Biodiversity Protection and Economic Development in Kakamega District, Kenya: The Challenge to Social Capital

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Abstract: *The interrelationship between economic development, biodiversity protection and its respective facilitation through what is called 'social capital' is a complex one. This paper draws on research undertaken in Kakamega District, Kenya to address the question of possible preconditions and prospects of reconciling economic development and biodiversity protection through a) enhancing agricultural biodiversity, and b) diversifying rural household income. Effects of declining agricultural productivity, climate change and shocks are discussed with a view to current response options, including the use of social capital. The paper argues to be cautious towards the promise of social capital resources when high levels of poverty persist and major shocks are beyond the adaptability of individual households. This leaves ample room for discussing the need of interventions at the regional and national level.*

1. Introduction

The management of natural resources and the protection of biodiversity are intrinsically linked to problems and perspectives of collective action, local institutions, and social relationships. In recent times the question of how, in particular social capital affects environmental management gained prominence among scholars from different disciplines and development practitioners alike.

Trust, norms and networks as elements of social capital are regarded as central issues of livelihoods which have positive impacts on endeavours to protect natural resources. Thus, most research deals with informal practices governing the access to or use of natural resources, the structure and functions of associations or self-help groups, the very process of institution-building itself or the specific features of successful collective action (Pretty/Ward 2001; Bawa/Joseph/Setty 2007; Leach/Meanes/Scoones 1999; Guthiga/Mburu 2006; Allen 2001).

However, the concept of social capital isn't an uncontested one. Issues like inequality, exclusion, competition and gender are rather neglected (Cleaver 2005; Westermann/Ashby/Pretty 2005). Instead, the seemingly overwhelming positive effects of trust, reputation and cooperation in communities, between firms and as drivers of pro-poor growth strategies are emphasized.

Since the protection of biodiversity in and around primary forests, wetlands or other endangered ecosystems always concerns the very livelihood of local communities, discussing the importance of social capital in natural resource management is meaningless without taking into consideration the economic context of rural households.

This paper is about the interface of natural resources and economic development in Kakamega District, Kenya with a view to individual responses to shocks and crises, existing forms of collective action, and self help groups. It will analyse the explanatory power of social capital while having a look at real life. Pathways out of poverty which are in line with biodiversity protection are examined with a view to the possible importance of social capital to realize them.

The paper is based on research undertaken in the BIOTA East research project.[2] The subproject E14[3] of the BIOTA East research project, in the last three years explored the linkages between biodiversity protection in and around Kakamega forest, on the one side and the status quo and trends in agricultural and other economic activities as well as its institutional embeddedness, on the other side. A number of surveys among rural households, and micro and small enterprises were conducted in close cooperation with partners from other German universities, the Institute for Development Studies at the University of Nairobi, the Kenya Agricultural Research Institute in Kakamega and the Central Bureau of Statistics, Kenya.

To approach endangered environments through a ' poverty lens' in the case of Kakamega District, meant to address specific problems of the rural poor which are affected most by the loss of natural resources and environmental services of Kakamega forest. The development of linkage incentive strategies which motivate the protection of existing biodiversity in and around the forest and the sustainable use of (non-) timber forest products which are integrated

[2] This project is funded by the German Ministry of Education and Research (BMBF). Its first phase took place from 2002-2004 and was focused on assessing the quantity and quality of biodiversity inside the Kakamega forest. The second phase from 2004-2007 included expertise on agriculture, economics and rural planning to link the issue of biodiversity to people living around the forest.

[3] The official title of this subproject which is carried out by researchers from the universities of Bonn, Dortmund, Hamburg and Leipzig is 'Anthropogenic risk factors and management of biodiversity around East African rain forests'. The author of this paper belongs to the team of GIGA, Hamburg which is called E14c.

in the agricultural landscape, is regarded a necessity to ensure the further existence of Kakamega forest.
The paper will develop an argument for being cautiuos to assess as to whether social capital holds the promise of balancing out income differentials while at the same time supporting collective action for the protection of the biodiversity of Kakamega District. It will argue for a careful evaluation of preconditions of its functioning in terms of levels of poverty and social security systems.

2. Economic development and natural resources: the case of Kakamega District, Kenya

2.1 Basic assessments

Kakamega forest is the only Kenyan remnant of the once far stretching belt of rain forests from Western to Eastern Africa. It is regarded as a biodiversity hotspot and a highly protected area. At the same time, Kakamega District is one of the most densely populated areas of Kenya with a population of 643,457 people. Around 57 % of them live below the poverty line. The district is predominantly agricultural with a few industries - mostly agricultural based ones. Agriculture accounts for over 62 % of household incomes in the district.
Among the crops that contribute the most to the household income in the district are sugarcane, tea, coffee, maize, vegetables, bananas, and sweet potatoes. Casual employment in Kakamega town and rural areas together with livestock production are yet other sources of income in the district. Agriculture absorbs directly or indirectly the bulk of the labour force in the district.
The level of household incomes in Kakamega District is rather low. The following table gives an overview about the main occupation of respondents and gendered distribution of income analysed with data from a household survey covering 372 rural as well as some peri-urban and urban households near Kakamega town.

Table 1: Main occupation according to gender

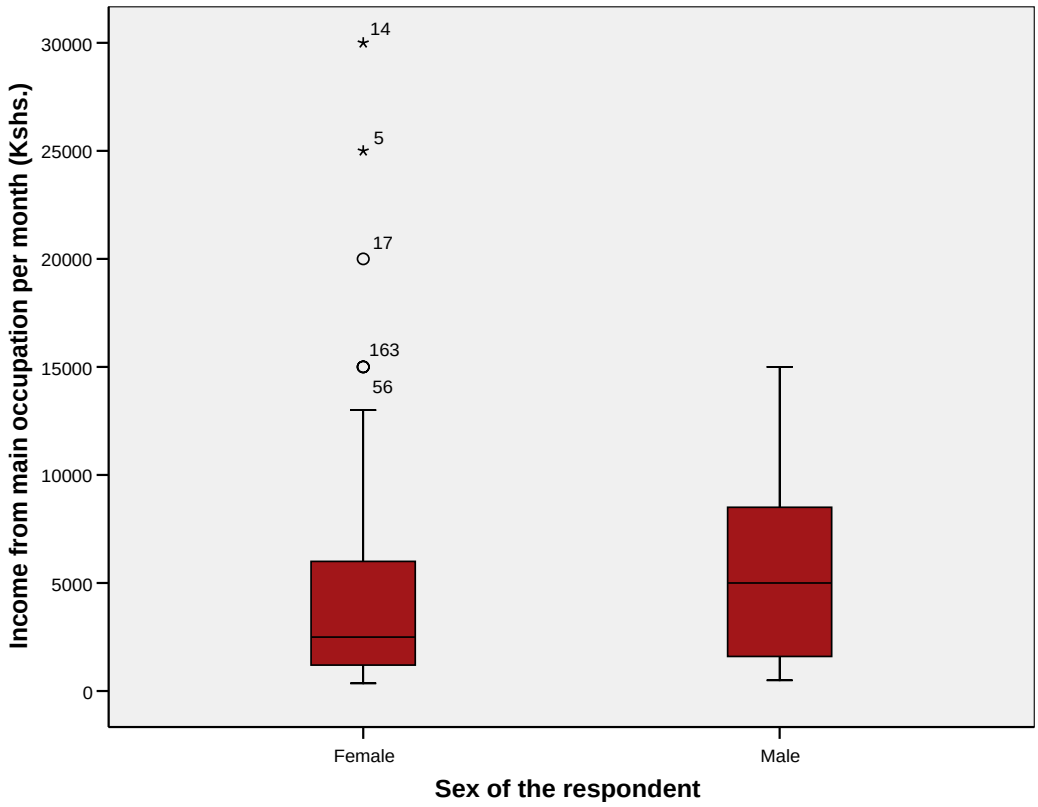
		Female	**Male**	**TOTAL**	**% of total respondents**
Main Occupation	**Farmer**	124	75	**199**	**53.5**
	Employee/ Worker	48	27	**75**	**20.2**
	Self-employment/ Employer	57	41	**98**	**26.3**
	TOTAL	**229**	**143**	**372**	**100**

Source: Survey data 2005

The average monthly amount of income for female respondents was 5.387,26 Ksh while it was 5.482,61 for male ones.[4]

[4] 1 Ksh currently amounts to 0.01 EUR; a monthly income of around 5.000 Ksh thus equals 56 EUR.

