The benefits and constraints of participation in forest management. The case of Taita Hills, Kenya

NINA HIMBERG, LOICE OMORO, PETRI PELLIKKA AND OLAVI LUUKKANEN

Himberg, Nina, Loice Omoro, Petri Pellikka & Olavi Luukkanen (2009). The benefits and constraints of participation in forest management. The case of Taita Hills, Kenya. *Fennia* 187: 1, pp. 61–76. Helsinki. ISSN 0015-0010.

Although they accommodate a wide variety of endemic flora and fauna, the indigenous mountain rain forests of East Africa are being depleted. Some patches remain in Taita Hills of Kenya and benefit from their management as forest reserves, with limited access to local communities, by the Kenyan government. Recently, through the Forest Act 2005, the government began to grant user rights to forest adjacent dwellers through participatory forest management initiatives. We conducted this study in February 2007 among groups engaged in forest-related activities and living near the Ngangao, Mbololo, Mwambirwa and Chawia forest reserves in order to offer insights into local people's perceptions about benefits and constraints of participation in forest management during the transformation of the forest policy. Our respondents considered efforts to conserve forests for ecological services, namely water catchment and biodiversity maintenance important. Sustainable future use of forest products, especially firewood and medicinal plants were emphasized. However, shortcomings, such as inadequate access to updated information about management practices and legal rights, hampered participation. The respondents viewed this as working without proper tools, which, they stated, may gradually lead to unsuccessful conservation efforts, and felt that the government still prohibits full community participation.

Nina Himberg & Petri Pellikka, Department of Geography, PO Box 64, FI-00014 University of Helsinki, Finland. E-mails: nina.himberg@helsinki.fi, petri.pellikka@helsinki.fi.
Loice Omoro & Olavi Luukkanen, Viikki Tropical Resources Institute, PO Box 27, FI-00014 University of Helsinki, Finland. E-mails: loice.omoro@helsinki.fi, olavi.luukkanen@helsinki.fi.

Introduction

The Rio Earth Summit (UNCED 1992) and the World Summit for Sustainable Development (WSSD 2002) have elaborated on the need for environmental conservation, sustainable development and the integration of local participation. Subsequently, many countries have implemented strategies to address these concerns. Some of these strategies include the enactment of new legislation, the provision of incentives and the restructuring of the forestry sector (GoK 1994; GRN 1996; GRN 2001; RoK 2005). New concepts in forest management hitherto unknown in conventional forestry, such as participatory forestry, community forestry (Selener 1997; Saxena et al. 2001) and joint forest management (Misra 1997), have developed and been incorporated into forest policies and legislation.

In the early 1990s, development agencies introduced participatory forest management in sub-Saharan Africa (Matose & Wily 1996; Salomao & Matose 2007) with the key objective that the governments that own and administer most of the forest resources (White & Martin 2002) would devolve powers to local communities. In the process, governments would improve forest management practices (Andersson et al. 2006) or institute ownership and rights over natural resources (Potters et al. 2001). In participatory forestry, such decentrali-

sation would presumably enable communities to manage their natural resources in an efficient, equitable and sustainable manner (Agrawal & Ribot 1999; Blaikie 2006). The key element in this assumption is that the government devolves powers to local communities to fully manage the forests. Unfortunately, this rarely occurs; the local communities to whom such powers are purportedly devolved are seldom allowed to dispose of the productive forest resources, nor are they able to resolve divergent interests between actors and institutions with which they interact (Agrawal & Ribot 1999). However, other development workers suggest that decentralisation functions differently depending on the types of powers that are decentralised (Ribot 2002) and that in specific contexts, decentralisation functions well when systems for accountability and resource transfer are in place (Agrawal & Ribot 1999; Andersson et al. 2006). The involvement of communities in forest resource management is considered a way of increasing democratisation process (Nygren 2005), particularly when the communities elect their representatives and establish local institutions to make specific decisions. Such representations are also considered signs of democracy (Ribot 2006).

Community participation in forestry in Kenya is outlined in the Forest Act (RoK 2005). Like most government-instituted policies that outline agenda and activities for implementation (Agrawal & Gupta 2005), the Act defines membership, activities to be undertaken and penalties. In reference to the forests under study, which are remnants of the Eastern Arc Mountains and rated among the world's 34 biodiversity hotspots (Conservation International 2005), the management priorities include preservation and conservation (Mwang'ombe 2005a). The provisions of the Act require that the communities define management objectives and prepare management plans for approval. In so doing, the community's powers are limited since their plans must conform to the government's desires. This only confirms the observations of Agrawal and Ribot (1999) on devolutions in which communities are seldom permitted to exploit the resources of the forests for either commercial or domestic utilisation. Instead, such communities are allowed to institute reforestation activities using only indigenous tree species, or to set up activities, such as apiaries, butterfly farming or resin tapping, which do not threaten the wellbeing of the forest. In effect, no powers are devolved; rather, the people engaged in forest activities are granted access, but with no rights over the use of resources. Restrictions such as in these forests fail to conform to the spirit of community forestry which, according to Agrawal and Gupta (2005), should enhance the participation of stakeholders in decision-making and in the accrual of benefits associated with a common forestry resource. In this case, the people engaged in forest activities safeguard the interests of the government by preserving the forest while making no decisions whatsoever about its management. On the other hand, participation means different things to different people. Arnstein (1969) differentiated participation into eight levels ranging from low participation, where manipulation is commonplace, to high participation, where control rests in the hands of citizens. He thus refers to participation as the power of degree to which the actors control decision-making.

