the results of the motive assessment carried out in order to understand the motives of Tiervlei farmer's to keep livestock, will be discussed. For the complete variable list and details about the methodology see Chapter 4.3 and Appendix 1.

Tiervlei residents prefer to keep their herds rather than selling or slaughtering them. Farmers feel significantly less content if they sell or slaughter than if they keep the herd intact (see Figure 51, Table 10 & Appendix 13). Many respondents stated that having a large herd shows that you are a good farmer. It gives self-esteem. It is especially the better educated respondents who do not always stay in Tiervlei who prefer keeping their livestock instead of selling and slaughtering them.<sup>87</sup> Slaughtering is more favoured amongst permanent Tiervlei residents.<sup>88</sup> The following analysis will explain the preferences of different population groups.

Tiervlei farmers believe that their monetary income is significantly negatively affected if they slaughter (see Appendix 13). Although the median for keeping cattle is higher than the one, for selling this variance is not statistically significant (see Figure 51, Table 10 & Appendix 13). Keeping, especially female stock, is perceived to be an investment because livestock can reproduce. Maximising the herd size is also a way of saving (see also RoN 1992: 39; Klocke-

Daffa 2001: 174). Livestock is turned into cash when food or clothes need to be bought and to cover the costs of education, health services and celebrations (RoN 1992: 40). 55.6 percent of the respondents said they only sell livestock in these situations. It was also mentioned that the proceeds from sales are mainly saved. Nevertheless, many farmers see cash as an entity which is used unproductively and disappears fast. Living animals are a tangible and secure form of wealth. This can be partly explained by the customs of a society where those who have cash are constantly being asked to help relatives, neighbours and friends financially. As long as there is meat or cash in the house or money in the bank, one has to support others based on deeply rooted cultural norms and obligations (Klocke-Daffa 2001: 271, 286, 303). If you have been seen selling livestock at an auction you can be sure to be approached soon (Klocke-Daffa 2001: 304). It is mainly healthy male animals which are sold. These get the highest prices and are less valuable in the long-term. If animals are slaughtered, some of the meat is usually also sold. Slaughtering also saves money because there is no need to buy food. High off-take further reduces the costs for medicine, supplements or food. Tiervlei farmers are aware of market prices and only sell if prices are high. There are different opinions amongst respondents on the impact of sales on financial capital. Those farmers who think that selling decreases the household's financial capital prefer to keep livestock. Especially non-permanent residents with a higher level of education and formal employment see the negative impact selling has on their disposable income.<sup>89</sup> Households with higher incomes have a tendency to invest salaries in livestock (RoN 1992: 45). This indicates that well educated, employed weekend farmers demonstrate an even lower commercial orientation in livestock production. They see livestock as an investment and communal land as a bank account. This, however, does not lead to obviously different behaviour. There is no correlation between herd size or off-take rate and factors such as employment, permanent residence or level of education.

Food availability is perceived to be highest for selling followed by slaughtering; it is lowest for keeping (see Figure 51, Table 10 & Appendix 13). This perception can be explained by the fact that livestock and meat is sold to buy food or to be consumed at home while the milk the livestock provided for home consumption was not of great value. Permanent residents who rely mainly on livestock, pensions and remittances as sources of income, think that selling rather than slaughtering improves their food availability. In contrast, non-permanent residents with permanent or even temporary jobs perceive that selling has a negative impact on their food supply. They are less likely to sell to satisfy immediate basic needs. They feel slaughtering significantly enriches the daily diet. Employed people can purchase foodstuffs

other than meat more easily with the income from their salaries. In a natural environment with high rainfall variability and high risks of livestock losses this means that food security in the Berseba area is highly dependant on non-farming cash income (RoN 1992: 33; Fara 2001).<sup>90</sup>

Despite this fact, in the absence of jobs and alternative insurance mechanisms many communal farmers see maximising herd sizes as the only viable option to prepare themselves for dry years when losses of livestock are inevitable (Fara 2001). Even those who are not dependent on farming income continue to keep livestock in order to maintain this livelihood option in times of trouble (Klocke-Daffa 2001: 58). Although the median indicates that a household's security is rather positively affected if livestock is kept and not slaughtered or sold, the Wilcoxon significance test did not confirm any variances (see Figure 51, Table 10 & Appendix 13). On the one hand, many respondents state that meat and money would disappear fast while living animals can be turned into cash in case of a crisis (see also RoN 1992; Fara 2001). Keeping thus increases long term security. On the other hand keeping increases one's vulnerability to droughts or theft. Heads of household who think that selling increases cash income also believe that selling improves the future security of their families.<sup>91</sup> Perceptions regarding the satisfaction of safety needs were statistically independent of factors such as employment, permanent residence or other household characteristics.

Vulnerability during droughts can be reduced by proper pasture management. Tiervlei residents recognise that lowering livestock numbers reduces pressure on natural resources. They are aware that livestock off-take increases the availability of natural capital in terms of water and grazing (see Figure 51, Table 10 & Appendix 13). At present communal resource management institutions have failed, however, to internalise high positive externalities of pasture improvements. There are very little incentives for individual farmers to reduce pressure on natural resources because not only they but all fellow farmers will benefit from such investments. Thus, Tiervlei farmers sell livestock only when natural resources are already in dangerously short supply. As a result of inadequate land reform instruments, some farmers even try to increase their natural capital base by increasing pressure on communal resources. Several farmers mentioned trying to increase their herd size in order to qualify for an affirmative action loan to buy their own private farm (see also Chapter 5.3.4).

Keeping livestock is perceived to be much more time consuming compared to selling or slaughtering (see Figure 51, Table 10 & Appendix 13). Despite this fact, farmers complain

that livestock prices obtained in the market are relatively low compared to the imputed transaction costs for selling animals at auctions. Auctions are normally organised in town areas. This is one reason why many southern Namibian communal farmers prefer to sell livestock to local shop owners within the communal areas (RoN 1992: 62). Prices paid by such shop owners are much lower than auction prices. Farmers accept their prices, however, because transaction costs related to sales to such shop owners are much lower than transaction costs related to auction sales. These results indicate that lowering marketing transaction costs would increase farmers' income from livestock sales. Such income increases, again, are an incentive for more commercialised farming practices which normally put less pressure on natural resources.

The analysis of motives of livestock keeping showed so far that Tiervlei farmers perceive livestock most of all as a means to increase their financial capital and to satisfy safety needs. Such motives are also reinforced by the social environment of heads of households. Livestock fulfils various social functions (Klocke-Daffa 2001: 54f, 61). Relatives' and friends' long-term well-being and food security depends also on the owners' decision to sell or slaughter their livestock. This is the reason why many relatives and community members disapprove of off-take as correlation analysis showed. Consequently lots of farmers perceive that herd size maximisation is the best strategy to increase their social status and to satisfy social needs.<sup>92</sup> A large herd is an expression of wealth and an indicator that somebody is serious about farming (see also Klocke-Daffa 2001: 273). This is one reason why mutual stocking rate restrictions

**Figure 51 and Table 10:** Median of livestock motive assessment (N = 21) (source: Falk)



are difficult to enforce on the intensively used Tiervlei land. Not all heads of household share this view but those who believe that herd size maximisation helps to satisfy the need for belonging and the need for self-esteem also have a higher preference for keeping.<sup>93</sup> Perceptions about relatives' and friends' opinions influence livestock owners' behaviour. Correlation analysis showed that this perception seems to depend on the livelihood options of livestock owners. Employed respondents believe that livestock off-take is disapproved of while pensioners feel they are encouraged to sell and slaughter regularly.<sup>94</sup> This is again an indicator that those who are least dependent on communal farming have the strongest inclination to maximise herd sizes. Only few respondents mentioned that such behaviour is viewed negatively by fellow-farmers because it increases the pressure on pastures. Respective social incentives would be, however, a valuable basis for a more sustainable communal natural resource management. It is therefore necessary to raise awareness and change the cultural values not only of livestock owners but of communal society as a whole.

Tiervlei farmers generally prefer to maximise the number of livestock a household owns and few have a preference for selling and slaughtering. Livestock is seen as an investment and insurance. The primary objective of off-take is not the maximisation of monetary income but the satisfaction of immediate basic needs such as food. Tiervlei farmers do not all have identical motives for keeping livestock. Absent herd owners particularly have a higher preference for herd maximisation and a lower one for off-take. Compared to the remaining residents, better educated people see livestock more as a monetary investment. Those who are best equipped with financial and human capital and least dependent on natural resources have a motive structure which promotes the maximisation of livestock numbers. One has to admit, however, that real livestock and marketing numbers are not correlated with variables like employment or level of education. The results of the motive assessment show that poverty alleviation and reducing the dependency on natural resources, e.g. by creating job opportunities does not necessarily reduce pressure on the resource base. Institutional incentives are needed in order to motivate, in particular, those whose well-being is least dependent on unsustainable farming practices to reduce their livestock numbers. The Communal Land Reform Act stipulates that communal land is supposed to be used by the poor who do not have alternative income such as employment (RoN 2002b: 17 (1); LAC 2003: XVII). Opportunity costs of a necessary reduction of livestock numbers on communal land are much lower for employed farmers than for those without regular cash income and job opportunities because of poor education. Farmers who are better equipped with assets should



therefore be especially encouraged to look for alternative savings and insurance instruments in order to reduce pressure on communal resources. This would be a measure of biodiversity preservation and poverty alleviation. Nonetheless, it should be carefully assessed to which degree wealthier farmers make investments and provide services for the whole farming community. Their capital inputs are often crucial for the poor. Due to the complexity of the situation the problem can only be solved amongst the residents of the Tiervlei farms. Those should be encouraged to discuss the topic in order to find the most appropriate solution.

## **6.5 Institutions**

The analysis of capital availability and motives of livestock keeping showed that increased livelihood opportunities of communal farmers does not necessarily lead to more sustainable natural resource use. Institutional factors have to accompany such measures. The following chapter assesses how customary and statutory institutions affect the natural resource management of Tiervlei farmers.

### **6.5.1 Ownership and access to land and natural resources**

The Tiervlei area is designated communal land and owned by the government (RoN 1998a: 11). The government is obliged to administer the land in trust for the benefit of traditional communities residing on such land (RoN 1998a: 11; RoN 2002b: sec. 17 (1)). Nobody, except the Namibian President, may dispose of such land (Hinz 1995: 14; RoN 2002b: sec 17 (2), 19 (1) (c)). The majority of the Tiervlei residents is convinced that their land is not openly accessible (80 percent) and that it is possible to prevent people from using it (76 percent). Particularly owners of large livestock herds, households with high off-take rates, members of community committees and those who have savings are aware that access to the land is restricted.<sup>95</sup>

The colonial administration transferred the control over the access to land to traditional councils (RoN 1992: 54). After independence, the allocation of customary land rights for residential and subsistence farming purposes was again delegated to traditional authorities (RoN 1998a: 12; RoN 2002b: sec 20; see also Huysmans 2003). Most residents of the Berseba communal area, i.e. 85 percent of the Tiervlei farmers, would seek out traditional authorities in order to get access to the land (Fuller & Turner 1996; Keulder 1997: 32). The power of traditional authorities is justified by the community's respect of customary law. Southern Namibian traditional authorities are elected during public meetings (Keulder 1997: 21, 24). Bersebe residents feel largely positive about the organisation of traditional leaders (Keulder

1997: 18f). One important reason for the support is the de facto absence of government agencies, though the majority of Kleuders' respondents recognise the legitimacy of regional councils (Keulder 1997: 30, 37ff, 45). The acceptance of specific traditional leaders largely depends on their actual performance (Keulder 1997: 22).

Despite the legal recognition of traditional authorities there is no unified system determining who is allowed to settle in the area. The role of traditional authorities was often unclear (RoN 1992: 57). The chief complained that the younger generation, in particular, does not appreciate customary institutions. Traditional authorities are further weakened as there are two persons competing for the chieftaincy of the Berseba area. The conflict had already started prior to independence, has an ethnic background and is today strongly affected by party politics (Adams & Werner 1990: 96; Keulder 1997: 12; Klocke-Daffa 2001: 63, 66; Kössler 2001: 348). In 2004, neither 'chief' was officially recognised by the government.

Traditional authorities deem the regulation of access to communal land as an instrument to control stocking rates. If somebody applies for residential and subsistence grazing rights they initiate a screening process. Information about the applicants are collected e.g. from church leaders and community members of the place where they came from. This serves to avoid future conflicts. Access to communal land is a lifetime right. Should right holders pass away, their children have to reapply for the customary land rights. Only members of the nuclear family may join residents. Brothers, sisters or cousins have to apply separately for residency. No payments are made for getting access to communal land.

All respondents agreed that natural resource use rights on the Tiervlei camps are restricted to the residents. Four fifth of the respondents stated that somebody who wants to settle in one of the farming units has to ask the respective residents first. Rights to control access are justified by the residency. The most common reasons for refusing access to a farming unit was the lack of grazing or water. Farmers worried that the land could deteriorate if too many people farm on it and were concerned about future farming opportunities for their children (Fuller & Turner 1996: 19). They stressed that there is no more space for newcomers and that they would only temporarily, in cases of emergency, allow other people to use their territory. Most respondents stated that the communities' decision is more important than the decision of traditional authorities. Traditional authorities did, however, not mention the power of the residents to grant access to land. A case was reported where traditional authorities allowed

somebody to settle in a camp without knowledge of current grazing conditions and despite resistance from the current users. Giving local users the opportunity to permit access to land is a good measure to control livestock numbers. It provides incentives to use resources in a more sustainable manner because residents can more probably benefit in future from investments such as pasture improvements. In addition, local users know best whether the land can carry another herd. In contrast to many other communal areas in Namibia, Tiervlei farmers do not have traditional authorities on the local level. This gap is now partly filled by water point committees. These committees were established on initiative of the Ministry of Agriculture, Water and Rural Development at the end of the 1990s. They have the primary task to manage the local water supply (see Chapter 4.4.8.1 & 6.5.4). 41 percent of the respondents believe that the water point committee has a say in granting access to land. Farmers emphasised that the official right to control access to water strengthened their rights to control access to land. The water point constitution is seen as instrument to legally enforce exclusion.

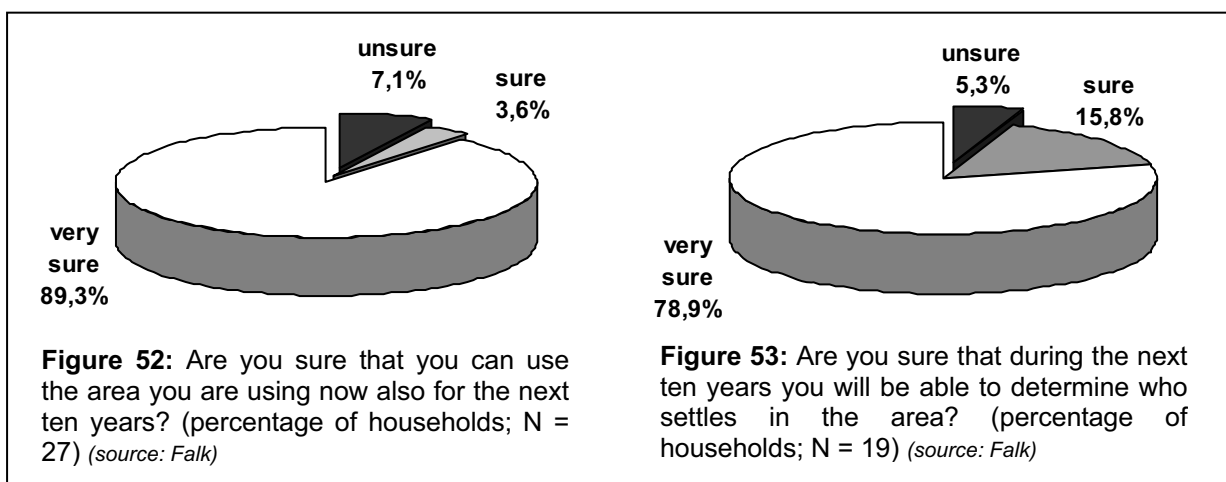
Occupiers of so called Odendaal farms, such as the Tiervlei camps, can use fences as an extremely effective way of enforcing exclusion. These former commercial farms were incorporated into the communal land as enclosed units. A limited number of families was moved from the old reserve to these farms. The division in camps and allocation of camps to one or few families made it easier for the settlers to keep newcomers away from the land. Residents developed a stronger feeling of ownership. Borders are clearly marked and where fences remained intact they restricted the uncontrolled moving in of non-residents' livestock (RoN 1992: 54). Tiervlei farmers mentioned that maintaining fences is an effective instrument to exclude outsiders from grazing resources. The situation on the 'Odendaal' farms shows the constructive role fences can play in communal natural resource management. This puts in question the strategy of the Namibian government which, on the whole is strongly opposed to fences being put up on communal lands as stipulated in the Communal Land Reform Act of 2002 (RoN, 2002b; see also Chapter 5.3.7).

The situation on Odendaal farms is not the same everywhere (see also RoN 1992). While some camps are occupied and communally used by a number of households, (e.g. the Nuwefontein camp with 9 households) other units are used by one family only (e.g. the Nabaos camp with 2 households belonging to the same family). There is a tendency that mainly relatives joint the first communal residents of Odendaal farms (RoN 1992). The preference given to family members with regard to granting access to areas can improve

natural resource management. Social ties and multiple relations between relatives make collective action more probable and provide transaction cost efficient enforcement instruments against non-cooperative behaviour. Such instruments are not effective with strangers. The five Tiervlei farm units show, however, no significant variances in the quality of natural resource management.<sup>96</sup>

The first enforcement instrument of unauthorised resource use would be to talk to the intruder and to try to convince them to leave. Should this prove unsuccessful, the traditional council and the water point committee are informed. Most farmers were convinced that the power of the residents and traditional authorities is widely accepted in the community and justified by customary law. Should social and moral-based institutions prove ineffective, some farmers stressed that they would chase the intruder away, not specifying how this would be done. As a last resort, they would call the police. Nevertheless, incidences of unauthorised invasion of grazing areas were reported. Although the social and moral-based institutions manage to deal with access issues in most cases, the government needs to reinforce customary rules in cases when they fail.

Tiervlei farmers feel very secure in their rights of use (see Figure 52). With the exception of one respondent, all those who feel secure explain their confidence with the fact that they were given permission by traditional authorities to live in the area. Only one person stated that he feels secure because the water point committee allowed him to stay. The situation regarding the future exercise of access control appears to be similar. Most respondents are convinced that in the next ten years they will be able to determine who settles in their area (see Figure 53). This feeling provides positive incentives to preserve natural resources and might be a starting point for improved resource management. Households with savings and an



administrative function in the community feel they have more power when it comes to controlling access than those who receive remittances.<sup>97</sup> The better the financial and social capital of a household, the securer is the perception of property rights. In this way, capital investments indirectly support biodiversity maintenance, since secure property rights are a precondition for sustainable resource management.

In the framework of the Communal Land Reform there will be a new player taking part in controlling access to communal land. The Communal Land Reform Act of 2002 stipulates that land boards will keep check on traditional authorities' allocation of land (see Chapter 4.4.3). There is much confusion amongst residents and traditional authorities on the future distribution of decision making rights. For instance, the local residents' customary right to participate in decisions of access regulation is not recognized in the Act. Whether local residents can influence the moving in of newcomers will depend on the good-will of traditional authorities to recognise the respective customary law. Tenure security would lessen, if the participation rights of local residents were to be neglected. This would lower incentives to use natural resources in a sustainable way.

### **6.5.2 Access to emergency grazing and reactions to droughts**

The combination of low precipitation, high rainfall variability and intensive resource use makes Tiervlei farmers vulnerable to temporary forage shortage. Particularly in the early and mid 1990s, a number of poor rainfall years resulted in a drought. Communal farmers in the region have different strategies to cope with such events. Two fifth of the households (40.7 percent) believe they could take livestock to other grazing places on the communal land in cases of emergency. The Fishriver area, whose pastures seem to be in better condition than the remaining Berseba land, was often mentioned. In order to get emergency access to communal areas, permission from traditional authorities and the residents is needed. Tiervlei farmers are aware that they would have to pay water fees to respective Water Point User Associations.

High mortality rates during droughts which are much higher than sales numbers (Fara 2001) indicate, however, that emergency grazing areas are insufficient to protect all livestock against the consequences of temporary forage shortage. The few households with higher cash incomes have the alternative of purchasing supplement feed. The majority of poorer farmers would have to sell part of their herd in order to reduce pressure on the pastures for the remaining part and to receive income to buy supplement feed. For two reasons this strategy is little preferred. On the one hand, would all other fellow-farmers benefit as much from reduced

pressure on communal pastures as the ones who sold part of their herd. Such positive externalities are the consequence of uncooperative pasture management. As a result, during periods of drought, farmers keep their livestock as long as they possibly can in order to maximise the percentage of their herd which will survive the emergency period. On the other hand, immediately before and during droughts, livestock prices drop significantly. The market therefore provides little incentive to reduce livestock numbers. In order to reduce the pressure on the resource base without threatening communal farmers' livelihoods, the government introduced marketing subsidies. In 2003, marketing subsidies were also paid, which could be one reason for the relatively high off-take during this year.

### **6.5.3 Limitations of grazing and browsing intensity**

Land access regulations are the only currently effective institution limiting the intensity of use of Tiervlei livestock numbers. The example of drought coping strategies illustrates how these institutions are not able to effectively restrict stocking rates. Tiervlei residents and Berseba traditional authorities agreed that there are no limitations for livestock numbers of residing farmers. It is alarming that especially those households who are aware of exclusion mechanisms recognise an increase in livestock numbers over the last few years.<sup>98</sup> In the past, colonial administrations also struggled to enforce measures of stocking rate control such as the levying of grazing fees (Kössler 2001: 349). Many farmers see the lack of a proper management system as one of the most crucial problems on Tiervlei land. They are aware of the problem of overgrazing and suggest controlling stocking rates as well as introducing rotational grazing practices.

Despite the existence of camps rotational grazing is not practiced. Many respondents mentioned, however, informal divisions of grazing areas within farming units. There are also agreements between farmers from neighbouring settlements concerning the sharing of grazing areas. Informal pasture distribution reduces the number of farmers using one area. A smaller and well defined user group has lower transaction costs for co-ordination and stronger incentives to maintain resources. Collective action becomes more probable. Nevertheless, the majority of respondents felt powerless to improve the natural resource management. The facts that so many people have to share a relatively small portion of land, that the land is designated to be communal, that local residents have no opportunities to enforce management rules and that farmers do not cooperate are reasons for a paralysing atmosphere of apathy.

Moving away or motivating others to move away from communal land is often seen as the only viable opportunity to reduce pressure on communal resources. In 1992 for instance, three Berseba farmers bought private farms with affirmative action loans (Klocke-Daffa 2001: 56). The affirmative action programme helps emergent communal farmers to leave communal land in order to start commercial farming and to make space for small scale farmers (see for details Chapter 5.3.4). In order to qualify for the programme one has to own more than 800 small stock. In 1992, 21 of 453 Berseba farmers owned more than this number and could have benefited from the affirmative action scheme (RoN 1992: 63). Respondents reported that one non-permanent Tiervlei farmer with a comparably high level of education planned to move to a private resettlement farm as benefiting from the programme. He owned 157 goats which is by far not the biggest herd on Tiervlei land. No Tiervlei farmer would with his/her current herd size qualify for an affirmative action loan. The wealthiest household has 181 goats, 120 sheep and 14 cattle (see also Chapters 5.3.4 & 8.3.5).

#### **6.5.4 The impact of rural water supply reforms**

Besides grazing, water is the most crucial resource for Berseba farmers (Fuller & Turner 1996: 28; see also RoN 1992). Tiervlei farmers rated the water supply as the second most important issue after the grazing quality. Ground water in the area is extremely sensitive to over utilisation. In low rainfall years, boreholes dry up and cause severe strain to the population and animals (RoN 1992: 52). There are six water points on the Tiervlei farms which are run by windmills. Each one is suitable for livestock but only four of them for human consumption. Lack of water also restricts gardening activities (RoN 1992: 66).

In the past, the government was responsible for the water infrastructure. Whenever something was damaged, the residents were not allowed to repair it but had to inform the government. Communal farmers were very dissatisfied with this set-up because repairs usually took such a long time. In a study done by the Ministry of Agriculture, Water and Rural Development in 1992, the majority of respondents expressed the wish to maintain the water points themselves provided they are equipped with the necessary tools (RoN 1992). The new water supply approach puts a lot of emphasis on participatory planning and development in order to replace the old centralised schemes (Werner 2003a; see also Chapter 4.4.8.1).

At the end of the 1990s, the Tiervlei Water Point User Association was founded on the initiative of the Ministry of Agriculture, Water and Rural Development and a water committee elected. The latter performs the day-to-day management of water points, which

includes financial activities and the maintenance of the water structures. A water constitution, regulating water consumption and supply, was drawn up. Residents are aware of newly introduced rules. For instance, they must be at least 20 m away from the water point when they wash themselves, their clothes or their cars. The Water Point Committee restricts the use of water for the irrigation of gardens. Such rules indicate that the reform motivates residents to save scarce water resources. All Tiervlei residents are members of the Water Point User Association. The monthly fee of approximately US\$1 per household is independent of the amount of water consumed. Fees are saved to be used for future maintenance work of the water infrastructure. Since the pumps are run by windmills, no diesel has to be purchased. This limits costs of the water supply. In 2007, the government was still responsible for major repairs and investments (e.g. the drilling and installation of new water points). Despite the low fees, getting all members to pay their contributions is a problem.

One explanation for the residents' unwillingness to pay these fees could be the fact that, in 2003, many Tiervlei residents were dissatisfied with the performance of the water point committee. They argued that the committee does not meet often enough and does not make the necessary decisions. The transaction cost of fulfilling the responsibilities of a water point committee member are very high and provoke low initiative amongst the members.

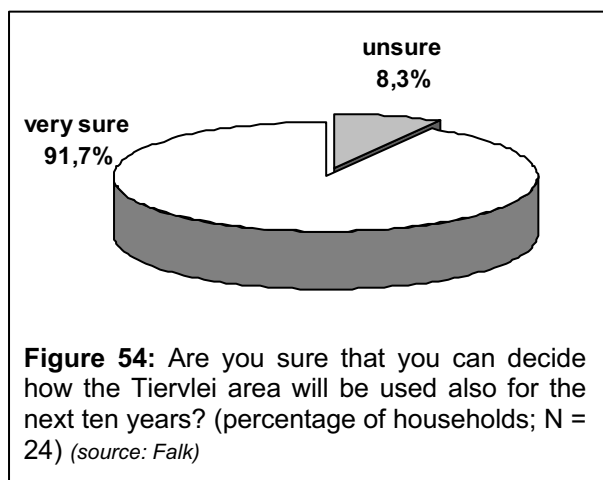
A very important element of the water reforms is that members of the Water Point User Association have the formal right to grant or deny access to their water. This also applies to access to other natural resources. Some respondents mentioned that from the moment the water point was handed over to the community, they had the right to exclude others from the land. The members of the water point committee were especially convinced they had the right to stop people from using Tiervlei resources.<sup>99</sup> Whoever controls access to water also controls access to land. The right to exclude others from the land gives many farmers the confidence to decide how resources are used. Water committees in different Namibian communal areas have increasingly become a forum for community discussion on natural resource issues (see also Twyman et al. 2000: 132). Thus, the impact of the rural water supply reform goes far beyond the promotion of sustainable water management. It creates a stronger sense of ownership and incentives to invest in natural resource preservation in general. All this could be actively encouraged. Government law enforcement authorities are also able to enforce the bylaws of the water point constitution. Similar bylaws e.g. those concerning wood or grazing resources could improve the general communal natural resource management.



The fact that the new water reform directly affects the regulation of access to land is, however, not totally unproblematic. Confusion over roles and jurisdiction of the water point committee intensifies the lack of cohesion in the communities. Representatives of the Directorate of Rural Water Supply emphasised that traditional authorities were not supportive in the process of reform implementation. As discussed in Chapter 6.5.1 the allocation of land is the customary right of traditional authorities. It is not surprising that traditional authorities complain that the new water policy leads to much confusion about their future role. On the one hand, residents report that the committee becomes involved in permitting access to land, on the other hand traditional authorities are also involved in water issues. Traditional authorities intervened for instance when non-residents used Tiervlei water without permission and without paying water fees. Contradictions between the Rural Water Supply reform and the Communal Land Reform deepen the confusion. According to the Communal Land Reform Act, no person may be prevented from drawing water from any water point on a commonage except with written permission of traditional authorities and ratification of the land board (RoN 2002b: 29(4)(d)). This law undermines the power of the water point committee.

### 6.5.5 Regulations of wood and wildlife resources

It is not only grazing and water resources that are under human pressure. The use of wood, wildlife, and soil resources is regulated by Namibian environmental laws and policies. In addition, 77.7 percent of Tiervlei respondents mention that it is the responsibility of local residents to regulate natural resource use. One farmer stated that the first settlers in an area have the right to decide. One fifth (22.2 percent) of those interviewed considered both traditional authorities and water point committees to be the most important decision making units. Tiervlei farmers are confident that in future they will also have the right to determine what happens with their land (see Figure 54). The fact that Tiervlei residents strongly feel they have the right to prevent others from using their resources and to decide how the land is used is a good starting point for improved natural resource management.



Apart from livestock farming, the second most important natural resource use activity is collecting and cutting of fire wood (see Chapter 6.3.1). All but one Tiervlei household collect

wood. Only those with higher income use paraffin or gas, which both require a high starting capital for the stove and gas cylinder. The transaction cost of refilling the cylinders are high because it can only be done in towns (RoN 1992: 26). High costs of alternative energy sources increase pressure on communal wood resources. Respondents are, however, well informed about rules regulating the utilisation of firewood. It was mentioned that one should never cut living trees or remove roots, although it was observed that this was done. Residents may use the wood in their area for home consumption without any permits.

Most respondents agree that mainly commercial wood cutting leads to environmental destruction. One third of the Tiervlei households (33.3 percent) sells wood. If one wants to harvest wood for commercial purposes one has to acquire a harvesting permit (approximately US\$2 for 6 months), a transport permit (approximately US\$2 for 7 days) and a marketing permit (approximately US\$2 for 6 months) from the Ministry of Agriculture, Water and Forestry/Directorate of Forestry. A transport permit must be also acquired if one collects wood for one's household outside the communal area (approximately US\$0.60 for 7 days). Transport permits, only issued for a week, are seen as way of limiting the use of woody vegetation. Local residents have the right to check the permits of harvesting people and can report those who are not in possession of the necessary papers to the traditional authorities or the government. Many Tiervlei residents reported taking such cases to the Directorate of Forestry but some said they would also inform traditional authorities. The latter do not fine offenders in the Berseba area.

The Directorate of Forestry attempts to improve the resource management mainly through extension service, community development and creating awareness. Regional forestry officers do not see their role as policing the communal land. They fear this would isolate them from the community and make residents less willing to inform them about events and offences. Law enforcement is further weakened due to human, financial and technical capacity constraints. There is only one forestry law enforcer responsible for the whole Karas region which is as big as Malawi. Therefore fines are very seldom issued. Should somebody be caught the first time without the necessary permits she/he would be warned and the wood confiscated. A second-time offender would have to pay a fine of not less than US\$ 12. More serious cases are handled by the magistrate court. Offenders are fined according to their individual income. Confiscated wood is sold at auction and the proceeds go to the government.

Many residents complained about the fact that non-residents also use the wood in their territory. Respondents feel powerless to stop non-residents from cutting large amounts of wood. There is some confusion regarding the issue of whether somebody with a permit has the right to collect wood anywhere. Officers of the Directorate of Forestry explicitly stated that there is no discrimination and anybody can get permits for anywhere they wish. Local residents must only be informed. Officially the directorate has to make regular inventories but because of the above mentioned capacity constraints this is not done and permits are issued without regard for the natural resource availability. Forestry officers stressed that it is the responsibility of traditional authorities to regulate the use of natural resources. Non-residents receive permits for wood collection from the government only if they can show a letter from the traditional authorities. This does, however, not guarantee that traditional authorities involve the residents. If local residents have no way of limiting the use of woody vegetation in their area these resources are de facto open to uncontrolled exploitation.

Many residents are aware of legal opportunities and constraints concerning wildlife although only one respondent mentioned hunting problem animals. With the necessary permits from the Ministry of Environment and Tourism/Department of Wildlife farmers may hunt game. Permits are only issued with the agreement of the traditional authorities and after official inspections. Since 2000, no hunting permits for the communal area have been issued due to insufficient numbers of game. Tiervlei residents are very much afraid of hunting illegally because an officer of the Directorate of Wildlife lives on a neighbouring communal farm.

It is questionable whether the lax enforcement policy of the government is really in the community's interest. Many Tiervlei farmers complained that uncontrolled wood collection has direct negative consequences on their livelihoods and that they do not have the power to stop it. Customary law, social control and sanctions can limit the wood harvest to a certain extent but it is unrealistic as well to think the government alone can fill the existing gap. There is a need to formalise the power of local residents to regulate the use of wood in customary and statutory law. Their physical closeness to the resources results in low transaction costs of monitoring and enforcement. External support of traditional authorities or the government should be available when social and moral-based institutions fail. Often, however, there is not enough support. In order to strengthen customary law sanctions should be formalised as for instance, is the case in the Kavango region.

The general weakness of traditional authorities in the Berseba area has direct implications on the enforcement of customary natural resource use regulations. Following independence, the Berseba traditional court stopped working as the judicial body for the community and traditional councillors only assist Namibian police with minor cases (Keulder 1997: 28; Hinz 2000b: 126). As a result, there has been an increase in crime (Keulder 1997: 28). Despite the recent shortcomings, the majority of southern Namibian communal farmers wish traditional authorities to play a more important role in the management of natural resources and the enforcement of institutions (Keulder 1997: 29). Such expectations indicate that internalised values exist and should be used to introduce a more transaction cost efficient method of natural resource management.

#### **6.5.6 Intra-community institutions**

Nonetheless, at present traditional authorities are basically absent from the area and lack financial and human capacity (Keulder 1997: 27, 44). No traditional authority is living in the five Tiervlei farming units. The closest members of the traditional council live approximately 25 km away. Both chiefs of the Berseba area live outside the communal land (Keulder 1997: 27). The access to government authorities seems to be even worse and the majority of southern Namibian communal farmers has never been consulted by their regional councillor (Keulder 1997: 40). Before the introduction of water committees no formal decision making structures existed in Tiervlei at local level.

The water point committee fills a crucial gap in the community. Two fifths of the respondents (40.7 percent) mentioned the committee as a unit of decision making for the use of natural resources. No other local organisations responsible for such questions were mentioned. It is the only committee in Tiervlei. Half of the respondents participated in collective action but this was limited to involvement in water point management. Eight households (29.6 percent) are represented in the committee and no interviewed person mentioned having any other community function other than being member of the water point committee. Members of the water point committee have larger livestock herds and sell more than others. They are used to having savings.<sup>100</sup> This shows that the community elects those who have most capital.

As well as formal structures, Tiervlei farmers also benefit from social networks such as family ties. Two thirds (66.7 percent) expect to be supported by somebody in cases of emergency. Half of the households (55.6 percent) mentioned remittances as a source of income.

Especially households with a low level of education believe that they can rely on support.<sup>101</sup> It seems that social capital makes up for the lack of human capital.

Generally speaking, it seems community members rarely take part in collective action (RoN 1992: 64). It is very rare, for instance, for different families to group and herd their livestock together (RoN 1992: 54). Only very few farmers (7.4 percent) see advantages in the joint use of natural resources (see Figure 48). Many Tiervlei residents agreed that the lack of co-operation between residents of the same camp is one of the most serious problems in the community. In the past as today, it is often negatively affected by party-politics (see also RoN 1992: 67). One would expect that the small number of households occupying each farming unit keeps transaction costs of direct coordination relatively low. Despite this fact and the awareness that improvements can only be achieved working together the necessary steps are not taken. Nonetheless, three fourths of the respondents (74.1 percent) felt able to influence what happens in the community. This feeling of power should be used as a starting point for institutional improvements.

## **6.6 Conclusion**

Biodiversity research shows that the differences in natural resource use between Gellap Ost and Tiervlei result in differences in species numbers and composition. Socio-economic reasons are complex. Overcrowded communal land, a legacy of the era of apartheid has put a lot of pressure on the resource base. This situation, together with lack of alternatives due to low levels of education, poor infrastructure development and the lack of markets make many people dependent on small portions of land. Natural resources have to satisfy the basic needs of a large proportion of people. Livestock as the most important way of resource use provides the rural population with food and is an instrument of capital accumulation as well as retirement, unemployment and health insurance. The animals can be used for one purpose or another at any time. Multiple livestock functions create incentives to maximise herd sizes. This is one of the main reasons for high stocking rates on communal land. Even those who are not exclusively dependent on natural resources want to maximise livestock numbers. Under such conditions, income generating measures alone cannot release pressure on biodiversity. Institutional regulations are needed.