Graph 1: Distribution of monthly income according to gender

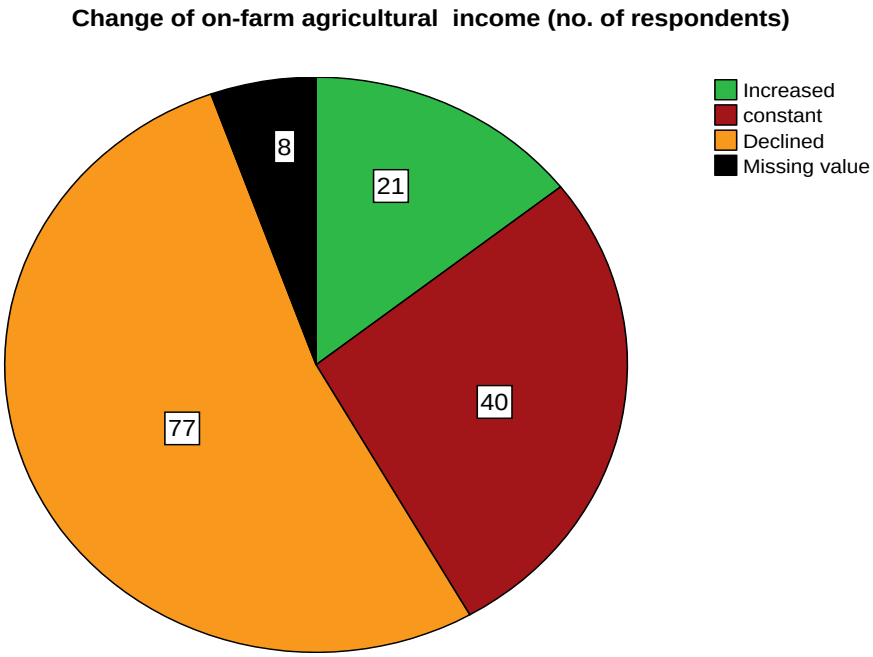


Source: Survey data 2005

The difference between average monthly amounts of income was thus rather negligible. But the look at the related boxplots reveals some important details. Although female respondents were the majority and their income averaged those of men, their mean value of monthly income was definitely lower. The small difference in average income was caused by a few women earning much more than the rest of them.

Crop yields in the district are generally on the decline since 1991. Factors associated with this include: declining land sizes; rising costs of farm inputs; unfavourable commodity markets leading to disillusionment; lack of affordable credit schemes; poor weather conditions and low rate of adoption of new technologies. Intensive cultivation over long periods (> 90 years in some cases) without adequate measures to conserve soil fertility has generally resulted in substantial declines in soil fertility around Kakamega forest (Shepherd and Walsh 2003). This was also true for 77 of 146 respondents interviewed in a land use typology exercise carried out by the team of Bonn in spring 2005.

Graph 2: Trends of on-farm agricultural income change during 2003-2005



Source: Land use typology data 2005

Since it is estaimated that nearly 90% of all people living in Kakamega District are either directly or indirectly dependent on agriculture, this trend sheds a dim light on economic perspectives. The average household size in the district is estimated to be 4.8 members, while nearly 1/3 of all households are recorded as female headed ones (Kakamega District Development Plan 2002-2008).
In addition to farming as the main source of income, a range of micro and small enterprise activities are carried out. About half of the households interviewed in the household survey indicated that there main activities were in the realm of either paid employment or self-employment. These activities are carried out in different sub-sectors, among which the following ones are most prevalent:

Table 2: Activities in the small scale enterprise sector in Kakamega District, 2005

1. Trading Activities	Wholesale, retail, fish mongering, butchery, bookshop, music/electronic shop, IT and/ or communication devices, hawking, vegetables/fruits selling
2. Craft Activities	Carpentry workshops, welding workshops, tailoring, knitting/clothing shops, painting
3. Service Activities	Hotel, bar, rental houses, bicycle repair, medical clinics, transport, photo studio, electronic repair
4.Manufacturing Activities	Maize milling/posho mills, sugarcane processing, bakeries

Source: Michuki, M. (2005)

In a series of 75 interviews in preparation of the comprehensive household survey, conducted between January and April 2005, wholesale and retail trade figured prominently with 14.7% among the non-farm activities ranked first. This was followed by employment in the public sector (9.3%), casual labour and manufacturing (6.7%, respectively).
A number of constraints, including lack of finance, perceived high levels of competition, unreliable markets, physical distance, lack of reliable power sources, inadequate entrepreneurial skills and information and non-supportive government policies did prevent more people to engage in non-farm activities. Given the opportunity, 56.7% would like to engage in wholesale or retail trading, followed by manufacturing (10.7%), hotels, bars and restaurants (5.3%) and hair dressing/beauty salons (4.0%) (Michuki 2005).
Nevertheless, natural resources will remain the backbone of economic activities. This not only concerns resources directly influencing individual agricultural productivity but the mere existence of Kakamega forest. It is one of the few areas in Kenya known for richness in biodiversity resources. The forest plays a vital environmental conservation and water catchment function. The total value of the forest to the adjacent households alone in terms of being a source for charcoal, pasture, fuel wood, medicinal products, timber, pole wood and gold was estimated at Kshs 345 million while the department of forests reported revenues of Kshs 12.9 million in 1992 (GoK 1994). According to the current Kakamega District Development plan (GoK 2002) one percent of the local population relies directly on forest related activities for their sustenance.