After Kenya's independence, the pre-independence laws governing all the major forests carried over. Forest management entailed the enforcement, through policing and punitive actions, of laws to prevent illegal activities. Such management led to widespread conflicts between the people and the Forest Department as more forest reserves were being created amid the rising population. To allay the rising discontent and conflict, the government had to introduce changes in the forestry sector. The changes were effectively instituted in the 1990s even though Kenya had previously adopted the District Focus for Rural Development (DFRD) strategy (GoK 1983) where government departments adopted a policy of decentralisation. This strategy, however, dwelt on the administrative aspects of the government in which local communities were uninvolved. In what can best be described as the diffusion of administrative services (Agrawal & Ribot 1999; Oyugi 2000), the powers of the central government were devolved to appointees of the central government, namely to government departments in districts that aimed at bringing development closer to the people, and thus improving the delivery of services, local development and management (Oyugi 2000). Already in 1975, elements of local participation were initiated, but solely on private lands (Burley 1982). In 1994, the government initiated the Kenya Forestry Master Plan (KFMP), which spelt out the need for reform in forest policy and legislation as well as the importance of involving communities in forest management (GoK 1994; Luukkanen 1996). Subsequently, in 2005, Kenya enacted a new Forest Act. Under the Act, the Director of For-

estry can confer upon communities all or some rights to the forest provided that such communities are registered as associations and apply for permission to participate in the management of state or local forests.

In Taita Hills, the indigenous forests are important sources of water for the surrounding community as well as for those living in the lowlands further downstream. The agricultural sector employs a majority of the people compared with only five per cent of those engaged in forestry-related activities (RoK 2008). The increasing population and declining land holding sizes, without a corresponding expansion of alternative economic activities, are considered major threats to sustainable resource management (Mogaka 2002). The aim of this study is to offer insight into local people's perceptions about benefits and constraints of participation in forest management in Taita Hills, during the transformation of the forest policy. The people organised into forest conservation groups and residing adjacent to Ngangao, Chawia, Mbololo and Mwambirwa forests, were the subjects of this study. Through facilitating participatory rural appraisal exercises and a questionnaire study we identified factors motivating and hindering the conservation and livelihood enhancement efforts of our respondents during the early stages of policy implementation.

Study site and methods

The Taita Hills, a mountain massif located in south-eastern Kenya (03° 25′ S and 38° 20′ E) in the Taita-Taveta district, has a topography ranging from 700 m to 2208 m above sea level. Indigenous mountain rain forest fragments on the hills accommodate a variety of endemic and threatened flora and fauna. Out of twelve remaining forest fragments eight are smaller than 5 ha (Bytebier 2001). A Presidential Directive in 1988 banned the cutting of indigenous forests, while the conversions of indigenous forests into exotic plantations ended in 1984 (Beentje 1988; Mbuthia 2003). The three largest fragments are Ngangao (120 ha), Mbololo (185 ha) and Chawia (86 ha) located in areas of high potential agricultural activity (Pellikka et al. 2009). Ngangao is located in the Wundanyi division and in the vicinity of six sublocations, which are the smallest statistical units for population data in Kenya. Mbololo and Mwambirwa are located in the Voi division: the former in the vicinity of five sublocations and the latter in the vicinity of three sublocations. Chawia is located in the Mwatate division in the vicinity of four sublocations. The characteristics of the sublocations appear in Table 1 and the study area with forests and sublocations is illustrated in Fig. 1.

Participation in forest management is technically open to all households; not all individuals in the vicinity of the forest are involved, however. The composition of the population on the study area is not homogenous, even if the people share the same language and culture within a social structure with common norms. They are differentiated and stratified in various ways based on other attributes. Some of these attributes identified by Agrawal and Gupta (2005) include levels of income, social status and the capacity of individuals to influence decision making process. It is worth assuming that not all people who would be willing to participate in the study area are able to do that, due to the aforementioned attributes as constraints. Subsequently, many of the people living around the forests, and who hitherto had informally depended on those forests for their livelihoods, have formed associations and prepared management plans, as the Act required, before the user could be conferred such rights. The plans require that the forest areas are divided into different zones and define their conservation status. Depending on the forest, these are named as biodiversity conservation zone, utilization-, intervention-, non-consumptive use-, habitat restoration-, afforestation- or catchment protection zones (Kenya Forest Working Group et al. 2004; Mwang'ombe 2005b).