Tiervlei land is owned by the government and access to specific plots is regulated by local residents, traditional authorities and increasingly, the water point committee. One main

problem is the lack of restrictions of livestock numbers. Although many respondents are aware of this, weak co-operation is an insurmountable obstacle for collective use regulations. The same applies to the collection of firewood. The woody vegetation in the area is heavily utilised. Government control mechanisms are poorly enforced due to capacity constraints. There is hope that the new rural water supply reform will bring improvements for people and the environment. With the establishment of a water committee and the formulation of a water point constitution, many residents feel strengthened in their rights to decide who uses their natural resources and how. This committee fills an institutional gap because no local organisations existed in Tiervlei before. The increasing feeling of ownership should be used as a starting point for the improved management not only of water but also of other natural resources. In order to provide cost efficient institutional services, it is necessary to make use of residents', traditional authorities', water committees' and government authorities' opportunities in a flexible and co-operative way.

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<sup>78</sup> *Spearman-Rho correlation:* „changes in livestock numbers” & „LSU of household”; coefficient -0.583; sign.: 0.004; N = 22; „changes in livestock numbers” & „LSU sold”; coefficient -0.425; sign.: 0.048; N = 22; „changes in livestock numbers” & „have a function in community”; coefficient -0.425; sign.: 0.049; N = 22.

<sup>79</sup> *Spearman-Rho correlation:* „grazing conditions” & „LSU of household”; coefficient 0.474; sign.: 0.014; N = 26; „grazing conditions” & „education level of household head”; coefficient 0.429; sign.: 0.029; N = 26.

<sup>80</sup> *Spearman-Rho correlation:* „have garden” & „LSU of household”; coefficient 0.332; sign.: 0.091; N = 27.

<sup>81</sup> *Spearman-Rho correlation:* „permanence household head” & „collect wild fruits”; coefficient: 0.350; sign.: 0.074; N = 27.

<sup>82</sup> *Spearman-Rho correlation:* „pension as source of income” & „changes of pasture quality 10 years”; coefficient -0.464; sign.: 0.046; N = 19.

<sup>83</sup> *Spearman-Rho correlation:* „education level of household head” & „changes of pasture quality 10 years”; coefficient 0.668; sign.: 0.002; N = 19.

<sup>84</sup> *Spearman-Rho correlation:* „livestock as source of income” & „have savings”; coefficient: 0.433; sign.: 0.027; N = 26; „permanent job as source of income” & „have savings”; coefficient: 0.417; sign.: 0.034; N = 26; „permanent job as source of income” & „think can get a loan”; coefficient: 0.525; sign.: 0.007; N = 25; „LSU of household” & „have savings”; coefficient: 0.464; sign.: 0.017; N = 26.

<sup>85</sup> *Spearman-Rho correlation:* „LSU of household” & „sell to get money”; coefficient: 0.570; sign.: 0.002; N = 27; „permanence household head” & „sell to get money”; coefficient: 0.491; sign.: 0.009; N = 27.

<sup>86</sup> *Spearman-Rho correlation:* „education level of household head” & „pension as source of income”; coefficient: -0.559; sign.: 0.002; N = 27.

<sup>87</sup> *Spearman-Rho correlation:* „education level household head” & „happiness keep”; coefficient: 0.412; sign.: 0.063; N = 21; „permanence household head” & „happiness keep”; coefficient: -0.387; sign.: 0.083; N = 21.

<sup>88</sup> *Spearman-Rho correlation:* „permanence household head” & „happiness slaughter”; coefficient: -0.403; sign.: 0.070; N = 21.

<sup>89</sup> *Spearman-Rho correlation:* „money keep” & „money sell”; coefficient: 0.530; sign.: 0.013; N = 21; „happiness keep” & „money sell”; coefficient: 0.466; sign.: 0.033; N = 21; „permanence household head” & „money sell”; coefficient: 0.568; sign.: 0.007; N = 21; „education level of household head” & „money sell”; coefficient: -0.421; sign.: 0.057; N = 21; „permanent work as source of income” & „money sell”; coefficient: -0.463; sign.: 0.035; N = 21.

<sup>90</sup> *Spearman-Rho correlation:* „permanence household head” & „sell to get money”; coefficient: 0.491; sign.: 0.009; N = 27; „permanence household head” & „food sell”; coefficient: 0.822; sign.: 0.000; N = 21;

- „permanent job as source of income” & „food sell“; coefficient: -0.901; sign.: 0.000; N = 21; „casual work as source of income” & „food sell“; coefficient: -0.387; sign.: 0.083; N = 21; „importance livestock as source of income” & „food sell“; coefficient: 0.440; sign.: 0.046; N = 21; „importance remittances as source of income” & „food sell“; coefficient: 0.641; sign.: 0.002; N = 21; „importance pension as source of income” & „food sell“; coefficient: 0.549; sign.: 0.010; N = 21; „permanent job as source of income” & „food slaughter“; coefficient: 0.408; sign.: 0.066; N = 21; „casual work as source of income” & „food slaughter“; coefficient: 0.516; sign.: 0.017; N = 21; „remittance as source of income” & „food slaughter“; coefficient: -0.382; sign.: 0.087; N = 21; „pension as source of income” & „food slaughter“; coefficient: -0.468; sign.: 0.032; N = 21.
- <sup>91</sup> *Spearman-Rho correlation*: „money sell” & „security sell“; coefficient: 0.531; sign.: 0.013; N = 21.
- <sup>92</sup> *Spearman-Rho correlation*: „relation keep” & „approval keep“; coefficient: 0.658; sign.: 0.001; N = 21; „status keep” & „approval keep“; coefficient: 0.617; sign.: 0.003; N = 21; „relation keep” & „status keep“; coefficient: 0.585; sign.: 0.005; N = 21; „relation sell” & „approval sell“; coefficient: 0.665; sign.: 0.001; N = 21; „status sell” & „approval sell“; coefficient: 0.693; sign.: 0.000; N = 21; „relation sell” & „status sell“; coefficient: 0.694; sign.: 0.000; N = 21; „relation sell” & „food sell“; coefficient: 0.506; sign.: 0.019; N = 21.
- <sup>93</sup> *Spearman-Rho correlation*: „happiness keep” & „approval keep“; coefficient: 0.433; sign.: 0.050; N = 21; „happiness keep” & „status keep“; coefficient: 0.443; sign.: 0.045; N = 21; „preference slaughter” & „approval keep“; coefficient: -0.631; sign.: 0.002; N = 21; „preference slaughter” & „status keep“; coefficient: -0.497; sign.: 0.022; N = 21.
- <sup>94</sup> *Spearman-Rho correlation*: „permanent work as source of income” & „relation sell“; coefficient: -0.429; sign.: 0.052; N = 21; „casual work as source of income” & „relation sell“; coefficient: -0.454; sign.: 0.039; N = 21; „pension as source of income” & „relation keep“; coefficient: -0.471; sign.: 0.031; N = 21; „pension as source of income” & „status keep“; coefficient: -0.472; sign.: 0.031; N = 21; „pension as source of income” & „relation sell“; coefficient: 0.514; sign.: 0.017; N = 21.
- <sup>95</sup> *Spearman-Rho correlation*: „open access?” & „have savings“; coefficient: -0.434; sign.: 0.034; N = 24; „can somebody be excluded?” & „serve in committee“; coefficient: 0.350; sign.: 0.086; N = 25; „can somebody be excluded?” & „LSU of household“; coefficient: 0.442; sign.: 0.027; N = 25; „can somebody be excluded?” & „LSU sold“; coefficient: 0.495; sign.: 0.012; N = 25.
- <sup>96</sup> *Spearman-Rho correlation*: „grazing conditions” & „number of households in camp“; coefficient: -0.570; sign.: 0.002; N = 26.
- <sup>97</sup> *Spearman-Rho correlation*: „have savings” & „security of exclusion rights ten years“; coefficient: 0.475; sign.: 0.046; N = 18; „have a function in community” & „security of exclusion rights ten years“; coeff.: 0.392; sign.: 0.097; N = 19; „remittances as source of income” & „security of exclusion rights ten years“; coeff.: -0.487; sign.: 0.034; N = 19.
- <sup>98</sup> *Spearman-Rho correlation*: „changes in livestock numbers” & „can somebody be excluded from resource use“; coefficient -0.502; sign.: 0.020; N = 21.
- <sup>99</sup> *Spearman-Rho correlation*: „member of committee” & „can somebody be excluded from resource use“; coefficient: 0.385; sign.: 0.057; N = 25.
- <sup>100</sup> *Spearman-Rho correlation*: „member of committee” & „have savings“; coefficient: 0.411; sign.: 0.037; N = 26; „member of committee” & „total LSU of household“; coefficient: 0.526; sign.: 0.005; N = 27; „member of committee” & „LSU sold“; coefficient: 0.428; sign.: 0.012; N = 27.
- <sup>101</sup> *Spearman-Rho correlation*: „member of committee” & „have savings“; coefficient: 0.411; sign.: 0.037; N = 26; „member of committee” & „total LSU of household“; coefficient: 0.526; sign.: 0.005; N = 27; „member of committee” & „LSU sold“; coefficient: 0.428; sign.: 0.012; N = 27.

## 7 Soebatsfontein

Soebatsfontein is a rural settlement in the north-west of South Africa. It is situated in Namaqualand, in the Kamiesberg Municipality/Northern Cape Province. The village lies approximately 80 km southwest of Springbok. In 2002, 266 people lived in the settlement. This is 60 percent more inhabitants than in 1970. (RSA 2001a; Schneiderat 2004).

Archaeological excavations indicate that hunter-gatherers lived in Namaqualand at least 3000 years ago. The first Khoi-Khoi people migrated from northern Botswana with domestic animals into Namaqualand 2000 years ago. Due to the appearance of diseases like “krimpsiekte” caused by *Cotyledon* bushes and restricted water availability the herders were forced to move seasonally between high- and low-lying areas of Namaqualand. Thanks to traditional natural resource governance structures and low population density, problems like overgrazing and land degradation were not serious (Webley 1993).

At the beginning of the 19<sup>th</sup> century, the first European settlers arrived in Namaqualand. They quickly transformed the traditional property rights systems and set about changing the semi-nomadic way of life of the previous residents. The non-European population reacted either by moving further north or became dependent on the mission station. Mission stations promised protection and to a limited degree land access (RSA 2001a). When the Cape Coast Exploration Company bought most of the properties in Namaqualand in the 1920s, the land was already mainly in ‘white’ hands. Land was acquired in order to secure mining rights. This is the reason the land of today’s Soebatsfontein commonage has been bought by the company. The land was run by Cape Coast Exploration and later by its legal successor De Beers. De Beers allowed the former European owners to live and work on their former farms under leasing contracts. By this time, a mixed population lived in Soebatsfontein, though land was owned by de Beers or Europeans only. From the 1950s onwards, the coloured population had to stay on a small area bought by the church. The main source of household income was the farm work on the surrounding De Beers farms (SPP 1995).

Since 1994, De Beers has sold 116.000 ha of their farm land mainly to the government. It was bought for the benefit of local people (such as the 15.069 ha of Soebatsfontein) and nature conservation (like the Namaqua National Park). Today’s commonage was transferred to the municipality of Kamiesberg and given to Soebatsfontein in March 2000.



## **7.1 The capital availability in the Soebatsfontein community**

### **7.1.1 Natural Capital**

Namaqualand is situated in the winter-rainfall Lowland Succulent Karoo subdivision of southern Africa's Succulent Karoo biome (Rutherford & Westfall 1986; Tene 2004). Precipitation is predictable in the range of 50 to 150 mm. Serious droughts are rare (Tene 2004). Rainfall variations affect the plant cover but hardly species numbers (Tene 2004). The climate is mild throughout the year with a mean annual temperature of 16 °C. The special climatic regime is responsible for the unusually rich flora (Cowling et al.1998; Tene 2004). The Succulent Karoo eco-region includes about 5000 species of which 40% are endemic (Cowling et al. 1999; Tene 2004). 428 plant species have been recorded on the Soebatsfontein BIOTA-observatory. Almost half of them are perennial shrubs and one third are succulents (Tene 2004). Mass flowering displays of annuals occur in spring often on degraded or fallow lands. Disturbed areas are frequently invaded by the non-palatable shrub *Galenia africana*. Palatable, non-succulent shrubs, such as *Tripteris sinuatum*, occur in protected and sustainable grazed areas (Tene 2004). Due to the specific topography, the presence of many heuweltjies, as well as the high variability of soil conditions there are an unusually large number of microhabitats. These factors explain a high local phytodiversity in Soebatsfontein. The Soebatsfontein observatory has the highest alpha diversity compared to any other BIOTA-observatory in the Succulent Karoo Biome. This indicates that the grazing pressure was and is relatively moderate on the Soebatsfontein commonage (Tene 2004).

The most serious threat to biodiversity in Namaqualand is probably climate change, caused by air pollution and the emission of greenhouse gases (Lovejoy 2002: 39; see also O'Riordan 2002: 14). There are predictions that, due to climate change the Succulent Karoo of South Africa will be largely eliminated (Lovejoy 2002: 40). This not only leads to loss of biodiversity but also affects the farming opportunities of the local population.

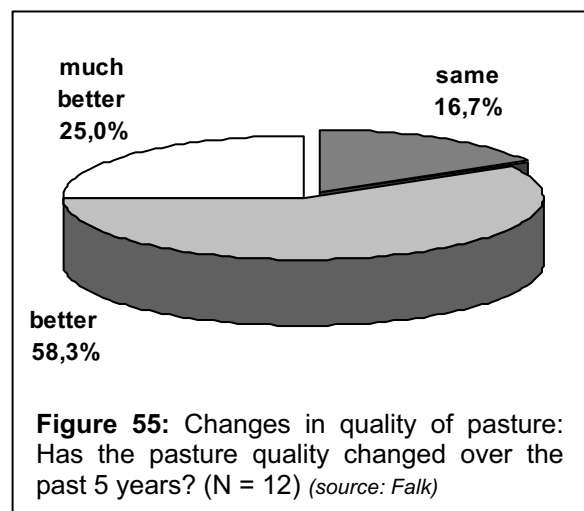
Until 2000, the majority of today's Soebatsfontein population had no access to the rich natural resources of Namaqualand. In 1995, only seven households had temporary use rights on commercial farms (e.g. De Beers farms) and five households used other communal areas in the region (SPP 1995, SPP 1997). Very few Soebatsfontein farmers see opportunities to take livestock to commercial farms or other communal areas even in times of emergency, e.g. during droughts. In 2002, four households still had use rights on 'white' commercial farms.

Members of these households work on these farms. No grazing fees must be paid but animal numbers are restricted. The farm infrastructure and veterinarian products are at their disposal. Some farmers also use small private camps in the surroundings of the settlement.

Since 1994, the communal land base of Namaqualand has expanded by 19 % (Rohde et al. 2001: 10) within the framework of the National Land Reform and particularly the Land Redistribution Programme. The objective of the programme is to allow the disadvantaged and poor access to residential and productive farm land (RSA 1997a). It focuses on livelihood improvements and restitution (RSA 2001a) with no explicit reference to nature conservation. As part of a land redistribution strategy the government assists emerging farmers in acquiring commercial farm land (RSA 2001a). Many Soebatsfontein residents dream of buying or leasing a private farm. The main land reform instruments in Namaqualand are, however, commonages (RSA 2001a; Rohde et al. 2001: 10).

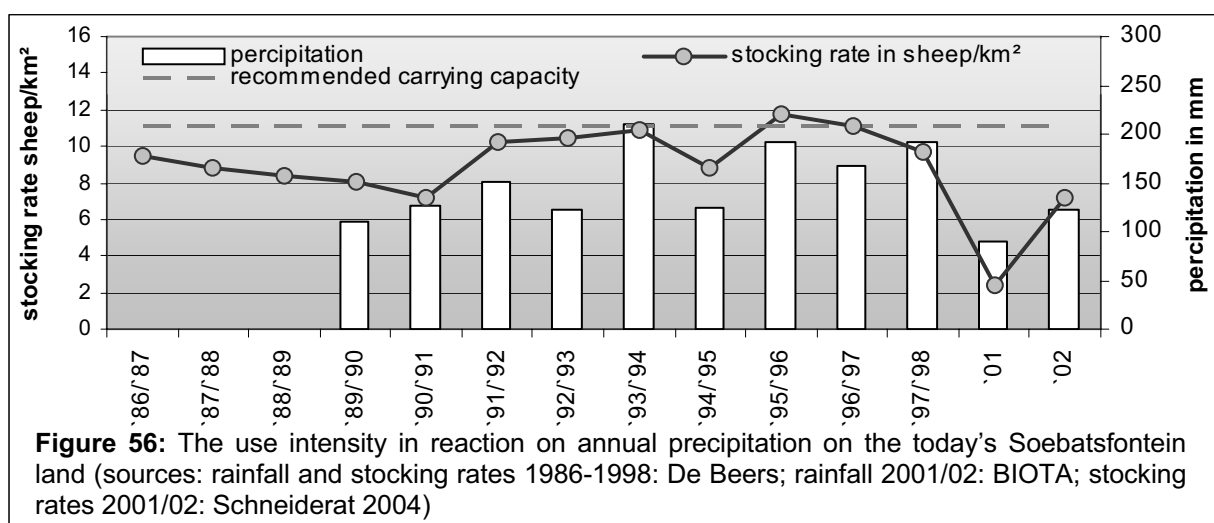
Since 2000, 15.069 ha land have been made available as a commonage to the people of Soebatsfontein. The de Beers recommendation for the carrying capacity of the land is 9 ha/sheep. The commonage can therefore feed approximately 1,700 goats or sheep. During the time of land transfer, the De Beers management classified five to ten percent of the farm as being in bad condition and seventy percent in moderate condition. It saw a low potential in the land. The high complexity of the eco-system requires sophisticated management practices.

The fact that de Beers has not always coped with this eco-system shows the widespread erosion in the whole of Namaqualand such as on the Soebatsfontein land (Tene 2004). Botanical analysis of BIOTA show that species richness decreases closer to water points. The occurrence of the annual and unpalatable Australian invader *Atriplex lindleyi* and the dominance of pioneer species are indicators for disturbance in many areas of the commonage (Tene 2004). Older residents report the disappearance of many plants and game during the time the land was used as a private farm. Some also perceive a reduction of rainfall over the years. Those who knew the area before, e.g. because they worked on the former De Beers



farm, agree that the quality of the pasture has rather improved (see Figure 55). Most farmers hesitated, however, to compare the state of the natural resources on the commonage between 2003 and the past. At the time of research, they had only had the land for three years.

Improvements were almost exclusively related to a reduction in stocking numbers. Communal farmers perceive that De Beers kept too many animals on the farm which resulted in high grazing and trampling pressure. De Beers records of grazing days do not prove this perception. Based on the experience of the agricultural extension office the De Beers management defined a recommended stocking rate of 9 ha/sheep (11.1 sheep/km<sup>2</sup>). The records for the whole commonage show that this rate was very seldom exceeded. The mean stocking rate between 1996 and 1998 was 10.7 ha/sheep (9.3 sheep/km<sup>2</sup>) (see Figure 56). Nonetheless, with the transfer of the land to the Soebatsfontein community livestock numbers decreased significantly. The main reason for this is the residents' lack of capital. Straightaway, they were not able to buy as much livestock as the land could carry. The Soebatsfontein residents believe the reduction of use intensity has led to specific improvements, such as the disappearance of bare soil patches, the return of specific grass species (e.g. the annual *Schmidtia kalaharensis*) and the fact that bushes and grasses grow bigger. In 2002, livestock numbers had already increased notably also because of subsidised government loans for the purchase of livestock. In 2002, approximately 800 sheep and 300 goats grazed and browsed on the commonage (Schneiderat 2004). This was, however, still far below the De Beers recommendation.



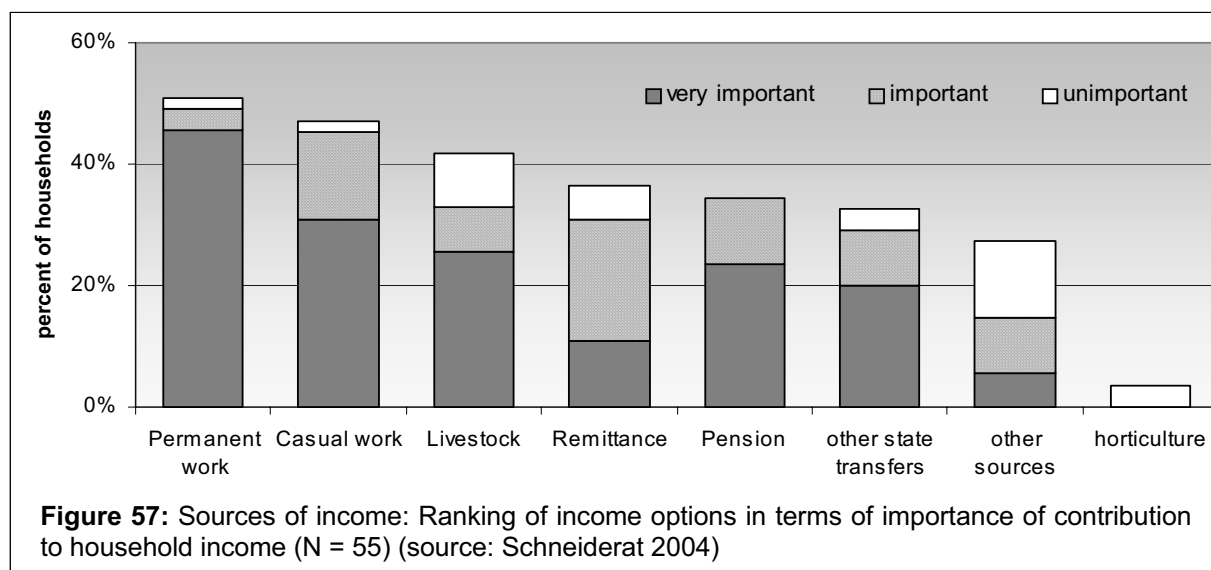
Stocking rates are not the only changes in land use after the land transfer. Some respondents discovered the commonage as fuel supply. There is a critical shortage of energy supply in Soebatsfontein. Gas is expensive and there is no electricity in the settlement. A number of

households even run their ovens with plastic garbage. Firewood collection was initially banned by the government because of expected negative effects on the vegetation and soil erosion. On the one hand, most farmers promoted the recommendation of government officials, NGOs and scientists not to collect wood. Dry wood is important for water catchments and to avoid wind and water erosion (Tene 2004). In Soebatsfontein even green bushes are harvested. Farmers further complain that wood collectors damaged fences. On the other hand, especially residents with limited income opportunities repeatedly voiced concerns that also poorer households should be allowed to benefit from the commonage. People who collect fire wood usually do not have permanent jobs and have a lower monetary income.<sup>102</sup> Please see Chapter 7.3.3 for a discussion of the regulation of wood collection.

Hunting is another human activity affecting biodiversity. It is generally prohibited apart from problem animals such as jackals and caracals. Respondents engaged in hunting problem animals have larger livestock herds, higher monetary income and a function in the community.<sup>103</sup> Farmers see this activity as being in the interest of the whole community. Many lambs have been killed by jackals and caracals. This was the main reason why stock posts had to be installed on the commonage. These posts increase the labour intensity of farming and cause very localised trampling and grazing pressure. The direct vicinity to the Namaqua National Park increases the danger of problem animals. Predator density is higher in and around the park. Jackals and caracals cause biodiversity relevant externality for the farmers. The park reacted by investing in game-fences, researching livestock-predator interaction and awareness campaigns. Farmers must be encouraged not to kill problem animals. One strategy of the park management is to train watchdogs to protect livestock against predators (Rossouw 2004). The main strategy of the park is to avoid damages. Nevertheless, it should also consider compensating farmers for livestock losses.

### **7.1.2 Financial Capital**

For historical reasons, livelihoods in Soebatsfontein are not as dependent on natural resources as in most communal areas of the region. There is no dominant source of income in Soebatsfontein. Livelihoods are based on a wide range of strategies. Half (50.9 percent) of all households are permanently employed. A similar proportion of households (47 percent) rely on casual jobs. This livelihood is, however, rarely perceived to be of major importance (31 percent compared to 46 percent; see Figure 57). Unemployment is rising in the region due to the fact that de Beers is reducing its mining and farming activities. It is estimated that by 2010, most of the diamond and copper mines in Namaqualand will be closed (SPP 1996). In



1991, only 14.3 percent of the Namaqualand population were unemployed (SPP 1996). By 1998, the rate rose to one third (Rohde et al. 2003: 50). It is a great challenge of post-apartheid policy to create new jobs based on a more equal and sustainable utilisation of resources. A similar proportion of Soebatsfontein households mentioned pensions, other state transfers such as child and disability allowances as well as remittances as sources of income. Pensions (23.6 percent) and other state transfers (20.0 percent) are often a very important source of income. Households who receive state transfers often also rely on remittances.<sup>104</sup>

Sixteen households (29 percent of all Soebatsfontein households) mentioned saving money (see Table 11). Twenty-nine percent of the families would try to sell something in cases of immediate monetary demands. Eighty percent of these sixteen households said they would sell livestock. The remaining respondents

**Table 11:** Availability of financial capital in Soebatsfontein (N = 55) (source: Falk)

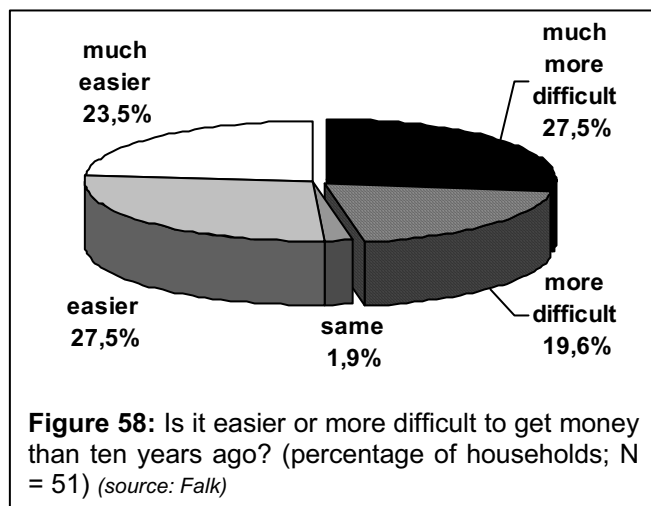
	percentage of households
Do you have monetary savings?	29,1
If you need money, do you sell something?	29,1
Do you sell livestock?	21,8
Do you think you could get a loan?	47,3

sell homemade bread, biscuits or handicrafts. The community is well informed about the possibility of receiving loans. Half of all households see the opportunity to get a credit (see Table 11). In most cases they have land bank credits in mind. These subsidised government loans focus on the support of agricultural activities of resource-poor individuals. They can be flexibly used for diverse income-generating activities. No security is required (Landbank 2004). At least seven communal farmers received until 2003 such loans in order to buy livestock. The loans range from approximately US\$ 375 to US\$ 3.000, run 5 to 9 years and

interest rates range from 15 to 19 percent a year. All farmers used the credits to buy sheep. They plan to pay the annual instalments by selling livestock.

Thanks to the subsidised government loans, the livestock numbers on the commonage have increased since 2000. The accumulated possessions of all residents rose between 1997 and 2003 from 200 to 300 goats and from 400 to 800 sheep (SPP 1997). Nevertheless, the number of livestock keeping households did not increase significantly after the commonage was transferred to the community. In 1995, 37 percent of the families owned livestock (SPP 1995). By 2004, this number had only slightly increased to 41.8 percent. During the time of research, 25.5 percent of the households considered farming to be an important source of income. Selling and slaughtering numbers were moderate. In 2002, 38 sheep and 8 goats were sold as well as 35 sheep and 5 goats slaughtered. Livestock off-take rate were, therefore, 8 percent of the total sheep number and 3.9 percent of the total goat number. The fact that livestock owning households did not increase considerably might be an indication that the land redistribution was not yet for the benefits of the poorest of the poor as had been pronounced initially (SPP 1996; see also McIntosh & Vaughan 2000: 227). This is not surprising if one keeps in mind that at least a basic stock of different kinds of capital is necessary to start farming. Also the access to external finances depends on the availability of other capital. Employed people with higher income and savings mainly get credits. Households which rely on pensions and casual work do not see this opportunity.<sup>105</sup>

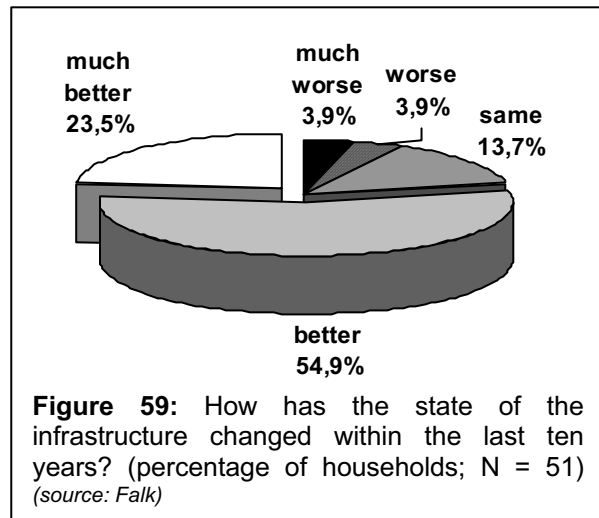
Perceptions regarding changes of financial capital availability are ambivalent within the Soebatsfontein community. Approximately fifty percent think it has become easier to get money while the other half believes it has become more difficult (see Figure 58). The development of the past ten years seems to have winners and losers. Some benefit from new opportunities and enhanced government support while many others have lost their jobs. It is surprising that livestock owners are amongst those who think it has become more difficult to obtain money.<sup>106</sup> They are in fact the ones who benefited most from the subsidised micro-credit schemes of the government.



### 7.1.3 Physical Capital

Most Soebatsfontein residents live in iron shacks and a few in brick houses. In 2004, many of them were waiting for new housing to be built in the framework of a government housing programme. Since 1996, the percentage of South African households with access to housing, water, sanitation, electricity, refuse and telephones has increased significantly (Mouton 2003).

In Soebatsfontein, the perception regarding changes in physical capital is very positive. Almost eighty percent of the interviewed heads of household see improvements. (see Figure 59). One improvement is the new desalination plant which was build in the 1990s. It improved the water supply in quality and quantity. Large drums to catch rain water have been brought to Soebatsfontein. In the past the community had to rely on the



brackish water of a farmer's wind pump. De Beers also brought water to the village though the supply was not reliable (SPP 1995). Another improvement was the installation of compost toilets in 2003. In this way the government improved the sanitary situation.

The telecommunication infrastructure has also improved since 1995. Soebatsfontein is connected to a land line telephone net. There is a public telephone and 13 percent of the households have a telephone connection to their house (see Table 12). Some few hundred metres away from the centre of the village there is also cell phone network and some residents, especially those working in towns, have a cell phone. Seventy percent of families own a radio which is an important source of information. In 2007, Soebatsfontein was connected to an electricity line. Nonetheless, gas, paraffin, firewood, plastic waste and

	percentage of households
Do you own means of transport?	38,2
Do you own a car?	29,1
Do you have a telephone?	12,7
Do you own a television?	30,9
Do you own a radio?	69,1

candles are still important fuel (SPP 1995). The municipal office in the village has solar panels in order to run the basic office equipment.

Soebatsfontein is situated 80km away from the regional centre Springbok, which can be reached via gravel road. There is no public

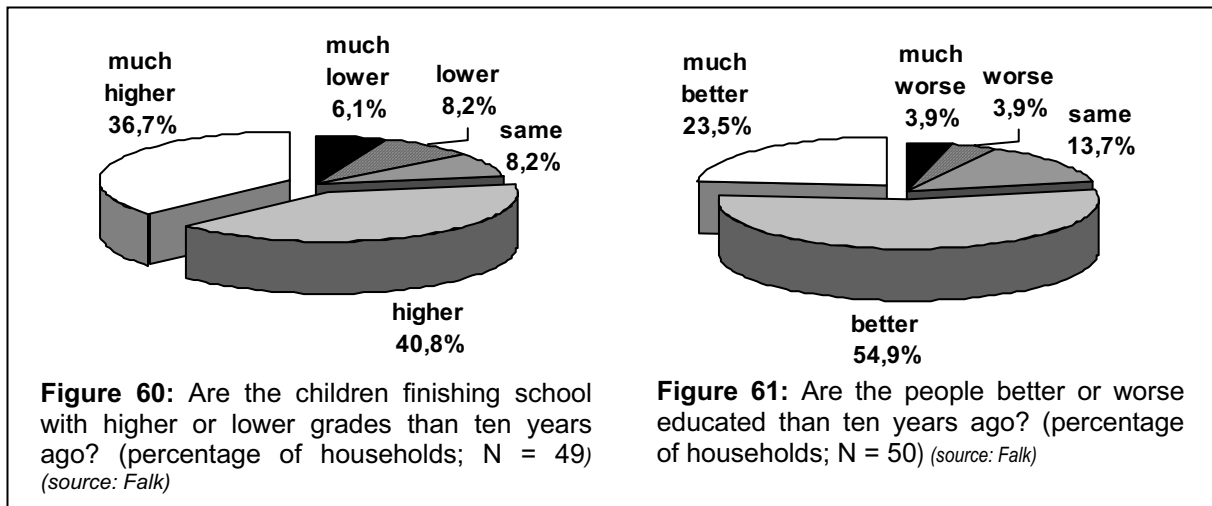
transport. Approximately 40 percent of the households mentioned having any means of transport (see Table 12). Three fourths of them possess a car. In 2002, a lift to Springbok cost between US\$6 and US\$15. This is half of what was reported in 1995 (SPP 1995). Whoever urgently needs a car to be driven to the next town has to pay up to US\$45. People who keep livestock more often own means of transport.<sup>107</sup> Since the livestock owners usually live in the settlement, which is relatively far away from their animals it seems to be a requirement for livestock keeping to have a means of transport. Generally, only wealthier farmers apply for the use of new commonages in Namaqualand (Rohde et al. 2001: 14). Having a car seems to be a good wealth indicator in Soebatsfontein. Those who have a car are more optimistic to get a loan and more likely they have savings.<sup>108</sup>

#### **7.1.4 Human Capital**

Not only financial and physical capital goes hand in hand in Soebatsfontein. The more physical and financial assets a household owns the higher the level of education of the head of household. In contrast, the less educated heads of household are more often reliant on insecure income sources such as casual work.<sup>109</sup> Similar phenomena have been reported from other Namaqualand communal areas (Rohde et al. 2003: 30).

South Africa has a Human Development Index of 0.677. The coloured population of Namaqualand has, however, only a ranking of 0.340 (Rohde et al. 2003: 23). Such discrepancies are the result of long enduring discrimination. For a long time Soebatsfontein had two schools. One was reserved for white pupils while the non-white children had their classrooms in the church. Only in 2003, thanks to investments of the Namaqua National Park, were coloured children able to move from the overcrowded small classrooms of the church to the newly renovated larger ones (see also SPP 1995). Nevertheless, the fact still remains that the two teachers in Soebatsfontein can only teach children up to Standard 4. Students who want to continue with their education have to move to boarding schools in Kharkams, Kamieskroon or Springbok. For many parents these schools are too expensive and it is not unusual to stop going to secondary school because of financial constraints (see also Rohde et al. 2003: 30). The Garies school costs approximately US\$40 a year and the hostel fees are approximately US\$125 a year. The Alexkor Development Foundation and Namaqualand Diamond Trust Fund make donations to improve education opportunities and facilities in order to empower the people of Namaqualand (SPP 1996). These foundations provide scholarships for students with the highest marks (Rohde et al. 2003: 30). Soebatsfontein pupils attended school on average 6.8 years. More than three fourths of the heads of





households perceive that children are getting a better education than they were ten years ago (see Figure 60). It is no longer unusual for a young person to finish school with a matriculation standard. Considering also the education status of the adult population even more than ninety percent of the people see an improvement in comparison to the situation ten years ago (see Figure 61). An indicator for these developments is also that older residents have a lower level of education.<sup>110</sup>

These improvements seldom refer, however, to enhanced natural resource use skills. Many of today's Soebatsfontein farmers received their farming skills while working on commercial farms. SPP reports that Soebatsfontein farmers practiced rotational grazing on land rented from De Beers (SPP 1997). On-the-job experience is a good basis for further trainings. The BIOTA project attempts to improve the knowledge of the resource managers about the natural environment. The objective is to identify biodiversity-friendly and locally adapted resource-use practices in co-operation with the community and other stakeholders.