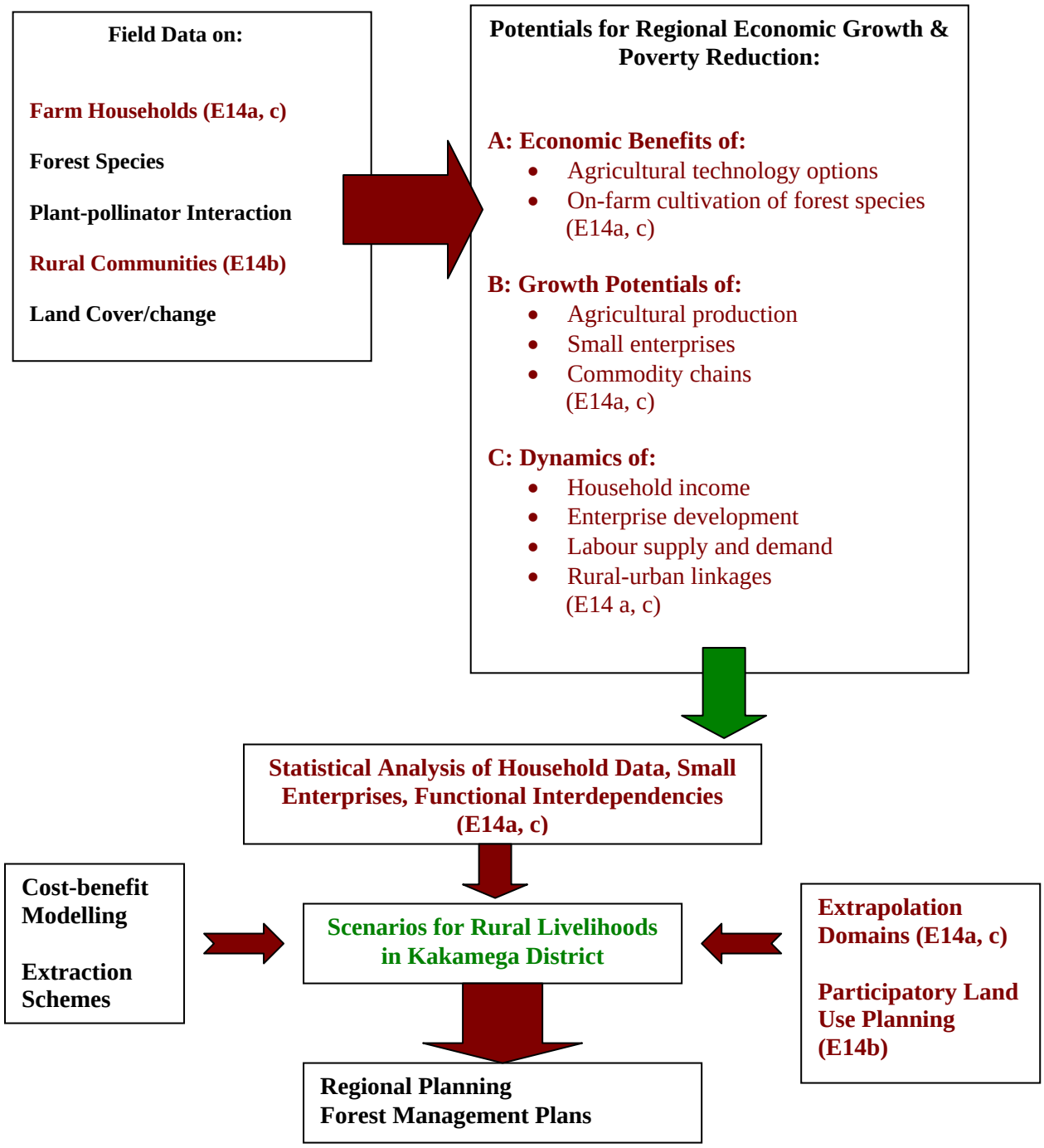
2.2 Research framework

The economic analysis of rural households is but a starting point to elaborate upon opportunities, strategies and management options which serve the twofold purpose of stable livelihoods and sustainable use of natural resources (Rao 2000). In addition, specific social features of Kakamega District (i.e. high population density; high incidence of HIV/Aids; out-migration) do have a strong influence on the vulnerability/opportunity context of rural households (Giesbert 2006) and therefore need to be taken into consideration, too.
From the forgoing section it seems that there are poor perspectives of economic development with current assets and activities. Several options are possible, among which raising agricultural productivity and income diversification are the most obvious ones.
Among scholars, it is widely acknowledged that diversification of income sources and livelihoods can result in more stable und sustainable income at the household and farm level (Bryceson 2002; Daniels 1999; Upton 1996). At the same time, existing income levels, labour constraints, and low levels of human and social capital can lead to ‘poverty traps’ – a situation in which the necessary investment thresholds for complementary or alternative economic activities cannot be passed (Barrett/Bezuneh/Aboud 2001; Barrett/Swallow 2006). This will inevitably lead to further degradation of natural resources and counteract strategies for the protection of the ecosystem’s resources and services by depleting the productive capacity of soils and aggravating the pressure on the Kakamega forest.
The pre-conditions for enhancing the adaptive capacity of rural populations towards the degradation of natural resources are generally the same that can help to mitigate it. This capacity is driven by:

- Technology options;
- Innovation behaviour;
- Social support structures;
- Formal and informal institutions governing individual and collective responses and
- Input-output markets.

In the framework of the BIOTA research project, E14 is responsible for assessing the potentials for regional economic growth and poverty reduction. It thereby relies on data input from other subprojects to ultimately develop scenarios for rural livelihoods which in turn help to develop instruments of regional planning and forest management plans:

Graph 3: Links of BIOTA Subprojects for the Reconciliation of Biodiversity Protection with Economic Development



Source: Author's compilation

In the course of research it became evident that biodiversity in the agricultural landscape is itself increasingly affected also by climate change, causing uncertainty and additional risks for coping with long standing development challenges in Kakamega District.

Climate change and variability is recognized through unpredictable rainfall patterns, shrinking resources of ground water, and the occurrence of plant diseases. This, in turn, affects household welfare by raising their vulnerability and lowering capacities to adapt to common as well as new risks and uncertainties.

The net impact of climate change, called 'end point vulnerability', is a function of exposure to climate risks, the sensitivity of the ecosystem, the well-functioning of the social system concerned, and the adaptive capacity of individuals, households and communities. Adaptive capacity itself includes the capacity to modify the exposure to risks, to absorb and recover losses, and to be able to exploit new opportunities which emanate from the process of adaptation (Kelly/Adger 2000). It is mediated by institutions governing the access to resources, balancing conflicts and communicating development priorities through different channels and levels of governance.

Currently, Kenya is ranked twentieth among fifty African states according to their National Adaptive Capacity Index (NACI), but looses out nine ranks when corruption is taken into account, too (Vincent 2007). At the household level, the adaptive capacity to changing status of natural resources depends on factors like the ability to anticipate change and identify new or modified livelihood opportunities, and the access to further resources required to achieve them. New opportunities for rural income generation are regarded as one of the opportunities where climate change mitigation can be piggy-backed on sustainable development initiatives (IPCC 2003).

These opportunities are one cornerstone of enhancing rural households' adaptive capacity by contributing to their economic well-being and stability (Vincent 2007).[5] They don't develop automatically, though. Most rural populations and institutions are poorly equipped to deal with these challenges. Even if activities are economically viable, environmentally sustainable and socially accepted, economic incentives alone will not lead to desired outcomes.

They are mediated by the characteristics of individual households, the social fabric of rural communities and the presence of rural-urban linkages that provide the background for decisions of labour allocation, input-output markets, and alternative employment opportunities (Dalal-Clayton/Dent/Dubois 2003; Pedersen 1997; Place/Adato/Hebinck 2005; Salafsky/Wollenberg 2000) – a clear case for issues of social capital.

Growing inequality, shrinking social capital and weak institutions will reduce the resilience of social systems and hence their adaptive capacities to stress imposed. From such a perspective, emphasis should be placed on expanding employment and gainful opportunities especially for poor people through growth of income, improved access to markets, and increased assets and education.

At the same time, stakeholder analysis, participatory processes, community mobilization, and overall capacity building are essential elements of strategies aiming at enhancing the adaptation to and mitigation of the changing status of natural resources at the regional level (World Bank 2002).

Data presented in this paper was collected in three different sets of interviews carried out in 2005: a household pre-test covering 75 households in Kakamega District (administered by E14c), a land-use typology covering 146 farm households (administered by the team of Bonn) and a household survey covering 372 households (administered by E14c).

[5] The weighted sub-indices of the ‚Household Adaptive Capacity Index' are the following: economic well-being and stability (20%), demographic structure (20%); interconnectivity in higher level processes (20%); natural resource dependence (20%) and housing quality (20%). See Vincent 2007, p. 19.

Interviews assessed the actual situation, trends and perspectives in rural households with a view to establish indicators of different land use and characteristics of households related to income structure, use of natural resources, and institutional embeddedness.
E14 combined its competencies in agricultural research, rural planning and development economics to address issues of

- **Enhancing the level of biodiversity in the agricultural landscape** of Kakamega District by introducing agricultural technology options and on-farm cultivation of forest species;
- **Fostering complementary or alternative sources of income** to take the pressure away from forest resources;
- **Developing the capacities of rural communities** to device own strategies and instruments in dealing with land use planning and biodiversity conservation.

Based on the social capital literature the question remains, whether existing patterns of social relationships are supporting current adaptive capacities and pro-active collective action and whether there is a chance that one can rely on them for introducing the proposed options.
The next section will first address the question of which functions are ascribed to social capital in coordinating and facilitating economic activities.