At the time of this study, the groups had yet to be granted user rights and were prohibited from extracting any forest resources. They were accorded only some rights and not yet fully-involved in different phases of the management process. They were however, allowed to implement certain activities that ease the pressure on the forests to enhance conservation. The specific activities in which they engage, such as informing Forest Service and patrolling for minimising unauthorised entries into the forest, serve forest protection. Information management, including awareness creation and education among the local population, is often organised under the aegis of non-governmental organisations operating in the area. Ecosystem improvement activities, where some of the members are involved in raising indigenous tree seedlings for reforestation, serve forest enhance-

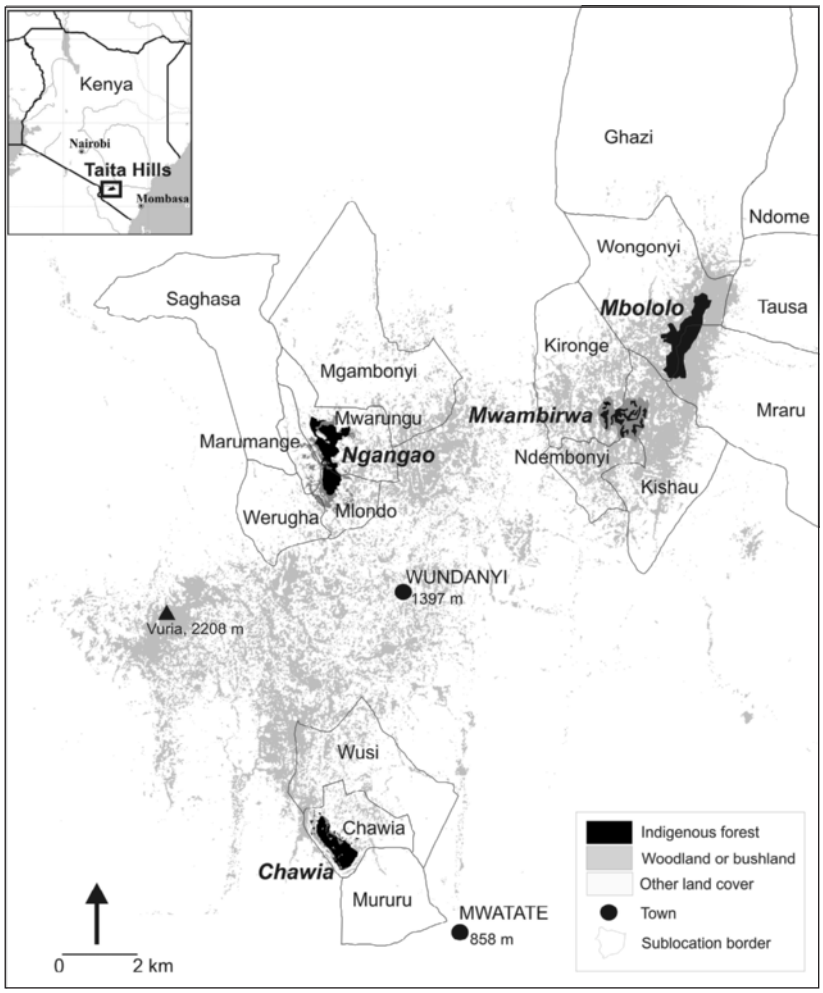

Fig. 1. The study focuses on benefits and constraints of participation in the conservation and management of the biodiversity "hot spot" forest patches in Taita Hills, Kenya. The largest forests Mbololo, Ngangao and Chawia are indigenous, whereas Mwambirwa consists mainly of exotic tree species (*Pinus patula*, *Pinus eliotii*, *Eucalyptus*) and will be rehabilitated and restorated.

ment, and income-generating activities such as bee-keeping, butterfly farming and sericulture, resin tapping and tree nursery business, represent alternative forest livelihoods. These offside activities can be seen as "software" for the people's immediate financial gain, but without access or rights to manage the forest resources in full scale. Some members are directly employed as guards, tour guides or research assistants. The latter two are new opportunities that have arisen from recognition of the threat to these forests despite their status as areas of biodiversity. Consequently, the constant presence and activity of tourists and scientists from international and national institutions in Taita Hills generate employment opportunities.

The social-cultural context is viewed as playing a crucial role in participation. Befu (1977) points out that the socio-cultural context sets the stage on which actors display their behaviour while norms guide in structuring the actors. In the study area, the communities had traditionally laid down their norms regarding forest conservation that were operating long before the government's intervention. These norms have been understood and implemented through traditional rites. For instance, *fighis* (sacred forests) have been important sites for medicine men to protect the communities from social evils and for rainmaking. According to Ville (1994), the Taita ritual complex was used for more than just protecting territory and bringing rain.

Table 1. Population of the sub-locations within the Ngangao, Chawia, Mbololo and Mwambirwa forests, and the number of respondents per sub-location. Census statistics were obtained from Central Bureau of Statistics (2001).