The human capital of Soebatsfontein residents also depends on the public health care situation. A mobile doctor visits Soebatsfontein every month. The closest hospitals are in Garies and Springbok. A health committee helps sick people on a voluntary basis. The government supports them with trainings. Some committee members hope this is a way of finding a job in the public health system. HIV prevalence appears to be low in the region (Rhode 2003: 28).

## 7.2 Motives of resource use

It has been mentioned above that natural resource based livelihoods are not as important in Soebatsfontein as in the Namibian case studies. Only 37 percent of all households (total of 20)

own livestock (Schneiderat 2004). Dependency on livestock keeping is low because mainly wealthier non-permanent residents with employment income keep animals.<sup>111</sup> The government of South Africa sees a dual purpose in communal land. First it should supplement the subsistence income of the poorest. Secondly, it is seen as a stepping stone for emergent farmers (RSA 2000a). There is little awareness of a conflict of interest and that the dual objectives provoke overuse. Sustainable communal resource management requires use restrictions such as stocking rate regulations. Incentives to increase the herd size in order to qualify for affirmative action programmes work against incentives to reduce the grazing pressure. Without effective institutions, the use of communal lands as a stepping stone undermines stocking rate restrictions and provides incentives to overuse the resources.

Due to the short farming history of the Soebatsfontein commonage, no detailed analysis of the needs and motives of different community members could be carried out. Results of other studies in the region support, however, the hypothesis that in Namaqualand the motives of communal farmers vary from those of commercial ones. For many communal farmers, livestock fulfils multiple objectives including food supply and security, capital storage, insurances, and means of transport. It influences the social status and people's self-identification (Marinus 1998a: 46; Rohde et al. 2001; Rohde et al. 2003: 49f, 58). It directly affects the satisfaction of physiological, esteem and safety needs and is an investment in physical and financial capital. Therefore, herd size maximisation is for many communal farmers the optimal strategy (Rohde et al. 2001). By maximising the herd size rather than the monetary income, the livestock can be easily shifted from one use form to another or it can fulfil different objectives simultaneously.

Regional representatives of the Department of Agriculture see in the experience of commercial farmers an effective tool of persuasion to improve communal farming practises in order to relieve pressure on natural resources. They try to promote a stronger business perspective. Nevertheless, one cannot use the same arguments to convince subsistence farmers and commercially oriented ones. A good example is the use of inputs. Small scale farmers with little financial, physical, human and natural capital will not easily be convinced to make expensive investments in the herd like for instance by buying a costly breeding ram. Due to the fact that most Soebatsfontein farmers have working experience on commercial farms, one could expect them to be more commercially minded than other communal farmers in the region. Many dream of becoming commercial farmers. Those who received land bank

credits are forced to sell regularly in order pay their instalments. Only time will tell whether the maximisation of monetary income or of herd sizes is going to be the dominant strategy in Soebatsfontein. This will have a significant impact on the maintenance or rehabilitation of the biodiversity on the commonage.

Incentives for biodiversity conservation could increase if the initiatives of community members, the Namaqua National Park and BIOTA succeed in generating tourism related income. Tourism is a growing sector not only in Namaqualand (SPP 1996). Income from eco-tourism would be a direct incentive to keep the environment in good condition.

The analysis of the capital availability and motives of resource use show that the Soebatsfontein community generally has good preconditions for sustainable natural resource management. The community is not strongly dependent on intensive and unsustainable resource use practices. In comparison with communal farmers in the Namibian case studies, the population is well equipped with financial, physical and even human capital. It is also important to note that the residents are acquainted with more commercial farming methods. This experience influences motives of livestock keeping and steers farmers towards farming practices which put only moderate pressure on natural resources. As a result of moderate capital availability and more progressive livestock keeping motives, efforts to maintain biodiversity have to focus on the institutional setting. The following chapter will describe the institutional developments of today's Soebatsfontein commonage.

### **7.3 Institutions**

Due to the short farming history of the Soebatsfontein community, it is important to pay special attention to the historic management of the land. The history of use rights and the way livestock was managed became strongly influenced by colonisation since the middle of the 19<sup>th</sup> century (RSA 2001a). Before 2000, no land belonged to the non-white population of Soebatsfontein. The settlement was a labour pool for surrounding private farms and mining companies. In order to secure at least residential rights for the unemployed, in 1954 the United Reformed Church bought a small piece of land where pensioners, in particular could live (SPP 1995).

Before today's Soebatsfontein commonage was bought by the Cape Coast Exploration Company, it was owned by white farmers. In the early 1920s, the company acquired full

ownership rights over the land. Cape Cost Exploration and its successor De Beers wanted to secure mining rights. Therefore the former owner could stay on the farm and manage it on a leasehold basis. De Beers made no profit from the farming business and for a long time paid little attention to the management of their land. The only things tenants were not allowed to do were ploughing the land and removing any soil without permission in order to avoid diamond quarrying. Leasing contracts were for a maximum five years. Nonetheless, use rights were relatively secure. Only in rare cases have contracts not been renewed.

From the start, De Beers protected game on the farms. Hunting restrictions worked well. Problems occurred with regard to grazing resources. Some farmers rather exploited the leased land since they had no security to benefit from long term investments. To stop the exploitation of these farms, the Extension Office of the Department of Agriculture became active in the 1970s. Under the Soil Conservation Act, farming instructions were given to tenants who heavily overused their farms. Optimistic estimates of carrying capacities were revised and farmers had to reduce stocking rates. In 1982, the former extension officer Floors Brand joined De Beers and took over the companies' farming management.

Laws such as the Soil Conservation Act No. 45 of 1946 did not protect natural resources efficiently. In the 1980s, the company changed its renting policy in order to motivate farmers to invest in the De Beers property and to preserve natural resources. A rent was charged which increased over the years up to approximately US\$5 per SSU. The farmers could choose, whether they wanted to pay De Beers in cash or invest in infrastructure. It was also possible to "pay" in advance, if major investments were planned. Since the rent had to be paid per head of livestock there was also an incentive to reduce livestock numbers. Apart from these measures, De Beers also prescribed carrying capacities.

After 1971, all farms in the surroundings of Soebatsfontein were incorporated by De Beers in order to experiment with improved farming practices. Since 1986, every single move from one camp to another has been recorded in grazing days. Such records also exist for the Soebatsfontein farm (see Figure 56). They show that the today's commonage was intensively used, but seldom above the recommended carrying capacity.

De Beers used a rotational camp management with no kraals or stock posts. Livestock was moved relatively often from one camp to another. Problems arose if camps were not grazed

equally because of water points or fences. Transects analysis in Soebatsfontein show the signs of past intensive use especially around water points. An almost linear increase of species with growing distance from the water points can be observed. Particularly the richness of succulent plants lessens the closer one gets to watering places (Tene 2004). The decisions where to put fences and water facilities are very important for the preservation of grazing resources. Since the 1970s, more watering places have been installed in order to distribute the pressure.

At the end of the 1990s, the South African government made funds available for the acquisition of today's Soebatsfontein municipal commonages for the purpose of establishing agricultural lease schemes particularly for the benefits of the poor (Turner & Ibsen 2000: 27). In 2000, the land was handed over to the community. The following chapters will describe today's institutional framework of the commonage's natural resource use.

### **7.3.1 The role of land ownership**

Ownership of the Soebatsfontein commonage is vested in the municipality of Kamiesberg. All newly acquired commonages in Namaqualand are owned and administered by municipal authorities (Rohde et al. 2001: 10). One can talk, however, only about a restricted form of ownership. The land must be used for the benefits of Soebatsfontein residents. This fact is very important since it contributes to the security feeling of use rights (see chapter 7.3.2). Restricted state ownership in combination with secure leasing contracts provides planning security for the farmers and incentives for nature conservation. One must, however, consider the signal effects of state tenure. Farmers automatically feel less responsible for the land and the owner, the municipality is legally obliged to control resource use.

Any South African person or community whose tenure of land is legally insecure as a result of past racially discriminatory laws or practices is constitutionally and according to the Communal Land Rights Act entitled to tenure which is legally secure (RSA 1996: sec. 25 (6); RSA 2004a: 4. (1); RSA 2004b: 4; see also SPP 1996; Kepe et al. 2003: 7). Tenure is thereby referred to as insecure if it is owned by the state and held in trust for the occupants (Kepe et al. 2003: 7). Everybody shall occupy land under a unitary legally-validated system of landholdings (Rohde et al. 2000a: 260). Upon registration of community rules, a community becomes a legal entity and hold rights, incur obligations and dispose of movable and immovable property (RSA 2004a: sec. 3). Communal land shall no longer be paternalistically registered in the name of traditional leaders, traditional councils, the State or held in trust by the Minister for Agriculture and Land Affairs (RSA 2004b: 4). In the past, communities' land

rights were often informal and unregistered and had a low legal and social status (RSA 2004b: 12). In future, land shall be held communally or individually in the name of a person or household or a family in title. A mixture of such tenure types is possible. (RSA 2004b: 4). The National Government is committed to transferring communal land ownership to a person or community because such a person or community has a constitutional entitlement to legal tenure and to own land independent of the State or the State functionaries (RSA 2004b: 14).

The White Paper on Land Policy proposes that citizens should be allowed to choose the form of tenure system which is most appropriate to their needs and conditions (RSA 1997a; SPP 1996). In community meetings in the middle of the 1990s, residents of former Namaqualand reserves agreed that land should fall under the ownership of community trusts (SPP 1994). The Soebatsfontein community was also informed about land reform choices in 2000 (RSA 2001a). Despite other legal options and in contradiction to South African tenure reform legislation, no Namaqualand reserve has been transferred to communities but all are held again in trust by the government. This is all the more surprising as municipal commonages were initially there to support poor urban and peri-urban residents (Turner & Ibsen 2000: 27). Particularly in the Northern Cape, the scheme was used to redistribute land not to urban but to rural communities (Turner & Ibsen 2000: 27). The NGO Surplus Peoples Project argued that the local government is the most appropriate structure to manage communal resources because it reduces the scope for power abuse of community organisations (SPP 1994). This strategy copies, however, the old paternalistic tenure system which goes against the constitution and the ideas of the tenure reform.

Government officials perceive that they need control over the land in order to use it for main commonage purposes: a) to provide access to land for supplementing income and b) as a stepping stone for emergent farmers (Turner & Ibsen 2000: 44). The Commonage Policy of Namaqualand defines three main objectives: social equity, environmental sustainability and restructuring of commonage management (Rohde et al. 2001: 12). Government officials argue that the government can only play a role in local development if it owns the land. The South African Constitution obliges local government, however, to ensure the provision of services to communities, to promote social and economical development and to promote a safe and healthy environment (RSA 1996: sec. 152 (1)(b); RSA 2000: sec. 4(2)(f), (g), (i); Lebert & Westaway 2000). The Communal Land Rights Act stipulates that no law can forbid a municipality from providing services and development infrastructure on communal land

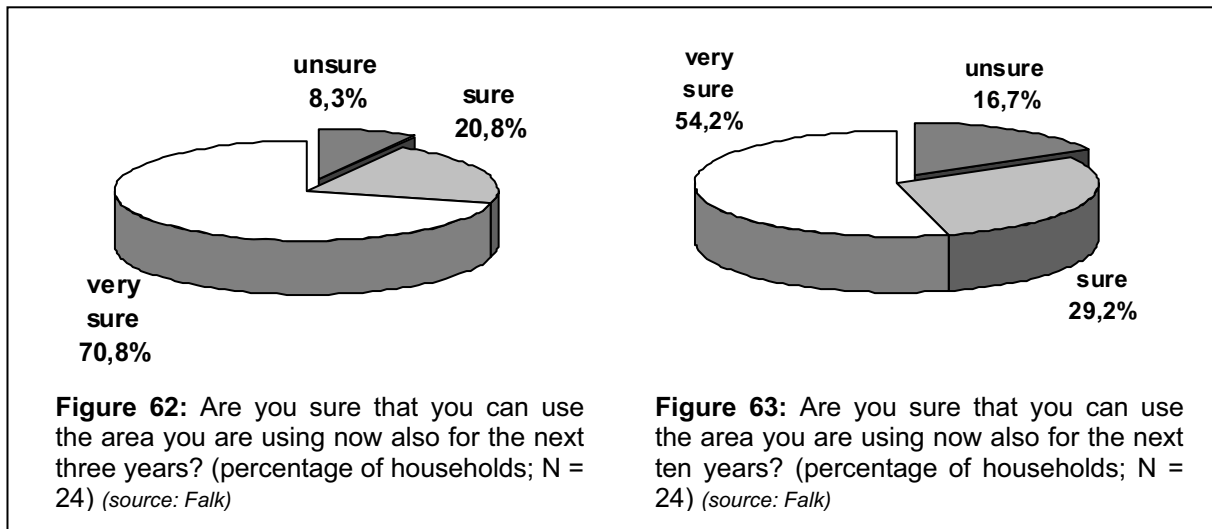
however held or owned (RSA 2004a: 37). The analysis shows that neither the government nor involved NGOs trust communities. Both stakeholders preferred stronger state control. The fact that the government again keeps the land in trust is an insult to local communities who feel they are being treated like minors (RSA 2001a).

### **7.3.2 Access regulations and security of use rights**

The restricted form of ownership is reflected in the Grazing Regulations. The Grazing Regulations oblige the municipality to improve the access especially of poor, disadvantaged and female members of the community (RSA 2002 § 11). There is no doubt amongst the various stakeholders, that the land is supposed to be used only by residents of Soebatsfontein. Eleven out of twelve farmers were sure that only people from the village may use it for farming and fire wood collection. Ninety percent were sure that the elected commonage committee and the municipality can prevent somebody from using it. Soebatsfontein residents believe that neither the committee nor the municipality can deny them access to the land as long as they follow the terms of the contract, the Management Plan and the Grazing Regulations.

The Grazing Regulations give the municipality the ultimate power to allow and deny access to the commonage. Access criteria are residency in Soebatsfontein, the carrying capacity of the land, the production capacity of the farmer, the neediness of the farmer and her/his history of commonage use. A farmer earning more than approximately US\$ 180 per month can be excluded from the land. The municipality has the power to specify and change access criteria (RSA 2002: sec. 12). Farmers have to agree to the rules of the Management Plan and the Grazing Regulations as well as to pay the grazing fee by signing a contract with the municipality. The grazing contract specifies the camp to be used and the period of the contract (RSA 2001b). Farmers always get access to two camps which they can use together with the other camp occupiers for rotational grazing. Livestock which has no right to be on the land can be confiscated by the municipality (RSA 2002 § 30).

Most farmers are very sure that they can use the land for the coming three to ten years (see Figure 62 & 63). They believe they have a lifelong right to use it. An important source of security is the contract between the municipality and the individual farmer. Commonage users feel very secure as long as they comply with the provisions of the contract, laws and by-laws. Paying grazing fees also has a positive impact. Farmers believe that they have the right to use the land because they are paying the fees. As long as the community does everything right,



the municipality can not chase them away. The government would need very good reasons to deny a resident access the land which has been bought for the benefits of the community.

The most important source of insecurity is the fact that the land was owned by the government. Especially when looking at the next ten years, some respondents felt apprehensive what might happen if the government changes. Some farmers also see the growing stock numbers on the commonage as a source of risk. Will there be enough space for their animals if more and more people keep livestock on the land? Since the land is supposed to be used by the poorest people in the settlement there are some constraints for wealthier community members. If poorer farmers increase their number of animals, then the wealthier ones will probably have to remove their stock. This situation could explain why farmers with higher livestock numbers feel more insecure about their use rights.<sup>112</sup>

The security of use rights is also affected by the rule that grazing rights can not be inherited. If a livestock owner passes away, the inheritors have to apply for grazing permission again. Inheritors can be forced to sell livestock if they already own animals and these together with the ones they have inherited exceed the maximum number of livestock allowed (RSA 2002 § 22). The rule guarantees equitable land access to all residents of Soebatsfontein. Nonetheless, it reduces incentives for current users to make long-term investments in the land.

Some farmers mentioned rainfall and climate change as an increasingly important risk particularly in a situation of growing stocking rates. Some respondents stated sarcastically that the jackals are the ones who benefit most from the land because they killed so many lambs in 2002. No stockposts were allowed then in the camps and the young stock was not even safe at



night in a kraal. Changing that rule in 2003 did not only reduce the mortality rate of lambs but also increased the number of farm workers. These became an important group of beneficiaries of the commonage. In 2003, almost half the farmers (44 percent) stated that paid herders worked in their camps. Livestock owners who are not permanently staying in the village are more likely to employ farm workers. Owners of larger herds are also more likely to have shepherds working for them. In general, one can observe that those farmers who have more access to physical and financial capital are the ones employing workers.<sup>113</sup> Payment schemes vary significantly. Some farmers employ relatives who they pay in kind while others pay up to US\$ 100 a month and still provide food and accommodation.

### **7.3.3 Resource use regulations**

As mentioned above, state ownership of the land gives the government the power to control what happens on it (SPP 1994). Legislative competence for municipal commonages rests with provincial and municipal authorities (RSA 1997a). The 2002 Grazing Regulations of the Kamiesberg Municipality give the municipality far reaching power to decide over the use of the commonage (RSA 2002). The municipality developed various regulations in cooperation with the community and national NGOs such as Legal Resource Centre and Surplus Peoples Project. Examples are the Soebatsfontein Management Plan and individual contracts between the farmer and the municipality. The agreement on a management plan between the local authority and the community was a precondition for giving the community access to the land (Rohde et al. 2000b: 344). Apart from the municipality, Soebatsfontein residents also mentioned the commonage committee and farmers as decision making authorities. Particularly for livestock management including herding, stock posts and camp management the farmers feel they are responsible. The elected commonage committee is, however, only supposed to implement the Management Plan and Grazing Regulations. It is only an advisory and executive panel for local government (Rohde et al. 2000a: 260) but does not have the power to make, change or abolish institutions.

Farmers are aware of the limitations of the carrying capacity and that collecting firewood is forbidden. The Grazing Regulations permit the municipality to limit the maximum number of animals per farmer (RSA 2002 § 9). In Soebatsfontein, this is 150 SSU. It was, however, agreed not to implement this rule as long as the carrying capacity of the land is not exceeded. Permission of the municipality is required for (RSA 2002): removing stones or soil from the land, mining, putting up fences or other structures, ploughing the land, collecting, cutting or burning any vegetation including fire wood, hunting (with the exception of problem animals

such as jackals and caracals), keeping pigs outside of kraals and keeping ostriches (RSA 2002 § 28). The community must only be informed and consulted about laws and actions of the government (RSA 2002 § 17, 32). In 2004, the grazing pressure was still low and only few farmers complained about scarce grazing resources due to other farmers' livestock. This is why grazing and access restrictions have not (yet) been contested.

The Grazing Regulations oblige the municipality to maintain the commonage infrastructure (RSA 2002 § 13). Maintenance is supposed to be financed by maintenance fees which each farmer pays per head of livestock (2002 to 0.50 R/SSU). Some observers worry that if land was to be held in other than the municipalities' hands, there would be no guarantee that local government would assist in the development, maintenance and management of the land (Pienaar 2000: 330). Government officials state, that the government can deliver public services such as road maintenance, water supply, sanitation and so forth only where it has the ownership (TRAC 1997). This opinion is in contrast to the South African legislation (see Chapter 7.3.1; RSA 1997a). If fences or the water infrastructure break down in Soebatsfontein, the farmers have to inform the municipality. There are two formal opportunities in such cases. Either the municipality repairs the damage or agrees that funds will be made available for the material used by the community. In 2004, tensions increased when urgent measures were needed but often not carried out. Representatives of the local NGO, Surplus Peoples Project, complain that the municipality responds too slowly to community requests. It is a common problem with municipalities in Namaqualand that recommendations of the commonage committees are either not properly discussed, rejected without explanation or approved but no action taken (RSA 2001a). Additionally, the fact that it is the municipality's responsibility to maintain infrastructure supports an attitude of careless behaviour. As a result, first farmers stopped paying the fees. They felt that the municipality had violated the contracts, not fulfilling its investment obligations.

Infrastructure problems were reduced in 2004, when the Land Care Programme of the Department of Agriculture heavily invested in the farm infrastructure. The Land Care Programme's objective is to improve the natural resource management of the Soebatsfontein commonage. The concept is based on experiences in Australia and New Zealand. It promotes the development of a conservation ethic through local-level involvement in environmental decision making (Mohamed 2000a: 169ff). In Soebatsfontein, the programme invests in the community's natural, physical, human, social and financial capital. Training is provided in

sustainable farming practices and resource monitoring methods as well as raising awareness of environmental problems. A number of temporary jobs were created. Up to 2004, the programme's most significant achievements have been investments in farm infrastructure. Additional water points have been established, which reduced stress on the vegetation around the already existing ones. Fences were repaired and new ones put up in order to amplify the management options. The settlement was further supplied with seedlings of key plants. In the framework of this programme, scientists carry out botanical studies in order to get a better understanding of local vegetation dynamics. Little was done to improve the institutional environment for resource management, although a Land Care committee was established as a programme management structure. (see also Turner 2001).

The Land Care programme is the most important aftercare initiative on the redistributed Soebatsfontein commonage. It is worrying that in 2004 a significant portion of the Land Care budget was frozen because farmers removed water tanks from the intended places to commonage pumps where these persons believed the tanks were needed more. This was not done in order to steal them but disturbed the infrastructure development. Some tanks got damaged. It is important that the Land Care programme introduces and enforces rules. It is a problem, however, that the whole community is made responsible for offences committed by individuals. Giving the local Land Care committee legally enforceable rights to find and punish persons who violate Land Care rules would be a more efficient way to achieve the objectives of the initiative. It is incomprehensible that a programme, whose objective is to develop local natural resource management structures, be interrupted when social and moral-based enforcement structures fail to prevent offences. The contributions of the Land Care programme as a main aftercare initiative in Soebatsfontein are urgently needed and any delay of implementation has critical implications for biodiversity maintenance.

Other prominent organisations in Soebatsfontein are the two NGOs Surplus Peoples Project (SPP) and Legal Resource Centre (LRC). They have been intensively involved in the land redistribution process. Without their help, the Soebatsfontein community would probably still not have any access to land. The organisations will, in future, also support local communities if more portions of farm land become available around settlements. SPP and LRC were further involved in the formulation of various commonage use regulations. They provide institutional aftercare of land reform projects but feel they do not have enough manpower and

finances (RSA 2001a). Today SPP is the most recognised voice demanding more responsibility be given to the Soebatsfontein community.

Proper management institutions are crucial for land redistribution projects to be a success. When users create externalities because they can not guarantee ecological sustainability and social justice, government intervention may be necessary. There are many indicators that the Soebatsfontein community needs, at least at present, external support in resource management. No matter who owns the land, local government should take on certain components of land administration (Lebert & Westaway 2000: 245). It must play a controlling role (SPP 1994). South African legislation offers a wide range of instruments to fulfil this function. The Constitution's Bill of Rights protects, for instance, any citizens' rights to equality and non-discrimination, freedom of religion and belief, freedom of movement and residence as well as the right to a protected environment (RSA 1996: sec. 9, 15, 21, 24). Any person has the right to approach a competent court, alleging that a right in the Bill of Rights has been infringed or threatened, and the court may grant appropriate relief (RSA 1996: sec. 38). Soebatsfontein farmers like any South African citizen also operate within the framework of the Soil Conservation Act No. 45 of 1946 or the Conservation of Agricultural Resources Act No. 43 of 1983. A number of regulations were introduced in the 1980s in order to control communal land use, though very few of them have ever been used (RSA 2001a). The Tenure Director of the South African Department of Land Affairs Sibanda, recognises that there is a gap between law and practice (Sibanda 2004b: 19). The notion of representatives of the Ministry of Agriculture and the Kamiesberg Municipality that communal farmers can only be persuaded to recognise rules is a capitulation which does not help the farmers, the government or biodiversity maintenance. Government authorities must make use of their enforcement opportunities, especially if legitimate management structures such as the commonage committee call for it.

Soebatsfontein farmers are little aware of any other laws than those directly related to their land. If a law is not being enforced, then it is useless introducing another which, in turn, will also be ignored. The Grazing Regulations are as ineffective as national law. This becomes obvious in the case of firewood collection (see chapter 7.1.1). The conflict between farmers, non-farming community members and conservationists has not been adequately solved. Residents continue to collect firewood though this is a breach of the Grazing Regulations. Also, a resolution of the commonage committee to forbid wood collection was not enforced.

This example shows that the de facto enforcement of the sophisticated formal institutional framework is low. According to the Municipal Systems Act, the municipality has the authority to conduct prosecutions with respect to contraventions of by-laws, regulations or any legislation administered by the municipality (RSA 2000b: 112). The Grazing Regulations give the municipality the power to track down people violating the formal rules (RSA 2002 § 30). They can be prosecuted or their livestock can be confiscated. However, those who collected firewood without official permission, who stopped paying the grazing fee, or farmers who occupied a camp without the municipality's authorisation were not punished. Municipality officials stated that they can only try to convince people to comply. They argue that if communal land is misused it is often difficult to decide whose fault it is. Representatives of the Department of Agriculture complain about similar problems with enforcing the regular laws. The situation seems to be typical for South African land redistribution projects. Other cases were reported, where sophisticated rules on stocking rates, water rights and firewood collection are ignored because it is unclear who should enforce regulations and the fact that the various stakeholders do not have the power to enforce regulations (Bob & Banoo 2000: 102).

The main reason for this is the fact that both the government and the community can only provide limited institutional services. Transaction costs increase due to the fact that subsidiarity principles are not properly implemented in the governance structure. When users obey the rules, this is due to social and moral-based enforcement. Many rules are accepted because they were prerequisites to accessing the land (Rohde et al. 2001: 13). Too often, however, social control mechanisms are too weak. In these cases, the community has no reliable enforcement option since government lacks the capacity to enforce.

The Communal Land Rights Act offers an institutional alternative which transfers ownership and responsibility for natural resource management to local communities. Communities have to identify governance structures of their own choice and must, subject to any other applicable laws, regulate land use by defining legally binding management rules (RSA 2004a: 19, 21, 24). A local land administration committee is responsible for allocating land, registering land rights, establishing and keeping registers and records, promoting and safeguarding the interests of the community, endeavouring to promote co-operation among community members, assisting the resolution of disputes and continuously liaising with the relevant municipality, Board and any other institution dealing with the provision of services and the

planning and development of the communal land (RSA 2004a: 23(3)). In addition to national legislation, the municipality may reserve rights, which are either in the public interest or necessary in order to protect the land, rights in such land, an owner of such land and a holder of rights (RSA 2004a: 18 (4)). The Act also provides for the establishment of land boards (RSA 2004a: 25(a)). These boards have advisory and control functions (RSA 2004a: 28(1), 40, 41).

Applying the philosophy of the Communal Land Rights Act would improve the natural resource management of the Soebatsfontein commonage. The system strongly follows subsidiarity principles. Communities receive clear signals that they are responsible for the sustainable use of natural resources. Many communal farmers express the wish to accept this responsibility. Their wish is supported by various stakeholders such as the former De Beers farming manager, representatives of the Ministry of Agriculture. The NGO TARC, which is involved in the implementation of Communal Property Associations in the Namaqualand, suggests that the communities should receive support to develop their own operational rules and adopt sanction instruments which can be enforced, first of all, by the group themselves and only in case of failure by external enforcers (TARC 1997). Under the Communal Land Rights Act, the community can look for solutions to their problems in a creative process, which might be facilitated by the government or other stakeholders. The subsidiary approach can make efficient use of the potential of the different stakeholders to provide institutional services. Due to their physical closeness to the resources and their permanent presence, communal resource users are in a better position to monitor resource use (Ostrom 1990: 17). Community participation and a shift of decision making authority towards users are critical factors for successful common resource management and local development (Ostrom 1990: 101; Lebert & Westaway 2000: 246). In cases of conflict, they know best which interests are involved and what the local conditions are. Shifting responsibility for infrastructure maintenance to the users would be an incentive to treat fences and machines more carefully. Institutions, which are the result of accepted local decisions, can be enforced to a large extent by social and moral-based incentives. Although these mechanisms may not always work, in many cases they provide transaction cost efficient enforcement. Where these instruments fail, external enforcement is needed. The commonage committee could fine offenders but could also call on government structures, such as the police or the municipality. Government involvement is only needed if social and moral-based-institutions within the community fail.

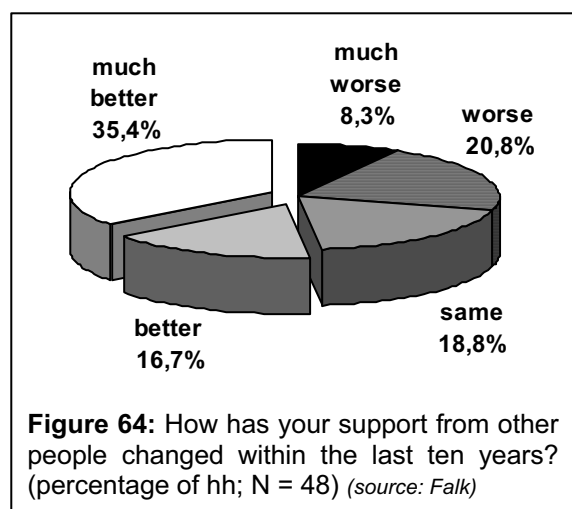
Often local use regulations do not carry the same power as public ones (Pienaar 2000: 335). Pienaar worries that community organisations are transaction cost intensive (Pienaar 2000). Setting them up is especially costly. Negative experiences with abuse and incompetence of so called community organisations such as management boards were interpreted as the general inability of local residents to play a significant role in resource governance (SPP 1994). These structures were, however, never really accepted by the population and rather an instrument of the apartheid system to implement its policies (SPP 1996: 26). One should be also aware that government organisations also incur costs. Formal institutions' costs of administration, limited information, limited monitoring abilities and insufficient sanctioning reliability are often neglected (Ostrom 1990: 10). One needs to be realistic in one's expectations regarding the capacity of local governments particularly in the current transitional phase (SPP 1996; Lebert & Westaway 2000: 245, 247). South African municipalities are often distant, unaware of local conditions and unable to manage relations between people and their resources (Pienaar 2000: 28, 334f).

None of the stakeholders, the district council, the municipality, the local residents, government Departments or NGOs have unlimited human and financial capacities. It is therefore necessary to use and combine their strong points. Neither the shortcomings of the municipality nor those of community organisations should lead to the conclusion that these bodies are unable to play a significant role in governance. Depending on who can best fulfil specific responsibilities, resources should be allocated. The Municipal Systems Act prescribes that the municipality must, within its administrative and financial capacity, delegate responsibilities to the most effective level within the administration (RSA 2000b: 51(k)). The municipal council can develop a system of delegation that maximises administrative and operational efficiency (RSA 2000b: 59(1)). This also means that financial and human resources should be allocated to stakeholders who can most efficiently perform certain resource management and development functions. The performance of the commonage committee can, for instance, be improved if direct individual funds are made available to the providers of institutional services, such as administration, monitoring and enforcement. While it is clear that government officials are paid for their work, it is commonly expected that community members should participate in local governance on a voluntary basis. Community participation boosts the capacity of local government but no compensation for such relief is allocated (SPP 1994). Managing the communal land in order to maintain the long term natural capital of the community is an important and time-consuming task.

### 7.3.4 Local social structures as institutions and capital

Soebatsfontein residents make use of different kinds of social capital even though its potential in the governance process has not yet been fully explored. Almost all heads of household (91 percent) know somebody who would support them in times of trouble. Respondents mainly support relatives and friends and many households are related through kinship and friendship ties. Such networks are important informal institutions (Rohde et al. 2003: 57). Especially households with permanent jobs, higher monetary income, livestock owners and those who are in local positions or committees, support others.<sup>114</sup> More than half of the respondents think that the villagers support each other more than in the past (see Figure 64). Particularly, farmers see an increase in community support.<sup>115</sup> Only a minority believes that the bonds between the people have weakened. Amongst those are especially car owners, respondents who think they can get a loan and heads of household with a higher level of education.<sup>116</sup> The support they receive has probably lessened because the community thinks those better-off can help themselves. They need no support and the community cannot help them with their problems (see also Coleman 2000: 21).

Soebatsfontein has a commonage, a tourism, a land care, a school and a health committee as well as a needlework and a garden project. Farmers founded a farmers union which has the objectives to represent the farmers' interests, organises trainings, promotes nature conservation, raises funds for infrastructure maintenance, organises breeding rams and reduces transaction costs for market information or veterinarian services. Despite such ambitious objectives, most community organisations are not very active. Many of them have been established on the initiative of external organisations such as the government or NGOs. Participation is usually on a voluntary basis and improves if significant individual benefits can be expected. The ever more increasing number of committees increases the risk of becoming bogged down in endless rounds of committee and planning sessions (Corbett & Jones 2000: 18). Almost every week some kind of poorly attended meeting takes place. Despite their unwillingness to participate in decision making, many people complain about decisions made. This reduces the acceptance of resolutions and discourages people from participating in the





decision making. Limited participation and acceptance of decisions is a hazard for various initiatives and projects in the community including proper natural resource management.

In the de facto absence of external enforcement instruments, it is important that the interests of most interest groups are taken into consideration in order to find a sustainable solution which is widely accepted and will be socially and morally enforced. Widespread voting procedures promote such solutions. If one person makes a proposal, two others have to support. The decision is accepted if two people support the proposal and nobody indicates disagreement. Should somebody disagree, the discussion continues until a proposal is made that everybody can agree on. The procedure leads to a soft consensus which is accepted by everybody even if there are other solutions which some of the voters would have preferred (O’Riordan & Kleemann 2002: 103f).

Half of the households have at least one member in a position or function within the community. Thirty percent have a member who is involved in some kind of community committee (see Table 13). Employed people with higher monetary income are more likely to be involved in community organisations.<sup>117</sup> They are highly respected and are perceived to be capable representatives of community interests. Nevertheless, this group of people leave the committees if they see their efforts yield few results. Some have also been dismissed because of they do not attend meetings regularly.

Two third of the villagers stated that they participate in collective actions in the community (see Table 13). At least one third of all respondents did not hesitate to give examples of their engagement. Many collective actions seem to be related to farming. People help each other to take care of the livestock and to maintain infrastructure (see Chapter 7.1.1). The more important livestock is as a source of income, the more likely there is to be participation. Farmers with larger livestock numbers participate more in collective actions.<sup>118</sup> The fact that some of the activities are related to church and old age groups or a choir should not be underestimated. Multiple relations play

**Table 13:** Social capital in Soebatsfontein (N = 55) (source: Falk)

	percentage of households
In case of emergency I would get support from somebody.	90,9
I have any position in the community.	49,1
I am member of a committee.	30,9
I participate in collective activities in the community.	65,5
I think you can influence what is happening in your community.	72,7

an important role in social networks and are a good basis for social enforcement. Such institutions can indirectly support natural resource management.

Soebatsfontein residents do not feel powerless. Almost three fourths believe that they can influence what happens in the village (see Table 13). Especially those in committees think they can influence village life. People with permanent jobs, pensioners and those with higher livestock numbers are the ones who feel most influential. Households depending on remittances feel they have less power. If people consider themselves able to influence what is happening in the community, they are less likely to recognise negative externalities.<sup>119</sup> This shows that those who participate in collective decision making are also able to promote their interests. From the point of view of biodiversity maintenance this is especially important with regard to natural resource management organisations.

### **7.3.5 Community institutions and natural resource management**

The most important natural resource management organisation in Soebatsfontein is the Commonage Committee. It was established by the municipality. The Service Agreement of the Kamiesberg Municipality delegates the following responsibilities to the committee:

- a) Together with the Ministry of Agriculture and the municipality it has to prepare a management plan.
- b) Based on the criteria of the municipality it has to decide on applications of new commonage users and draws up contracts with those who get access.
- c) It has to run a farmers register and can decide about to reduce livestock numbers or to close camps for management purposes.
- d) The committee is supposed to inform the municipality about necessary infrastructure measures and offences against the grazing regulations.

The Service Agreement prescribes that the farmers have to follow the instructions of the Commonage Committee. Committee members are not paid. The committee can, however, apply for funds in order to cover necessary expenses, e.g. for infrastructure maintenance (Kamiesberg Munisipaliteit 2002).

Most farmers accept the commonage committee as a responsible authority of land management even though it is de facto more an implementing organ of government decisions. The municipality limited the committee's responsibilities to a minimum, making it an administrative arm of the government, and controls the committee from the inside. In 2002, a municipality representative was nominated by the municipality to be the chairman of all

commonage committees in the Kamiesberg region. This person is supposed to visit each commonage once a month. Taking his workload into consideration this is far beyond his capacity. In the permanent absence of the chairman there was confusion about the committee's ability to make decisions. This confusion, the lack of support from the government as well as the committee members' lack of experience explain poor performance.