3 The Value of social capital

3.1 Social capital and the economy

The attractiveness of the idea that social mechanisms are an important precondition for economic development is based upon two perspectives. First, there is the ever present problem of regulating and coordinating economic activities at different scales. Secondly, there are questions of dealing with uncertainties and risk associated with economic activities. This leads to the acknowledgement that organisations and institutions and hence social relationships as such may be strategic resources of contemporary societies (Biggart/Castanias 2001).

The present and potential resources embedded in such kind of relationships have their own structural, relational and cognitive aspects which are used to establish beneficial relationships between economic actors (Lesser/Storck 2001). Independent of the amount of social capital prevalent in a society, there is the possibility that it vanishes like other forms of capital in case it isn't cared for constantly (Fukuyama 1995; Bayart 1993; Hyden 2001).

Whether social relationships encompass social capital differs according to the context and varies with the degree of enforceability of claims. Non-existent formal institutions and lack of governance work against the fulfilment of promises made. To be called 'social capital' relationships have to entail resources for actively influencing disadvantageous conditions of livelihood (Foley/Edwards 1997).

According to Humphrey/Schmitz and Granovetter the question whether and how social capital can be constructed is basically tied to the institutional and organisational context and a society's interpersonal engagements, loyalties, and identifications (Humphrey/Schmitz 1996; Granovetter 1993). To be able to trust someone else is influenced by personal and cultural settings, too (Preisendörfer 1995; DiMaggio 1994; Hyden 2001; Marfaing/Sow 2000).

Critiques point to the fact that the influence of social capital isn't necessarily positively determined. In contrast, for Sub-saharan Africa sometimes a specific form of social capital

prevails which is based upon clientelistic and neo-patrimonial relationships and which has its roots in barred alternatives of income generating activities (Hibou 1999).

Viewed positively, activating social capital serves to lower transaction costs, speed up flows of information and founding the basis for collective action. Micro and small enterprises try to thereby overcome problems of short capital, outdated technology or market entrance barriers (Barr 2000; Murphy 2002). Networks built upon social capital use the efficiency of hierarchies and the flexibility of free markets and are able to establish a mid-term reference frame for actors involved (Weyer 2000). For Africa, networks acting as cooperative institutions supporting the competitiveness of enterprises are rather the exception than the rule (Barr 1998).

This has to do with the fact that trust can be viewed under different perspectives: a generalized and a selective one. Generalized social capital is built upon common moral norms or well functioning institutions which deliver relevant information and constrain opportunism. Selective trust, on the other hand, is focused on a specific group of actors who were selected due to their family membership, ethnicity, religion or profession (Humphrey/Schmitz 1996). Both forms offer economic actors access to resources (Mohan/Mohan 2002) and can thus be regarded as capital, indicating the *potential* to generate surplus value (de Soto 2001; Morgan 2000).

This means that establishing institutional arrangements (even with the help of selective social capital) partially substitutes for good governance and thus establishes a necessary condition for economic *activities.* But going ahead towards a *broad-based economic development* will need secure legal frameworks. In a long-term perspective, only generalized social capital provides a society with institutional arrangements working against opportunistic economic behaviour (Bigsten/Kimuyu/Lundvall 2000).

One of the solutions offered is the instalment of intermediaries for creating trust and cooperative relationships. A positive, cumulating effect seems to be possible by taking the chance of disturbing old established systems of relationships (Junge 1998; Hyden 2001).

The aim of scientific endeavour should thus be to analyse the ‚dynamic coupling and de-coupling social mechanisms' which allow economic actors to benefit from memberships in networks and thereby gain abilities and resources to cross and overcome group boundaries (Woolcock 2001). One should avoid old dichotomies and evaluate conditions where markets, states and civil societies link up effectively in favour of economic and social development.

For Kakamega District, this means to assess what forms of social capital are prevalent in coping with economic stress and in combining resources to invest in new or expand current economic activities. This will lead to an assessment whether the reconciliation between economic development and biodiversity protection seems realistic in the realm of farm households and communities.

3.2 Social capital and natural resources

The concept of social capital is used in different fields of application ranging from levels of civil society engagement, political participation, networks and enterprise performance, and the support of endangered livelihoods to dysfunctional commmunities and management issues. Its application in natural resource management is an extension of analysing problems of collective action with a view to interpersonal relationships based on trust and common values (Westermann/Ashby/Pretty 2005; Roseland 2000; Agrawal/Gibson 1999).
One of the various approaches suggested in biodiversity management is commonly known as community-based conservation. This school of thought is premised on the principle that biodiversity protection is maintained through mechanisms that not only support local economies, but also rely on empathetic local management for its conservation (Stol-Kleeman/ O' Riordian, 2002).
This, in turn is affected by types and levels of social capital which influence the formation and development of local groups for natural resource management (Pretty/Ward 2001; Bawa/Joseph/Setty 2007; Bardhan 2000). Some research even dealt with specific features of groups as explanatory variable for their maturity and effectiveness in adressing resource management issues (Westermann/Ashby/Pretty 2005; Jones 2004).

In the BIOTA E14 research project, two lines of thought try to assess preconditions of community participation in protecting resources of Kakamega forest and its surroundings. First, part of the research in teams E14b (Dortmund) and E14c (Leipzig) deals with different notions of biodiversity at the national, regional and local level and the effectiveness of existing institutions governing access to natural resources.
Second, there is growing evidence that the outcome of natural resource protection, the applicability of management approaches and processes of institution-building themselves are mediated by levels of poverty and inequality of social capital among participants or potential group members (Jones 2004; Cleaver 2005; Markandya 1998). This approach is taken as a starting point for assessing the relevance of social capital, here. It is made possible out of the interdisciplinary research approach of the whole team of E14.
For Kakamega District, the high incidence of poverty and certain household characteristics might not only affect the implementation of proposed management options but also the type and level of participation in resource management groups, leading – in worst case - to a downward spiral of poverty and natural resource degradation.

3.3 Framework for adressing the value of social capital in Kakamega District

In view of the aforementioned arguments, one can draw the following graph to describe the possible functions of social capital for addressing the interface of natural resources and economic development in Kakamega District:

Graph 4: Definition of social capital by characteristics, functions and applications to biodiversity conservation in Kakamega District

SOCIAL CAPITAL =

"Potential	**to generate**	**surplus value"**	**(application)**
-Prior existence *-Has to be activated* *-Can be lost in time/ Due to circumstances*	*-Has to be put into use*	*-Enhancing the value of* **LAND** →	**A*gricultural biodiversity***
		LABOUR →	**A*lternative,*** h***igher-return activities***
		CAPITAL →	**C*redit associations***

= important resource
= driver of endogenous developments

Source: Author's compilation

The value of social capital is thus a function of the complex interrelationship between economic, social and institutional developments.

As said in section 3.1; whether a surplus value can be generated out of social capital depends on specific characteristics of the rural communities in question.
In Kakamega District, several factors aggravate the difficulties of individuals and communities to better their situation, among which are

- *The high incidence of poverty, therefore limiting the potential effect of available support structures;*
- *The poor situation of physical infrastructure which is detrimental to economic development in general and towards implementing new options in particular;*
- *Poor health, leading to the destruction of well-balanced systems of mutual support.*

These factors affect the vulnerability, adaptability, and general responses of individuals as well as communities.
Since E14c is foremost concerned with the interface of poverty and biodiversity management, economic development will be the focus of the next chapter; without losing sight of the other two dimensions which will be re-incorporated later on.