Forest and surrounding sub-location	Men	Women	Total	Household	Area km^2	Density	Mean household size	Number of respondents/ sub-location
Ngangao								
Mwarungu	924	1038	1962	370	7	293	5.3	27
Mgambonyi	1931	2042	3973	789	20	199	5.0	7
Marumange	462	471	933	189	2	467		–
Mlondo	768	817	1585	307	3	547		1
Saghasa	1269	1317	2586	554	16	159		–
Werugha	1812	1814	3626	786	6	636		–
Chawia								
Chawia	796	894	1690	387	6	307		60
Wusi	1892	2200	4092	875	11	365		6
Mururu	904	1157	2061	481	7	290		2
Mbololo								
Ghazi	1445	1523	2968	644	88	34		1
Wongonyi	805	863	1668	351	15	109		31
Ndome	1828	1614	3442	952	77	45		2
Tausa	1540	1642	3182	713	28	113		–
Mraru	2626	2867	5493	1181	63	87		–
Mwambirwa								
Kironge	599	654	1253	252	12	109		17
Kishau	578	603	1181	238	12	98		17
Ndembonyi	385	440	825	176	4	188		1

Cutting trees or collecting firewood from these forests is still forbidden, because of their spiritual value. Thus, such norms indeed serve in forest protection. People's participation in forestry was previously more structured within the traditional sense. The local people understood which conservation and utilisation practices to apply, and participated without being coerced in return for fulfilment of their livelihood needs. The Taita ritual complex, however, has been overtaken by events such as conversion into Christianity, increased demand for forest resources and government land use policies.

The study was conducted in January 2007 by firstly using a self-completion questionnaire. The questionnaire was developed based on the research questions and translated into the Dawida language, and all respondents completed the form individually. The design included 13 structured and 10 open-ended questions (see Appendix 1).

Secondly, Participatory Rural Appraisal tools including focus group discussions, institutional analysis and SWOT analysis (Pretty et al. 1995; Thomson & Schoonmaker Freudenberger 1997) were used. The data were obtained from farmers living adjacent to four remnant forests distributed across the four geographical areas of Ngangao, Chawia, Mbololo and Mwambirwa. These people belong to the Taita ethnic group and share a similar language and culture. Data were obtained from 172 respondents (Ngangao, N = 35, Chawia, N = 68, Mbololo, N = 34 and Mwambirwa, N = 35). Three research assistants, familiar with the local languages of Dawida and Swahili, facilitated the interpretation of the questionnaires and discussions at each site. The respondents were selected based on their involvement in groups or associations in various forestry-related activities. Other area residents, not registered in forest-related groups, do not form part of this study. The Sub-Chiefs and Forest Officers (government employees) of the area were in-

formed of the study, and the informants were invited to assemble at central meeting points where the studies were conducted.

The participatory study was conducted by dividing the respondents at each study sites according to the alternative forest livelihood activity they were involved in. These activities were: bee-keeping, butterfly and silkworm farming, resin tapping and tree nursery business. Focus group discussions (IDRC 2009) including institutional analysis exercises were facilitated within these groups. Space was created for free discussion that could help both the facilitators and participants to understand the positive and negative dynamics within groups and with other stakeholders involved. All groups draw their organisatorial structures on paper and Venn diagramming was used for describing and assessing the role and importance of various stakeholders for the group activities. The discussions were recorded and the benefits and constrains later on detected through content analysis. The participants were further divided into four mixed groups and Strengths (S), Weaknesses (W), Opportunities (O), Threats (T) analyses were used to gain insight and further qualitative understanding of the benefits and constraints of the different activities the people were engaged in. The participants were divided in mixed groups in stead of their own group in order to facilitate fresh discussion between members acting in different fields of forest conservation. The groups brainstormed over the state of participatory forest management initiative with the help of SWOT four field -tool after which the results were presented for all participants, as well as discussed and debated jointly. Within the analysis, the strengths and opportunities were considered benefits while threats and weaknesses represented constraints.

The participants in our study, although homogenous in terms of language and since the majority originated from Taita Hills, they also showed differences as individuals based on their religion and social status in the society. These factors were not studied individually, but became evident in the answers of the open-ended questions and during the focus group discussions and institutional analysis. The greatest differentiation existed between committee members and ordinary members. Committee members are regarded as leaders in their groups and are entitled to make decisions without consulting ordinary members. Other differences existed between gender and age groups as well as between informants with different religious views and affiliations.