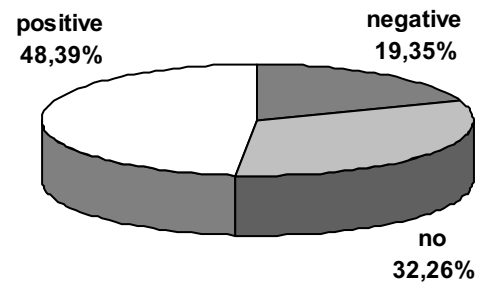
In first conflicts about firewood collection, the non-payment of grazing fees and unauthorised camp occupation, the decisions of the committee were ineffective. Farmers were reported as registering fewer animals than they actually kept on the land. This does not only reduce the grazing fees but also undermines the stocking rate control. Social control mechanisms were too weak to stop such behaviour. Existing laws and bylaws do not give the Commonage Committee enforcement instruments. Reports to the municipality had no effect, although the Service Agreement stipulates that enforcement is the municipality's sole responsibility (Kamiesberg Munisipaliteit 2002). It is important to point out that during the first four years of its history the Soebatsfontein commonage committee had a high turnover of committee members. Many capable members left the committee frustrated because they saw no point participating in an authority with no real power. This further weakened the committee.

Despite these problems, there are also some signs of potential for self-governance. Members of the commonage committee were willing to monitor livestock numbers on a voluntary basis. They could not because they had no transport available. The committee can apply for funds at the municipality in order to fulfil administrative and maintenance tasks but has not done this so far. Some farmers wanted to collect their own resources independently from the municipality fee in order to finance basic management measures. The opposition of farmers against a rule of the management plan also demonstrated their organisational capacity. At the very beginning no stock posts were allowed on the commonage by law. Only one farmer occupied one of the two farmhouses and took care of other farmers' lambs. The rationality of that rule was that stock posts concentrate degradation while a camp management distributes the grazing activities more equally. Many farmers complained about this rule because of large distances to their camps. Studies from other commonages in Namaqualand show that the prohibition of stock posts especially affects poorer households and can even exclude them from land use (Rohde et al. 2001: 14). Since the young stock was moving around in the camp even at night it was easy prey for predators and many lambs got killed. Some Soebatsfontein farmers moved animals to other Namaqualand commonages because of this. After long

discussions, the commonage committee decided to allow a limited number of stock posts with certain restrictions. Now the animals can be kept in a kraal at night and there are fewer losses. The new rule was introduced against the written law. One can argue that this decision does not support biodiversity conservation but it does express the needs of the community. The case shows that the community is able to discuss problems and to find compromises. External enforcement was not necessary since there was little opposition against this rule amongst the farmers. The municipality was not involved in the case but tolerated the decision afterwards.

### 7.3.6 Communal versus individual farm management

Most Soebatsfontein farmers see the advantages of communal farming (see Figure 65). People benefit from helping each other. One person has time to check the animals, the other has a car, the other knows a lot about livestock farming and they share the costs of employing a herder or of buying medicine (see also Marinus 1998a: 98, 108). This reduces the input costs of each farmer by maintaining the same output. The people combine their individual capital in order to optimise the livestock management. Economies of scale can be realised (see also Marinus 1998a: 98). Some even mentioned that they would not be able to afford to keep livestock if it was not managed communally. Another important factor supporting communal resource use is the erratic occurrence of rainfall in the area. Farmers can jointly use those areas of their land which received sufficient rain (Ostrom 1990: 13, Marinus 1998a: 139). Particularly, the capital inputs of wealthier communal farmers in the communal use system are crucial for the whole system (Rohde et al. 2000b: 343; Rohde et al. 2001: 18). More prosperous Soebatsfontein farmers employ workers also for the benefits of the poorer ones.<sup>120</sup>



**Figure 65:** Negative or positive externalities due to others' land use: Do you recognise negative or positive externalities due to other people's land use? (percentage of areas used by households) (N = 31) (source: Falk)

Despite the many advantages of communal land use, many farmers would like their own camp or even a private farm. They think they could improve and better plan the management if there were no other people using the camp. Communal land use requires more co-ordination. Some farmers hope to purchase private farms with the support of land bank credits. Rohde et al. points out, however, that in Namaqualand affirmative action schemes are not profitable for the farmer. Land prices and interest rates of the subsidised land bank loans for acquiring the land are too high to pay back the yearly credit instalments with the annual profits from

livestock sales. A positive annual net-benefit can be expected only if the farmer has considerable non-farming income and does not rely on credits (Rohde et al. 2001: 19f).

The distribution of benefits is important for the relative attractiveness of communal or individual land management. Some community members complain that only a limited number of residents benefits from the land. They believe that everybody should benefit equally. There is no discussion that the benefits from livestock-keeping belong to the livestock owner. Discussing the establishment e.g. of tourist infrastructure is already more complicated. Should some individuals be permitted to start their own tourist business on the land or can this only be done communally? This question is crucial for the success of projects. If the whole community benefits, positive externalities are preassigned and will reduce incentives for initiatives. User groups should receive direct benefit from their activities (Pienaar 2000: 324). A group of residents will only invest in the land if they receive individual and direct returns on their investments. This also includes that the government levies and fees for environmental-friendly activities should be as low as possible. Successful projects on the commonage open new income opportunities even for those residents who did not start the project initially. The aim to create new sources of income as well as to protect biodiversity would be most effectively realised if those who pay the costs also receive the benefits.

### **7.3.7 The Soebatsfontein community and the Namaqua National Park**

The direct vicinity of the Namaqua National Park affects the livelihoods of the Soebatsfontein population and biodiversity maintenance on the commonage. South African conservation authorities are engaged in many projects all over the country with the intention of making parks better neighbours to the adjacent rural population (Turner 2000b: 179). The relation between the Soebatsfontein community and the Namaqua National Park is. Their availability of natural, physical, financial and human capital is positively and negatively affected by the park. The community has high expectations of the park which are difficult to meet.

The most obvious benefit for the village was the purchase of a school building by the park for the community. The class rooms could be moved from a small church to this building. This is an important contribution to the long term investment in human capital and the development of the village. Neither the building nor the surrounding farmland had much value for the park and were in fact very expensive. There was a community meeting to discuss ideas how the building should be used. There are plans to open another park gate there. Accommodation facilities and an information centre are also planned. These measures would attract more

tourists and could create new opportunities for tourism based income in Soebatsfontein. Villagers were encouraged to become involved in the provision of tourist accommodation inside the park and even on the commonage. The park also offers training courses related to tourism and nature conservation. Surprisingly the response was poor and only few people from Soebatsfontein joined the trainings.

A number of villagers are permanently or casually employed in the park. They work as rangers, remove invading plants within the framework of the Work-For-Water program and build or pull down fences either independently or employed by a contractor. The South African Work-for-Water program was launched in 1995 by the Department of Water Affairs and Forestry. The objectives are to conserve ecological integrity, catchments stability and biodiversity. In Soebatsfontein, the programme recovered water being lost to invading plants and created jobs. In 2000, throughout South Africa, 25,000, especially poor people were employed in the framework of the program. It is one of the country's most important public works programmes (Tuxill 1999: 105; Mohamed 2000a: 170; Younge 2002: 180). In addition to ecological improvements and employment opportunities, the citizens of Soebatsfontein benefited because much of the wood from the removed plants was transported to the village to be used as firewood. This reduced, at least temporarily, the pressure on the commonage's wood resources. Nevertheless, some residents had hoped more jobs would be created. The park management complains about the unreliability of some Soebatsfontein workers. Often people whose job it was to remove fences inside the park did not finish the work or only removed the materials which were of use for them.

In chapter 7.1.1 was mentioned that livestock-predator interactions cause tensions between the Namaqua National Park and the community. Many villagers are also unhappy that the park bought most of the farms around the settlement. There was the hope that at least some of this land could be transferred to the community or individual residents (see also SPP 1996). A central problem for both sides seems to be the lack of communication. The difficulties can only be partly explained by the poor telecommunication infrastructure. The park management is disappointed that the people are not grateful for the things the park has done for them. These reasons, coupled with a sense of fairness have led the park to cooperate more closely with other villages around the park.

## 7.4 Conclusion

The Soebatsfontein community is relatively well equipped with various forms of capital. The level of education, in particular, is much higher than in the Namibian case studies. Soebatsfontein residents are relatively independent of natural resource based livelihoods as a result of the past economic system and the availability of capital. Due to the fact that, in the past, many farmers worked on private farms, they are familiar with a wide range of commercial management instruments. This experience influences their attitude towards more commercial livestock keeping strategies.

This situation could be a good starting point for sustainable natural resource management. Despite the government and NGO's well-meant efforts, the present institutional framework does not make use of this potential. The institutional framework of the commonage is very similar to the past patronizing system and does not reflect the philosophy of more progressive South African tenure reforms. The local government monopolises many management responsibilities because it does not trust the community's abilities. The municipality has, however, neither the capacity to fulfil most of its management functions nor to enforce all the laws and by-laws. The situation leads increasingly to a de facto unregulated commonage use. It is worrying that Soebatsfontein could become just another example of failed communal resource management. At the moment, failure can still be averted. The government and the farmers have to discuss the distribution of responsibilities with an open mind. Both stakeholders have to realistically assess its ability to provide institutional services. Costs of the management system have to be distributed between farmers and the government who both will benefit from sustainable resource use. Stakeholders' strengths must be combined and their weaknesses compensated or reduced. There is a realistic chance of establishing an institutional system in Soebatsfontein which can guarantee long term biodiversity maintenance. The Namaqua National Park can be a valuable partner in this process.

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<sup>102</sup>*Spearman-Rho correlation:* „collect firewood“ & „have permanent job“: S-R cc: -0.609; sign.: 0.010; N = 17; „collect firewood“ & „level of monetary income“: S-R cc: -0.557; sign.: 0.020; N = 17.

<sup>103</sup>*Spearman-Rho correlation:* „do hunting“ & „LSU“: S-R cc: 0.657; sign.: 0.004; N = 17; „do hunting“ & „level of monetary income“: S-R cc: 0.605; sign.: 0.010; N = 17; „do hunting“ & „have position in the community“: S-R cc: 0.789; sign.: 0.000; N = 17.

<sup>104</sup>*Spearman-Rho correlation:* „casual work as source of income“ & „other state transfers as source of income“: S-R cc: 0.478; sign.: 0.040; N = 55.

<sup>105</sup>*Spearman-Rho correlation:* „have savings“ & „think can get a loan“: S-R cc: 0.289; sign.: 0.040; N = 51; „level of monetary income“ & „think can get a loan“: S-R cc: 0.291; sign.: 0.038; N = 51; „importance of

- permanent work as source of income“ & „think can get a loan“: S-R cc: 0.366; sign.: 0.008; N = 51; „pension as source of income“ & „think can get a loan“: S-R cc: -0.251; sign.: 0.076; N = 51; „casual work as source of income“ & „think can get a loan“: S-R cc: -0.490; sign.: 0.000; N = 51.
- <sup>106</sup>*Spearman-Rho correlation*: „own livestock“ & „changes to get financial capital“: S-R cc: -0.289; sign.: 0.040; N = 51.
- <sup>107</sup>*Spearman-Rho correlation*: „own livestock“ & „have means of transport“: S-R cc: 0.274; significance: 0.047; N = 53.
- <sup>108</sup>*Spearman-Rho correlation*: „own a car“ & „think can get a loan“: S-R cc: 0.390; sign.: 0.007; N = 47; „own a car“ & „have savings“: S-R cc: 0.566; sign.: 0.000; N = 49.
- <sup>109</sup>*Spearman-Rho correlation*: „education level of household head“ & „have telephone“: S-R cc: 0.283; sign.: 0.040; N = 53; „education level of household head“ & „have savings“: S-R cc: 0.308; sign.: 0.025; N = 53; „education level of hh-head“ & „casual work as source of income“: S-R cc: -0.313; sign.: 0.020; N = 55.
- <sup>110</sup>*Spearman-Rho correlation*: „education level of household head“ & „pension as source of income“: S-R cc: 0.491; sign.: 0.000; N = 55.
- <sup>111</sup>*Spearman-Rho correlation*: „own livestock“ & „permanence of household head“: S-R cc: -0.373; sign.: 0.005; N = 55.
- <sup>112</sup>*Spearman-Rho correlation*: „LSU“ & „security of use rights for coming three years“: S-R cc: -0.565; sign.: 0.003; N = 25; „LSU“ & „security of use rights for coming ten years“: S-R cc: -0.380; sign.: 0.061; N = 25.
- <sup>113</sup>*Spearman-Rho correlation*: „permanence of household head“ & „employ worker“: S-R cc: -0.533; sign.: 0.041; N = 15; „LSU“ & „employ worker“: S-R cc: 0.506; sign.: 0.054; N = 15; „own car“ & „employ worker“: S-R cc: 0.745; sign.: 0.002; N = 14; „have TV“ & „employ worker“: S-R cc: 0.559; sign.: 0.038; N = 14; „have savings“ & „employ worker“: S-R cc: 0.645; sign.: 0.013; N = 14.
- <sup>114</sup>*Spearman-Rho correlation*: “do transfer to others” & “importance of permanent job”: S-R cc: 0.489; sign.: 0.000; N = 47; “do transfer to others” & “level of monetary income”: S-R cc: 0.469; sign.: 0.001; N = 47; “do transfer to others” & “have livestock”: S-R cc: 0.300; sign.: 0.040; N = 47; “do transfer to others” & “have position in community”: S-R cc: 0.407; sign.: 0.005; N = 47; “do transfer to others” & “being in committee”: S-R cc: 0.331; sign.: 0.023; N = 47.
- <sup>115</sup>*Spearman-Rho correlation*: „importance of livestock as source of income“ & „support changed last 10 years“: S-R cc: 0.331; sign.: 0.022; N = 48.
- <sup>116</sup>*Spearman-Rho correlation*: „own a car“ & „support changed last 10 years“: S-R cc: -0.314; sign.: 0.038; N = 44; „think can get a loan“ & „support changed last 10 years“: S-R cc: -0.308; sign.: 0.037; N = 46; „education level of household head“ & „support changed last 10 years“: S-R cc: -0.293; sign.: 0.043; N = 48.
- <sup>117</sup>*Spearman-Rho correlation*: „level of monetary income“ & „having position in community“: S-R cc: 0.280; sign.: 0.040; N = 54; „level of monetary income“ & „being in committee“: S-R cc: 0.304; sign.: 0.025; N = 54; „have work“ & „being in committee“: S-R cc: 0.279; sign.: 0.041; N = 54.
- <sup>118</sup>*Spearman-Rho correlation*: „importance of livestock as source of income“ & „participate in collective actions“: S-R cc: 0.345; sign.: 0.012; N = 52; “LSU of farmers“ & „participate in collective actions“: S-R cc: 0.494; sign.: 0.037; N = 18.
- <sup>119</sup>*Spearman-Rho correlation*: „being in a committee“ & „think can influence“: S-R cc: 0.270; sign.: 0.056; N = 51; „have permanent work“ & „think can influence“: S-R cc: 0.270; sign.: 0.056; N = 51; „receive pension“ & „think can influence“: S-R cc: 0.288; sign.: 0.041; N = 51; „number of LSU“ & „think can influence“: S-R cc: 0.306; sign.: 0.029; N = 51; „importance of remittances as source of income“ & „think can influence“: S-R cc: -0.252; sign.: 0.075; N = 51; „externalities from other people’s land use“ & „being able to influence what happens in the community“: S-R cc: 0.516; sign.: 0.012; N = 23.
- <sup>120</sup>*Spearman-Rho correlation*: „own car“ & „employ worker“: S-R cc: 0.745; sign.: 0.002; N = 14; „have electricity“ & „employ worker“: S-R cc: 0.555; sign.: 0.032; N = 15; „have TV“ & „employ worker“: S-R cc: 0.559; sign.: 0.038; N = 14; „have savings“ & „employ worker“: S-R cc: 0.645; sign.: 0.013; N = 14.



## **8 Comparison of the research sites and inter-regional discussion**

The study presented four communities and showed a very heterogenous situation in Namibian and South African communal areas. In this chapter the assessments presented in Chapters 4 to 7 are summarized and analysed. The results are discussed based on the theoretical framework elaborated in Chapter 2 with special emphasis on the impact on biodiversity maintenance.

### **8.1 Capital availability**

Capital assets vary significantly between the four research sites. The poorer natural resources are, the more important other types of capital become in relative, as well as absolute terms. Capital constraints and opportunities strongly affect, in turn, biodiversity maintenance. The less livelihood alternatives local resource users can develop, the more difficult it is for them to reduce the pressure on natural resources. As a consequence, a reduction of the dependency on ecologically unsustainable livelihood strategies is an important precondition for any successful preservation of biological diversity in the research region. The following Chapter discusses the impact of the availability of natural, financial, physical and human capital on resource users' activities, particularly on those relevant for biodiversity preservation. For reasons explained in Chapter 2 social capital will be assessed as part of the institutional framework in Chapter 8.3.7.

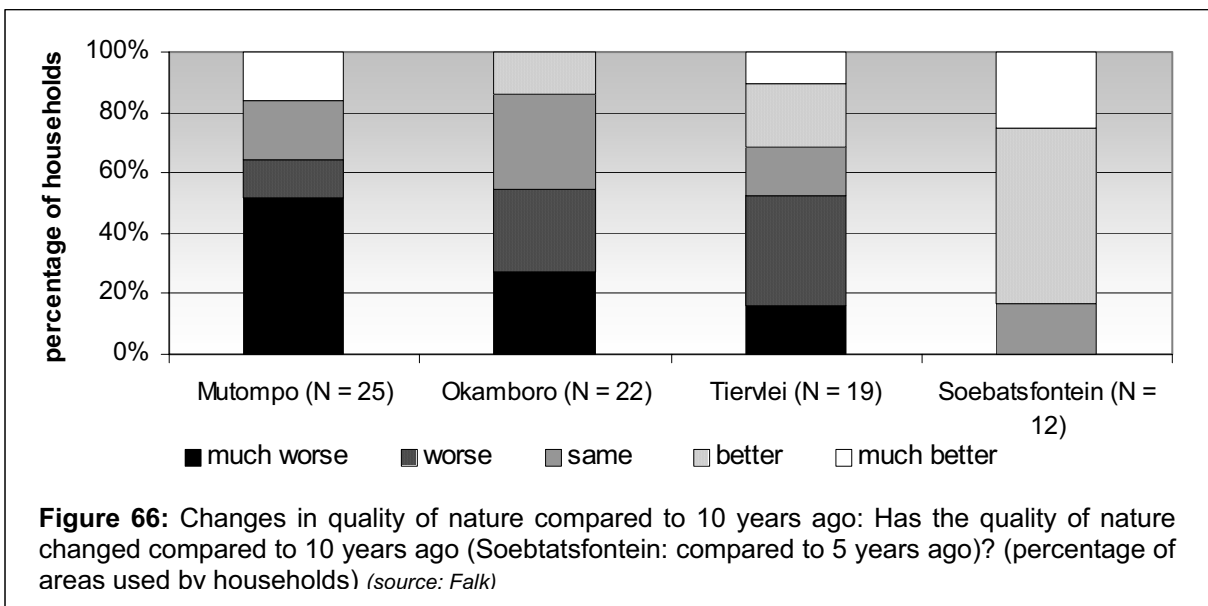
#### **8.1.1 Natural capital**

Many Namibians and South Africans still have no real choice but to seek their livelihood off the land (Adams & Werner 1990: 116). However, opportunities natural resources have to offer vary enormously between the sites selected for case studies along the BIOTA-transect. The main reason for this is the distribution of rainfall. While average rainfall in Mutompo exceeds more than 500 mm, as one moves south the numbers drop to 350 mm in Okamboro, 150 mm in Tiervlei and approximately 100 mm in Soebatsfontein. These precipitation patterns are reflected in the kind of natural resource use activities and their diversity. Only Mutompo residents in the north of Namibia have the opportunity to cultivate crops. They collect a much larger amount and wider variety of wild fruits and other non-timber products. For Mutompo residents wood, thatch, grass and clay are much more important sources of building materials than for those in Okamboro, Tiervlei or Soebatsfontein. Although people in these settlements collect wild fruits and cut wood as well, these are not as important for their

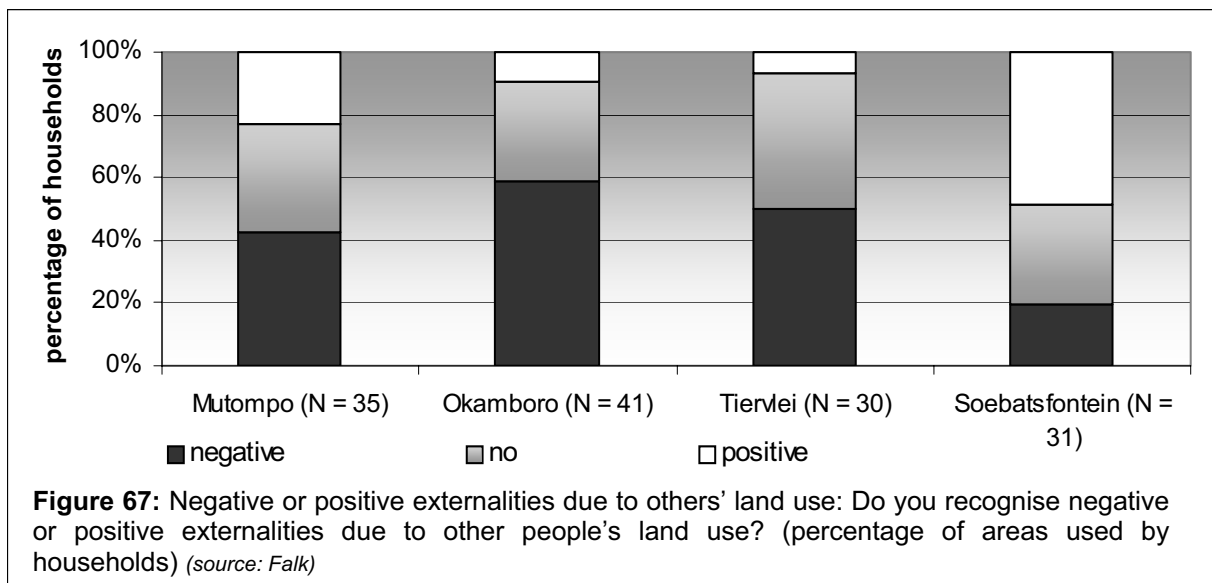
economic well-being as they are in Mutompo. In Soebatsfontein and Tiervlei even the collection of firewood becomes a critically discussed issue and a new threat to biodiversity maintenance. The declining rainfall the further south one goes is also reflected in the stocking rates recommended by the Namibian and South African governments. For Mutompo 9 ha per livestock unit (LSU) is calculated, whereas in Okamboro 11 ha are needed (Mendelsohn et al. 2002), increasing to 37 ha in Tiervlei and 54 ha in Soebatsfontein. In Tiervlei and Soebatsfontein mainly small stock is kept which is better adapted to a semi-desert.

The fact that the population density decreases southwards along the BIOTA transect is connected to the lessening opportunities to make use of natural resources. Nonetheless, Okamboro in Central Namibia has a higher population density (2.2 persons/ km<sup>2</sup>) than Mutompo (2.7 person/km<sup>2</sup>). This can be mainly explained by the poor water supply in Mutompo (see Chapter 4.4.8.2, 8.3.6). The least densely inhabited areas are the Tiervlei farms with only 0.6 persons/km<sup>2</sup>. In Soebatsfontein 1.8 residents have to share one square kilometre, which is quite a lot if one considers the low productivity of the semi-desert environment. It must, however, be taken into account that in 2004 only a minority of villagers made use of the land in the vicinity of the settlement. A majority was either not interested or capable of using it for productive purposes.

Soebatsfontein farmers have a significantly more positive perception regarding the changes in the quality of their pastures than those in Mutompo, Okamboro and Tiervlei (see Figure 66).<sup>121</sup> In addition, they seem better able to maintain this quality advantage, as they



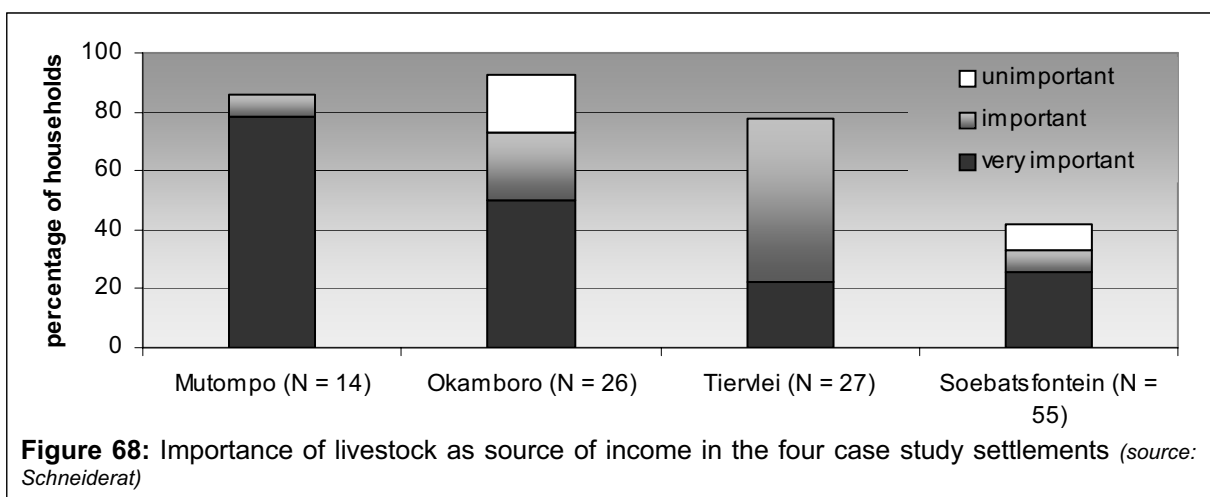
experience significantly less negative effects resulting from uncooperative pasture management or uncontrolled resource use by non-residents than the Okamboro and Tiervlei farmers (see Figure 67).<sup>122</sup> These results are mainly explained by the duration of pasture use in the past, in concrete terms by the fact that the Soebatsfontein commonage was only handed over to the local community in 2000. In this village, residents did not have the financial capital to immediately use the full grazing capacity of the land with the result that the number of livestock on the commonage has only increased slowly since 2000. Particularly in Mutompo and Tiervlei major problems emerged with non-residents who increasingly used common natural resources without the authorisation of traditional and formal legislation. In addition, exclusion of non-residents seems to work best in Soebatsfontein. No significant variances between Mutompo, Okamboro and Tiervlei have been detected as far as externalities and the change in pasture quality are concerned. In these three settlements the perception predominates that the natural resource base is being continuously depleted and thus the basis of their livelihood is being eroded. A general positive correlation can be detected between recognised negative externalities in an area and the resulting degradation of natural resources.<sup>123</sup> This is just one indicator among many, which underline the importance of institutional factors for biodiversity maintenance and poverty reduction. The following chapter will show that the use of natural resources is still a crucial source of income for many respondents, even if residents of the settlements further southwards along the BIOTA transect, where natural resources are few, have found alternative ways of earning their livelihood.



### 8.1.2 Financial capital

Especially in Mutompo, Okamboro and Tiervlei most households keep livestock as easily-disposed asset and therefore main component of financial capital (see Figure 68). In all four researched settlements, it was found that for the majority of respondents, keeping livestock was a significantly more important source of income than permanent jobs or pensions.<sup>124</sup> Nonetheless, the importance of livestock decreases the further south one goes. In comparison with Mutompo, significantly less Tiervlei farmers identify this as an important source of income.<sup>125</sup> In Soebatsfontein keeping livestock is a much less frequent source of income than in the other three villages.<sup>126</sup> The residents of Soebatsfontein have found livelihood alternatives to compensate for the limited farming opportunities (see chapter 8.1.1). Two fifths of Soebatsfontein households receive regular pensions and/or salaries. Especially compared to Okamboro a relatively large percentage of Soebatsfontein residents also depend on regular state transfers, such as unemployment and disability benefits.<sup>127</sup> Keeping livestock becomes particularly important if there are no alternative sources of income. Natural resource-based livelihoods are of major importance to the rural poor, even though they are only a small part of their monetary income (May 2000: 26; Kepe & Cousins 2002). On average, livestock owning households in all four settlements only sold 8 percent of their herds during the period assessed. A household's monetary income is always highest if household members are permanently employed (May 2000: 26; Shackleton et al. 2000a). Job creation is therefore an important strategy to alleviate poverty.

Portfolios of sources of income, again, differ according to agro-ecological zones and socio-economic profiles of the communities (see also Shackleton et al. 2000a: 43). In all settlements, on average 2.7 sources of income have been reported per household. The livelihoods of Mutompo residents who are most dependent on natural resources appear to be



most diversified with a mean number of income sources of 3.4.<sup>128</sup> Such a diversification is the result of household strategies of risk reduction. Mutompo has a relative advantage in terms of natural environment but it was found that those whose livelihood depended on natural resources were often more likely to experience stress and shocks. In the absence of alternatives livestock becomes the most important means to satisfy safety needs even though it is vulnerable to droughts, disease and theft (see also Chapter 8.2). Half of all respondents of the four research sites stated that they were forced to sell their assets such as livestock or crops when they had cash-flow problems.<sup>129</sup> Reducing the dependency on sources of income and instruments of capital accumulation based on natural resources therefore also makes the population less vulnerable. Human capital development plays a crucial role in this context (see chapter 8.1.4). Better educated people do not need to diversify their livelihoods as much as those less educated.<sup>130</sup> Their sources of income are relatively safe and they are able to stabilise their livelihoods. It was generally only regularly employed and better educated respondents who were able to accumulate savings and expected to receive credit.<sup>131</sup> Farmers in Soebatsfontein and Mutompo mentioned the opportunity to borrow money significantly more often than those in Tiervlei.<sup>132</sup> In Soebatsfontein such expectations can be explained with the extensive government Landbank loan program which allows them to buy livestock on credit. By 2003, at least seven Soebatsfontein residents received such loans. Thirty-seven percent of all respondents mentioned generating savings and thirty-five percent saw the opportunity to get loans. In countries with a fragmented capital and credit market, the existing institutional infrastructure strongly influences the ability to get access to credit and to discriminate when giving credit.

Livelihoods of the researched communities are strongly affected by the HIV/AIDS pandemic. Both in Namibia and South Africa, more than one in five people is HIV positive. As a consequence of this the demand for cash diverted to medical and death expenses increased (Campbell et al. 2002: XIII, 116). In the absence of substantial financial resources, the families affected have to overuse natural resources directly; for example medical plants or timber for coffins or indirectly in order to generate cash income for drugs and funerals (Drimie 2000: 16; ABCG 2002: 2). Under existing socio-economic conditions, only a minority of rural residents can fall back on a medical insurance system or on monetary savings (Matanyaire & Timpo 1999: 12). As a result, the families sell their livestock, crops and agricultural production goods such as mechanical equipment to cover the costs generated by HIV/AIDS (hospital fees, traditional healer's fees; transport, special food, funeral

expenses) (Drimie 2000: 8, 13, 15). This threatens their livelihood and food security status, in particular, as livestock and cultivation still have multiple functions in the rural household economy (Matanyaire & Timpo 1999: III, 11, 37; Drimie 2000: 15; see also Chapter 8.2). The whole extended family is affected as it supports several nuclear ones in covering the increasing costs of sickness and death (Matanyaire & Timpo 1999: 35; Mullins 2001: 4). The more HIV/Aids is disseminated in rural society, the more dangerous the impact for biodiversity maintenance due to changing time preferences: Long-term environmental issues and a careful exploitation of nature's capital to ensure its regeneration is ignored by those affected by HIV/Aids as they focus on the more important short-term livelihood problems faced by the remaining family (ABCG 2002: 8).

To summarize, livelihood strategies based on natural resources become more important as source of income and financial capital accumulation the more supportive natural conditions are. Nonetheless, there is a tendency for those who keep livestock without having regular monetary income from employment to be less wealthy and more vulnerable. Lack of employment opportunities and livestock independent savings and insurance instruments make people dependent on the extraction of natural resources. Additionally, indicators show that preferences for a high environmental quality increase with rising per capita income (Schubert & Dietz 2001: 10). This is confirmed by empirical data where employed respondents, for instance, collect firewood from local bushlands and forests less frequently.<sup>133</sup> The dependency on the extraction of natural resources and rural poverty continues to jeopardise attempts at biodiversity maintenance (Corbett & Daniels 1996: 26; Hara et al. 2000: 75; Krugmann 2001: 5; Turner 2001; Ramutsindela 2003: 41). The situation is aggravated by additional problems such as the HIV pandemic.

### **8.1.3 Physical capital**

A lack of physical and social infrastructure remains a severe common problem of Namibian and South African communal areas (Adams & Werner 1990: 109; Shackleton et al. 2000a: 36; Pohamba 2002). All four researched settlements can still only be reached by dirt roads. However, the roads to Okamboro, Tiervlei and Soebatsfontein are regularly maintained and remain of reasonable quality. These three villages also have telephone access. In 2002 Okamboro was even electrified whereas none of the other settlements is yet connected to a power line. Of all sites, Mutompo has the poorest infrastructure. Pump water quickly becomes polluted since it is stored in an open reservoir. Unsafe water is thus one main reason for health problems in the settlement. The water supply in Okamboro, Tiervlei and Soebatsfontein is

considered to be safe, although water has to be collected from taps and water points which are often far away from the households. The main means of transport are still oxen and donkeys. However, in each settlement there are a couple of households who own a car. Most respondents own a radio which is an important way of receiving regional news such as market information and announcements of meetings or funerals which are important for social capital formation. There are no statistically significant variances between the settlements regarding the possession of cars, other means of transport or radios.

Changes in the physical capital base can support both sustainable as well as unsustainable natural resource use practices. Improving roads for instance may reduce the transaction costs for eco-tourism or livestock sales but also of illegal logging. Thus, some of the activities which would lead to negative externalities may have been unattractive in the past only because of high transaction costs and may become more remunerative. Again, if changes in physical capital reduce transaction costs it becomes necessary to establish institutions which contribute to internalising such emerging or increasing negative externalities.

#### **8.1.4 Human capital**

Namibia and South Africa, both inherited an unequal system of education which is to the disadvantage of the majority of the population (Shemeikka 2000: 153, 162). Apartheid policy left the majority of people, in particular in remote rural areas, with little or no formal education (Gatter 2002: 2). In line with this policy, agricultural extension services for communal farmers have also been poor in the past and still are. Family and neighbours therefore were and are the main source of advice; strengthening, on the one hand, the role of local, indigenous knowledge but discouraging, on the other hand the dissemination of external, “modern” technologies in land use (Fuller & Turner 1996: 34).

However, Namibian and South African governments put a lot of emphasis on investing in human capital – also in rural areas. In 1998, Namibian public expenditure for education was 31 percent of overall government spending. Improving access to primary education is of particularly high priority (Shemeikka 2000: 154). Today, the education level of heads of households is significantly higher in Soebatsfontein than in Mutompo and Okamboro.<sup>134</sup> As a result, Soebatsfontein residents show a significantly more positive perception on the improvements of education since the mid 1990s.<sup>135</sup> Despite an on average lower education level in Okamboro, heads of households here are the most eager to learn more about improved farming practices. Mutompo farmers, who probably have the most subsistence oriented

production system and who are worst educated, do not see much need for training e.g. regarding livestock keeping.<sup>136</sup>

There is again a tendency for education levels to increase as one moves south along the BIOTA-transect. The stronger the constraints of natural capital the more important the human capital investments required to create alternative ways of earning a living. Strategies which depend less on natural resources often require more formal education. Independent of such constraints it was observed that in all four communities the households with a low level of education are more reliant on natural resources. Correlation analysis proves that heads of households with poorer education more often see livestock as a very important source of income than the better educated respondents.<sup>137</sup> This is transformed into capital accumulation strategies, as the first group also shows higher livestock numbers.<sup>138</sup> Better educated respondents are less dependent on multiple livestock functions and therefore have less incentive to keep animals. Communal farmers are increasingly recognising the importance of investments in human capital. They sell livestock in order to cover the education costs of their children (RoN 1992). This reduces pressure on natural resources directly through the immediate reduction of livestock numbers and indirectly through the reduction of long-term dependency on natural resource based livelihoods.

Reducing the dependency on natural resource based livelihoods through human capital investments also reduces vulnerability. This is reflected in the fact that better educated households have less diversified livelihood strategies. The higher the educational level of a household the less income sources have been reported.<sup>139</sup> The lower the human capital basis the more important is the diversification of sources of income as a risk-reducing strategy. Education is thus a critical factor for the stabilisation of people's livelihoods.