4 Economic development around Kakamega forest: what role for social capital?

4.1 Enhancing agricultural biodiversity

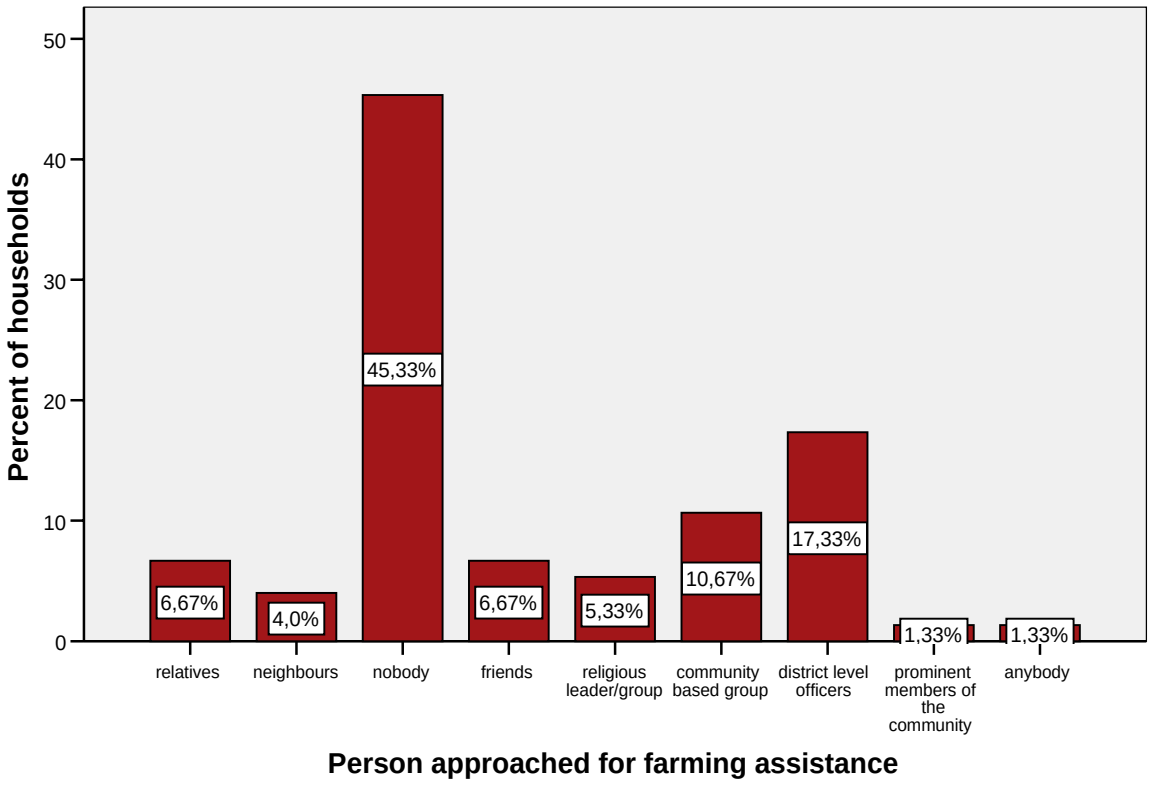
Out of the basic assessments made before, it is clear that in Kakamega District there is an urgent need to reconcile the growing economic needs and the increasing public concern for environmental issues through the development and efficient implementation of site- and system-specific environmental concepts that ensure sustainable land use (Kroes & Mensah-Abrampa 1996). The aim is to strike a balance between the overall development goals of poverty alleviation and environmental protection in the face of global economic and climate change and its implications for biodiversity.

Increasing agricultural productivity, diversifying production and incorporating forest products that are useful to the community into agriculture and enhancing non-agricultural income generating activities may largely decrease the pressure on existing natural resources and biological diversity. But the path to sustainability in agriculture and the maintenance of biodiversity is fostered by adaptive, strong and relevant institutions which in turn may be constrained by low levels of social capital (Bawa/Joseph/Setty 2007).

In view of this, data was collected to get an overview about existing levels of participation in and use of farmers' groups or institutions, and about the reasons of (not) joining them. The rationale behind this is to assess levels and potentials of collective action and cooperativeness. This will allow for evaluating preconditions for implementing proposed options. Here, data from the household pre-test of 2005 is used to illustrate the involvement in 'communities of action' directly related to agriculture.

Generally, 26.7 % of interviewed households were members of some farmer's institution; 73.3% not. In asking about the possible source of help in case support is needed on the farms, about 45% of households didn't know about any source they could rely on, while others relied on quite diversified sources. What is astonishing is the strong reliance on official, government related channels of assistance, reflected in addressing district level officers. Whether this was/is successful is but another question.

Graph5: Type of person approached for farming assistance in times of need



Source: Pre-test data 2005

The limited and only specified use of farmers' institutions for mutual assistance was also recognizable when one asked about the reasons for joining them. Out of the 26.7% for whom this question was applicable, 8% saw farmers' institutions as a diffusion centre for new farming technologies; 5.3% as source of farm inputs; 4% as source of small loans; 4% as a group to be addresses for mutual assistance and 1.3% as an instrument for marketing their products.

Among the remaining households, the reason for not joining them were their sheer non-existence in the village concerned (32%), no interest in it (14.7%), bad previous experiences (10.7%) and time constraints (8%). Lack of membership fees and/or collateral was only mentioned in 4% of the cases.

The impression gained through the pre-test was again confirmed by the household survey. Here, too nearly 70 % of all respondents did address nobody[6], while the rest overwhelmingly responded to services by agricultural extension staff. Farmers' groups and community based organizations were among the least frequent mentioned ones.

With a view to this evidence, the implementation of agricultural technology options and the on-farm cultivation of forest species may be hindered by low levels of participation in and use of existing associations. Despite the potential of enhanced levels of agricultural biodiversity

[6] Even if one takes into account that agriculture was the main ocupation for only 199 out of 372 respondents (see Table 1), this also concerns agriculture as the second most important source of income.

for poverty reduction, perceptions of what is economically profitable and rewarding to do are only one side of the coin.
Since new options should preferably built upon existing institutions, styles of thinking and social relationships, the highly individualistic manner of approaching shortages of labour and the limited functionality of farmers' institutions need to be adressed to pave the way for biodiversity management instruments.
Thus, in addition to evaluate common individual household characteristics which promise a successful adaptation of proposed options, future research will definitely have to include social capital of farm households and communities as determinants of successful development interventions.

4.2 Diversifying Income

Rural diversity in activities and income has been identified as a potential motor for rural economic growth. It generates additional income, and production and consumption linkages between agriculture, industry and services (Reardon *et al*. 1998; Hagblade *et al*. 2005).
Generally, differentiation is made between demand-pull and distress-push diversification. Distress-push diversification typically occurs in an environment of risk, market imperfections, and hidden agricultural unemployment. It implies engaging in economic activities that are often less productive than agricultural production but necessitated by the need to avoid further loss of income.
Demand-pull diversification, on the other hand is characterized as a response to evolving market or technological opportunities, which offer the potential for increasing labour productivity and household income. The occurrence of one or the other type of diversification is thus the result of a complex relationship between household characteristics and the socio-economic environment.
Distress-push diversification is said to dominate in rural areas which have one or more of the following characteristics: geographical isolation, low-quality physical infrastructure, low human capital, underdeveloped markets, scarcity of resources, or shocks to the natural environment, economic system or agricultural sector. With a view to prevailing poverty levels in Kakamega District (see chapter 5) there is a tendency that the majority of rural households in the District diversify out of need.[7]
On the other hand, demand-pull diversification is possible in the presence of expanding technological innovations (whether within or outside agriculture), market development or intensifying links with markets outside the local economy (Davis/Pearce, 2001).
Social capital in the form of networks, access to wider instituions, group membership and high levels of interpersonal trust contributes to a significant degree to the performance of rural non-farm activities.
These, in turn have the potential to complement current and generate additional income substituting for failing agricultural production. They can help to take the pressure away from forest resources and/or to invest in new agricultural technologies and on-farm cultivation methods.[8] 46% of households covered by the household survey engaged in low-return non-