Reasons that propel participation in forest conservation are presented based on the activities undertaken, benefits accrued and their preferences. No distinctions were made between areas, although gender and age variables were factored in for some cases to assess whether there were differences between who participates and in which forestry activities. Some of the analyses were based on the total number of responses; some specific questions had multiple responses. In such cases, the total number of responses exceeded the number of respondents (N), whereas in other cases, there were fewer responses, and therefore some response totals fell below N. The data from the structured questions were analysed using SPSS 13.0 software for Windows. Frequencies and cross tabulations were generated and used to explain the trends observed; correlations between variables, analysis of variance and preference rankings were performed based on the scores the respondents provided. We analysed the respondents' preferences concerning the benefits obtained by both genders from the forest for domestic use. They had individually scored the products in a given list based on their perception on the importance of these products. Highly valued products were given the highest score (10), while least valued products were given the lowest score (1). These scores were then put into SPSS to generate the rankings. Table 2 shows the forest product rankings (1–10) by male and female respondents, respectively. The answers to open-ended questions were coded and categorized through content analysis (Flowerdew & Martin 2005) in order to elicit all the different dimensions of the benefits of participation as well as the constraints for it.

Results

Gender and age distribution in forest conservation activities

The total number of respondents was 172, with men accounting for 60% and females 40%. The distribution of the respondents according to their areas of residence was 20%, 40%, 20% and 20% for Ngangao, Chawia, Mbololo and Mwambirwa, respectively. Of all the respondents, 25% were under 30 years of age, and 75% were over 30 years.

More adult males participated in group nursery (25%) and in improving the forest ecosystem (26%) (see Fig. 2). A larger proportion of male youths participated in patrolling (14%) than did adult males (7%). A higher proportion of adult males (14 %) participated in informing Forest Service than did male youths (5%). The leading activity of female youths was information management (36%) and improving the forest ecosystem (24%), with some involved in group nursery or other activities (12%). The leading activities of the adult females were information management and group nursery (each 21%) as well as improving the ecosystem (18%). The representation of female youths varied notably wider than did that of the female adults.

A comparison between youths revealed that a higher proportion of male youths were participating in patrolling, tree nursery and training than were the female youths. In the case of male adults, a higher proportion participated in tree nursery and ecosystem improvements relative to the female adults. Correlation analysis between age group and gender was weak (correlation coefficient 0.49) among the male and female youths, but was strong between adult males and females (correlation efficient 0.75), as it was between males and females (0.75) in general. We tested differences in representation by gender and age groups in the different activities, and concluded that there were no significant differences. In the group activities, analysis by gender showed a significant difference between men and women ($p = 0.002$ Pearson's Chi square test) with regard to certain specific activities. More men than women participated in beekeeping and nursery management.

Conservation for water resources as primary motivation for participation

As looked at the motivating factors for participation we saw that the highest response was on the "will to conserve" at 52%, access to forest products at 46%, income at 36% and employment opportunity at 32%. Here employment referred to an appointed job given by an outsider person or institution, whereas income is the money earned from one's own efforts, such as with tree nursery management and beekeeping. Only 4% considered social prestige as a motivating factor. Further analysis by cross-tabulation to compare motivation preferences by gender showed significant differences between men and women (Chi square test); men considered employment ($p = 0.025$) and income source ($p = 0.007$) their main reasons for participation. Men also felt that social prestige motivated them, whereas this factor was not notably meaningful among the women. Mainly due to a few recently grown activities dealing with development and research as well as tourism in the area, people were employed for example as research as-

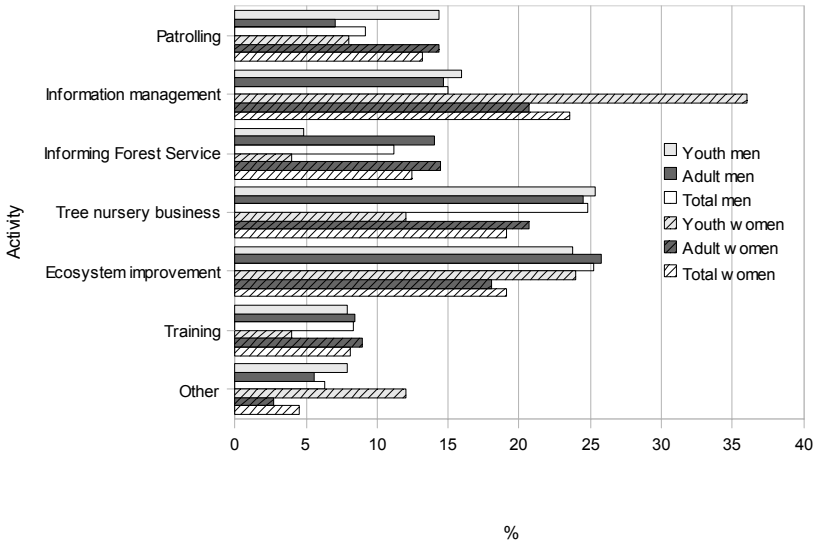

Fig. 2. Distribution of respondents by age, gender and activities participated in (%).

sistants, forest guards and tour guides. More men than women were gainfully employed and all types of jobs were more frequent among the respondents over 30 years old than those younger.

The frequency of response on the question about tangible benefits showed that water resources elicited a response rate of (67%) and others included employment (45%), income from butterfly farming (40%) and ecotourism (37%). 14% of the respondents, reported deriving no tangible benefits from participation in forest conservation.