Risk reduction is of special importance in the context of the HIV/AIDS pandemic which seriously affects the long-term development of human capital in the researched region. As a consequence of a considerable death toll, existing local and formally adopted knowledge and skills are no longer transferred to the next generation (Mullins 2001: 5). The most dramatic consequence is that HIV/AIDS diminishes the workforce of the most productive age group (between 15 and 49 years of age) (Drimie 2000: 2, 8). In the second half of the 1990s the number of deaths in this age group doubled in Namibia (Matanyaire & Timpo 1999: 2). The death of direct income earners is especially problematic (Matanyaire & Timpo 1999: III, 13;



Campbell et al. 2002: 115; ABCG 2002: 2). Pressure on natural resources increases if families lose income components based on active employment (ABCG 2002: 7). The higher the educational level of those affected by HIV/Aids has been in the past, the more severe the impact on family livelihoods. Additionally, attending funerals and taking care of the sick directly disrupts labour allocation devoted to farm work (Matanyaire & Timpo 1999: III, 16) and thus reduces the quantity of human capital available for production purposes.

To summarize, investments in human capital strongly support biodiversity preservation, poverty alleviation and reduce vulnerability. They give people livelihood options such as employment opportunities which are less based on natural resources and promise securer and higher income. This reduces dependency on extractive natural resources utilisation. Investments in human capital will play a very crucial role in the ecologically, economically and socially sustainable development of communal areas in the researched region particularly considering the inherited discriminating education system, high population density in Namibian and South African communal areas and factors such as the HIV pandemic.

## **8.2 Motives of resource use**

In the previous chapter it was argued that at least part of the population in the researched area is highly dependent on livelihood strategies based on natural resources. The main reasons are lack of financial and human capital. The following chapter will show that the satisfaction of a broad range of needs depends on natural resource based sources of income. As mentioned earlier, natural resource-based livelihoods only contribute slightly to the cash income of the rural poor (May 2000: 26; Kepe & Cousins 2002). The study presented here, as well as additional observations in other communal areas in southern Africa, show that off-take rates are low in comparison to commercial farms. In 2001, subsistence agriculture contributed only 1.6 percent to the Namibian GDP (RoN 2002d: 9; see also Shackleton et al. 2000a: 36). Nonetheless, natural resources are used in the different settlements in various ways and generate non-monetary income which, in fact, contributes to the GDP. The importance, for instance, of keeping livestock, crop production or cutting firewood is, however, structurally ignored and underestimated because many goods and services generated by rather 'subsistence-type' household activities are not priced on markets. Communal farmers satisfy a whole range of physiological, social, esteem, cognitive and safety needs and invest in natural, physical and financial capital by using the ecosystems' goods and services.

Need satisfaction and capital investments are generated from a broad range of activities. All researched communities cut wood for fuel, construction material and utility items. They harvest wild fruits, herbs as well as medical plants and use thatching grass and clay (Shackleton et al. 2000a: 44; Dovie et al. 2000: 338f; Ntshona 2000: 318; Ballance et al. 2001; Campbell et al. 2002: 68). It is only in Mutompo that crop production is a central opportunity to satisfy, in particular, physiological needs. Especially in periods of natural and economic stress and unexpected problems such as droughts, bush fires, HIV-infection or unemployment; wild fruits, small game and various other natural goods become important food supplements and sources of cash income (Ashley et al. 1995: 3). Furthermore, certain plants and animals also have cultural and spiritual values and are used for ceremonies (Ntshona 2000: 318). In all researched settlements, the most important resource utilisation is, however, grazing. Motives for keeping livestock have been analysed separately for each settlement and will be compared as well as discussed in the following section.

In all settlements the expressed *preference* for keeping livestock was very high with no statistically significant variance. Tiervlei farmers have a significant higher preference for slaughtering in comparison to the other settlements (see Appendix 15). Okamboro responses indicate a significant preference for selling particularly in comparison with Mutompo ones. Nonetheless, actual selling and slaughtering numbers do not vary significantly between these settlements. Okamboro farmers sell and slaughter a significantly lower percentage of their herds than the Tiervlei ones do, though total marketing numbers are equivalent. In Mutompo the total off-take is significantly lower than in Tiervlei (see Appendix 14 & 15).

It is not surprising that the more livestock a household possesses the more it sells and slaughters.<sup>140</sup> In Okamboro better educated residents with secure non-farm income and larger herds are less keen to keep livestock (see Chapter 5.2). They are already more commercially oriented which could, in the long run, reduce pressure on grazing resources. Okamboro is therefore an example of job creation having a positive impact on biodiversity preservation. In contrast, wealthier and better educated farmers in Tiervlei prefer keeping their herds rather than selling them. In Mutompo and Tiervlei particularly, wealthier respondents perceive themselves as maximising their herd size even if correlation analysis proves that their actual herd size is not higher and their real off-take not lower than those of any other farmer (see Chapter 4.3 & 6.4). In order to interpret such attitudes one has to look more in detail at the motives for keeping livestock.

The farmers' perceptions of how they can best invest in financial capital seem to be of particular importance. Keeping and selling animals is perceived to improve the *monetary income* situation while slaughtering reduces it (see Appendix 15). Nonetheless, particularly the above mentioned employed and better educated Mutompo and Tiervlei farmers believe that selling decreases their financial capital (see Chapter 4.3 & 6.4). The tradition of using livestock as a means of investment and saving (May 2000: 30; Shackleton et al. 2000a: 55; Shackleton et al. 2000b; Rohde et al. 2000: 256) puts additional pressure on grazing resources. The strategy to accumulate capital in livestock can be explained rationally. Cash income is frequently used unproductively because of high transaction costs of alternative saving and investment mechanisms as well as cultural attitudes (Ashley 1996: 12). For instance, relatives and friends continue to deem cash as something which should be shared. This is not as much the case with livestock. The Okamboro example shows that education can change attitudes. In this settlement, the better educated farmers perceive that keeping livestock reduces monetary returns. A commercially oriented class of farmers emerges (see Chapter 5.2). This emphasises again the importance of human capital investments for biodiversity preservation. In addition, a reduction of transaction costs and advertisement of alternative saving opportunities is in the interest of biodiversity preservation and the rural poor who are more dependent on natural resource based livelihoods than employed residents. Job creation alone is insufficient to reduce the pressure on natural resources.

High transaction costs also of alternative insurance mechanisms again in combination with cultural attitudes (Ashley 1996: 12) make livestock a major instrument to satisfy *safety needs* for the rural population in the researched area. Most respondents in the researched settlements believe that a regular off-take has a negative impact on overall *household security* (see Chapter 4.3, 5.2& 6.4). For the same reasons as mentioned above regarding the accumulation of financial capital, the better educated Mutompo farmers in particular believe that off-take makes their lives more insecure. Accumulating capital in terms of livestock is the cheapest and most appropriate kind of insurance they can think of. In Okamboro and Tiervlei no correlation between the feeling of security and type of household could be observed (see Chapter 4.3, 5.2& 6.4). Keeping livestock as an insurance increases pressure on natural resources. Such practices require the accumulation of capital in animals. This is why higher stocking rates make more sense in this case than when the maximisation of cash income is the objective (Swallow & McCarthy 2000: 11; see also Williams et al. 2000: 136).

An analysis of currently available insurance mechanisms has been carried out in order to assess how appropriately such mechanisms could substitute the function of livestock as an insurance instrument. The analysis has been based on expert interviews with representatives of leading insurance companies in Namibia. The analysis first focuses on medical insurances. Routine treatment in government hospitals is strongly subsidised and cheap. This is why there is little incentive for insurance companies to develop relevant products. The capital basis of rural households diminishes very quickly however, if serious illnesses occur, which is particularly relevant in the context of an escalating HIV epidemic (RoN 2002c). At present the most appropriate product is a medical insurance for serious illnesses which covers a married couple and five dependant children up to the age of 21. This product can be combined with a funeral policy with a natural death cover of approximately US\$ 1.250.00 (which is equal to about three cattle).<sup>141</sup> Both insurances come to about US\$16 a month. In order to also cover retirement, disability and death risk a group insurance was hypothetically discussed with representatives of one insurance company. In order to reduce transaction costs the contract partner would not be individual farmers but an organisation such as a farmers union. The union would be responsible for paying the monthly instalments which it would collect from the community members. The monthly costs per household for life insurance cover of approximately US\$1,250 for a household member over 17, US\$625 for a household member between 7 and 16 and US\$315 for a child under 6 one would expect to pay US\$ 7.50. For a disability cover of US\$1,250, payable on condition a household member aged 17 or older is no longer fit to work because they have been disabled by injury or disease, the monthly expected costs per household would be US\$ 3.00. From a certain stage of the development of the disease, AIDS would qualify as a disability. Additionally, a hypothetical retirement fund has been discussed. A net contribution of US\$ 3.00 per month for people over 25 could be accumulated in an investment fund. Out of this fund the person would receive a pension when they reach age 60. Assuming that on average five adults live in a household, each household would have to pay approximately US\$ 40.00 per month for the insurance package outlined above. This is more than the value of one goat. Approximately 1.5 cattle or 16 goats would have to be sold every year in order to cover the annual insurance costs per household. For many communal farmers such an amount is not affordable as they still need complementary cash to buy food, clothes and tools as well as to pay for education costs.

A disadvantage of rural insurance schemes is that most products only insure relatively specific risks while the traditional insurance instrument, which is livestock, can easily be used

universally. Livestock works simultaneously as unemployment, retirement, health, disability, life and funeral insurance (see also Fafchamps et al. 1998; May 2000: 24, 30; Shackleton et al. 2000a: 55; Shackleton et al. 2000b; Claassens 2000: 129; Rohde et al. 2000: 257; Ashley 2000a: 10; SLSA 2001A; Long et al. 2002: 30). Amongst others these livestock functions have to be substituted in order to motivate communal farmers to reduce their livestock numbers. Despite their obvious disadvantages, innovative insurance instruments can contribute to such substitution. Their promotion could be combined with additional incentives to reduce livestock numbers such as grazing fees. Channelling these fees into insurance funds can motivate farmers gradually reduce the pressure on natural resources without putting their livelihoods more at risk.

In Mutompo and Okamboro keeping livestock is perceived to be the best way to improve the *food supply* while Tiervlei respondents would rather sell animals in order to buy victuals (see Chapter 4.3, 5.2& 6.4; see Appendix 15). One explanation is that Mutompo and Okamboro farmers keep mainly cows while Tiervlei ones predominantly own small ruminants. Additionally, Mutompo and Okamboro respondents mainly have long term food security in mind whereas Tiervlei farmers think more about the immediate impact. There is a general tendency for households who do not have regular monetary income and lower education to believe that selling livestock improves their food supply.<sup>142</sup> Due to the lack of alternatives, it is especially the poor who depend on natural resources to satisfy their basic *physiological needs*. As has been pointed out in Chapter 2.2.1.1 poverty increases discount rates. Somebody who simply tries to survive from one day to the next does not care about long term effects e.g. on future food security or biodiversity (OECD 2002: 35). On the one hand, high discount rates give one less of an incentive to maintain or invest in natural capital. On the other hand, pressure on natural resources is reduced when the poor are regularly forced to sell and slaughter livestock. Respondents who have other cash sources do not depend on livestock to satisfy their immediate physiological needs and focus more often on long term food security. This is again an incentive for well-off farmers to maximising the herd size. Linking the long term interests of this section of the population to keep livestock, to the long term preservation of biodiversity requires effective institutions of communal pasture management.

In Mutompo, besides keeping livestock, crop production is also crucial for the satisfaction of basic physiological needs particularly for those residents who do not have employment income. Nonetheless, livestock also plays an important role in the process of crop production

as a means of transport and production. Drought power is needed to cope with labour peaks and reduce the work load. In Okamboro, Tiervlei and Soebatsfontein livestock is only useful as means of transport. Therefore, questions on how livestock off-take affects the *work load* of a household were differently interpreted in Okamboro and Tiervlei than in Mutompo. Mutompo farmers argue that their daily work is easier the more livestock they own while in the other villages a large herd means more farm work. Significance tests prove these regional differences. The fact that, particularly in Mutompo, livestock is important physical capital is again an incentive against commercialisation.

Okamboro farmers complain about higher selling transaction costs than Tiervlei respondents. In Tiervlei, slaughtering is perceived to be more time consuming than in Mutompo. This can be explained by the fact that Tiervlei farmers sell more meat and marketing transaction costs associated with slaughtering are therefore higher. They need more information e.g. about meat prices and potential buyers than farmers in the other villages. Especially in Mutompo slaughtered animals are rather directly consumed (see Chapter 4.3, 5.2& 6.4; see Appendix 15). Marketing transaction costs are not the main reason for communal farmers' low off-take rates. Nevertheless, reducing these costs could encourage more commercialisation of communal farmers and thus reduce pressure on grazing resources.

The discussion of the variables analysed so far indicates that many motives for keeping livestock rather encourage livestock owners to maximise their herd size (see also Shackleton et al. 2000a: 43, 52; Rohde et al. 2000: 256; Campbell et al. 2002: 63). The social environment recognises these motives as well and reinforces a respective strategy. Analysis of informal institutional variables affecting social and esteem needs proved true the hypothesis that the social environment rewards herd size maximisation and disapproves livestock off-take. Southern African communal farmers associate high levels of livestock ownership with an increase in *prestige* and *status* (Fafchamps et al. 1998; Shackleton et al. 2000a: 53). The disapproval of livestock off-take increases the more diverse the motives for keeping livestock and the more important livestock is perceived to be as a livelihood component. In Mutompo, where livestock has most multiple functions and where it is most appreciated as source of income, selling and slaughtering is significantly less approved than it is in Okamboro (see Chapter 4.3, 5.2& 6.4; see Appendix 15). The fact that livestock owners satisfaction of social and self-esteem needs depends greatly on the size of their herds puts additional pressure on natural resources. In order for farmers to reduce livestock numbers, they would have to find

other ways to indicate their status. Alternative status symbols have to be established (e.g. higher education levels of children). Changing the attitudes also within the social environment of livestock owners is a major challenge for biodiversity preservation.

This study proves that the motive structure of at least part of the researched farmers promotes a farming practice which maximises livestock numbers. Most respondents realise, however, that such a strategy reduces their natural capital and therefore in the long run their economical opportunities. There is a generally strong awareness that larger off-take improves water and pasture availability for the remaining herd with no variances between the settlements (see Appendix 15). The recognition that livestock reduction is in turn an investment in natural capital should be taken as another starting point to improve natural resource management.

As already said, much of the attraction of livestock farming lies in the fact that this asset can easily be shifted from one function to another. Many households do not use the whole range of goods and services livestock offers, yet they appreciate having the diverse options should a need arise (Shackleton et al. 2000a: 55). Any initiative which promotes alternatives to existing farming practice such as by improving the productivity of livestock husbandry, wildlife management and utilisation, tourism or commercial forestry still has to be aware of these multiple benefits land users gain from livestock (Ashley et al. 1995: 8; Ashley 1996: 16). Such benefits have to be substituted if alternative natural resource use practices are to be, not only environmentally, but also socially and economically sustainable. Any shift towards a more sustainable alternative will only occur if users are confident that there will be a relative increase in benefits and that these benefits will be immediate.

Comparing the researched villages as well as the different groups of residents within these settlements shows that the multifunctional character of livestock is the higher the fewer assets a household possesses. Less well-off households make use of a larger range of goods and services provided by livestock. In particular the satisfaction of physiological needs is a key motive, which requires, at least to a certain extent, livestock off-take. The majority of communal farmers cannot afford to cater to these needs in any other way (see also Ballance et al. 2001; Dovie et al. 2000: 339; Shackleton et al. 2000a: 48; Crookes 2000: 334). For wealthier farmers keeping livestock is mostly a way of accumulating capital. They mainly satisfy their basic physiological needs by buying goods from their earned monetary income and are therefore less often forced to sell livestock (see also Shackleton et al. 2000a: 52;

Campbell et al. 2002: XI). They even use their salaries and other cash income as capital injection into herd building (Shackleton et al. 2000a: 38). From Herero farmers is reported that in the early 20<sup>th</sup> century the investment in livestock herds was already an important motivation to look for non-farming work in order to earn cash income (Werner 1998: 159; Rao & Stahl 2000: 43; Campbell et al. 2002: XI). As a result, even if livestock plays a less diverse role nowadays in the lives of those employed and better educated southern African farmers, many households with higher off-farm income still tend to own larger herds (Shackleton et al. 2000a: 52). The motive assessment which has been done throughout this study has clearly shown that livestock remains an attractive investment and insurance for employed farmers as well as catering to all their needs, particularly that of self-esteem.

To summarize one can say that, on the one hand, encouraging the villagers to generate non-farming income encourages them to substitute diverse functions of natural resource use. This would make them less dependent on natural resources which, at the moment, are being put under extreme pressure by humans (see also Barrett & Arcese 1998: 462f). On the other hand, income generation and diversification are insufficient in order to reduce pressure on natural resources as long as those who are not dependent on natural resource use still have strong motives to maximise herd sizes. Such motives are particularly related to capital accumulation and the satisfaction of safety needs. It has been discussed that transaction costs of alternative savings and insurance instruments have to be reduced in order to make the substitution of respective livestock functions more probable. Additionally, the Okambo case showed that investments in human capital and changing attitudes can reduce pressure on natural resources. The following chapter will explain that the above proposed interventions also have to be backed by proper institutions which regulate resource use (Schubert & Dietz 2001: 11, 22, 24). In response to the situation where wealthier citizens use communal land as a savings account, the Namibian government for instance, stipulates in the Communal Land Reform Act, that communal land is to be used predominantly by the poor who do not have alternative sources of income (RoN 2002b: 17 (1); LAC 2003: XVII). Alternative income generation, increasing the attractiveness of substitutes, investments in human capital and institutional reforms are strongly interlinked interventions which have to be addressed simultaneously. Poverty, lack of alternatives and poor education together increase the pressure on natural resources and challenge existing institutional arrangements and settings. In this context, communities are more likely to accept breaches of rules in cases where local offenders face hardships (Barrett & Arcese 1998: 450, 462f; Campbell et al. 2002: 114).



### **8.3 The role of institutions**

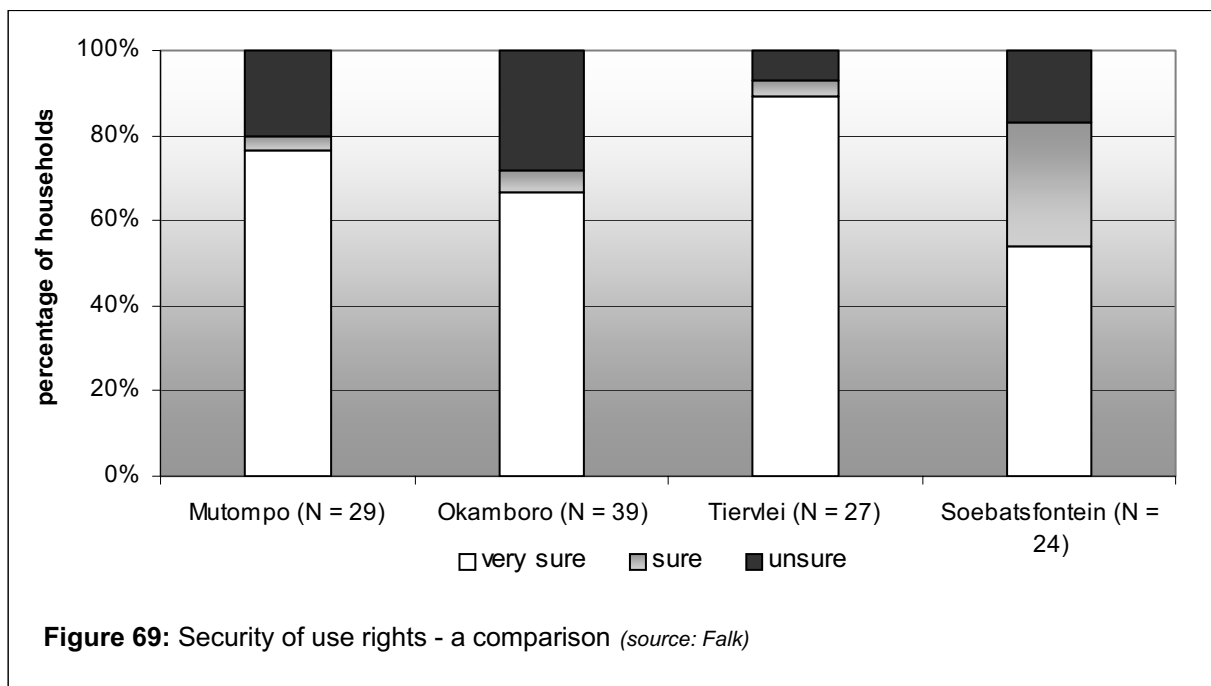
Both Namibia and South Africa, have wholly committed themselves to maintaining biological diversity. The governments stipulate their commitments in the Constitutions, through various laws and by implementing policies (see e.g. RoN 1990: Art. 95(1); RoN 1993b; RoN 1993c; RoN 1994: sec. 1; RoN 1996a: sec. 2(1)(a); RSA 1996: sec. 24; RSA 2000: 4(2)(i), 11(2)(l), 73(2)(d), 74(2)(h); RoN 2002c: sec. 6(9)). They are responsible for protecting the environment and (RoN 2002c: sec. 2) ensuring that current and future generations will benefit from the country's natural resources (RoN 2002c: sec. 6(1); RSA 1996: sec. 24(b)). A direct link between biodiversity maintenance and human welfare is recognised based on these manifold objectives, strategies and instruments applied. The following chapter thus compares and summarises formal and informal institutional incentives for biodiversity maintenance related to the four case study areas.

#### **8.3.1 Ownership and use rights**

The land of all researched Namibian communities is designated communal land and owned by the state (RoN 1998a: 11; see also RoN 2002b: sec 17(1)). Soebatsfontein land in South Africa is owned by the local government of Kamiesberg (see Chapter 7.3.1). In all four case studies state ownership on the communally used land only works as a restricted form of ownership. In none of the researched cases can land be sold or bought. Governments have to administer communal land in trust for the benefit of the local land users working on it (RoN 2002b: 17 (1)). The Commonage Policy of South African Namaqualand has three main objectives: social equity, environmental sustainability and the restructuring of commonage management (Rohde et al. 2001: 12). In this context, the restricted nature of state tenure seems to provide, both in Namibia and South Africa, stable and secured use rights.

Users are therefore, not required to be assigned with formal registered titles as long as rights holders can be confident that local society supports their entitlement to harvest the benefits of their investments (Adams et al. 2000: 111, 113; see also Pienaar 2000: 329). Secured use rights change time preferences of users and give higher value to future benefits which increases incentives to maintain resources such as biodiversity. These legally enforceable rights are necessary for local residents in order to take a very active part in the decision-making process regarding resource use, access and exclusion. At this point, it is crucial to understand property rights as a bundle of rights which can be separately distributed to different stakeholders (de Alessi 1990: 8; Furubotn & Richter 1991: 6; SPP 1994; Allan 1997:

107; Birner 1999; Claassens 2000: 135, 137; Werin 2000: 47; Brousseau & Glachant 2002: 22; Libecap 2002: 140ff; Meinzen-Dick & Pradhan 2002: 6; Okoth-Ogendo 2002; Richter & Furubotn 2003: 90; OECD 2004: 27, 53). It is not uncommon in southern Africa for people to enjoy de facto tenure security under state ownership and to have the opportunity to fully benefit from the land, even in the long run (Adams et al. 2000: 118; Makopi 2000: 145). The farmers derive a strong perception of security from the knowledge that they have been allocated rights to land under customary law (Adams & Werner 1990: 133). The vast majority of land users (71.7 percent) in all four researched settlements is sure they will be allowed to use their grazing areas for the next ten years at least. Very often they said they had lifetime rights regarding the use of the land and that their descendants would be able to claim the same rights. Only in Soebatsfontein did some farmers perceive state ownership as possibly endangering their right of use. In times of rapid reforms they are afraid that changing governments could change their property rights' status again (see Figure 69).



There are contradicting opinions as to whether government or community ownership best facilitates rural infrastructure and service provision. On the one hand, the community can generate more investment incentives if it is the owner and can execute unrestricted ownership rights (Adams et al. 2000: 111). Government ownership discourages local initiative because local people continue to wait for government-sponsored schemes and support from “outside and above” (Adams et al. 2000: 120). This is most obvious in the case of Soebatsfontein but can also be observed in the Namibian settlements. On the other hand, most communities only have limited financial and human capacities to invest in the land. In such a situation

government investments in rural infrastructure and service provision are of utmost importance. This is used as an excuse not to transfer ownership to communities or private persons. Local government officials often argue that government investments are only possible as long as the land belongs to the state and is not communally or privately owned. Such opinions are in contrast to the South African Communal Land Rights Act, which stipulates that no law must prohibit a municipality from providing services and developing infrastructure on communal land whoever holds or owns it (RSA 2004a: 37). The Act therefore knocks out the bottom of the argument of local governments who maintain they are not responsible for investments in infrastructure and service provision on communal land. This creates legal opportunities to transfer ownership to communities and give them investment incentives without overcharging them.

One of the reasons why land ownership is important is that it indicates who is free to make decisions regarding land allocation and use (Adams et al. 2000: 111). Unfortunately, it is still very common for communal farmers to have limited decision-making power regarding the land which they use (Adams et al. 2000: 117; Claassens 2000: 129). State ownership creates confusion amongst communal farmers when it comes to allocating use and decision-making rights. When rights are not clearly assigned, there is a reluctance to invest in resources and assets (Adams et al. 2000: 118). In Okamboro some respondents perceive that they cannot introduce pasture management rules as they live on communal land and only government is authorised to introduce and to change rules. In Soebatsfontein the state ownership has led to an accumulation of responsibilities for land administration by the local government. However, none of the researched settlements have central or local government branches able to de facto manage and administer the use of natural resources. State ownership therefore leads to a situation where neither local residents nor central or local governments take de facto responsibility for managing the natural resources. Ostrom (2005: 130) points out that “(...) where external authorities impose rules but are able to achieve only weak monitoring and sanctioning” management is inefficient. Another disadvantage of pure state ownership is that no land markets for permanent transfers can evolve. Land markets can theoretically lead to a more efficient resource allocation. Agricultural investments and rural development can be promoted if land can, for example, be used as collateral for credits (Turner 2001; LAC 2003: XIII; RSA 2004b: 4, 13). This only applies if the financial infrastructure and complementary credit market value this kind of collateral, which is not the case for the current tenure options of communal farmers in the researched areas. Neither transferable customary land rights

under the Namibian Communal Land Reform Act nor group ownership rights under the South African Communal Land Rights Act are likely to be accepted as collateral. Experiences with South African Communal Property Associations show that private banks and even parastatal financial institutions do not recognise titles held by a group as a tenable tenure basis for lending (TARC 1997). Only freehold tenure rights are considered bankable. Private individual property regimes are, however, difficult to implement in the current situation. There is simply not enough land available to create economically and ecologically sustainable private holdings for every communal farmer (Archer 1993; SPP 1996; Marinus 1998a: 137; Rohde et al. 2000b: 333). In addition, individual ownership is not necessarily the institution which guarantees good land management practices in the face of marginal resource availability, high seasonality and risks. It is communal range management, which has certain advantages in regions with high spatial variability of rainfall distribution. Transaction costs of coordinating resource use in such areas are assumed to be lower under common property regimes than under private ownership (Swallow & McCarthy 2000: 10f; Grell & Kirk 2000: 56; Williams et al. 2000: 135).

Additionally it is questionable whether communal farmers would be willing to use their land as collateral, as there is always the risk of losing the land, which feeds the whole family. If one considers that farmers are reluctant to sell livestock that have multifunctional purposes (see Chapter 8.2) they would probably be even less willing to sell the basis of their livelihood. Therefore in the case of the four researched settlements, improving access to credit markets and creating functioning land markets is not an argument for group ownership of land. That however, does not make it an argument for state ownership either.

To summarize, state ownership in its restricted form creates a situation where the secure rights to use encourages resource maintenance. State ownership seems to encourage governmental infrastructure and service provision although it has been shown that alternative tenure systems must not formally stop the government from providing these services. Given the current situation, it is probably not possible to implement changes in the tenure systems which would significantly improve communal land markets. State ownership has, however, a negative impact on biodiversity preservation when it is not clear who, ultimately, has decision-making power. Land users who have no ownership rights feel they are not responsible for managing the land. Although it is not applicable to any of the areas in this study, the South African Communal Land Rights Act exemplifies a progressive institutional alternative. It does not

only transfer ownership to local communities but also gives them more responsibility regarding local natural resource management. Communities have to identify suitable governance structures of their own choice and have to - subject to any other applicable laws - regulate land use by defining and enforcing legally binding management rules (RSA 2004a: 19, 21, 24). In this process, a local land administration committee is responsible for allocating and registering land rights, establishing and maintaining registers and records, promoting and safeguarding the interests of the community, endeavouring to promote co-operation among community members, assisting in the resolution of emerging disputes and continuously liaising with the relevant municipality and any other stakeholder concerning the provision of services and the planning and development of the communal land (RSA 2004a: 23(3)). Under the South African Communal Land Rights Act, the government has major control functions and only intervenes in a subsidiary way as a superior body, if the community has failed to solve a problem. This helps to save transaction costs by reducing the demand on government management capacities, monitoring and enforcement. Most important for biodiversity maintenance, however, is that communities receive clear signals and incentives that they are the responsible entity for a sustainable use of natural resources. In this context, it must be emphasised that no participatory and subsidiary natural resource management theoretically requires a transfer of ownership right to the users. Communal land management systems such as the one proposed by the South African Communal Land Rights Act can also work under state ownership as long as the government clearly shifts enforceable communal land management rights to land users.

### **8.3.2 Exclusion from and access to natural resources**

Probably the most important land management right is the granting of access to resources. In all researched communal areas rules exist which regulate who is allowed to use resources and who is not. In Soebatsfontein it is mainly the local government which decides who gets access to the commonage. One important precondition is that a potential farmer be a resident of Soebatsfontein. Whether a new person may use a camp for herding strongly depends on the carrying capacity of the plot and its current stocking rate. Current occupants can therefore rest assured with the arrival of newcomers the carrying capacity will not be exceeded and their resource base will be kept intact. This is a strong incentive to use local resources in a sustainable manner. Nonetheless, limited participation rights of local residents remain a very paternalistic way of government control, which does not promote the feeling of responsibility amongst land users.

At the Namibian sites it is mainly customary law that regulates access rights (see also Werner 2000: 247). Therefore, the overwhelming number of Namibian communal farmers ascribes the power to grant access to land to traditional authorities (Fuller & Turner 1996: 3; Hinz 2000a: 88). Although there is no uniform system of land allocation in Namibia (Adams & Werner 1990: 96) it can be said that in all three case studies multi-layer traditional hierarchies exist which are widely accepted. Without the approval of the hompa/chief as well as that of the community members, land cannot be allocated (see also Hinz 1995: 29; Ntsebeza 1999: 17f). An important protection mechanism for biodiversity maintenance is the fact that the granting of access depends on the agreement of local residents (see also Corbett & Daniels 1996: 15) as residents know best whether their local natural resources can sustain another household and whether the new person will fit into the social and economic structure of the settlement. This active participation of the residents further ensures that strangers cannot easily reap the benefits of investments that have been made such as pasture improvements. Again, this works as an incentive to improve range management.

Social- and moral-based sanctions are the main foundation of access regulation in a situation where customary access rights are hardly enforceable by statutory law. The Namibian Traditional Authorities Act of 2000 limits the powers of traditional leaders to the members of their traditional community and those who submit themselves to customary law (RoN 2000b: sec. 14 (b)). This limitation operates as an incentive for them not to allocate land to members of other ethnic groups even if this may contradict the basic principles of the Namibian Constitution (RoN 1990: sec. 10, 21(1) (h)). There is often the fear that customary law conceals ethnic tensions and tribalism because it refers to a specific ethnic group (Mamdani 1996: 184). Any group has incentives to keep an outsider off the land because she/he may disregard basic social values and reciprocal obligations of the group (see also Claassens 2000: 135). This is why somebody is more likely to be granted access to an area if they belong to the same ethnic group and are best friends or relatives of residents (see also Hinz 1995: 41; Fuller & Turner 1996: 20f; Blackie 1999: 12; Rohde et al. 2000b: 335). It is more difficult to enforce social- and moral-based institutions with strangers (see also Heath 1976: 143). The behaviour of “embedded” newcomers such as friends and relatives is easier to predict. Co-operation, which has a positive effect on natural resource management, is therefore more probable amongst those who are related and share similar values. Nonetheless, it is understandable that the central government wants to avoid too strong kinship affiliations and combat ethnic discrimination. In the light of past and ongoing discrimination and

corruption a close look is taken at the practice of giving preference to relatives, friends and members of the same ethnic groups. Policy makers should, however, ask themselves whether the state is really able to replace such experienced and deeply rooted enforcement instruments. Simply not allowing people to give preference to relatives, friends and members of the same group when allocating lands would have direct negative implications on natural resource management and the poverty status of rural poor. Incentives to grant other ethnic groups access to land would increase if local residents and traditional authorities had the right to ensure that the rules of their group also apply to members of other ethnic groups who live in their territory. Such rights would have to be enforced by third parties such as the government. If the residents have legal opportunities to enforce their customary rules, they would be less afraid of an outsider disregarding their values and morals.

There are two Namibian reform laws which show a potential to influence the regulation of access to communal land. One is the Water Resources Management Act; the other is the Communal Land Reform Act. With the rural water supply reform, communities have to establish local water point committees who rule and manage water supply. One of the rights of these water point committees is to decide who is entitled to use water from a water point and under which conditions. In a natural environment where access to water and access to land cannot be separated, this gives a committee a de facto right to determine who uses the land around the water point. One has to be aware that this reform can undermine and conflict with existing institutions regulating access to land, in particular. In all three Namibian settlements, the water reform has already been implemented. So far there have been no significant conflicts between traditional authorities and water point committees. In Tiervlei two fifth of the respondents believe that the water point committee has a say in granting access to land. Farmers emphasise that the right to control access to water strengthened their rights to control access to land. The water point constitution is seen as instrument to legally enforce exclusion, which has positive impacts on natural resource management.

The second reform is the Communal Land Reform Act of 2002. The Communal Land Reform Act strengthens the power of traditional authorities to allocate communal land (RoN 2002b: sec 20, 21). This formalises the de facto power they have in the three observed Namibian communal areas. The Act gives traditional authorities an instrument to legally enforce customary land rights. Invasion of communal land without permission of traditional authorities as happened at the western boarder of Kavango becomes explicitly illegal and

official actions may be instituted for the eviction of invaders (RoN 2002b: 43(2); RoN 2003b: 10(3); Namibian 2003b). Furthermore, the act directly connects grazing rights to residential rights and thus ensures that primarily those people living at the site benefit from the land (RoN 2002b: 29(1); LAC 2002: XVII). In order to protect communal farmers from corrupt traditional authorities, the act stipulates that no consideration, neither in cash nor in kind, is paid for the allocation of customary land rights (RoN 2002b: 42(1)). As another control instrument the act stipulates that a land board must ratify customary farming rights, which have been allocated by traditional authorities (LAC 2003: 17; Werner 2003b: 11). Land boards are supposed to maintain registers of customary land rights with the aim to increase the security of such rights (RoN 2002b: 13; LAC 2003: XVI) and to avoid any duplication of allotted rights. However, the registration process in place causes high transaction cost. Because of these costs current users do not always register their land rights. This makes them vulnerable in a situation where the act gives potential intruders instruments to legally challenge not (yet) registered informal resource use rights of present land users. There is the risk that the requirement to formally register use rights will under the given conditions lead rather to more insecurity for farmers.

Nonetheless, as soon as customary land rights are officially registered, the Communal Land Reform Act – at least de jure – improves the protection of communal farmers against negative externalities arising through socio-economic change and new scarcities. Any granting of customary land rights or rights of leasehold as well as the approval of fences will only be ratified by the land board if other persons who already hold rights to that portion of land are compensated and do agree to the measures (RoN 2003a, RoN 2003c, RoN 2003d, RoN 2003e). In particular, no individual rights will be allocated in the case of land, which is reserved for common usage (RoN 2002b: 4(c), 30(3)(a)). Traditional authorities are entitled to withdraw grazing rights from persons who carry on activities other than lawful grazing of stock, which restricts other residents' exercise of their grazing rights (RoN 2002b: 29(4)(e)). Fences will only be authorised by the land board if they do not interfere with the use of the commonage by other community members (RoN 2002b: 28(8)(b)). The act also stipulates that registered customary land rights, in line with the Communal Land Reform Act, can be inherited. This overrules customary rights that require the return of the land to traditional authorities in case of the death of the right holder (see also Hinz 2000a: 133). With newly defined tenure systems, increasing population pressure and a lack of non-agricultural employment, the question of inheritance of use rights on communally managed land becomes



more important. In general, the opportunities to inherit property rights to natural capital provide incentive to maintain the capital base. Current users feel, through social institutions, (see Chapter 2.3.4.3) more inclined to hand over productive resources to relatives and descendants. Such long-term incentives to maintain natural resources reduce discount rates of resource users and therefore support biodiversity preservation. The Namibian Communal Land Reform Act stipulates that customary land rights last a lifetime (RoN 2002b: 26(1)). It further specifies that once assigned, customary land rights must be allocated to the surviving spouse. Children can inherit these rights only in accordance to customary law (RoN 2002b: 26(2)). According to these customary regulations in all three observed Namibian communal areas residential and grazing rights can be inherited by persons who were already living on the land when the right holder passed away. In any other case the relatives of the deceased have to apply for residency following local customary rules. In the Namibian cases customary and statutory law increase incentives for long-term maintenance of natural capital. The situation looks slightly different in Soebatsfontein/South Africa. Here, land use rights can explicitly not be inherited according to the grazing regulations (RSA 2002 § 22). In this way, access to the commonage also remains open for future residents who are not using the land at the moment. Not being able to inherit, however, reduces incentives to maintain long-term resources for the above-mentioned reasons.