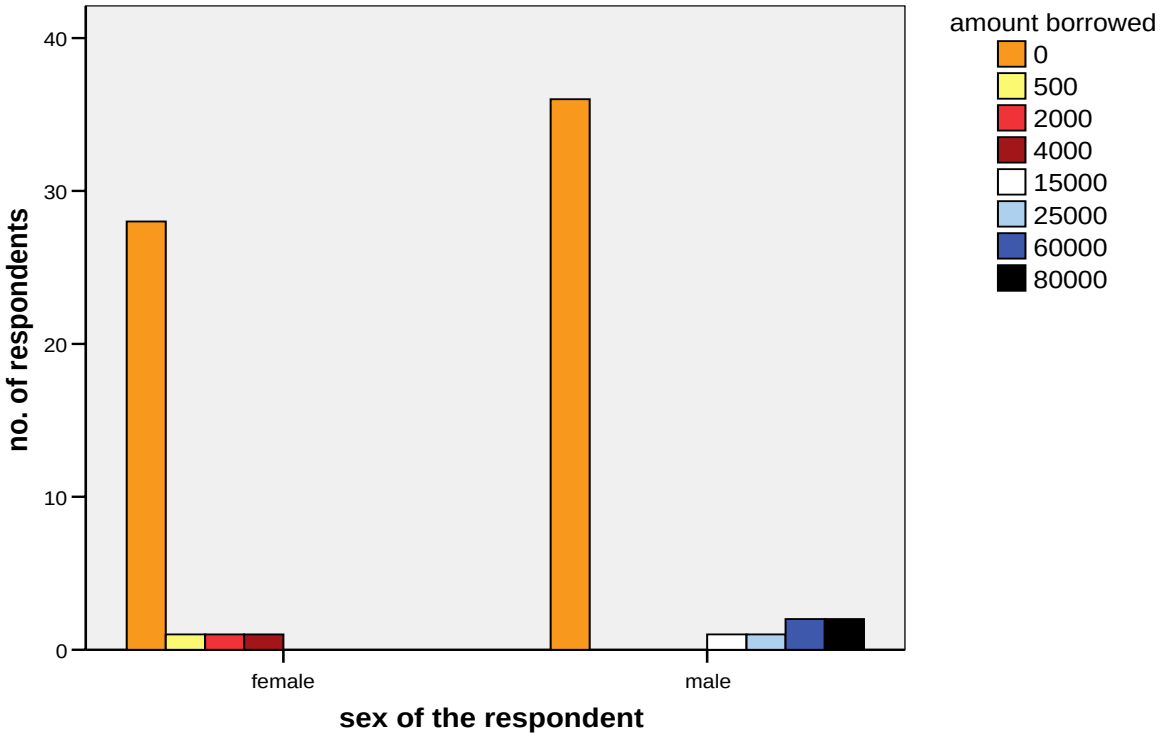
[7] The analysis of data collected during the household survey in 2005 revealed the existence of differently motivated diversification strategies of households (Lay/M'Mukaria/Mahmoud 2007).
[8] Diversification is not only achieved by localised change of activities but also by the availability of remittances due to migration of household members. 35.6% of households in the comprehensive household survey had at least one migrant; the mean number of migrant was 1.81. Nearly 74% of households with migrants received remittances which was reflected in the higher mean of total household income (9.894,50 Ksh versus 8.667,32 Ksh for households without migrants) and a slightly higher mean value of assets (42.395,93 versus 41.804,81 Ksh for households without migrants).

agricultural activities (implying that they are run by one household member only), while 20% were active in high-return activities (implying at least one hired worker or two household members). Both low- and high-return activities add to household incomes in a meaningful way. What is surprising though is that even richer households engage in low-return activities on a level comparable to those of poorer households. This may indicate not only asset constraints and entry barriers but low demand throughout the district, combined with high risk involved in more productive activities (Lay/M'Mukaria/Mahmoud 2007).

For future diversification of economic activities and the realisation of investment opportunities, savings and access to credit matter. The pre-test revealed that only 20% of interviewed households were members of some kind of credit groups, while 80% were not. Among the 20% of households who were members of credit groups, the majority of them (12%) were organized in savings and credit associations, followed by youth groups (4%), cooperatives (2.7%) and womens' groups (1.3%).

Those who got access to loans borrowed an average amount of 25.115,38 Ksh (the median was 4.000; the maximum amount borrowed 80.000 Ksh). Gender differences were amazing: female members borrowed an average of 209, 68 Ksh, while males got 7.619,05 Ksh.

Graph 6: Size of loans according to gender differences

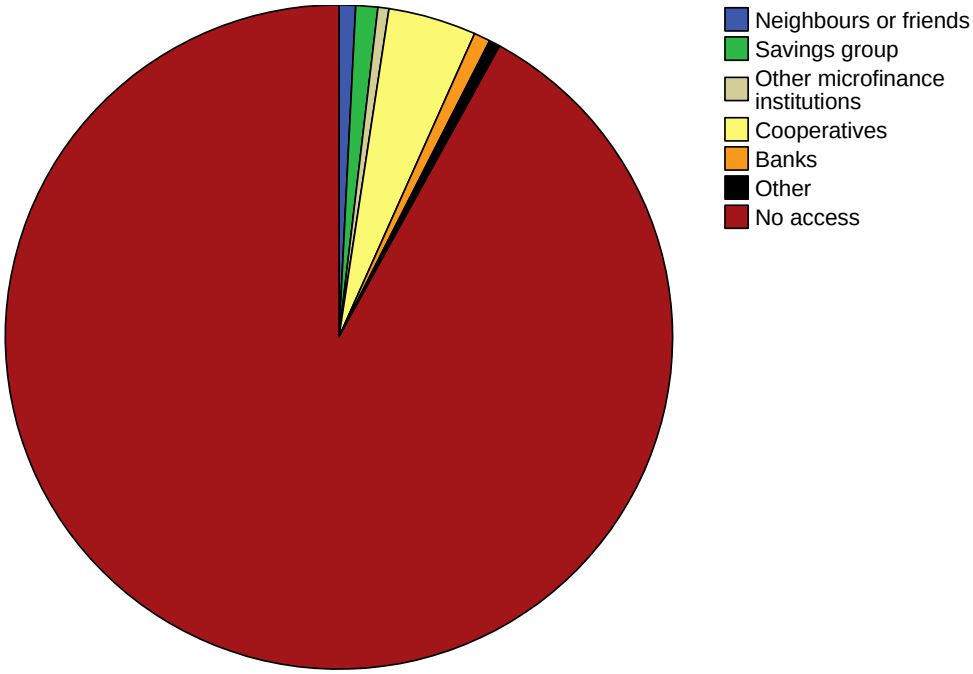


Source: Pre-test data 2005

Asked about the most important use of remittances, the money was mostly used for foodstuff (47.6%) and other daily needs (32.9%), indicating the dire need of additional funds in rural households of Kakamega District. Nevertheless, for 36.4% of households with migrants, the main effect of migration was increased household income, 22% felt relieve of costs. For 15.2% migration had no effect and for 18.2% the effect was even negative, forcing households to hire labour or send money in support of migrants (Giesbert 2006).

This again was confirmed by the household survey which indicated a low level of participation in credit schemes and /or groups. According to the data collected, only 16% of respondents were active members of such groups.[9]
But loans are not only accessed through (in-) formal credit associations and channels. Households which had acquired some credit line also used the support of people living nearby or managed to address state-sponsored institutions: 10% got it from neighbours and friends; 6.7% from microfinance institutions; 53.3% from cooperatives; 10% from banks; and yet 6.7% from other, not further specified sources:

Graph 7: Access to and source of loans of rural households



Source: Survey data 2005

Further analysis revealed a value of Phi of .466 for those who had borrowed during the last 12 months or had outstanding loans and those who were member of a credit scheme or group. This means that being a member of such kind of groups implies a definitely positive correlation to accessing loans in a regular manner.
With regard to biodiversity protection there is need to strengthen these existing, albeit rather weak forms of associations to foster income diversification and pro-poor growth.