A correlation analysis was performed between the motivating factors and the benefits accrued. The total number of responses (N) was 852. The r was calculated as 0.047, and proved to be significantly higher than the computed r, which was 0.034 (in a two-tailed test with N = 852, $\alpha = 0.05$, $1/\sqrt{N}: = 1/\sqrt{852} = 0.034$). This indicates that correlation existed between the motivating factors and the benefits the people derive from participation. When the motivation factor "will to conserve" was cross-tabulated with the tangible benefit "water resources", a two-sided asymptotic significance of the chi-square statistic (p = 0.044) showed a relationship between the two. Other higher correlations were found for forest products and butterfly farming.

The most preferred benefits for domestic use were water, medicinal plants and firewood. Both men and women ranked water as the first forest product, but ranked subsequent products differently. The women ranked medicinal plants higher than firewood, whereas the men ranked firewood as the second most important item, followed by medicinal plants. Mushrooms and forest use for leisure were appreciated especially by women whereas men ranked timber fifth important.

Perceptions of recent changes and expectations of forest conservation

Out of 172 respondents 35% had noticed an improved water situation including both increase in water flow and better water catchment. 13% considered that planting of indigenous trees had accelerated both inside the forests as well as in the fields. They thought that improvement had taken place both in means of soil erosion control and in biodiversity enhancement (21%). The group members considered that people take more measures individually to protect the forests from illegal logging and fires and that may be due to their increasing awareness of the importance of the forests and their endangered species.

Our informants mentioned various initiatives that had been created concerning forest conservation. Voluntary tree planting and tree nursery activities were most frequently (40%) mentioned. The possibility to organize into groups, associations and committees including the responsibility taken in forest conservation was considered as an important recent development step. Incentives in alternative forest based businesses were mentioned frequently (56%). A few people mentioned increased education on conservation issues and growing awareness. New employment opportunities had come up along with the research activities and tourism in the area.

Table 2. Ranking of the benefits derived from forests for domestic uses.

	Men's rankings	Women's rankings	Rankings by all
Benefits	Rank	Rank	Rank
Water catchments	1	1	1
Firewood	2	3	3
Medicines/Herbs	3	2	2
Fruits	4	7	7
Timber	5	6	6
Mushrooms	6	4	4
Leisure	7	5	5
Honey	8	9	9
Others, specify	9	8	8
Reduced soil erosion	10	10	10

The most frequently mentioned beneficial factor improving the livelihoods of respondents was clean water for use (17%). Sale of seedlings was the second most important factor (14%) followed by bee-keeping (10%). Income generating activities in all were mentioned by 38% of respondents. Unspecified employment, increase in income level and butterfly farming contributed to this figure. A few people considered socializing in groups, climate improvement and new skills gained as factors for improved livelihood. Six percent had not experienced any improvements. Someone stated: "*The tasks are hard and no tangible benefits available – therefore conservation can be frustrating*" (female 42 years). On the other hand, some individuals experienced crucial importance of additional income, like the person who wrote: "*I managed to finish secondary education due to employment*" (male 20 years). The time spent on conservation was seldom mentioned as an inconvenience in the open questions. Time as a cost centre was analysed separately and showed that the mean time that the respondents spent each week on forestry activities was about 11 hours with maximum of 72 hours. More people spent less than 10 hours per week based on a standard deviation of 12.5 hours.

Most frequent expectations our respondents had regarding forest management were improvements in the environment including aspects of higher biodiversity and forest rehabilitation (48%). Conservation of water, timber and firewood resources for future use was also mentioned frequently (30%). Forest conservation and rehabilitation was expected to contribute to increasing precipitation and reflects a traditional belief according to which forests "attract" or "call" rain. At the same time many respondents (28%) considered that all forest related activities should generate income and increasing job opportunities were expected. A minority (12%) brought up their expectations on forest products as directly extracted benefits. Those respondents felt they were denied access to resources such as firewood, timber and grazing areas, even though the management plans propose regulated access to these resources. A handful of people mentioned that they are waiting to gain more knowledge about forest conservation and a few insisted that community should have more freedom to manage forests in the future.

Traditional knowledge applied in forest conservation and contemporary practices learned

Our informants provided information about traditional practices of forest management applied in their forests. Those can be categorized into technical and symbolical types of knowledge and practices. Most commonly mentioned were the use of herbs and medicinal plants (14%) and favouring of indigenous tree species (23%). Traditional protection of forests from destruction like fires or illegal logging was considered important (10%). This included e.g. a common responsibility of patrolling and reporting about suspicious people. Our respondents mentioned knowledge on traditional methods in pest and disease control, fertilization and about environmentally friendly tree species (14%). Traditional rules tell to plant many trees after cutting one and the village elders should be elected to supervise logging activities. There are traditional laws, governing how trees should be cut and which ones not to cut. Preferably only dead wood should be used. The relics of the Taita tradition still remain in the form of these rules and practices and sacred groves and caves, which are places for conducting rituals and worshipping, are found both inside and outside the gazetted forests. The value of forests remains high and serves as a traditional way of restricting people from entering and destroying the forests. Some locals deeply appreciate these areas for their cultural-historical value.