The fact that under the Communal Land Reform Act traditional authorities will be controlled by land boards is often interpreted as a loss of their power (Corbett & Jones 2000: 4, 11; Jones & Mosimane 2000: 10). It is a major shortcoming of the act that it does not explicitly recognise residents' rights to decide over the access to and use of natural resources. The reform, in its current form, shifts powers for land allocation to the regional level of government and to traditional authority rather than to local levels such as local land users (Blackie 1999: 12). Land boards are the only instrument for the central government to control communal land administration. The reform therefore has a centralising component and the hegemonic approach continues (Rohde et al. 2000b: 343f). Customary law, which provides different control mechanisms for traditional authorities' actions, is not mentioned as a guiding principle. Under the new act, it is legally possible for a person to receive a formal residential right to a settlement from a traditional authority without consulting the residents of the place in question. This person would be allowed to take her/his livestock to this place again without consulting other residents (RoN 2002b: 29(1)). Traditional authorities may even grant grazing rights to non-residents without consulting the residents (RoN 2002b: 29(3)).

In this context one should point out that land boards are not elected bodies. They are established by decree of the Minister of Lands, Resettlement and Rehabilitation and consist of an exactly prescribed number of stakeholders (traditional authorities, farmers unions, government officials, women, representatives of conservancies (RoN 2002b: 2(1), 4(1)). It is very questionable whether they will have the human and financial capacity to fulfil their complex control functions which have been exercised before by multi-layer traditional authorities and subsidiary customary law structures which included the decision making rights of local residents. The exclusive delegation of the control of customary land allocation to the board incurs high transaction costs. There is the danger that local residents could be expropriated of some of their rights; in particular of customary rights to determine the access to and exclusion from their natural resources. These are the rights, which are of major importance for biodiversity management (see also Corbett & Daniels 1996: 15). Formally recognising local residents' right to decide on access to, exclusion from and utilisation of natural resources in the settlement territory would have been a valuable incentive for users to improve resource management.

### **8.3.3 Regulation of livestock numbers and pasture management**

Particularly at the Namibian research sites controlling access to land is the only way to regulate stocking rates. Permanent residents of the settlements can keep as much livestock as they want. Their only limitation is the grazing on the land. Years with poor rainfall lead to significant livestock losses especially in Okambo and Tiervlei where stocking rates are high and above the recommended numbers. Traditional means of pasture control have not adapted to conditions of acute water and land shortage. They do not produce effective mechanisms to sufficiently limit livestock numbers on communal land (Adams & Werner 1990: 96).

Grazing fees have been common in Namibian communal areas and accepted if the proceeds were directly used for the benefits of the residents (Adams & Werner 1990: 109). Historic attempts of various governments to impose controlled grazing practices have been, however, very unpopular (Campbell et al. 2002: 137) as reported for instance from the Ovitoto reserve. Farmers easily find ways to avoid the regulations (Wagner 1957: 36f, 45ff). The enforcement of rules and regulations is especially ineffective when social and moral-based institutions rather reward a maximisation strategy of livestock numbers. The analysis of informal institutional variables, affecting social and esteem needs, proved the hypothesis to be true that the farmers' social environment rather rewards herd size maximisation and disapproves off-take (see Chapter 8.2). Disapproving off-take increases the pressure on natural resources.

In Soebatsfontein, the municipality formally regulates stocking rates and pasture management. Who receives access to which camp strongly depends on the remaining carrying capacity of an area. In 2004, the grazing pressure was still low and only few farmers complained about scarce grazing resources due to other farmers' livestock. This is why grazing and access restrictions have not yet been contested. This can, however, change in future and it is not clear whether the municipality will be able to control range management effectively. It can theoretically confiscate livestock as punishment for violating the rules. This is however, a rare occurrence on other commonages in the region. Municipality officials state that they can only try to persuade herders. They argue that it is difficult to find the culprits if communal land is misused. Representatives of the Department of Agriculture complain about similar problems with enforcing national laws. The situation seems to be typical for South African land redistribution projects. Sophisticated rules on stocking rates, water rights and firewood collection are ignored because it is not clear who has to enforce regulations. Often no stakeholder has the necessary capacity to provide monitoring and enforcement services (Bob & Banoo 2000: 102).

Experiences with attempts of apartheid governments to impose controlled grazing practices have shown that stocking rates control on communal land requires a high degree of acceptance amongst the farmers. Progressive grazing fees can be a valuable instrument to increase incentives for livestock off-take and to finance, for example, community based institutions, promote education especially of the poor or to invest in services to substitute livestock functions (e.g. insurance schemes). The extremely high transaction costs to externally control livestock numbers make it, however, indispensable that farmers really want such limitations to be imposed and that they are willing to enforce them internally. To do this, the Namibian Communal Land Reform Act gives traditional authorities the power to impose such regulations of land use (RoN 2002b: 29). This could be a solution in many Namibian communal areas where traditional authorities are well accepted (such as in Mutombo and Okambo). In order to make the most efficient use of existing social and moral-based institutions, residents should choose under which structure they want to be governed. The South African Communal Land Rights Act considers this possibility (RSA 2004a: sec. 21 (2)). The community has to create and adopt community rules and appoint a community organisation, which administers the land (RSA 2004a: sec. 19, 21, 24). Social and moral-based institutions reduce the need for external enforcement and in turn transaction costs of natural resource management. Only in cases where the informal institutions have proved to be

inefficient, must the community have the chance to call for government support. The Namibian Communal Land Reform Act, for instance, transfers exclusive and legally enforceable pasture use rights to the residents of the settlement to which the pasture belongs (RoN 2002b: 29 (1)). The South African Communal Land Rights Act gives communities the authority to control natural resource use (RSA 2004a: sec. 19, 21, 24). Such transfers and legalisation of rights, provide incentives for local residents to maintain resources.

The analysis of pasture distribution in Mutompo and Okamboro shows that differentiated informal pasture management practices exist. This is not uncommon and has been reported as well from other Namibian communal areas (Fuller & Turner 1996: 40). In Mutompo, herders let certain areas rest to improve pasture productivity on fallow plots. This is done after the first rains when fresh grass is growing. Additionally, strategic grazing areas have been identified. They are mainly situated far away from neighbouring settlements and where borders are clearly identifiable and rather fixed. Grazing areas closer to neighbouring villages are avoided especially during the cropping season. During this time livestock owners worry that their stock could damage fields. While Mutompo households delimit their pastures mainly from neighbouring settlements, Okamboro land is also distributed within the community. On the one hand, each household uses only certain parts of the Okamboro territory with informal rules and social conventions preventing them from letting them graze their stock in adjacent areas. This scheme helps to reduce the number of farmers using one place and therefore lowers transaction costs for pasture management agreements. On the other hand, a significant part of the Okamboro territory is already informally privatised by enclosures (see Chapter 8.3.8). In Tiervlei and Soebatsfontein lands from former commercial farms are divided into newly created camp units. Only relatively small groups of farmers use one camp. Therefore it can be said that in all four researched areas, formal and/or informal institutions exist which limit the user group of grazing areas. Sustainable communal range management with positive effects also on biodiversity maintenance is more likely if user groups of clearly defined resources are a rather small and connected through multiple relations. Social- and moral-based institutions work best in such situations.

#### **8.3.4 Regulation of non-grazing resources**

As mentioned above, natural resources in the researched areas are used in various ways. Local residents, particularly those who have no alternative way of generating income, use wood, fruits and wildlife mainly for subsistence purposes. In all researched areas, however, one observes that some residents and non-residents respond to new market opportunities.

Particularly in Mutombo the development of new markets for natural resources results in a growing exploitation of the local resource base. Non-residents commercially harvest valuable timber species and medical plants increasingly. Such developments are not uncommon in southern Africa (Shackleton et al. 2000a: 45; Shackleton et al. 2000b) and a more commercial resource use is, generally, not bad for the natural environment. Further commercialisation set examples for a more sustainable and efficient use of resources if some key conditions, such as the establishment of strong institutional arrangements, are fulfilled. Resource use regulations are required in order to avoid a further unsustainable exploitation of the resource base as the result of negative externalities, which are mostly to the detriment of the poor (see also Ashley et al. 1995: 23; Shackleton et al. 2000a: 45). This reformed institutional frame has to react to external changes such as expanding markets and better physical access to natural resources.

The fact that all four researched areas are formally state lands makes many residents feel that the government is also responsible for natural resource use regulations. Both Namibian and South African environmental legislation and policies are relevant. According to the regulations of the Namibian Communal Land Reform Act, the land board and traditional authorities have the power to suspend customary use rights if the right holder causes soil erosion or does not comply with the requirements regarding farming practices of the Ministry of Agriculture (RoN 2003b: 31(1), (2); 32). Local residents are mainly aware of laws that control hunting, the use of wood and forest fires and not that aware of those related to grazing. In Soebatsfontein, the municipality's Grazing Regulations of 2002, the management plan and individual contracts between farmers and the municipality regulate local resource use patterns. The most recognised rules amongst farmers are the limitations of the carrying capacity and the prohibition of fire wood collection (see also Chapter 7.3.3).

Apart from statutory law, customary law and traditional authorities play an important role in natural resource management (Hinz 1995: 4, Hangula 1995: 14). This can be said for many communities in southern Africa, though in the researched areas only at the Namibian sites a history of traditional authorities exists. The Namibian government recognises customary law, which includes all rules and regulations related to nature conservation (Hinz 2000a: 52). The Traditional Authorities Act obliges traditional authorities to ensure that the members of their community use natural resources on a sustainable basis and in a manner that conserves the environment and maintains the ecosystems for the benefit of all persons in Namibia (RoN 2000b: sec. 3 (2)(c)). Empirical studies in northern Namibian communal areas show that the

majority of respondents (97.4 percent) believe that traditional authorities have the function to control and protect grazing and other natural resources (Hinz 2000a: 88). Since they are so widely accepted, traditional authorities are often used to inform communities about nature conservation (see also Düsing 1999: 242). Local customary environmental laws are usually in line with statutory law. They exist particularly for resources that are relevant at a given place. In Mutombo regulations exist regarding pasture management, crop production, the use of water, the harvest of construction and firewood, the cutting of thatching grass, the hunting of wildlife, the collection of wild fruits and the control of forest fires. In Okamboro rules exist only for pasture management, the use of water, wildlife and forest fires. In Tiervlei customary regulations for firewood and wildlife are mentioned. To a large extent, customary law is enforced through social and moral-based institutions. Residents behave according to values because they believe they are supposed to. If somebody violates customary law, traditional authorities can impose fines or other penalties (Hangula 1995: 18). Penalties are formalised particularly in the Kavango region (see RoN 2002a). The enforcement of a customary court decision is, however, again much dependent on the acceptance of the verdict. Where social and moral-based institutions fail to be effective, traditional authorities have little opportunity to collect fines. In some cases they can call upon the state law enforcement authorities. The government, however, has similar problem where the use of natural resources is concerned (Jones 1998: 2; Campbell et al. 2002: XIII, 113). In this context, human, physical and financial resources available for enforcing environmental laws are extremely limited. The areas to be patrolled are vast, inhospitable and far away from administrative centres (Jones 1998: 2, 4). This is the main reason why statutory natural resource use regulations are basically not enforced at all researched sites. Ineffective enforcement is a signal to the whole community that the rules are not to be taken seriously and that disregarding them will not be sanctioned. Enforcement is most effective in the Kavango region although here the most diverse and serious offences can be observed as well. In this region, government and traditional authorities cooperate to a certain extent regarding the enforcement of statutory and customary law. Nonetheless, here as well human and financial capacity constraints of law enforcement authorities remain a serious threat for biodiversity maintenance.

State officials often express that it is difficult for them to enforce rules in communal areas, as it is a problem to find out who is the offender and due to social constraints, to take action against the poor. There seems to be a widespread perception that law enforcement in communal areas ends up in actions against the local rural communities. Very often, however,

local residents call for police intervention in cases where social and moral-based institutions fail. They perceive the reinforcement of customary and statutory resource use regulations as a service for the communities and not against them.

In order to improve wildlife management in Namibian communal areas, wildlife councils are established (RoN 1996b: 155c(1); RoN 1996c: 24B(1)). They have the potential to become regional forums for coordination and planning of wildlife management and preservation. The councils are a joint body of government and community leaders, which manage wildlife on behalf of the community in a region. They do not represent particular communities and are, in turn, not accountable to them (Corbett & Daniels 1996: 4; Jones 1998: 8). Wildlife councils operate at a regional level and are composed of MET officials, the regional governor, traditional leaders and community representatives. They are declared to be owners of all game (Corbett & Daniels 1996: 7). The council's income from wildlife production and utilisation is put into a regional development fund and cannot be accessed by individuals (Jones & Baker 1996; RoN 1996c: 24B(4)). Such an approach of equitable benefit distribution, however, disconnects the benefits from wildlife utilisation from the cost of wildlife conservation (Jones 1998: 8). People who lose crops, livestock or other property due to game activities as well as those who invest in wildlife management, e.g. by not hunting wildlife in exploitive ways, receive the same revenues as those who do not engage in these conservation activities. Such externalities reduce incentives to further conserve wildlife. Different experiences in southern Africa have shown that there is no real incentive for local people to preserve biodiversity if there are no direct benefits. If a regional government receives the funds for building a school or clinic, the links between the community's efforts to preserve nature and their benefits are too tenuous (Jones 1995: 9).

The results of the analysis support the call for a more cooperative, subsidiary and holistic natural resource management approach that gives local residents regulated, exclusive use and decision making rights not only to grazing but also to forestry and wildlife resources. Only such rights provide incentives to manage resources sustainably in a joint manner because it increases the likelihood that residents will benefit directly from investments in biodiversity maintenance (see also Jones 1998: 7; Schwoerer 2003: 9; Ruck et al. 2003: 12; BMBF 2004: 10). Shifting responsibility of natural resource control to residents makes best use of their indigenous, local knowledge. Due to their physical closeness, they can best monitor their resource use. In this context, one should, however, keep in mind that monitoring forests and

savannah landscape is usually difficult due to the vast area they cover, their remoteness and many access points (Deacon & Murphy 1997: 1). Giving residents rights to regulate resource use within a self determined structure reduces the need for external enforcement because social and moral-based institutions work as self-enforcement in at least some of the cases (see also Jones 1998: 7). A significant proportion of northern Namibian residents believe that it is the responsibility of traditional authorities to control and protect grazing and natural resources (Katjaerua 2002: 12). Local natural resource management institutions should be given legal status in order to improve their enforcement (RoN 1994: sec. 3.1 (b), 3.5). Legalising internalised institutions gives communities a chance to provide different management services, which, at the moment the government is formally responsible for. In order to support a more subsidiary system the government should be given means to promptly react on calls from the population for external enforcement if social and moral-based institutions fail. Communal conservancies and community forests both recognise the advantages of more subsidiary approaches.

The Community forest approach shifts rights to local residents and hence gives them incentives for sustainable management. Rights to manage and use forest products, to graze animals in and around forests and to authorise others to exercise those rights as well as collect fees and impose conditions for the use of forests are conferred to a local community organisation (RoN 2001a: sec. 15(2)(d)). An important component of the approach is the investment in human capital through forestry-related training and organisational development (DoF/DED/KfW 2002; Hailwa 2002; see also Dovie et al. 2000: 342; Qobo 2000: 382). The problem with this approach, however, is that transaction costs for establishing a community forest are extremely high. They are, therefore, more like projects and have no concept to protect forestry resources on a national scale.

Communal conservancies are regarded as a means to combat discriminatory laws preventing communal farmers from obtaining benefits from wildlife (RoN 1993b: 5; RoN 1994: sec. 2; Corbett & Daniels 1996: 1f; Krugmann 2001: 19). Communities that form conservancies receive their own authority over wildlife in order to create incentives for the maintenance of wildlife habitat and population. Conservancy creation is an instrument to improve communal natural resource management through institutional capacity building (Schalkwyk 2002: 28; Weaver 2002: 46), which directly contributes to biodiversity maintenance (Ashley 1996: 6). The creation of conservancies is, however, a complicated process. People who have had no



education opportunities and who live a subsistence way of life, must define clear boundaries, jointly formulate constitutions, form management organisations, distribute benefits and register members and enforce rules (Corbett & Daniels 1996: 5f; Corbett & Jones 2000: 7; Jones & Mosimane 2000: 25; Krugmann 2001: 18; Long et al. 2002: 10, 12). This creates high transaction costs, which make projects vulnerable (Long et al. 2002: 26) and dependent on donors, implementing NGOs and the government. As a result of high transaction costs, limitations in tourist markets (Blackie 1999: 8) and small per capita income of existing conservancies (Jones 1999a; Long et al. 2002: 53), conservancy models too will remain site-specific projects (Jones 1996: 1; Jones 1998: 8; Corbett & Jones 2000: 15; Jones & Mosimane 2000: 24). Their concept cannot easily be replicated in a large portion of communal areas (Jones 1998: 8; Jones & Mosimane 2000: 21ff; Long et al. 2002: 12; Sharma 2002: 5). Present natural resource policies will then lead to an increasing contrast between intensively used areas and proclaimed conservancies or community forests (Wardell-Johnson 2000: 35; Blackie 2000: 136). They do not encourage the majority of the population to invest in nature conservation (Blackie 2000: 138). This is clearly in contrast to the insights that isolated protected areas are insufficient to maintain biodiversity (Melchias 2001: 187).

Communal areas as collective local communal units still do not enjoy strong, exclusive and secure property rights over natural resources (Jones 1998: 9f). To achieve this, the same logic as for privately owned land should apply. Biodiversity in densely populated communal areas can only be maintained if local residents clearly recognise the immediate benefits of maintaining. Exclusive non-consumptive and consumptive use rights can, therefore, help communal farmers to perceive that biodiversity is a valuable resource worth protecting (Vorlaufer 2003: 52f; Sharma 2002: 4). To promote this, at least a basic authority to wildlife management has to be transferred to appropriate community structures, which should be chosen by the residents themselves. Such structures can be traditional authorities, existing community committees or in cases where established structures are too weak or do not even exist, newly established organisations.

### **8.3.5 The impacts of land reform**

Namibian and South African tenure and land redistribution reforms have a strong impact on the maintenance of biodiversity in communal areas. A more equitable distribution of land is a central objective of both post-apartheid governments in Namibia and South Africa. The land issue remains a sensitive topic and the political stability of both countries strongly depends on the visible progress of these reforms. Ten to fifteen years after independence/apartheid little

has changed in ownership relations and access to land for the majority of communal farmers who still live in overcrowded reserves (May 2000: 21). Nonetheless, farmers in each of the researched settlements are in one way or another affected by land reform.

Soebatsfontein is the site that most directly benefited from land reform. The formerly landless community received a 15.000 ha municipal commonage. This redistribution had obvious positive effects for the lives of the villagers. Most beneficiaries would not have had a realistic chance to run their own private farm. The land redistribution had positive effects on the self-esteem of local people and promoted institutional development. Support in management issues is provided within the framework of the Department of Agriculture's land care programme. Nevertheless, even in such a case where land was given to a group of people, it is mainly those better off who benefit from the commonage. This is not surprising since those who already have assets can mobilize more resources to make use of an increasing natural capital base. In order to alleviate poverty of the very poorest more radical investments are needed, in particular, into their most basic assets, which will not be land in the near future. In this context, the building of human capital is of major importance.

For the above-mentioned reasons Namibian and South African land redistribution as well as resettlement policies particularly target wealthier farmers or those enlarging their units with the help of land reform initiatives. Government and traditional authorities encourage wealthier farmers to buy private farms in order to relieve grazing pressure in the communal areas (Werner 2003b: 12). The broader community benefits when these farmers remove their livestock from communal lands to put them into newly fenced pastures based on individual private tenure. This, in turn, facilitates access to communal resources for the rural poor (Ashley et al. 1995: 7). The marginal opportunity costs of livestock reduction are much lower for wealthier farmers and one should therefore make efforts to provide incentives particularly for this group to reduce their livestock numbers on communal land.

To a certain extent, the pre-independence Namibian government promoted black ownership of farms under freehold title. At that time, barriers to the purchase of land have been mainly economic and not so much of a legal character. No formal restrictions prevented black farmers from acquiring land in white areas. Financial assistance was given to non-white farmers in order to promote the transition from subsistence to commercial production and to ease pressure on communal land (Adams & Werner 1990: 58ff). In the 1980s owners of more

than 200 heads of cattle or 1,200 small ruminants benefited from subsidised credit schemes of the state-run Land Bank. Due to high qualification criteria only 47 farmers bought such private farms within the framework of the programme. Two thirds of them were Hereros and not a single one came from the Kavango region (Adams & Werner 1990: 58ff). Today, especially in Ovitoto, Tiervlei and Soebatsfontein, wealthier farmers are aware of increased opportunities to receive grants and affirmative action loans, which make it easier for them to purchase private farms. It is reported from Ovitoto and the Berseba communal areas that owners of large herds bought private farms with affirmative action loans. Local residents appreciate this. An increasing number of residents believe that farmers who have the opportunity to get a private farm are supposed to remove their livestock from communal land thus improving their own livelihood conditions.

In order for the resettlement of wealthier farmers to also have positive effects for the poor, it is indispensable to improve the enforcement of the rule that farmers having access to private land are not allowed to keep livestock in communal areas. It is very simple for emergent private farmers to officially, not have any livestock on communal land but to leave the animals de facto on common ground as one simply has to register the herd in the name of a relative. The government will never have the human and physical capacity to control such cases of abuse. Therefore, local community structures urgently need officially recognised enforcement rights. The residents of a specific site know best who the livestock belongs to and it is they who have the strongest interest that unauthorized livestock are removed.

There are structural problems involved in the implementation of resettlement programmes. In order to qualify for affirmative action farmland grants and loans the applicants have to prove that they already own a minimum number of livestock. It is not surprising that such incentives go against the need to limit herd sizes in many of the already intensively used communal areas. Using communal land as a 'stepping stone' further increases pressure on communal land and reduces the grazing potential available for the poor. The fact that resettlement programmes reinforce herd size maximisation and take-off minimisation, which can not be maintained on market integrated commercial farms where input costs are high, is also problematic. Alternative qualification criteria are needed, for example that a farmer generates a regular significant financial income from livestock production. This would encourage emergent farmers to farm in a more commercial way and would prepare them for the future challenges on a private farm where they have to cover costs e.g. for infrastructure

maintenance and transport and where their management decisions will depend on market conditions. Such challenges have to be taken serious especially if one considers that, given current land prices and interest rates on loans, the payback period of emergent farmers' investments is very long. This strongly questions the economic sustainability of many projects (Rohde et al. 2001: 18ff).

Critics argue that focusing on emergent farmers alone only allows a small number of formerly discriminated citizens to benefit from land reform (Cousins 2000). The present strategy underestimates the value of subsistence and part-time farming for the livelihoods of the majority of the population and overestimates the potential of privatisation, intensification and commercialisation of agriculture under marginal natural conditions for the alleviation of poverty, reduction of inequality and long-term development (Cousins 2000: 4; Shackleton et al. 2000b; Campbell et al. 2002: 139f). The long-term impact of land redistribution on rural development risks being limited (Werner 2003b: 15) especially if one considers migration as a legitimate long-term strategy to escape poverty traps. The success of this strategy is based on investments in skills and education as well as on a stable macro-economic environment generating sufficient jobs outside agriculture and rural areas (Campbell et al. 2002: XV, 140). Communal lands will, however, remain the base of many livelihoods as long as employment opportunities for the less educated poor are limited (see also Kepe & Cousins 2002). If, at the moment as well as in the near future, rural resources are important for the poor, but do not have much development potential some authors provoke that the logical conclusion is to reduce the size of commercial farms and enlarge communal farms through strict redistribution mechanisms (Campbell et al. 2002: 140) which all have potential negative economic, social and political risks known from neighbouring countries, such as Zimbabwe.

### **8.3.6 The impact of Namibian rural water reform**

In order to make communal farmers lives economically, ecologically and socially more sustainable it is not enough to redistribute land. To achieve these objectives it is especially important to reform the institutions governing natural resource use on communal land. One example for such a policy is the rural water supply reform initiated by the Namibian government in order to improve the efficiency of water utilisation on communal land. Water is a precious and scarce resource in Namibia (RoN 2000d: 4). Its supply strongly influences grazing intensity, deforestation rates, soil degradation and local loss of biodiversity (RoN 2001c: 1, 5).

The rural water supply reform is part of the country's decentralisation policy. The reform devolves rights and responsibilities directly to local water users. In all three researched Namibian settlements water committees have been established, water supply rules formulated and water fees introduced. Incentives to save water are starting to work and water users are using water more efficiently and sustainably. Infrastructure investments have been made and informal institutions established in order to control the use of water. New institutional arrangements indicate that the reform actually motivates rural residents to use scarce water resources in a more sustainable manner. Research showed, however, that the national policy has a very different impact on the lives of farmers in different regions.

In Okamboro the water committee actively manages water supply. A caretaker, responsible for daily operation and maintenance work, has been appointed and receives a monthly salary of approximately US\$6 paid from water fees. One fifth of the Okamboro households mentioned that they help to repair and maintain the water infrastructure. This shows an increasing attitude of responsibility for the water point, among the residents. In Tiervlei as well, a water committee is responsible for the day-to-day management of water points, which includes financial activities and the maintenance of the water points. In 2003, a water constitution was passed, which regulates the water consumption and supply. One important component of the reform was the decision to give communities the legal right to punish people who do not abide by community decisions and rules (Blackie 1999: 8).

According to customary law and the Communal Land Reform Act, traditional authorities are responsible for regulating access to land. Water committees, conversely, are, as a result of the rural water supply reform, responsible for overseeing access to water. This must lead to some overlap of competencies in a region where land and water management cannot easily be separated (Blackie 1999: 11). In the past no formalised mechanism for water exclusion existed in any of the researched sites as a subsidised water supply did not make it necessary. Nonetheless, geographical closeness decided whether somebody used a water point or not. In most of cases, people could not use the water from neighbouring settlements because they would have to walk too long distances with their livestock to reach the neighbouring water point. As a result, those who have been granted access to land received access to the next closest water point only. Transaction costs of getting to a water point ensured that access to water was indirectly regulated through the regulation of land access. Traditional authorities were de facto controlling access to water.

The rural water supply reform challenges de facto rights of traditional authorities by making newly established water committees responsible for access and use of water. Water point user associations have the power to permit or exclude any person from water use according to the rules of the constitution and the management plan (RoN 2004: sec 19; RoN 2001d: 6.2.2). Under such circumstances water committees indirectly have the opportunity to control access to land, since access to land is useless without access to water. The rural water supply reform therefore shifts rights of exclusion from traditional authorities to newly established democratically elected community organisations. In Tiervlei, traditional authorities complain that the new water policy leads to much confusion regarding their own role. On the one hand, residents report that the committee becomes involved in permitting access to land, on the other hand traditional authorities are also engaged in water questions. The fact that in none of the case studies open conflicts evolved can be attributed to the fact that traditional authorities still maintain their power as long as they are accepted in the community. Their power is based on social and moral-based institutions and residents honour their decisions independent of formal rules. Traditional authorities can even be elected to Water Point Committees and continue to exert their influence within these new structures. In Mutompo, the majority of the residents expects that the headwoman be responsible for the water and that the water committee works under her supervision. Although the water committee is officially responsible for collecting the money for the diesel, it is in fact she who organises the water supply and decides, together with the residents, matters regarding water. In Okamboro it is accepted that the traditional councillor decides who may live where and therefore more or less decides who may use the water points. Despite such deep-rooted institutions, residents feel that from the moment the water point was handed over to them they also had stronger rights to exclude others from the land. The reform strengthens the rights of residents particularly when traditional authorities are weak or little respected. Although this situation may lead to new conflicts (Bock & Kirk 2006: 354), strengthening the rights of local users increases incentives for them to manage natural resources in a more sustainable manner. When farmers have the right to exclude others from the land, they become more confident to decide over the way resources within their reach are used. Therefore, water committees in different Namibian communal areas have increasingly become a forum for community discussion on pressing natural resource issues (see also Twyman et al. 2000: 132). One unsolved issue is, however, that water committees face enforcement problems (see also Twyman et al. 2000: 133; Bock & Kirk 2006: 354). It is not clear which instruments water committees and communities really have to protect themselves against uncooperative individuals.

The Communal Land Reform Act makes the situation more confusing. It seems that the authors of the act wanted to avoid a disconnection between the control over land and over water (see also RoN 2000d: 10). According to the act, nobody may prevent another person from drawing water from a water point except with the written authority of traditional authorities and ratification of the land board (RoN 2002b: 29(4)(d)). Any water committee denying somebody access to water without permission from traditional authorities would be committing an offence and liable to pay a fine not exceeding US\$500 or imprisonment for not more than a year (RoN 2002b: 29(5)). The law strongly undermines ongoing rural water supply reforms. Many stakeholders in all three Namibian case studies expressed their fear of the difficulty in identifying who will hold what kind of right in future (see also RoN 2000d: 14). Unclear exclusion and decision-making rights can undermine traditional, as well as newly established resource management mechanisms. Weakening these mechanisms makes unsustainable resource use more likely and poses as threat to the maintenance of biodiversity.

The rural water reform as a decentralisation policy not only shifts rights to local water users; it also puts serious burdens on them. The government strictly cuts rural water supply subsidies as these encouraged the unsustainable utilisation of this scarce resource. All three Namibian case studies developed demand-dependent payment schemes in order to cover running and infrastructure maintenance costs. Paying for water utilisation on the one hand works as an incentive to save water and to take care of infrastructure. On the other hand, water fees can have a relevant side effect as they are sometimes seen as a person's claim to grazing rights (Fuller & Turner 1996: 23). Both effects support sustainable natural resource management. Nonetheless, government's expected annual net savings realised with the reform (RoN 1997a: 15) are taken from the poorest of society.

In Mutompo Conjoint Analysis shows that people worry more about water supply than about grazing shortage. More than half of the households do not have regular monetary income. Considering the fact that many of the researched household rely on pensions, remittances and subsistence agriculture, they cannot afford to pay the full costs of water (Lange 1997: 23; see also Ashley et al. 1995: 14). Apart from the low capacity of rural water users, transaction costs of transporting diesel and spare parts are very high in remote areas. In addition, per capita costs are high if costs for infrastructure investments can be distributed only amongst a small number of users. Mutompo residents report selling crops and livestock in order to cover the fuel and transport costs. This affects food security in a region where 28 percent of the

children under the age of five were severely underweight in 2000 (Mendelsohn & el Obeid 2003: 85; Bock & Kirk 2006: 352, 354).

In contrast to the situation in Mutompo few complaints about the new situation were made in Okamboro. Here farmers collect their own money to buy diesel and even save money in a bank account for future repairs. However, quarrels are reported with a few livestock owners who are not willing to pay their fees. They and their employed workers come under high social pressure and the threat that the community will deny them access to water. Struggles to motivate all community members to pay their contribution also exist in Tiervlei.

The analysis shows that at least in some regions insufficient attention is paid to the capacity of water users to pay contributions for rural services. Removing 'perverse' subsidy and incentives for resource exploitation should not lead to a redistribution of wealth from the poorest of the society. At least in areas where water reform causes as serious problems as in inland Kavango settlements, one should think about ways to replace subsidies, which promote resource exploitation, by mechanisms which motivate the protection of the environment. One instrument could be, for instance, to provide additional incentives for livestock sales, staff to monitor and enforce conservation laws or additional investments in education. There is also a need to lower transaction costs of the new water supply scheme. Supporting the emergence of small-scale enterprises such as local contractors, workshops, spare part outlets and diesel contribution services reduces the users' costs of water supply and develops the local economy (RoN 1997a: 8).

It is therefore not enough to implement a decentralisation policy, which allows a regionally adapted natural resource management. In a country as heterogeneous as Namibia it is also important to adapt the implementation of decentralisation policies to regional differences (RoN 1993a; RoN 2004: sec. 3). While the Okamboro and Tiervlei farmers can cope with the new situation, the rural water supply reform creates food insecurity and even an emergency situation in Mutompo. Particularly, the speed of cost recovery introduction should be slowed down as the capacity of water users is limited leading to economic reactions which might be counterproductive to the preservation of biodiversity. As discussed above, poverty increases discount rates and therefore encourages resource exploitation.



### **8.3.7 Social capital and intra-community institutions**

As has been shown in the case studies, social capital and intra-community institutions play an important role in the lives of all researched settlements. There are hardly any differences with regard to informal support amongst the villages. People having a function in the community and who feel they have a say are more likely to make contributions to help others. Permanently employed people also make more donations or gifts than those having no formal job. Respondents sell or slaughter less livestock if they expect support from their immediate social environment in times of trouble. Those who help others have higher selling and slaughtering rates. This is partly due to the fact that households with larger livestock herds are more likely to give goods to relatives or friends.<sup>143</sup> Redistribution from wealthier to poorer community members reduces pressure on natural resources. However, as has already been mentioned the social expectation that those who sell and slaughter have to share the meat and money with relatives and neighbours is a disincentive for livestock off-take.

There are few differences between the research areas regarding the proportion of residents having a function in the community though the character of community institutions and organisations vary significantly between the case studies. Generally people with permanent jobs are more likely to perform a function in their community. The more livestock a household possesses the more influential a household head considers himself/herself to be. This also applies to households with savings. Those who have a function in a community are more likely to participate in collective action and believe that they can influence things happening in their community.<sup>144</sup> The results indicate that social capital is concentrated particularly in the hands of those who are also most wealthy in terms of financial capital.

A comparison of the four case studies shows that collective action, group involvement and initiative become more probable if members of the community see direct benefits from their investments in community affairs. Benefits for the wider community are appreciated but less accepted if beneficiaries did not contribute to the efforts (see also Pienaar 2000: 324). It is very often said that an equitable and wide distribution of benefits must be a high priority of development planning (Ashley 1995: 20; Bob & Banoo 2000: 108; Fay & Palmer 2000: 207; Mohamed 2000b: 41). If such an equitable distribution, however, creates too many positive externalities it hampers initiatives, as there must be a clear link between investments and benefits. Indirect collective benefits are not appropriate incentives for conservation as examples in southern Africa show (Jones 1995: 12; Jones 1998: 3). In Soebatsfontein, for

instance, tourism can only be developed if the people who invest their resources receive an individual benefit in return. Also on communal land an incentive-based way of thinking must emerge. Individual benefits should be seen as a reward for i.e. biodiversity preserving behaviour and lost benefits as punishment for damaging resources. A stronger connection between investments and behaviour reduces the tendency to exploit resources and encourages initiative. The fact that people use resources on a communal base cannot preclude the fact that human motivation is based on individual utility.

### **8.3.8 Fencing of communal land**

Attempts to privatise communal rangeland by fencing must be seen as an attempt to link individual investments to individual benefits. Fencing of communal land is a controversial topic. Informal privatisation of communal land through fencing has increased since independence (Ashley et al. 1995: 4; Blackie 1999: 7; Corbett & Jones 2000: 6; Blackie 2000: 138; Werner 2000: 247). On the one hand, fencing does improve natural resource management with positive impacts on biodiversity within the newly formed camps. On the other hand, fencing creates serious negative externalities for those pushed out of the fenced area and having negative effects on poverty alleviation and biodiversity maintenance outside the camps (Bromley 1989; Stahl 2000: 330f) particularly in cases where large pieces of communal land are enclosed to secure private seasonal grazing. Improved pasture management of camp owners negatively affects those residents who do not have the capital to fence land. Especially influential businessmen, retired public servants or politicians fence off communal land (Widlok 2003: 14). In Okamboro investments in fences is broadly accepted as a justification for an exclusive use of the enclosure. This means that only those who have the financial capital to invest in fences have camps. Those who can not afford the investment end up with a decreased per capita natural resource base (Kirk 2000: 36; Twyman et al. 2000: 129; see also Quan et al. 1994: 28; Hangula 1995; Fuller & Turner 1996: 22; Blackie 1999: 14; Werner 2000: 268; Stahl 2000: 319, 336; Blackie 2000: 138f; Corbett & Jones 2000: 4; Wardell-Johnson 2000: 29; Fara 2001; LAC 2003: XII). In this context, it is particularly problematic that farmers who privatise rangeland often have a two-fold strategy. They continue to use both communal and enclosed grazing by claiming their indigenous access and use rights (Kirk 2000: 35). As a result conflicts between fencers and non-fencers emerge (Wardell-Johnson 2000: 29; Blackie 2000: 139; Hangula 2000: 76, 88).