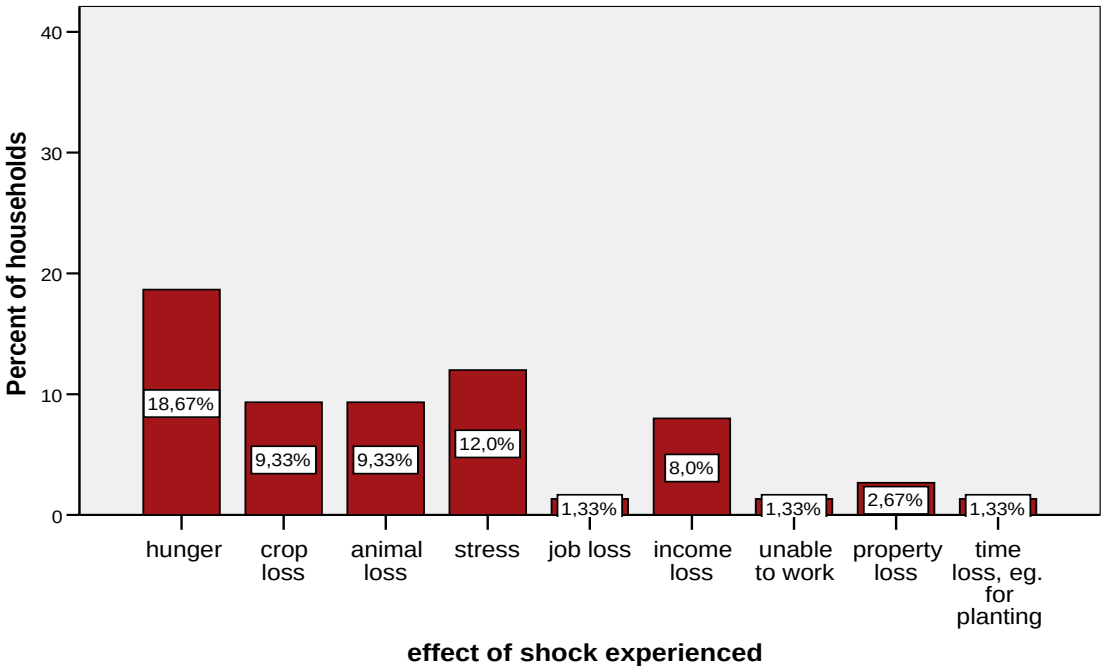
[9] Other series of interviews revealed different levels of group memberships with up to 51% of households reporting that at least one member joined some form of savings/credit group/money lending institution. But the average monetary value of help was observed to be only 2.500 Ksh (Mwamba 2007).

4.3 Coping with shocks

Shocks are common in rural areas of sub-Saharan Africa. They can take on different forms and are caused by the effects of climate change, diminishing quantity and quality of natural resources leading to low levels of yield, or sudden and unexpected events causing loss of household members or crucial assets.

In Kakamega District, health related problems figure prominently among the types of most important shocks experienced since 2000. Taken with a view to all 75 households incorporated in the pre-test, 64% of households experienced severe shocks during the last five years. For 32% of households illness or injury of a household member lasted longer than one month, 12% mourned the death of one of its members. Also 12% claimed the loss of productive assets the most dramatic incidence, while another 5% were negatively affected by the loss of a permanent job (Pre-test data 2005). Effects of these shocks varied, with hunger and general stress mentioned most:

Graph 8: Effect of shocks experienced by respondents during the last five years



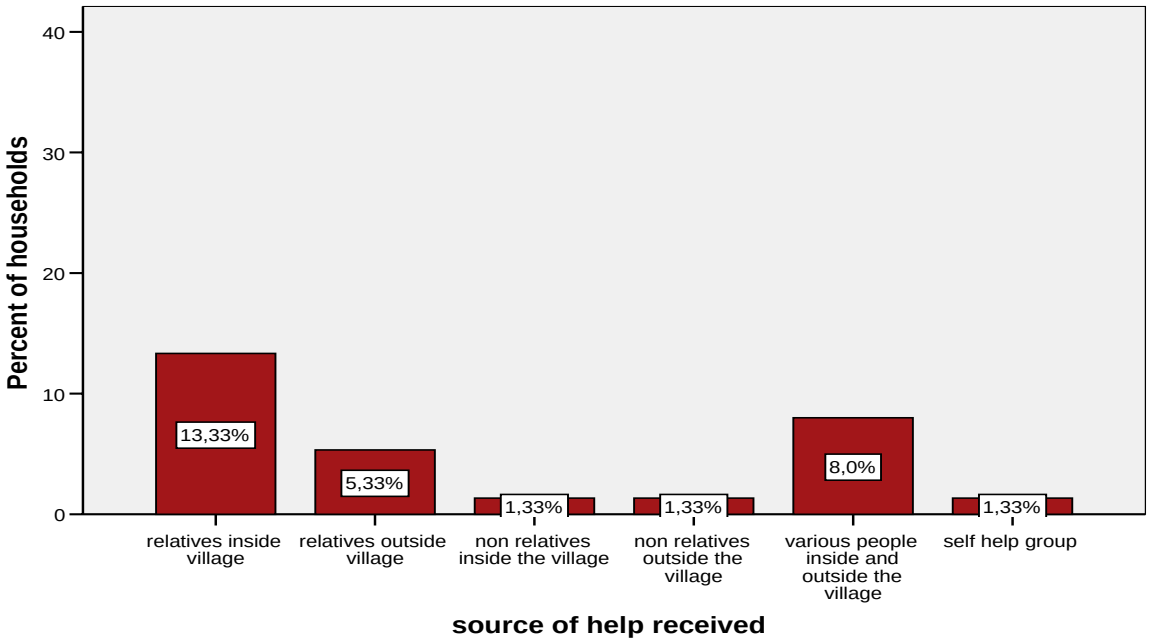
Source: Pre-test data 2005

Most of these shocks were experienced in the last three years, with 25% of them occurring in 2003, 43.75% in 2004 and 14.58% in 2005.

Even if one takes into account that recent shocks take their special share on memories, difficulties seem to mount. Of the 64% of households negatively affected by severe shocks, 24% received no help at all, the same percentage received help from somebody, 8% sold parts of their assets, and nearly 7% were able to borrow money.

Those who did receive help or could borrow money mostly relied on relatives inside the village or people whom they knew at village level. This is a rather narrow scope of social capital to be placed analytically at the micro level, and only partly at the meso level. There seems to be no basis of support and trustful relationships reaching beyond the group characteristics of kinship or immediate neighbourhood.