Technical knowledge and skills learned for conservation and management were many. Majority of respondents mentioned forest improvement skills (58%), like raising seedlings, planting rather indigenous than exotic species, water catchment area conservation, fire prevention, seed identification and collection from forests, use of traditional plants for pest control and soil erosion control. 12 percent had recently gained knowledge on techniques of nursery building and management. Less frequently mentioned was knowledge and skills upon income generating activities (4%), like butterfly farming and bee-keeping.

Participation benefits the environment, but people feel like working without proper tools

The good aspects and benefits of the recently launched conservation and management system of the forests were listed by the informants in a fol-

lowing way: It was considered by majority (58%) contributing to improved environment including aspects of improved tree cover, reduced soil erosion and intensified patrolling prohibiting illegal logging. Second important (13%) benefit was the increased water supply. The income generating alternative forest activities followed (12%) and the participation of the forest adjacent people was mentioned positive by seven percent of informants. However, while looking at the negative aspects, the biggest constraint for forest conservation according to 33 percent of the respondents was that the government still has a strong hold onto forests and does not allow full community participation and use of resources. People felt they were restricted from entering the forests, while some outsiders, like researchers and tourists enter there without nearby residents being aware of it. To quote one of our respondents: "*In as much the forests are ours (the local peoples) we are being exploited and yet gain nothing from it. The community does not directly benefit from the revenues from forests*" (male 48 years). The biggest need for a direct forest product was for firewood, according to 13 percent of respondents. People also worried about urgent environmental problems, like decreased endemic animal populations and herbal plants, illegal logging and hunting, deliberately started forest fires and inadequate planting of indigenous trees due to difficulties of getting particular seeds and seedlings. Those aspects were brought up by 14 percent of informants, while a few less considered careless logging of trees on farms, carried out by ignorant people, being a constraint for conservation.

Our respondents had opinions on how the forest management system should be improved. Most frequent initiatives (24%) concerned more profound and extensive involvement of various stakeholders. People would like to see more teaming up of non-governmental organizations, officers, area residents and religious leaders. The forest adjacent residents should be more widely involved and granted the authority as before to conserve the forests. "More widely" referred to the number of people and their different socio-economical backgrounds. Lack of participation by other forest adjacent residents than the members of the organized groups had been noticed. Additionally, "as before" meant the period before establishment of forest reserves and had a strong sense of "our forest" in it. Transparency in conservation activities was also demanded. The transition of responsibility on forest conservation and management practices should be more clearly starting from the communities upwards to government and then to other stakeholders. Some respondents (16%), however, felt the need for assistance in order to conduct properly their conservation work. This included capacity building in modern forest management skills, education on planning and management strategies and easier access to hands-on conservation inputs, like seedlings and fertilizers. The need for access to firewood came up once again and a debate, which was going on about compensation of crop losses of forest adjacent dwellers caused by wild animals, came apparent in the answers. The importance of forest fire prevention was emphasized as well as the need for more training on sustainable forest management methods.

The strengths, weaknesses, opportunities and threats of participation and the institutions involved

Strengths and opportunities were considered benefits while threats and weaknesses represented constraints in the SWOT analysis. The benefit category elicited 47 responses, scoring slightly higher than the 43 elicited by the constraints. A summary of responses is found in the fourfold Table 3 below.

The institutional analysis exercise showed that the Forest Act, the Ministry of Forest and the implemented regulations were perceived ambiguously by the informants. The Act was considered a crucially important step forward, but at the same time too restricting and paternalistic. The most visible and positively perceived stakeholder in the analysis was ICIPE (International Centre of Insect Physiology and Ecology). It had been contributing through its programs as an initiator and sponsor for beekeeping, butterfly farming and silk moth rearing. However, unreliable market related to these businesses was perceived as a threat. Important stakeholders in the area have been East African Wild Life Society and Greenbelt Movement. The former has been coordinating and facilitating forest conservation and livelihood activities and preparation of the participatory forest management plans. The latter had contributed to the establishment, advisory work and monitoring services of some of the tree nurseries. The market for tree seedlings included schools, churches, hospitals and individuals locally. The Community Development Trust Fund, a joint initiative of Kenyan gov-

Table 3. The strengths, weaknesses, opportunities and threats of participatory forest management according to the respondents.