In the Kavango region fencing is generally less frequent (Blackie 1999: 8). Land around Mutombo is enclosed only in order to protect crops from livestock (Corbett & Jones 2000: 6).

Since fields are managed privately these fences have little impact on the allocation of resources. Tiervlei and Soebatsfontein as former commercial farms show that fences on communal land can still be a valuable management instrument as they increase management options. Farmers can separate young stock, bulls and sick animals and save pasture for emergency situations. Some farmers say outright that enhanced management is impossible in Okamboro because of the absence of fences. Fences can make it easier to let certain portions of land rest and can improve the exclusion of non-residents from the settlement's pasture. Apart from the direct positive impact on natural resource management through better access control, exclusion also strengthens the community's sense of 'ownership' and the feeling of responsibility for 'their' resources (Twyman et al. 2000: 133f). Fences can also be seen as an attempt to reduce cattle theft as well as a substitute for herd boys for whom it is then easier to attend school (Fuller & Turner 1996: 40f; Stahl 2000: 321, 329f, 331). Reality in many communal areas shows that residents of a settlement use fences communally. There are even examples where communal farmers erect fences for joint use in collective action to keep outsiders out of the village territory (Twyman et al. 2000; Stahl 2000: 345).

Within the four researched settlements fencing only creates problems in one area (see Chapter 5.3.7). One third of the Okamboro farmers admit to owning a private camp. Approximately ten percent of the territory is fenced. Two camps are more than 150 ha. Some fences are erected in a way that they follow natural borders such as mountains and in this way enclose even larger areas. Initially enclosures were erected to protect young stock from carnivores and theft, for breeding control purposes and to separate sick animals. In particular, owners of larger camps use the communal territory outside the camp and save fodder in the camps until the grass on the commons is finished. There is no doubt that fencing in Okamboro causes negative externalities for those who cannot afford to build their own enclosures.

Namibian policy makers strongly signalise that such externalities have to be internalised (Corbett & Daniels 1996: 9, 14; Blackie 1999: 4; RoN 2002b: 28(8)(b); RoN 2003b: 27(4); RoN 2003c; Widlok 2003: 6). Although even in Okamboro fencing is not unregulated, communities and traditional authorities often do not effectively protect poorer farmers against the privatisation of wealthier ones. Frequently fences are erected with the knowledge and permission of traditional leaders (Widlok 2003: 14). If traditional authorities try to control fencing they often do not have the power to really stop it (LAC 2003: XII). It is therefore important that the Communal Land Reform Act gives land boards and traditional authorities

the right and power to remove fences. This, if effectively enforced, will motivate communal farmers to rethink fencing strategies.

In summary, the four case studies give a good overview of the complex issue of fencing. They show that fencing often causes serious problems but it is not necessarily a harmful innovation per se. The National Land Policy stressed that especially *private* enclosures are banned (RoN 1998: 16). Nonetheless, the Namibian Communal Land Reform Act does not make any distinction between private and communal enclosures. It does not consider collective fencing or fence management. Only individuals may apply for permission to have fences (RoN 2003c) and only very small enclosures around homesteads, livestock pens, water troughs and crop fields are permitted (RoN 2003b: 26). Although the Communal Land Reform Act signals a general negative attitude towards the enclosure of communal land, it gives land boards and traditional leaders some leeway in the decision to permit fencing (RoN 2002b: sec 29 (4)(a); RoN 2003b: 7, 26). Much depends on their interpretation of the new law (Corbett & Jones 2000: 6), which is flexible enough to encompass fencing where it is socially and environmentally sustainable (Corbett & Daniels 1996: 15). Instead of removing fences in Okavango one can try for instance to convince camp owners to use camps under a common management scheme. When the land boards and traditional authorities are making a decision about fences it is crucial that they consult the local residents whose participation will help to find the most appropriate and regionally adapted solution to internalise all externalities without prohibiting the use of fences for improved natural resource management.

### **8.3.9 The role of customary law and traditional authorities**

The previous chapters discussed different aspects of natural resource management in different regions of Namibia and South Africa. In at least three of the case studies, traditional authority structures and customary resource management play an important role in biodiversity management (Wardell-Johnson 2000: 38; Hara et al. 2000: 71; Dovie et al. 2000: 343). They fill critically important gaps in a situation where the enforcement capacity of the government is extremely limited. Traditional authorities regulate access to land and ensure therefore that natural resources are not openly accessible. They are involved in the regulation of resources use, the distribution of benefits from resources and the compensation for damages. Traditional authorities contribute greatly to local level administration and not only with regard to natural resources. Nonetheless, the role of traditional leaders is still a subject of controversial discussion in both countries. There is strong opposition against systems of traditional governance.

Traditional authorities are mostly criticised for not meeting modern democratic expectations (Cousins & Hornby 2002: 6). They are often described as being corrupt, abusive, vicious, autocratic, unaccountable, autocratic, backwards, in opposition to gender equity, ignorant of basic human rights, and feared (Düsing 1999: 254; Ntsebeza 1999; Blackie 1999: 7; Shackleton et al. 2000b; Claassens 2000: 130; Greenberg 2000: 369; Ntsebeza 2002; Cousins & Hornby 2002: 5f; Oomen 2002: 9, 21f; Ashley et al. 2003: 108). It is argued that they oppose decentralisation, democratisation, the separation of powers and generally any new initiatives in rural development (Jones 1999b; Ntsebeza 2002: 9). Cases have been reported where they oppose the transfer of ownership rights to smaller community units and argue instead that they are the body who must own the land (Claassens 2000: 133; Ashley et al. 2003: 103). In other instances, traditional authorities have imposed illegal taxes e.g. in the process of land allocation (Blackie 1999: 6; Ntsebeza 2002: 11).

Some authors question the relevance of customary law in modern southern African societies because they see it as a static concept which reflects pre-colonial traditions (see e.g. Mamdani 1996; Ntsebeza 1999: 65). What is commonly meant with the vaguely defined and misleading term 'traditional' is, however, not a static, inflexible and outdated system of customs and traditions, which was practiced prior to colonisation (Hinz 2004: 2). Customary laws have to be understood rather as the currently practiced informal institutional frameworks of different communities which govern day-to-day activities (Hinz 2000b: 14; see also Oomen 2002: 29). In all four researched communities such informal institutions could be found.

Much of the dislike for traditional authorities is related to their role during colonial history. There is no fundamental difference between the structure and philosophy behind the legislation enacted in South Africa and Namibia (Hinz 2000b: 52). During apartheid, traditional authorities became the decentralised arm of the (post-)colonial state (Mamdani 1996: 52; Hinz 2004: 2; Hinz 2000b: 55). They received their legitimisation through the appointment by administrative superiors and not as it had been handled previously through various community rules (Mamdani 1996: 53). This undermined traditional governance structures and encouraged being accountable to the central government rather than the local community (Ntsebeza 1999: 15, 25, 31, 32; Hangula 1995: 14). The apartheid regime privileged a form of customary administration which was neither traditional nor customary in many African societies, but rather instrumental for their control. This form was marked by the concentration of power in one single person who had judicial, legislative, executive and

administrative power (Mamdani 1996: 22f). This fusion of power combined with the community not having any control gave rise to abuse which, in turn, resulted in a decline in acceptance of traditional authorities (Mamdani 1996: 54; Düsing 1999: 28).

Mamdani argues that in apartheid South Africa a formal system was installed which contradicted the social and moral-based institutions of many people. By externally enforcing what was believed to be custom, the governance structure of the ethnic group was transformed (Mamdani 1996: 51, 81). Traditional authorities could maintain their powers only if the state enforced their decisions. Colonial power held itself to be the representative of humanity, public order and morality and used these arguments to justify the modification of customs (Mamdani 1996: 63, 115; see also Hinz 2004: 2). One should be aware that today's legal control of customary law does in fact nothing else: Customary law is only recognised as long as it does not contradict statutory law (RSA 1996: sec. 39(2), 211(2); RoN 1990: sec. 66(1)). The government decides whether customary law is compatible with statutory law (Düsing 1999: 189). The difference is that the new governments have, of course, a democratic legitimisation. This justifies that today's governments may modify customs.

The so called strategy of *indirect rule* reduced the costs of governing the countries according to the principles of the colonial and apartheid states (Kirk 2000: 26; Hinz 2002: 8; Katjaerua 2002: 2; Tötemeyer 2002: 15). Since the colonial governments did not have the capacity to control the territories at community level, it was decided to let the people live in accordance to structures which were at least related to existing systems. Even though the colonial government weakened indigenous institutions, they had a strong incentive to integrate them into their concept of governance (Düsing 1999: 37). The system of indirect rule could logically only lead to a reduction of transaction costs if the majority of decisions were made according to social and moral-based institutions whose enforcement did not require external power. Traditional authorities were transformed and motivated to collaborate with the government, particularly, in cases where the interests of the colonial state were affected.

One has to take formulated concerns very seriously but should be careful not to generalise (Hangula 1995: 12). Traditional authorities may or may not be legitimate accountable leaders and may or may not be abusive or corrupt (Ntsebeza 1999; Cousins 2000: 5). They may perform good and effective governance or they may perform bad governance (Blackie 2000: 139; Okupa 2002: 11; Hinz 2004: 7). Some violate customs and some uphold them (Mamdani

1996: 195). Their performance in natural resource management and development projects varies (Jones & Mosimane 2000: 14; Blackie 2000: 139). Many rural residents make a distinction between genuine and illegitimate traditional authorities (Ntsebeza 1999: 24). This is the reason why some traditional authority structures are still strongly supported by their constituencies while others are weak (Jones 1998: 2; Corbett & Jones 2000: 12). Corruption within traditional authority structures is not necessarily structural but can be related to individual persons (Düsing 1999: 143; Hinz 138). Examples from many African countries show that reforms to democratise governance did not necessarily stop abuse, corruption and inefficiency of the administration (Mamdani 1996: 104ff; Oomen 2002: 18). Any government can lose its legitimacy as a result of mismanagement, corruption and discrimination (Töttemeyer 2002: 2). There is a tendency to replace corrupt state officials while corrupt traditional authorities are seen as a reason to replace a whole governance structure.

Today an important source of legitimacy of traditional authorities is the government's support and reinforcement of their powers (Oomen 2002: 12, 15, 28, 31f). Chiefs/Hompas have to be recognised by the Namibian President (RoN 2000b: sec. 6) in order to receive the power given to traditional leaders e.g. by the Traditional Authorities Act and the Communal Land Reform Act. However, there is a danger that party politics as well as conformity and sympathy with the government become criteria for approval or disapproval, instead of just simply the community's will (Hinz 2000a: 167). The Traditional Authorities Act gives a community the power to remove a chief/hompa in accordance with customary law if it is not satisfied with her/his leadership (RoN 2000b: sec. 4(2); 8(1)(a); see also Yaron et al. 1992: 21; Adams & Werner 1990: 130). This is an important control mechanism which increases the accountability of traditional authorities. In 1999, the community of one Kavango ethnic group voted for the removal of its highest traditional authority but the government did not recognise the referendum for formal reasons (Allgemeine Zeitung 1999a and Allgemeine Zeitung 1999b; Namibian 1999b; Republikein 1999b). Not recognising the will of the community destabilises customary law and reduces the accountability of traditional leaders towards the community.

The South African Constitution gives traditional authorities the role of an institution at a local level (RSA 1996: sec. 212(1)). It submits them to customary law but simultaneously gives them legislative power over customary law (RSA 1996: sec. 211(2)). The Namibian constitution only recognises customary law and not explicitly traditional authorities. In this

country their power is derived from the Traditional Authorities Act which says that traditional authorities have jurisdiction over the members of the traditional community for whom it has been established (RoN 2000b: sec. 2(2)). They have the legislative power to ascertain and codify customary law in consultation with the community (RoN 2000b: sec. 3(1)(a)). The Hompa of Mbunza emphasises that he himself cannot make any rules. This is done by the community. Traditional authorities shall uphold, promote, protect and preserve the culture, language, tradition and traditional values of the community (RoN 2000b: sec. 3(1)(c)). Particularly where their legislative powers are concerned, the Traditional Authorities Act commits traditional authorities to community participation. Ascertained law upheld by traditional authorities might be, but does not have to be the living customary law (Hinz 2000a: 22). One has to be aware that de facto customary law very often successfully balances the powers of traditional authorities and ensures community participation in decision making. Giving the communities themselves legislative power over customary law is therefore extremely important.

On the one hand, Namibian and South African national legislations aim to harmonise customary and statutory law (see also Cousins & Hornby 2000: 10) and on the other hand, want to make customary law more transparent by formalising it. Elements of statutory law always enter living law (Hinz 2000a: 24). The formalisation of living law, which is based on social and moral norms, gives informal institutions statutory status (Dülfer 1999: 219; Hinz 2000b: 46). Closing the gap between de jure and de facto rights would be a transaction cost efficient way to enhance incentives for sustainable resource management and biodiversity preservation. At present, no proper system of codified customary law exists in Namibia (Hinz 2000b: 91) or South Africa. The main difficulty in formalising customary law is the extreme complexity and flexibility of many of the rights which are de facto practice (Hinz 2000b: 47; Cousins & Hornby 2000: 10; Adams et al. 2000: 122; Claassens 2000: 13; Campbell et al. 2002: 53). No legalisation should destroy the local adaptability of the system. The objective should not be to record all customary law but rather to formulate rules and regulations for cases where the community might need/expect external support, e.g. by state law enforcement authorities. One possible approach of formalising customary law is the preparation of by-laws and management plans within the framework of land redistribution projects, the establishment of community conservancies and forests, or in the frame of the rural water supply reform. Such documents can give de facto practiced customary law, legal effect. Since such by-laws and plans always refer to a specific land area or group of people, the instrument is flexible



enough to accommodate the heterogeneity of customary law. Considering the cultural heterogeneity of Namibia and South Africa, this process will only be effective if it is not based on standard blueprints which include many aspects which are crucial for the government, but are of little importance in the every day lives of those affected. It is rare, unfortunately, that residents are significantly involved in the development of the constitutions. Often, those affected do not even understand 'their' constitution (Corbett & Jones 2000: 16). Communities should be empowered to shape their own laws according to their own circumstances and culture beyond prescribed provisions (Jones & Mosimane 2000: 25).

National laws also give traditional authorities judicial rights. In Namibia, traditional leaders have jurisdiction over the members of their community (RoN 2000b: sec. 2(2)); they are responsible for the administration and execution of customary law (RoN 2002b: 3(1)(b)). In order to clearly separate legislative from judicial power, community courts will address the issue of customary law enforcement in future (RoN 2001i; Werner 2003a; Namibian 2003a). Community Courts will then have the jurisdiction to hear and make judgements on any matter related to customary law (Werner 2003a; RoN 2001i: sec. 8). They will, in accordance with customary law, make orders for compensation, damages, restitution or the payment of fines, (Werner 2003a; RoN 2001i: sec. 11). Community courts will also enforce the customary natural resource use regulations. A writ of execution from a magistrate's court can be obtained in order to enforce the decision of a community court (RoN 2001i: sec. 11). Appeal against the findings of the community court can be lodged at the magistrate's court (Werner 2003a; RoN 2001i: sec 12; Oomen 2002: 7).

Community courts judges are appointed by the Minister from a list of names put forward by traditional authorities (Werner 2003a; RoN 2001c: sec. 5-7). Any person deemed to have sufficient knowledge of a community's customary laws will be eligible to become a justice in that court. Not all traditional authorities feel comfortable with their loss of judicial powers. In the past, traditional leaders automatically presided over customary courts (Namibian 2003a) which is usually believed to be legitimate in the eyes of the community (Katjaerua 2002: 12). Those traditional leaders in the observed communities did not express any similar concerns. They appreciate that the government pays headwomen and headmen salaries to fulfil this task because it relieves them from time consuming responsibilities. They feel highly respected and are sure their opinion will be taken into account in court decisions.

The vast majority of northern Namibian residents believe that it is the responsibility of traditional authorities to enforce law and order in the community (Katjaerua 2002: 12). Nevertheless, the executive power of traditional authorities is very much limited due to the post-independence abolition of tribal police which resulted in an increase in crimes (Düsing 1999: 243). Both governments reduced the power of tribal policing (Oomen 2002: 5) because some traditional authorities used government enforcement during apartheid times to make decisions which contradicted with the values and morals of the community. Legislation does not clearly spell out how traditional authorities or local residents can enforce customary law and fulfil their legal obligation to support Namibian law enforcement (Werner 2003a; see also RoN 2000b: sec. 3 (2)(a), sec. 16). Both have few sanctions at their disposal when their customary and even statutory rights are violated (Norman 2000: 87). Any institution is, however, only as good as it can be enforced (Cousins & Hornby 2000: 23). At present, enforcement solely depends on the acceptance of the rules amongst the affected people (Corbett & Jones 2000: 3). Reduced external enforcement of traditional authorities' decisions makes them, therefore, more accountable. Nonetheless, regulated external enforcement is urgently needed to allow them to provide important public services. Namibian traditional authorities complain about the lack of police response particularly when police is asked to assist them in the administration of justice (Hinz 2000b: 134). Particularly with regard to natural resource management, local residents often do not have any capacity to motivate outsiders to comply with their social and moral norms (Blackie 2000: 139; Jones 1996: 21). This undermines the acceptance of customary law (see also Corbett & Jones 2000: 2). Although a wide range of customary laws exist, traditional authorities often see their role in nature conservation restricted to reporting to the officials of the ministry of Environment and Tourism or the police (Hinz 2000a: 131). Due to the limited capacity of the state and the limited legal power of traditional authorities, neither customary nor statutory rules are sufficiently enforced (Jones & Mosimane 2000: 15, 17, 25). As a result, natural resource use is de facto insufficiently regulated which is becoming a serious threat to biodiversity maintenance. A clear legal basis is necessary, which regulates under which circumstances government officials, including law enforcement authorities, may or indeed have to, support local organisations. An effective external intervention opportunity is indispensable particularly with regard to land invasion, discrimination, land allocation disputes, and the breaches of community rules (see also Cousins & Hornby 2000: 23). A lack of law enforcement has a significant negative impact on the protection of natural resources as all four case studies showed. There is an urgent need for community organisations to be granted the

right to create their own rules and ensure that these rules can be externally enforced (Cousins & Hornby 2000: 26) in situations where social- and moral-based enforcement fails.

Empirical studies in Namibian communal areas show that an overwhelming majority of respondents support the institution of traditional authorities (Keulder 1997: 18f; Hinz 2000a: 85; Katjaerua 2002: 6; Oomen 2002: 3). Ninety seven percent of interviewed northern Namibian communal residents recognise the power of traditional leaders (Hinz 2000a). They are particularly strong in the north-east of Namibia, for example, in the Kavango and slightly weaker in southern Namibia (Corbett & Jones 2000: 15; Hinz 2004: 3). There is no significant difference in recognition of traditional authorities according to gender, age, level of education or profession, though younger, wealthier and better educated people support them a little bit less (Keulder 1997: 19ff; Katjaerua 2002: 7, 9f, 15; Oomen 2002: 23, 33). Despite the often mentioned discriminatory accusation of traditional authorities, they are also strongly supported by women (Keulder 1997: 19; Hinz 2000a: 86; Katjaerua 2002: 7, 9f, 15; Oomen 2002: 25). One reason for this, might be, that they are the most accessible institution protecting women against domestic violence. (Oomen 2002: 26; RoN 2002a) This was also observed in Mutompo and Okamboro. Traditional authorities and customary law, whether they date back to pre-colonial times or were established later, are a social fact in Namibia and South Africa (Katjaerua 2002: 2, 6; Töttemeyer 2002: 18). Their legitimacy and efficiency depends on the values and moral of a community (Corbett & Daniels 1996: 3; Düsing 1999: 64; Hinz 2000a: 135; Claassens 2000: 133; Klocke-Daffa 2001: 277, 279; Okoth-Ogendo 2002; Bidaguren & Estrella 2002: 116; Töttemeyer 2002: 2). A leader has to behave in accordance with the social and moral norms of the governed group in order to be respected (Töttemeyer 2002: 9; Oomen 2002: 4, 121f). Traditional authorities assume their leadership, not by some tick against a name on an election ticket or official appointment, but often by common consensus regarding established principles and popular support (Ntsebeza 1999: 16; Gatter 2002: 5). In a socio-economic context, where external enforcement is expensive, the decisions of governments, elected committees as well as those of traditional leaders are ignored if they do not correspond to the values of the affected (Jones & Mosimane 2000: 25).

Poor performance of institutional alternatives is another important factor why customary law systems receive such support. In southern Africa it is common for the state not to have the financial and human resources to control and enforce national laws, let alone by-laws (Campbell et al. 2002: 113). Many people do not have guaranteed access to formal justice

(Bidaguren & Estrella 2002: 116; Ashley et al. 2003: 110). In these situations, communities often rely on their traditional leaders to put pressure on violators (Campbell et al. 2002: 51). Despite their limited legal responsibilities, traditional authorities perform *de facto* administrative and political duties (Düsing 1999: 241). In the South African case study of Oomen (2002) respondents made traditional authorities, rather than local government, responsible for democratic government and community involvement (Oomen 2002: 11). Studies in northern Namibian communal areas have come to the conclusion that regional councillors and governors fulfil their duties less satisfactorily in comparison to traditional leaders (Hinz 2000a: 88). To a certain extent, traditional authorities fill the gap left by a largely absent state (Keulder 1997: 21, 30, 45). The state asserts management authority over communal land and claims to be the main public service provider but often does not have the financial, physical and human capital to fulfil these obligations (Hangula 1995: 12; Fuller & Turner 1996: 3; Ntsebeza 1999: 58ff; Corbett & Jones 2000: 2, 11; Jones & Mosimane 2000: 10; Campbell et al. 2002: 11; Ashley et al. 2003: 110). The lowest level government officials are regional representatives of line-departments and regional administrations (Corbett & Jones 2000: 2; Jones & Mosimane 2000: 9; Jones 1996: 25) whereas village-level structures are mostly absent (Ntsebeza 2000: 302). The governors and regional councils who are the political heads of their regions (RoN 1998d: 14) do not play a significant role in natural resource management in their settlements. In contrast to elected councillors, traditional authorities are often much more accessible and their behaviour can be much easier socially controlled (Düsing 1999: 143; Ntsebeza 1999: 62; Ntsebeza 2000: 301; Oomen 2002: 31; Katjaerua 2002: 14). They have a great knowledge of customary law and are ready to act quickly (Hangula 1995: 12). Both in Namibia and South Africa, the support of traditional leaders is at least partly generated through the absence and weakness of existing state structures (Katjaerua 2002: 15; Oomen 2002: 12, 15, 17f, 28). Traditional authorities provide certain services cheaper and more effectively than any other organisation (Oomen 2002: 34).

Legal pluralism is an important control mechanism for both customary as well as statutory law. In most domains of social life and in most social settings, more than one 'legal' system becomes relevant (Meinzen-Dick & Pradhan 2002: 3). Where customary and modern law coexist both the courts and the parties involved in a dispute can choose between two sets of rules (Mamdani 1996: 104ff; see also Benda-Beckmann 2002: 60ff, 69; Bidaguren & Estrella 2002: 116; Ashley et al. 2003: 102). This is today's legal reality in most Namibian and South African rural areas (Hinz 2000a; Hinz 2000b: 136; Cousins & Hornby 2000: 9; Corbett &

Jones 2000: 4; Kirk 2000: 26; Wardell-Johnson 2000: 38). For appeals against customary court decisions one can still approach government courts (see also Hinz 2002: 10; Oomen 2002: 7). Where there is legal pluralism, individuals can make use of more than one law to rationalize and legitimise their decisions or their behaviour (Meinzen-Dick & Pradhan 2002: 5). Even though institutional pluralism can lead to insecurity, it offers the opportunity for 'forum-shopping'. People therefore have the choice between different normative repertoires and procedures to legitimate their interests (Benda-Beckmann & Benda-Beckmann 2001: 3; Meinzen-Dick & Pradhan 2002: 13, 9). Different organisations can be held responsible for providing institutional services (see also Benda-Beckmann 1994: 7; Keulder 1997: 37; Oomen 2002: 10). In natural resource management, the functions of government and traditional authorities clearly overlap (Düsing 1999: 210). People draw on a variety of mechanisms for claiming rights to natural resources (Ashley et al. 2003: 102f). Some advantages of customary law are strongly related to transaction costs. The official court system requires expensive professional lawyers and is marked by complex legal procedures and an enormous amount of paperwork (Gatter 2002: 3; Oomen 2002: 7; Bidaguren & Estrella 2002: 122f). The advantage of customary courts is their non-professionalism and accessibility (Hangula 1995: 12; Mamdani 1996: 130; Oomen 2002: 31). They are often based on consensus and shared norms and therefore much more transparent particularly for little educated parties (Oomen 2002: 7). Traditional authorities' knowledge of local social structures and natural circumstances makes it easier for them to understand and resolve conflicts (Hangula 1995: 12). Traditional authorities argue that the community courts' main objective is to restore peace, stability and cohesion in the community rather than to come up with fines or punitive measures (Hinz 2000b: 131; Niamir-Fuller 2000: 120; Oomen 2002: 31). In contrast, magistrate courts are often perceived to compensate victims inadequately (Hinz 2000b: 134). The legal competition provides strong incentives for traditional leaders to be accountable to the communities and to maintain a customary law which reflects their social and moral norms.

### **8.3.10 Cooperative Governance**

In situations where neither the government nor the community or even traditional authorities have the capacity to carry out their duties, it becomes necessary to expand partnership (Jones 1996: 7). Strengths should be reinforced and weaknesses reduced (Krugmann 2001: 9, 21; Werner 2003b: 11). Different stakeholders can provide institutional incentives. Depending on the situation, multi-player institutions may develop. This is the basic idea of cooperative governance, where responsibility is shared between different stakeholders (Mohamed 2000b: 39; Moseley 2004: 128; Peters 2000: 10). There is co-existence and interaction between

multiple legal orders such as state, customary, religious, project and local laws, all of which provide bases for claiming property rights (Meinzen-Dick & Pradhan 2002: I, 3f). Different institution providers may have different capital to offer. However, they are also constrained by their assets. The availability of human, social or physical capital influences how effectively these players can provide institutional services. Since institutions must be well adapted to specific (i.e. natural) conditions, specific knowledge is needed (see also Ostrom 1990: 92). The monitoring of the compliance of rules often requires means of transport and telecommunication (OECD 1999: 70). In this context, the available technology (physical capital) has a strong impact on the efficiency of an institution (North 1990: 61; Ostrom 1990: 203f). Additionally, situation variables like the physical closeness to a resource and their size, affect the costs of monitoring the compliance of use regulations such as stocking rate restrictions (Ostrom 1990: 17). It is important to recognise that local residents do not only have needs, but also valuable assets which can help to provide institutional services efficiently (Bob & Banoo 2000: 102; Moseley 2004: 126). This can reduce enforcement costs of conservation (Swanson 2003: 459). In cases where existing structures such as customary law are legitimised by social and moral-based institutions it is much more advantageous, cheaper and more effective to employ and extend them than to create new institutions (Hangula 1995: 19; Ntsebeza 2002: 14). Externally enforced biodiversity conservation tends to fail (Blaikie & Jeanrenaud 1996: 70) if it is not backed by other enforcement mechanisms.

Strengthening the cooperation between stakeholders such as landowners, landusers, NGOs, media, consultants, commercial companies, politicians, international organisations, combining their advantages and compensating for their limitations will result in a more promising institutional solution (OECD 1999: 16; Ntsebeza 1999: 60f; Mohamed 2000b: 41; McIntosh & Vaughan 2000: 228; RoN 2000d: 6; UNEP 2002: 15, 27, 29; Töttemeyer 2002: 14; Bidaguren & Estrella 2002: 130ff; OECD 2004: 133, 175; Bochniarz & Bolan 2004: 92). Combining efforts is the most efficient way to motivate people to protect ecosystems (Dovie et al. 2000: 345). The state is required to supplement informal constraints and vice versa (Libecap 2002: 142; Richter & Furubotn 2003: 21f, 26; Meinzen-Dick & Pradhan 2002: 28). Traditional authorities, for instance can provide cheap services to rural communities such as the administration of justice and the administration of natural resources (Jones 1996: 6). Conversely, national government can provide services, which traditional authorities cannot offer, such as infrastructure, schools and clinics. In addition, the government has to intervene if fundamental human rights are violated (Hangula 1995: 22; Norman 2000: 87) and should

concentrate on the provision of a general and workable legislative framework as well as the validation and enforcement of legally recognised customary and statutory rights when social and moral-based institutions fail (SPP 1994; Jones 1996: 6; Greenberg 2000: 380; Adams et al. 2000: 123; Claassens 2000: 129, 139; CIFOR 2002; OECD 2002: 45; see also Hampicke 1992: 380). Where local residents cannot handle externalities in a satisfactory manner, it should be involved in their internalisation. Community organisations often do not dispose of the same legal mechanisms to enforce and amend customary and statutory rights, as the government (McIntosch & Vaughan 2000: 228). In all four case studies local residents have only very limited access to the public good of government enforcement. This shortcoming is, however, not a law of nature and must be addressed by the government. Statutory environmental laws should apply and be effectively enforced on communal land just as they are applied to private land owners (Claassens 2000: 140). Such enforcement is not against the interests of communal farmers, but actually in their interest.

Communities expect a certain division of labour between traditional and regional authorities (Hangula 1995: 11; Keulder 1997: 32, 37; Hinz 2002: 10; Oomen 2002: 1, 7ff, 11; Katjaerua 2002: 12, 14; Töttemeyer 2002: 17f; Gatter 2002: 2). It is unwise to alienate any potential ally in the battle to preserve biodiversity (Steelman 2002: 157) particularly if one considers that they often have the potential both to support and to undermine efforts (see also Düsing 1999: 40, 211). Therefore one should aim at a system which combines customary and statutory structures (Hangula 1995: 18). How the bundle of rights is most efficiently distributed between local residents, different government departments, traditional authorities and NGOs, should be decided on a case by case basis (McIntosch & Vaughan 2000: 234). Whoever is willing to contribute to biodiversity preservation, whether by reducing/carrying costs of collecting information, negotiation, monitoring as well as enforcement or by paying compensation for somebody's losses due to more sustainable resource use, should be given the chance (OECD 1999: 67). In this context, it is important that a clear distribution of responsibilities exists between different authorities at different levels. Any absence of clear links leads to uncertainty about who may deliver rulings and often to conflicts between parallel structures (Cousins & Hornby 2000: 11; Shackleton et al. 2002; Jones 1999b). The more players become involved, the higher the transaction costs of coordination become (see also Jones 1996: 40). One should also be aware of the de facto status quo of property rights distribution in order to avoid conflict e.g. between local government structures and traditional authorities (see also Adams et al. 2000: 117; SLSA 2001c; UNEP 2002: 23; Ashley et al.

2003: 103). Any conflict between different governance structures undermines natural resource management (Letsela et al. 2000: 193).

### **8.3.11 Heterogeneity & community choice**

Namibia and South Africa are multicultural and ethnically diverse societies where cultural diversity has become a national value (Düsing 1999: 122; Ntsebeza 1999: 108). Different historical, economic and demographic factors have contributed to differing regional patterns (Hangula 1995: 19). It is a challenge in policy reforms to find institutional structures that correspond with the values of diverse groups and are thus socially legitimate and acceptable, while ,at the same time avoiding ethnic compartmentalisation (Corbett & Jones 2000: 12; Adams et al. 2000: 118; Krugmann 2001: 9; Cousins & Hornby 2002: 7). It is often feared for instance that customary law conceals ethnic tensions and tribalism because it refers to a specific ethnic group (Mamdani 1996: 184; Kössler 2003: 21). In contrast, civil law refers to a nation (Mamdani 1996: 292). The question is, however, whether a national civil law which the population is often unaware of and is not necessarily built on their internalised morals and values, can replace a customary law of an ethnic group whose enforcement is based on the groups' moral and social norms (see also Adams et al. 2000: 118). A national standardisation of natural resource management is likely to be insensitive to local social, economic, and environmental variations (Rohde et al. 2000b: 244). Transaction costs of enforcing a national law in a multicultural country may therefore be extremely high. It requires immense resources to replace accepted structures; most of the time the government does not have the capacity to fill the institutional gaps resulting from such replacements (Claassens 2000: 139, 141; McIntosch & Vaughan 2000: 231).

More regionally adopted approaches become necessary as the result of the great variations in conditions throughout the countries (RoN 1993a: 7; Hangula 1995: 19; Ashley et al. 2003: 104). This includes a decentralised governance approach which recognises the will of the citizens for their governance structure and protects them from abuse by traditional as well as government authorities. People should not only have the democratic right to choose their leaders but also the local governance structure under which they prefer to be ruled. It is unacceptable to force a governance system on someone, be it a traditional or a democratic one (Mbeki 1984: 47). Communities should be empowered to develop their own accountable structures that suit their own circumstances (Jones 1996: 37; Jones & Mosimane 2000: 25; Schalkwyk 2002: 6f). It should, therefore, be their choice to decide to which degree different stakeholders become involved and whether existing or newly formed bodies will take on



responsibilities. Local residents are often the most suited judges of who represents their interests best (Jones 1995: 13f). This also means that communities should have the choice whether functional and popular existing governance and resource management structures will continue to operate (Jones 1996: 39). Such structures often perform important natural resource management tasks and have a positive impact on promoting people's priorities in resource management (Thomas et al. 1998; Bob & Banoo 2000: 104; Shackleton et al. 2002; Ntsebeza 2002: 8). Adapting institutions to existing realities rather than attempting to replace them also involves giving them legal recognition (Cousins & Hornby 2000: 10). The South African Communal Land Rights Act provides a legal framework for a land administration system where communities have a choice between different land administration structures. They have the right to decide whether traditional authorities or local government authorities are involved in the management of their natural resources (RSA 2004a: sec. 21, 22(2); see also Sibanda 2000: 307, 309). Dissatisfied communities should, however, also have opportunities to replace illegitimate leaders and structures for instance with new democratic ones (Fuller & Turner 1996: 44; RSA 1997a; Düsing 1999: 252; Ntsebeza 1999: 62; Corbett & Jones 2000: 15; Claassens 2000: 140; Ntsebeza 2002: 18; Werner 2003a). In this context it is important that traditional authorities or any other community organisation derive their authority regarding natural resource management, the maintenance of law and order or dispute resolution from the community itself (Ntsebeza 1999: 52, 62; Claassens 2000: 141; Ntsebeza 2000: 302; Ntsebeza 2002: 18).

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<sup>121</sup> *Kolmogorov-Smirnov-Test* of variances between settlements for the variable 'changes of pasture since 10 years': Mutompo & Soebatsfontein: K-S-Z-coefficient: 1.819; sign.: 0.003; Okamboro and Soebatsfontein: K-S-Z-coefficient: 1.846; sign.: 0.002; Tiervlei and Soebatsfontein: K-S-Z-coefficient: 1.389; sign.: 0.042.

<sup>122</sup> *Kolmogorov-Smirnov-Test* of variances between settlements for the variable 'externalities': Mutompo and Soebatsfontein: K-S-Z-coefficient: 2.075; sign.: 0.000; Tiervlei and Soebatsfontein: K-S-Z-coefficient: 1.724; sign.: 0.005.

<sup>123</sup> *Spearman-Rho correlation*: „sum externalities” & „changes of pasture quality for the past 10 years “; coefficient 0.407; sign.: 0.001; N = 69.

<sup>124</sup> *Wilcoxon-Test* of variances between the variables 'pension as source of income' & 'livestock as source of income': W-Z-coefficient: -2.849; sign.: 0.004; 'permanent work as source of income' & 'livestock as source of income': W-Z-coefficient: -2.771; sign.: 0.006; N = 122.

<sup>125</sup> *Kolmogorov-Smirnov-Test* of variances between settlements for the variable 'importance of livestock as source of income': Mutompo & Tiervlei: K-S-Z-coefficient: 1.711; sign.: 0.006; N = 122.

<sup>126</sup> *Kolmogorov-Smirnov-Test* of variances between settlements for the variable 'livestock as source of income': Mutompo & Soebatsfontein: K-S-Z-coefficient: 1.466; sign.: 0.027; Okamboro & Soebatsfontein: K-S-Z-coefficient: 2.121; sign.: 0.000; Tiervlei & Soebatsfontein: K-S-Z-coefficient: 1.530; sign.: 0.018; N = 122.