Graph 9: Sources of help after shocks

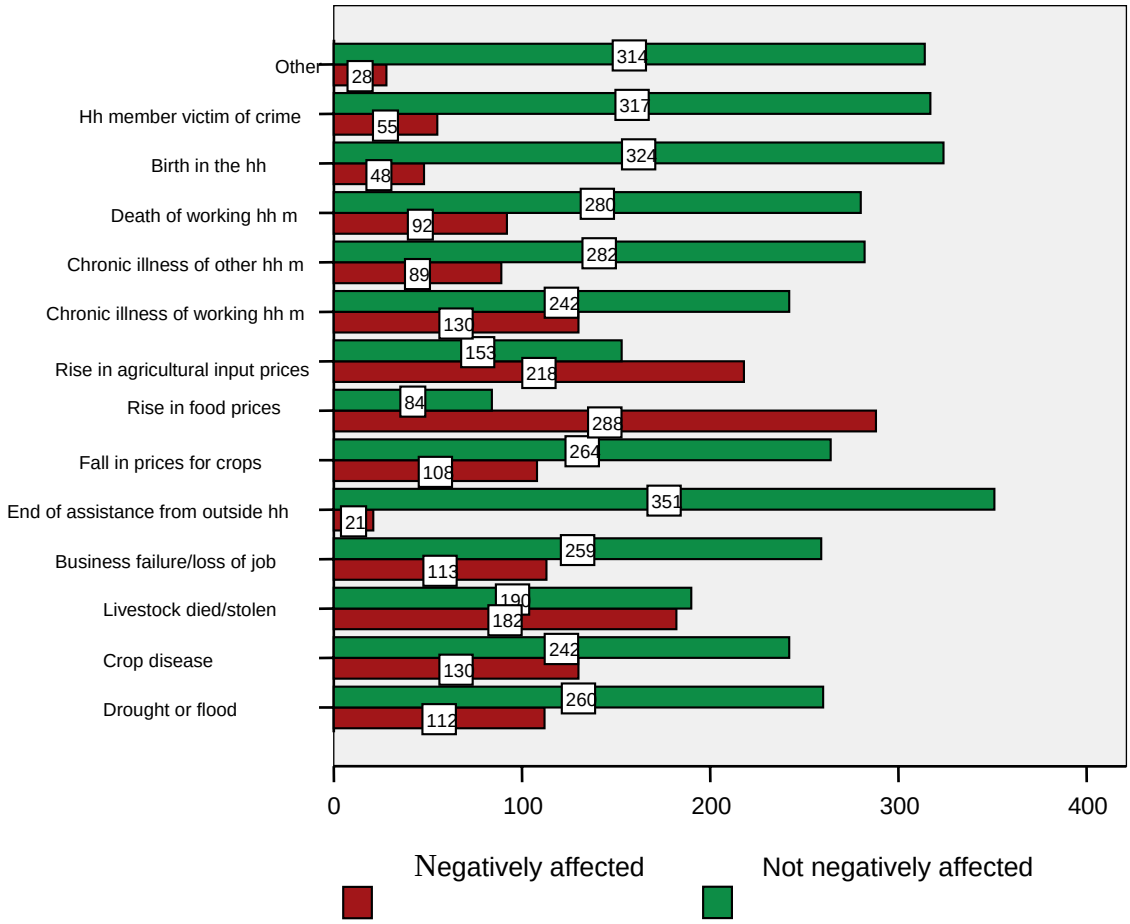


Source: Pre-test data 2005

A more detailed picture was established through the comprehensive household survey following the pre-test. Here, too illness figured prominently among the main causes, if one sums up individual accounts for different household members.

But 288 out of 372 households mentioned rising food prices as the most stressing factor. Combined with rising prices for agricultural inputs, this limits the potential of households to address health problems, to counteract effects of loss of assets or livestock, and to adapt to natural disasters.

Graph 10: Number of households (not) negatively affected by shocks during the last five years



Source: Survey data 2005

These shocks too, mostly occurred during the last two years. Nearly 34% of shocks were remembered as being of 2004, while the same holds for 2005. Compared to 2003, where 15% of shocks happened, this is again a remarkable increase for very recent times.
The nature of these shocks makes it difficult to activate social capital as a remedy. Widespread health problems will, in the long run undermine established micro-level support systems; leaving it uncertain whether one gets back what one has put into a relationship.

5. Poverty, social capital and biodiversity protection in Kakamega District – the way ahead

There are chances for successfully adressing biodiversity protection in Kakamega District, since **a) biodiversity is of local, regional and national significance, b) individuals and communities are directly or indirectly dependent on it** and **c) existing forms of cooperation and association can be used to remove constraints** caused by labour constraints, shortage of capital or tensions in decision-making processes.

But, as said in the beginning, people in Kakamega District are rather poor. Official accounts talk about 57% living below the poverty line, currently.
This indicates a striking continuity to past times. In 1994, the Welfare Monitoring Survey I indicated that 52 percent of the district population lived below the poverty line. Further evidence on the prevalence of poverty in the district was established by the 1997 Welfare and Monitoring Survey II, which found out that still 51.5 percent of the population in the district was living below the poverty line (CBS, 1997). Nowadays, trends tend to worsen.
In addition, for most constituencies throughout the district, the GINI coefficient of inequality ranks around 0.36 – 0.37, while 62 – 69% of people are poor according to the Head Count Index (CBS, Economic Survey 2004).
In view of the low level of participation in farmers institutions mentioned before, the question arises whether this is a consequence of generally high levels of poverty leading to the perception that other people's resources don't allow for being adressed for one's own needs and purposes. If this is the case, then the high level of poverty in Kakamega District is a real barrier to measures of biodiversity protection in the agricultural landscape - a special form of poverty trap[10] directly related to biodiversity protection.
New research results which are yet work in progress talk about the fact that over 80% of households have only up to 2 reliable lines of networks on which they can rely in case of negative shocks or activities requiring relatively large financial expenditures. These are mostly relatives to whom somebody has strong ties. In the extended family setting, members feel obliged to help each other even if it means drawing from invested capital. Since members of these kind of networks are mostly in the same income bracket (save for few rich relatives) this kind of self-help stunts growth attempts of even the modest endeavours of low income earners and partially explains why previous income and investment attempts do not contribute, to the extent that my be expected, to improved welfare for most lower income households (Mwamba 2007).
As an asset, though, social capital matters more for poor than non-poor people and has a profound effect on hosehold welfare (Grootaert/Narayan 2004). This is also true for the second barrier which is health-related problems causing a heavy financial burden on rural households and therefore limiting potentials of diversification and investment.

[10] The poverty trap literature indicates the presence of thresholds in transforming assets into income, which constrain accumulation of capital goods that would allow higher returns (Barrett et al., 2001; Dasgupta, 2003; Dercon and Krishnan, 1996).
Barrett and Swallow (2004) indicate characteristics of poverty traps at the household level: minimum efficient scale of production yielding high returns; incomplete access to financial markets; or risk and subsistence constraints that discourage long-term investment in high-return assets (Zimmerman and Carter, 2003).
The most extreme case of poverty trap at the microlevel is also responsible for intergenerational transmission of poverty where the household-scale financial constraints also result in underinvestment in the education of children and transmit poverty across generations.

As Jones argued, what is really needed in the study of collective action (and therefore also in natural resource management) is a theory adressing inequality and the development of trust as the mediating variable, including perceived levels of wealth differentials. Especially in cases were people have less experience in cooperatives and associations; wealth-based trust seems to matter as a basis for collective action (Jones 2004). Promotion of homogeneity through supporting poverty alleviation, education and gender equality can lead to collective beahvior that is more sensitive to environmental constraints and cooperation in the management of natural resources (Markandya 1998).
Gender differences do matter a lot. According to Westermann/Ashby/Pretty collaboration, solidarity, and conflict resolution in natural resource management groups increased were women are present (Westermann/Ashby/Prett 2005).
To ensure success of development interventions there is need to search for *pro-poor* natural resource management in a manner that secures sustainable livelihoods. Especially in contexts of growing uncertainty, the capacity of people to innovate and to adapt technologies to suit changing conditions and sustain their livelihoods becomes vital (Pretty/Ward 2001).
Higher income levels and degrees of diversification will provide for higher potentials of economic links between actors. A well- educated and healthy population will be able to address its problems more effectively while formal institutions provide for taking the risk of trusting someone.

The central question is how it can be mobilized and multiplied in the context of Kakamega District. This means to analyse:

- **How to use existing social capital for economic development in line with biodiversity protection?**
- **How to govern processes of decision-making and use of natural resources?**
- **How to overcome the limits of social capital in Kakamega District?**

Clearly, to rely on the awareness of farm households and communities only would mean to overstress their individual and collective capacities. Current forms of individual responses and self-help schemes are barely sufficient to cope with burning issues of poverty alleviation and repeated shocks. To instrumentalise them for biodiversity protection would be an undue task.
The problem has to be adressed from both sides: improved health care, the provision of small loans to invest in agriculture or business start-ups and a clear priority for pro-poor growth strategies at the regional and national level will definitely lessen the constraints on rural households in Kakamega District. This will widen the scope and scale of individual and collective responses to challenges posed by the status of natural resources and the level of economic development.
At the same time, efforts should be made to adress the issue of social capital by supporting existing network structures, fostering trust and facilitating the definition of common norms and values. Participatory land use planning sessions and stakeholder workshops carried out in Kakamega District in the years 2005-2007 were a first step in this direction.

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