<sup>127</sup> *Kolmogorov-Smirnov-Test* of variances between settlements for the variable 'other state transfers as source of income': Okamboro & Soebatsfontein: K-S-Z-coefficient: 1.375; sign.: 0.046; N = 122.

- <sup>128</sup> *Kolmogorov-Smirnov-Test* of variances between settlements for the variable ‘crop production as source of income’: Mutompo & Okamboro: K-S-Z-coefficient: 2.685; sign.: 0.000; Mutompo & Tiervlei: K-S-Z-coefficient: 2.595; sign.: 0.000; Mutompo & Soebatsfontein: K-S-Z-coefficient: 3.041; sign.: 0.000; N = 122.
- <sup>129</sup> *Spearman-Rho correlation*: „do you sell something if cash is needed” & „livestock sold in 2002“; coefficient 0.302; sign.: 0.001; N = 116.
- <sup>130</sup> *Spearman-Rho correlation*: „education level of household head” & „number of sources of income“; coefficient -0.283; sign.: 0.002; N = 122.
- <sup>131</sup> *Spearman-Rho correlation*: „household has savings” & „permanent work as source of income“; coefficient 0.206; sign.: 0.026; N = 117; „household can get loan” & „permanent work as source of income“; coefficient 0.424; sign.: 0.000; N = 102; „household can get loan” & „education level of household head“; coefficient 0.232; sign.: 0.019; N = 102.
- <sup>132</sup> *Kolmogorov-Smirnov-Test* of variances between settlements for the variable ‘can you get a loan?’: Mutompo & Tiervlei: K-S-Z-coefficient: 1.290; sign.: 0.072; Soebatsfontein & Tiervlei: K-S-Z-coefficient: 1.760; sign.: 0.004; N = 122.
- <sup>133</sup> *Spearman-Rho correlation*: „collect firewood” & „permanent work as source of income“; coefficient -0.300; sign.: 0.013; N = 68.
- <sup>134</sup> *Kolmogorov-Smirnov-Test* of variances between settlements for the variable ‘education level of household head’: Mutompo & Soebatsfontein: K-S-Z-coefficient: 1.649; sign.: 0.009; Okamboro & Soebatsfontein: K-S-Z-coefficient: 2.202; sign.: 0.000; Okamboro & Tiervlei: K-S-Z-coefficient: 1.323; sign.: 0.060.
- <sup>135</sup> *Kolmogorov-Smirnov-Test* of variances between settlements for the variable ‘changes of education level since 1994’: Mutompo & Soebatsfontein: K-S-Z-coefficient: 1.131; sign.: 0.064; Okamboro & Soebatsfontein: K-S-Z-coefficient: 1.374; sign.: 0.046.
- <sup>136</sup> *Kolmogorov-Smirnov-Test* of variances between settlements for the variable ‘do you need information on livestock farming?’: Mutompo & Okamboro: K-S-Z-coefficient: 1.271; sign.: 0.079; Mutompo & Tiervlei: K-S-Z-coefficient: 1.450; sign.: 0.030; Okamboro & Tiervlei: K-S-Z-coefficient: 1.399; sign.: 0.040.
- <sup>137</sup> *Spearman-Rho correlation*: „education level of household head” & „importance of livestock as source of income“; coefficient -0.184; sign.: 0.043; N = 122.
- <sup>138</sup> *Spearman-Rho correlation*: „education level of household head” & „total LSU of household“; coefficient -0.276; sign.: 0.002; N = 122.
- <sup>139</sup> *Spearman-Rho correlation*: „education level of household head” & „number of sources of income“; coefficient -0.283; sign.: 0.002; N = 122.
- <sup>140</sup> *Pearson’s correlation*: „total LSU of household” & „LSU sold“; coefficient: 0.670; sign.: 0.000; N = 80; „total LSU of household” & „LSU slaughtered“; coefficient: 0.492; sign.: 0.000; N = 80.
- <sup>141</sup> A goat price of N\$ 250 and a cattle price of N\$ 3.000 is assumed.
- <sup>142</sup> *Spearman-Rho correlation*: „food supply sell” & „employment status“; coeff.: -0.300; sign.: 0.041; N = 47; „relative value of food supply for keeping & selling” & „education level of household head“; coefficient: -0.303; sign.: 0.039; N = 47.
- <sup>143</sup> *Spearman-Rho correlation*: „number of LSU sold or slaughtered” & „get support if needed“; coefficient -0.205; sign.: 0.026; N = 117; „number of LSU sold or slaughtered” & „transfer to others“; coefficient 0.242; sign.: 0.024; N = 87; „number of LSU owned by household” & „transfer to others“; coefficient 0.345; sign.: 0.001; N = 87; „permanent job as source of income” & „transfer to others”; coefficient 0.230; sign.: 0.032; N = 87; „have a function in community” & „transfer to others”; coefficient 0.318; sign.: 0.003; N = 87; „can influence what happens in community” & „transfer to others”; coefficient 0.355; sign.: 0.001; N = 87.
- <sup>144</sup> *Spearman-Rho correlation*: „permanent work as source of income” & „have a function in the community“; coefficient 0.185; sign.: 0.043; N = 120; „number of LSU owned by household” & „can influence what happens in the community “; coefficient 0.185; sign.: 0.046; N = 116; „have savings” & „can influence what happens in the community “; coefficient 0.238; sign.: 0.010; N = 115; „function in the community” & „participate in collective action“; coefficient 0.331; sign.: 0.000; N = 114; „function in the community” & „can influence what happens in community“; coefficient 0.197; sign.: 0.034; N = 116.

## 9 Conclusion

The main objective of the presented study was to describe the human impact on biodiversity status along the BIOTA transect. The comparative analysis of the farming systems of Mutompo, Okamboro, Tiervlei and Soebatsfontein based on the Capital-Need-Institution-Model showed the complexity of communal farmers' decision making. A successful promotion of poverty alleviation, sustainable rural development and biodiversity maintenance depends on a wide range of factors, which have to be addressed simultaneously.

Starting with the capital component of the Capital-Need-Institution Model, it has to be stressed that a significant part of the researched communal farmers are highly dependent on natural resources because of the lack of employment opportunities and the lack of human capital required for alternative livelihood strategies. This dependency puts enormous pressure on biodiversity. Since opportunities for economic development are limited for natural resource based livelihood activities, this situation keeps many of the communal farmers poor and vulnerable. Respondents who are less dependent on natural resources, for instance because of employment income, are generally wealthier and are less forced to diversify their sources of income. In order to reduce the high dependency on natural resources, which is, to a large extent, responsible for the short time horizon with regard to resource use of many southern African communal farmers, it is first of all important that the target groups have more opportunities to earn a living. Human capital investments play a crucial role in this process. Education increases the chance of finding jobs outside of the subsistence agricultural sector. Additionally, investments in natural capital e.g. land redistribution, in physical capital e.g. improving the water and road infrastructure, in financial capital e.g. micro-credit schemes and in social capital e.g. empowering community based organisations must be considered. Such measures can steer people away from unsustainable resource use towards more sustainable options. Any attempt to make natural resource use more sustainable will fail if human, financial, natural, physical and social capital restraints leave resource users no choice but to exploit their natural resource base.

Nonetheless, just presenting resource users with more opportunities will not be enough to preserve biodiversity as long as, even those who are not dependent on natural resource based livelihoods, have a high preference for activities which put pressure on natural resources. Analysis of the motive component of the Capital-Need-Institution Model showed that at least

at some research sites many wealthier and better-educated farmers have a high preference for herd size maximisation. They use livestock in order to accumulate capital and to satisfy safety needs. In this context, it is important to offer and advertise attractive substitutes for respective livestock functions such as alternative savings and insurance instruments. The same applies to the fact that herd size maximisation is for many farmers a means to satisfy social and self-esteem needs. It must be pointed out that the social environment and the cultural background of farmers often reinforce the preference for unsustainable resource use practices. This again underlines the importance of human capital investments in terms of awareness raising not only of livestock owners but also of their social environment. It is crucial for biodiversity maintenance to reduce the relative attractiveness of a way of need satisfaction which puts pressure on natural resources in comparison to more sustainable alternatives. This can be achieved on the one hand by increasing the benefits of using sustainable alternatives and on the other hand reducing the benefits of engaging in unsustainable activities. Especially, if those who are not dependent on natural resource based livelihoods create costs for uninvolved parties then these local and/or global externalities have to be internalised.

Capital and motive assessments have made it clear that increasing people's opportunities to satisfy their needs in a more sustainable way is necessary for biodiversity maintenance but that alone is insufficient. Institutional incentives are needed in order to steer them towards more sustainable natural resource management. In this context, the distribution of property rights plays a very important role. In all researched areas, the right of access to natural resources are governed either by traditional or state authorities. The rights to use natural resources are regulated by customary and statutory law, even though, particularly where grazing and wood resources are concerned there are at least some instances of unsatisfactory management. The reasons for insufficient internalisation of externalities as the result e.g. of uncontrolled commercial hardwood cutting or uncooperative pasture management are complex and at least partly related to the question of land tenure. State ownership of communal lands signals that people residing on the land are only responsible for natural resource management to a certain extent. The fact that local users know they do not have ownership together with the confusion about their property rights are a serious threat to biodiversity maintenance. Generally, Namibian and South African governments formally take on much of the responsibility for natural resource management but, in practice, they do not have the capacity to fulfil this duty. This is most obvious with regard to the monitoring and enforcement of laws. In both countries the potential of communal land users to provide

institutional services is little used. Applying existing institutional structures, based on social and moral enforcement, such as multi-layer traditional authorities and communities' informal mechanisms of decision making could reduce transaction costs of natural resource management. This requires a more subsidiary cooperative governance methodology, which makes use of every stakeholder's opportunities to establish, run, change and abolish natural resource use regulations, and which compensates the disadvantages of different providers of institutional services. Due to high regional heterogeneity regarding natural conditions, capital availability and motives of resource users as well as existing institutional settings, regionally adapted approaches are needed.

## Appendixes

**Appendix 1:** Catalogue of variables for the motives assessment of livestock keeping (source: Falk)

variable	need or capital category	question	meaning of value 2	meaning of value -2
general preference	preference	How much do you prefer to keep, slaughter or sell one head of livestock?	like it very much	do not like at all
happiness	happiness/self-esteem needs	If you keep, slaughter or sell one head of livestock, does this make you feel happy or unhappy?	very happy	very unhappy
money	financial capital	If you keep, slaughter or sell one head of livestock, does this have an impact on the money available in the household?	much more money available	much less money available
work load	physical capital	If you keep, slaughter or sell one head of livestock, does this make your daily work easier or more difficult?	much easier	much more difficult
water	natural capital	If you keep, slaughter or sell one head of livestock, does this have an impact on the water available for the rest of your herd?	much more water available	much less water available
pasture	natural capital	If you keep, slaughter or sell one head of livestock, does this have an impact on the grazing available for the rest of your herd?	much more grazing available	much less grazing available
food	physiological needs	If you keep, slaughter or sell one head of livestock, does this have an impact on the food available in the household?	much more food available	much less food available
relations	belongingness needs/social capital	If you keep, slaughter or sell one head of livestock, are relatives and friends happy or unhappy with your decision?	they are very happy	they are very unhappy
approval	belongingness needs/social capital	If you keep, slaughter or sell one head of livestock, do relatives and friends approve or disapprove your decision?	they approve it very much	they disapprove it very much
support	belongingness needs/social capital	If you keep, slaughter or sell today one head of livestock, will relatives and friends support you in future times of trouble more or less than before?	they support me much more	they support me much less
status	esteem needs/social capital	If you keep, slaughter or sell one head of livestock, will this increase or decrease your status in the community?	much higher status	much lower status
security	safety needs	If you keep, slaughter or sell one head of livestock, will this make your future livelihood more or less secure?	much more secure	much less secure
information	transaction costs	Do you need special information if you want to keep, slaughter or sell one head of livestock?	many information needed	no information needed
time	transaction costs	How much time does it take to keep, slaughter or sell one head of livestock?	very much time	no time

**Appendix 2:** Wilcoxon-Significance-Test for the variables of the livestock motive assessment and asymptotic significance of variances - Mutompo (N=10) (source: Falk)

	Comparison between <b>keep &amp; sell</b> Wilcoxon Z-coefficient, ( <i>asymptotic sign.</i> )	Comparison between <b>keep &amp; slaughter</b> Wilcoxon Z-coefficient, ( <i>asymptotic sign.</i> )	Comparison between <b>slaughter &amp; sell</b> Wilcoxon Z-coefficient, ( <i>asymptotic sign.</i> )
preference	-2.81 (0.005)	-3.05 (0.002)	-1.60 (0.109)
happiness	-2.81 (0.005)	-2.76 (0.006)	0.00 (1.000)
money	-0.60 (0.550)	-2.69 (0.007)	-2.15 (0.032)
work load	-0.55 (0.586)	-1.98 (0.048)	-2.04 (0.041)
water	-2.27 (0.023)	-2.07 (0.038)	-0.45 (0.655)
pasture	-2.59 (0.010)	-2.46 (0.014)	-1.09 (0.276)
	Variance between	Variance between	Variance between



(N=8)	P&H	P&doE	P&doS	P&doN	H&doE	H&doS	H&doN	doE&doS	doE&doN	doS&doN
punish cs	-1.000 (0.317)	-1.511 (0.131)	-2.271 <b>(0.023)</b>	-2.060 <b>(0.039)</b>	-1.890 <b>(0.059)</b>	-2.414 <b>(0.016)</b>	-2.232 <b>(0.026)</b>	-1.604 (0.109)	-0.557 (0.577)	-0.447 (0.655)
punish ncs	0.000 (1.000)	-1.633 (0.102)	-1.633 (0.102)	-1.633 (0.102)	-1.633 (0.102)	-1.633 (0.102)	-1.633 (0.102)	0.000 (1.000)	0.000 (1.000)	0.000 (1.000)
relations cs	-1.000 (0.317)	-0.677 (0.498)	-2.041 <b>(0.041)</b>	-1.633 (0.102)	-1.841 <b>(0.066)</b>	-2.220 <b>(0.026)</b>	-2.041 <b>(0.041)</b>	-1.604 (0.109)	-0.756 (0.450)	-1.069 (0.285)
relations ncs	0.000 (1.000)	-1.604 (0.109)	-1.604 (0.109)	-1.342 (0.180)	-1.604 (0.109)	-1.604 (0.109)	-1.342 (0.180)	-1.000 (0.317)	-1.414 (0.157)	-1.000 (0.317)
approval cs	0.000 (1.000)	-1.342 (0.180)	-1.857 <b>(0.063)</b>	-1.633 (0.102)	-1.342 (0.180)	-1.857 <b>(0.063)</b>	-1.633 (0.102)	-1.633 (0.102)	-1.134 (0.257)	-1.000 (0.317)
approval ncs	-1.000 (0.317)	0.000 (1.000)	-0.535 (0.593)	-0.816 (0.414)	-1.414 (0.157)	-1.342 (0.180)	-1.342 (0.180)	-1.000 (0.317)	-1.089 (0.276)	-0.447 (0.655)
status cs	-1.000 (0.317)	-1.604 (0.109)	-1.890 <b>(0.059)</b>	-1.633 (0.102)	-1.604 (0.109)	-1.857 <b>(0.063)</b>	-1.633 (0.102)	-1.342 (0.180)	-0.272 (0.785)	-1.000 (0.317)
status ncs	0.000 (1.000)	-1.000 (0.317)	-1.342 (0.180)	-1.000 (0.317)	-1.000 (0.317)	-1.342 (0.180)	-1.000 (0.317)	-1.000 (0.317)	-0.447 (0.655)	-1.000 (0.317)
risks cs	0.000 (1.000)	-1.414 (0.157)	-1.841 <b>(0.066)</b>	-1.342 (0.180)	-1.414 (0.157)	-1.841 <b>(0.066)</b>	-1.342 (0.180)	-1.342 (0.180)	0.000 (1.000)	-1.414 (0.157)
risks ncs	0.000 (1.000)	-2.041 <b>(0.041)</b>	-2.041 <b>(0.041)</b>	-1.633 (0.102)	-1.841 <b>(0.066)</b>	-2.041 <b>(0.041)</b>	-1.633 (0.102)	-0.447 (0.655)	-0.368 (0.713)	-1.414 (0.157)
way cs	-2.050 <b>(0.040)</b>	-1.282 (0.200)	-2.032 <b>(0.042)</b>	-2.414 <b>(0.016)</b>	-0.566 (0.572)	-0.430 (0.667)	-1.633 (0.102)	-0.108 (0.914)	-1.791 <b>(0.073)</b>	-1.706 <b>(0.088)</b>
way ncs	-1.807 <b>(0.071)</b>	-1.200 (0.230)	-2.070 <b>(0.038)</b>	-2.410 <b>(0.016)</b>	-0.750 (0.453)	-0.272 (0.785)	-1.784 <b>(0.074)</b>	-0.108 (0.914)	-1.980 <b>(0.048)</b>	-2.047 <b>(0.041)</b>

**Appendix 5:** Wilcoxon-Significance-Tests for variances between grazing areas of variables between cropping and non-dropping season in Mutompo (Wilcoxon Z-coefficient, *asymptotic significance*)  
(source: Falk)

(N=8)	Pandureni	Horongo	do Epingiro	do Shihetekera	do Nzovhu
preference	-1.000 (0.317)	-1.511 (0.131)	-0.319 (0.750)	-1.414 (0.157)	0.000 (1.000)
happiness	0.000 (1.000)	0.000 (1.000)	-1.414 (0.157)	-1.414 (0.157)	0.000 (1.000)
pasture	-1.890 <b>(0.059)</b>	-1.633 (0.102)	-0.736 (0.461)	-1.134 (0.257)	-1.134 (0.257)
water	-1.342 (0.180)	-2.388 <b>(0.017)</b>	-1.841 <b>(0.066)</b>	-1.000 (0.317)	-1.000 (0.317)
punish	-1.000 (0.317)	0.000 (1.000)	-1.511 (0.131)	-2.388 <b>(0.017)</b>	-1.706 <b>(0.088)</b>
relations	0.000 (1.000)	-1.414 (0.157)	-0.816 (0.414)	-1.890 <b>(0.059)</b>	-0.921 (0.357)
approval	-1.414 (0.157)	-1.000 (0.317)	-1.000 (0.317)	-1.069 (0.285)	-0.272 (0.785)
status	-1.633 (0.102)	-1.732 <b>(0.083)</b>	-1.000 (0.317)	-1.342 (0.180)	-0.816 (0.414)
risks	0.000 (1.000)	0.000 (1.000)	-1.342 (0.180)	-1.000 (0.317)	-1.000 (0.317)
distance	0.000 (1.000)	-1.000 (0.317)	-1.342 (0.180)	-1.342 (0.180)	-1.000 (0.317)

**Appendix 6:** Correlation between the relative preference of area pairs and the relative value of different variables – cropping season (Spearman-Rho-correlation coefficients; significances in parenthesis; P=Pandureni; H=Horongo; doE=direction of Epingiro; doS=direction of Shihetekera; doN=direction of Nzovhu; N = 8) (source: Falk)

	pasture	distance	relation	status	approval	risks	water
P/H	0.095 (0.823)	0.630 (0.094)	0.667 <b>(0.071)</b>	0.095 (0.823)			-0.145 (0.731)
P/doE		0.864 <b>(0.006)</b>	0.299 (0.472)	-0.074 (0.862)	-0.247 (0.555)	0.330 (0.425)	-0.111 (0.794)
P/doS		-0.293 (0.482)	0.488 (0.220)	0.378 (0.356)	-0.378 (0.256)	0.378 (0.356)	0.667 <b>(0.071)</b>
P/doN		0.655 <b>(0.078)</b>	0.690 <b>(0.058)</b>	0.447 (0.267)	-0.149 (0.725)	0.333 (0.420)	0.145 (0.731)
H/doS		0.069 (0.871)	0.333 (0.420)	0.000 (1.000)	0.000 (1.000)	-0.577 (0.134)	-0.218 (0.604)
H/doN		0.717 <b>(0.045)</b>	0.738 <b>(0.037)</b>	0.443 (0.272)	0.443 (0.272)	0.330 (0.425)	-0.216 (0.607)
doE/doS	0.384 (0.384)	0.324 (0.434)	0.494 (0.214)	0.207 (0.623)	0.494 (0.214)	0.207 (0.623)	0.359 (0.383)
doE/doN	0.794 <b>(0.019)</b>	0.873 <b>(0.005)</b>	0.656 <b>(0.078)</b>	0.473 (0.237)	0.656 <b>(0.078)</b>	0.612 (0.107)	0.596 (0.119)
doS/doN	0.829 <b>(0.011)</b>	0.297 (0.475)	-0.063 (0.881)	-0.095 (0.823)	-0.095 (0.823)	0.364 (0.376)	0.000 (1.000)



**Appendix 7:** Correlation between the relative preference of area pairs and the relative value of different variables – non-cropping season (Spearman-Rho-correlation coefficients; significances in parenthesis; P=Pandureni; H=Horongo; doE=direction of Epingiro; doS=direction of Shihetekera; doN=direction of Nzovhu; N = 8) (source: Falk)

	pasture	distance	relation	status	approval	risks	water
P/doN	-0.218 (0.604)	1.000 (0.000)	0.218 (0.604)	0.143 (0.736)	0.095 (0.823)	0.293 (0.482)	
H/doE	-0.370 (0.367)	0.309 (0.457)	-0.067 (0.875)	-0.293 (0.482)	0.149 (0.725)	0.258 (0.537)	
H/doN	0.218 (0.604)	1.000 (0.000)	0.436 (0.280)	0.286 (0.493)	0.436 (0.280)	0.586 (0.127)	
doE/doS	0.447 (0.267)	-0.443 (0.272)	-0.488 (0.220)	-0.293 (0.482)	-0.293 (0.482)	0.516 (0.190)	
doS/doN	0.656 (0.078)	0.683 (0.062)	0.452 (0.261)	0.452 (0.261)	0.418 (0.302)	0.690 (0.058)	

**Appendix 8:** Median of variables for the assessment of grazing areas in Mutompo (source: Falk)

	preference	happiness	pasture	water	punishment	relations	approval	status	risks	distance
Pandureni cs	2	2	2	-2	2	2	2	0.5	2	2
Horongo cs	2	2	2	0.5	2	2	2	1	2	0
do Epingiro cs	-1.5	-1	0	-1	1.5	0.5	2	0	0	0.5
do Shihetekera cs	-2	-1.5	0	-2	-1.5	-0.5	0	-0.5	-1	-0.5
do Nzovho cs	-2	-2	0	-2	-1	0	1	0	1	-2
Pandureni ncs	2	2	1.5	-2	2	2	2	0	2	2
Horongo ncs	1	2	2	-2	2	2	2	0	2	0.5
do Epingiro ncs	-0.5	0	0.5	-2	2	0	2	0	-1	-1
do Shihetekera ncs	-2	-1.5	-0.5	-2	2	0	2	0	-1	0
do Nzovho ncs	-2	-2	0	-2	2	0	1	0	-0.5	-2

**Appendix 9:** Wilcoxon-Significance-Test for the variables of the livestock motive assessment and asymptotic significance of variances - Okamboro (N=16) (source: Falk)

	Comparison between keep & sell Wilcoxon Z-coefficient, (asymptotic sign.)	Comparison between keep & slaughter Wilcoxon Z-coefficient, (asymptotic sign.)	Comparison between slaughter & sell Wilcoxon Z-coefficient, (asymptotic sign.)
preference	-2.80 (0.005)	-3.62 (0.000)	-3.22 (0.001)
happiness	-3.33 (0.001)	-2.02 (0.044)	-2.85 (0.004)
money	-0.42 (0.676)	-2.59 (0.010)	-3.40 (0.001)
work load	-2.40 (0.016)	-2.40 (0.016)	-1.00 (0.317)
water	-2.33 (0.020)	-2.33 (0.020)	0.00 (1.000)
pasture	-2.46 (0.014)	-2.46 (0.014)	0.00 (1.000)
food	-0.56 (0.577)	-0.68 (0.500)	-1.55 (0.120)
security	-2.17 (0.030)	-2.97 (0.003)	-1.83 (0.068)
relations	-2.94 (0.003)	-2.54 (0.011)	-0.17 (0.865)
approval	-0.32 (0.750)	-0.60 (0.550)	-1.34 (0.180)
support	-1.87 (0.062)	-1.98 (0.048)	-1.41 (0.157)
status	-0.32 (0.752)	-0.95 (0.343)	-0.68 (0.498)
information	-1.81 (0.070)	-2.49 (0.013)	-2.31 (0.021)
time	-0.14 (0.886)	-2.50 (0.012)	-2.96 (0.003)

**Appendix10:** Wilcoxon-Significance-Tests for variances between grazing areas around Okamboro (Wilcoxon Z-coefficient, asymptotic significance in parenthesis) (n = north; mc = military camp; e = east; s = south; w = west) (N=15) (source: Falk)

	w&n	w&mc	w&e	w&s	s&n	s&mc	s&e	n&e	mc&e	mc&n
preference	-2.823 (0.005)	-0.492 (0.623)	-1.235 (0.217)	-1.520 (0.129)	-0.900 (0.368)	-1.584 (0.113)	-0.566 (0.571)	-1.524 (0.104)	-0.953 (0.341)	-2.829 (0.005)
happiness	-2.316 (0.021)	-0.396 (0.692)	-1.059 (0.290)	-1.264 (0.206)	-0.564 (0.573)	-1.194 (0.232)	-0.284 (0.776)	-0.632 (0.528)	-1.194 (0.232)	-1.911 (0.056)
pasture	-2.520 (0.012)	-0.540 (0.589)	-2.835 (0.005)	-2.435 (0.015)	-0.361 (0.718)	-2.623 (0.009)	-0.525 (0.589)	-0.325 (0.745)	-3.126 (0.002)	-2.657 (0.008)

	w&n	w&mc	w&e	w&s	s&n	s&mc	s&e	n&e	mc&e	mc&n
water	-1.309 (0.190)	-2.829 (0.005)	-2.066 (0.039)	-1.043 (0.297)	-0.212 (0.832)	-1.807 (0.071)	-0.537 (0.591)	-0.258 (0.796)	-1.320 (0.187)	-1.713 (0.087)
relations	-1.604 (0.109)	-1.857 (0.063)	-0.425 (0.671)	-0.427 (0.669)	-0.954 (0.340)	-1.841 (0.066)	-0.000 (1.000)	-0.954 (0.340)	-1.633 (0.102)	-2.401 (0.016)
approval	-1.604 (0.109)	0.000 (1.000)	-0.962 (0.336)	-0.755 (0.450)	-0.552 (0.581)	-1.633 (0.102)	0.000 (1.000)	-0.216 (0.829)	-1.342 (0.180)	-1.890 (0.059)
status	-1.342 (0.180)	-1.342 (0.180)	-0.272 (0.785)	-1.512 (0.131)	-0.552 (0.581)	-2.000 (0.046)	-1.732 (0.083)	-0.966 (0.334)	-1.000 (0.317)	-1.857 (0.063)
risks	-0.139 (0.889)	-0.128 (0.898)	-1.432 (0.152)	-0.796 (0.426)	-1.331 (0.183)	-1.941 (0.052)	-1.732 (0.083)	-1.968 (0.049)	-2.060 (0.039)	-0.159 (0.873)
distance	-2.672 (0.008)	-0.399 (0.690)	-0.226 (0.822)	-0.322 (0.747)	-1.978 (0.048)	-0.415 (0.678)	-0.414 (0.679)	-2.515 (0.012)	-0.045 (0.964)	-2.994 (0.003)

**Appendix 11:** Median of variables for the assessment of grazing areas (N = 15) (source: Falk)

	preference	happiness	pasture	water	relations	approval	status	risks	distance
north	-2	-1	0	0	0	0	0	-1	1
m. camp	1	0	2	0	0	0	0	-1	0
east	0	-1	0	-1	0	0	0	0	0
south	-1	-1	0	-1	0	0	0	-1	0
west	1	1	1	-1	0	0	0	-1	0

**Appendix 12:** Correlation between the relative preference of area pairs and the relative value of variables (Spearman-Rho-correlation coefficients; significances in parenthesis; mc = military camp; N = 15) (source: Falk)

	pasture	distance	relation	status	approval	security	water
west/north	0.338 (0.217)	0.232 (0.404)	0.349 (0.202)	0.274 (0.324)	0.349 (0.202)	-0.034 (0.905)	-0.148 (0.598)
west/mc	0.000 (1.000)	-0.299 (0.279)	0.342 (0.211)	0.026 (0.926)	0.465 (0.081)	0.000 (1.000)	0.000 (1.000)
west/east	-0.240 (0.390)	0.546 (0.035)	0.676 (0.006)	0.529 (0.043)	0.586 (0.022)	0.081 (0.773)	0.007 (0.981)
west/south	0.252 (0.364)	0.000 (1.000)	0.548 (0.034)	0.475 (0.073)	0.618 (0.014)	-0.198 (0.480)	0.326 (0.236)
south/north	0.090 (0.749)	0.540 (0.038)	0.430 (0.110)	0.430 (0.110)	0.391 (0.149)	-0.422 (0.117)	0.539 (0.038)
south/mc	0.431 (0.109)	0.268 (0.334)	0.238 (0.392)	0.477 (0.072)	0.395 (0.145)	-0.318 (0.248)	0.068 (0.811)
south/east	0.559 (0.030)	-0.221 (0.429)	0.409 (0.131)	0.456 (0.087)	0.409 (0.131)	0.000 (1.000)	0.472 (0.076)
east/north	-0.035 (0.901)	0.233 (0.404)	0.047 (0.867)	0.031 (0.913)	-0.051 (0.857)	0.104 (0.711)	0.244 (0.380)
east/mc	-0.125 (0.657)	0.203 (0.468)	0.292 (0.292)	0.267 (0.336)	0.392 (0.148)	0.242 (0.385)	0.220 (0.430)
north/mc	0.419 (0.120)	0.045 (0.873)	0.280 (0.313)	0.360 (0.187)	0.360 (0.187)	0.302 (0.275)	0.242 (0.384)

**Appendix 13:** Wilcoxon-Significance-Test for the variables of the livestock motive assessment and asymptotic significance of variances – Tiervlei (N= 21) (source: Falk)

	Comparison between <b>keep &amp; sell</b> Wilcoxon Z-coefficient, (asymptotic sign.)	Comparison between <b>keep &amp; slaughter</b> Wilcoxon Z-coefficient, (asymptotic sign.)	Comparison between <b>slaughter &amp; sell</b> Wilcoxon Z-coefficient, (asymptotic sign.)
preference	-3.65 (0.000)	-3.71 (0.000)	-0.56 (0.577)
happiness	-3.21 (0.001)	-2.21 (0.001)	0.10 (0.911)
money	-1.64 (0.101)	-2.89 (0.004)	-2.91 (0.004)
work load	-0.27 (0.785)	-0.05 (0.964)	-1.00 (0.317)
water	-3.17 (0.002)	-3.17 (0.002)	0.00 (1.000)
pasture	-3.17 (0.002)	-3.17 (0.002)	0.00 (1.000)
food	-3.92 (0.000)	-4.06 (0.000)	-1.81 (0.071)
security	-1.13 (0.257)	-1.48 (0.140)	-0.89 (0.371)
relations	-1.08 (0.282)	-0.12 (0.903)	-1.14 (0.254)
approval	-0.97 (0.334)	-1.21 (0.228)	-0.96 (0.336)
support	-1.84 (0.066)	-1.63 (0.102)	-2.00 (0.046)
status	-1.00 (0.319)	-1.12 (0.263)	-0.53 (0.599)
	Variance between <b>keep &amp; sell</b>	Variance between <b>keep &amp; slaughter</b>	Variance between <b>slaughter &amp; sell</b>

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	Wilcoxon Z-coefficient, (asymptotic sign.)	Wilcoxon Z-coefficient, (asymptotic sign.)	Wilcoxon Z-coefficient, (asymptotic sign.)
information	-0.63 (0.531)	-2.07 <b>(0.038)</b>	-2.57 <b>(0.010)</b>
time	-3.99 <b>(0.000)</b>	-4.00 <b>(0.000)</b>	-0.95 (0.341)

**Appendix 14:** T-Test for variances between settlements of real selling and slaughtering numbers  
(source: Falk)

	Mutompo & Okamboro		Mutompo & Tiervlei		Okamboro & Tiervlei	
	T-statistic	significance	T-statistic	significance	T-statistic	significance
LSU sold	-1.110	0.278	-1.829	<b>0.078</b>	0.342	0.734
percentage of total LSU sold	1.360	0.187	-0.609	0.547	3.877	<b>0.000</b>
LSU slaughtered	-1.204	0.240	-3.519	<b>0.001</b>	-0.580	0.566
percentage of total LSU slaughtered	0.820	0.420	-0.188	0.852	2.274	<b>0.029</b>

**Appendix 15:** Kolmogorov-Smirnov-Test of the motive assessment. A high coefficient indicates a significant variance between settlements (Kolmogorov-Smirnov-coefficient, asymptotic significance in brackets; M = Mutompo, O = Okamboro, T = Tiervlei; N = 47) (source: Falk)

	keep			sell			slaughter		
	M & O	M & T	T & O	M & O	M & T	T & O	M & O	M & T	O & T
preference	0.310 (1.000)	0.372 (0.999)	0.099 (1.000)	1.581 <b>(0.013)</b>	1.078 (0.195)	0.673 (0.756)	0.372 (0.999)	1.475 <b>(0.026)</b>	1.256 <b>(0.085)</b>
happiness	0.620 (0.836)	0.868 (0.439)	0.377 (0.999)	1.271 <b>(0.079)</b>	1.574 <b>(0.014)</b>	0.798 (0.547)	0.248 (1.000)	1.066 (0.206)	1.121 (0.162)
money	0.744 (0.637)	0.223 (1.000)	0.646 (0.799)	0.465 (0.982)	1.053 (0.217)	0.655 (0.785)	0.341 (1.000)	0.124 (1.000)	0.314 (1.000)
food	0.899 (0.394)	2.082 <b>(0.000)</b>	1.507 <b>(0.021)</b>	1.054 (0.216)	1.834 <b>(0.002)</b>	0.843 (0.476)	0.434 (0.992)	1.574 <b>(0.014)</b>	1.408 <b>(0.038)</b>
security	1.550 <b>(0.016)</b>	1.115 (0.166)	0.771 (0.591)	0.961 (0.314)	1.475 <b>(0.026)</b>	0.691 (0.727)	0.744 (0.637)	1.339 <b>(0.056)</b>	0.969 (0.305)
work load	1.736 <b>(0.005)</b>	1.326 <b>(0.059)</b>	0.574 (0.897)	0.837 (0.485)	1.041 (0.229)	0.368 (0.999)	1.333 <b>(0.057)</b>	1.438 <b>(0.032)</b>	0.511 (0.956)
time	0.992 (0.278)	0.260 (1.000)	1.175 (0.126)	1.023 (0.246)	0.421 (0.994)	1.731 <b>(0.005)</b>	0.806 (0.534)	1.326 <b>(0.059)</b>	0.556 (0.917)
information	1.271 <b>(0.079)</b>	1.450 <b>(0.030)</b>	1.399 <b>(0.040)</b>	0.589 (0.878)	0.781 (0.576)	0.610 (0.851)	0.310 (1.000)	1.450 <b>(0.030)</b>	1.453 <b>(0.029)</b>
pasture	0.155 (1.000)	0.112 (1.000)	0.188 (1.000)	0.899 (0.394)	0.595 (0.871)	0.404 (0.997)	0.496 (0.966)	0.273 (1.000)	0.404 (0.997)
water	0.310 (1.000)	0.372 (0.999)	0.188 (1.000)	0.403 (0.997)	0.273 (1.000)	0.404 (0.997)	0.186 (1.000)	0.273 (1.000)	0.404 (0.997)
relations	0.682 (0.741)	0.570 (0.901)	0.915 (0.373)	0.217 (1.000)	0.322 (1.000)	0.637 (0.812)	0.372 (0.999)	0.694 (0.721)	0.691 (0.727)
approval	0.806 (0.534)	0.868 (0.439)	0.233 (1.000)	1.240 <b>(0.092)</b>	1.177 (0.125)	0.574 (0.897)	1.333 <b>(0.057)</b>	1.066 (0.206)	0.422 (0.994)
status	1.209 (0.107)	1.066 (0.206)	0.386 (0.998)	0.837 (0.485)	0.545 (0.927)	0.386 (0.998)	0.589 (0.878)	0.533 (0.939)	0.484 (0.973)
support	0.961 (0.314)	1.574 <b>(0.014)</b>	0.655 (0.785)	0.620 (0.836)	1.041 (0.229)	0.565 (0.907)	0.248 (1.000)	0.521 (0.949)	0.565 (0.907)

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