STRENGHTS • forests' ecological services; water catchment, rain attraction, fresh air, place for leisure • feeling of empowerment through formation of community groups – "We can now make decisions and ask questions" • capacity building has taken place in many disciplines	WEAKNESSES • lack of unity • lack of transparency among stakeholders in resource sharing leading to prejudices and uneven distribution of benefits • ignorance • lack of commitment of members • insufficient knowledge about management techniques and legal rights • income from forest products not benefiting the forest itself or the community in large • human-wildlife conflict unsolved • lack of funds • time consumption • HIV/AIDS occurrence affects implementation of plans
OPPORTUNITIES • larger market for forest products • unique, endemic flora and fauna as attraction for tourism related businesses • commercial use of medicinal plants • access to forest resources; seedlings, medicinal plants, resin, sites for apiaries and butterfly farms • improved soil fertility leading to increase in food production • establishment of research centre and employment opportunities	THREATS • unpredictable weather conditions • forest fire outbreaks • over supply on the butterfly market sector causing competition and blockage • conservation efforts going wrong, because of lacking management capacities • thefts • "We are insufficiently equipped to fully engage in forest conservation"

ernment and the European Commission, was considered as an important source of funds for community-based organizations. However, also frustration and unmet expectations had emerged while dealing with the State administration, like Social Services and Ministry of Wildlife as well as with some non-governmental organizations and research projects in the area. The groups had seldom got responses from donors, and were not enough aware of the purposes of ongoing research activities in the area. They also felt barehanded and left alone in the human-wildlife conflict, whereby the farmers on a close range from forests suffer from noteworthy crop losses due to the damages that animals cause.

Discussion

We shall have a look at the underlying factors for peoples perceptions and the challenges of participatory forest management. The relation between direct financial incentives, social benefits and conservation as motivators are discussed. Contrary to the observations that direct incentives, notably financial subsidies (Morschel et al. 2004) and other schemes, have been used to encourage conservation efforts, this study established that conservation itself can be a strong motivator for community participation. Whereas financial incentives (Baumann 2000) have proven to be the most important incentive schemes for stakeholders in forest management, studies indicate that they have little propensity to generate significant economic gains (Brown et al. 2002). Moreover, stakeholders are not only driven by financial goals, but also by their predisposition towards certain goals, such as the security of sustainable resource management and access to forest products (Uphoff 1992; Pretty 1995). Our findings concur with those of Lise (2000) and Pejchar and Press (2006) in that the value and the dependency people attach to the environment motivate them to participate in forest activities. On the other hand, we need to take into consideration that the reason why the "will to conserve" as a motivating factor overshadowed other factors may be attributed to the short duration during which the forest management activities had been implemented. Another possible reason could be attributed to recent inputs on awareness-raising

in conservation; many organisations working in the area seem to stress the importance of it.

Our study established that fewer members of the youth population engaged in forestry activities, a finding similar to that of Munyu and Wesonga (2005), who alluded to limited opportunities for economic activities in the area. In our study, however, opportunities for income generation exist, but which the youth had yet to realise. Water was emphasized as the most important benefit motivating both men and women to participate, whereas income generating opportunities motivated mostly men. In Taita Hills, beekeeping is traditionally the duty of men (Maundu & Ogutu 1986). According to Boserup (1970), agricultural activities requiring investments do not attract women's participation. Beekeeping requires investments in equipment, which is likely to discourage the participation of women. Other reproductive roles, such as obligations for house maintenance, may also gear women more towards activities that meet their immediate needs (Omoro 1998). We know that non-agricultural sources of income are on the rise in the Taita households. According to a study by Soini (2005) on livelihood strategies in the Taita Hills, families have a unique and changing set of assets and incentives. Even if they consider themselves farmers, they are increasingly multi-occupational and continue to derive their livelihood from off-farm income creation. The respondents expect economical opportunities through the new management system. They emphasised how the value of biodiversity could be harnessed to serve livelihoods, such as ecotourism. Taita Hills have good ecotourism potential due to the unique forest biodiversity, great sceneries, interesting Taita culture and central location within the coastal tourism circle (Himberg 2008). The cultural and religious values attached to forests seem to strengthen the bond between people and nature. The possibility to engage in forest management work by applying traditional skills was considered an asset. On a positive note, the respondents stated that they had learnt new skills for alternative forest-based businesses. However, they felt the need for continuous education on management issues, which currently was limited. As Bhattacharya and Basnyat (2003) state, one of the major thrusts of empowerment is capacity development; the transition of empowerment into actual practice is a challenge for the sustainability of forest conservation.

The Forest Act stipulates the functions and structures to be established. Out of necessity, such structures have their own internal arrangements, which introduce elements of stratifications. In effect, the associations formed have executive committees and ordinary members. Elements of dissatisfaction, however, arose despite the democratic election of the committees. Participation was differentiated, and committees have been known to pursue other interests or to overlook their members' interest while making certain decisions that cause the rest of the members to feel that they have the upper hand or that the decisions lack sufficient transparency. Nygren (2005) describes this phenomenon as the promotion of hierarchical relations over democratic participation. The results reflected strong perceptions of the respondents striving towards more comprehensive decision making power in forest conservation. The respondents saw challenges in the implementation of equal legal rights and of benefit sharing mechanisms both inside their groups and in other adjacent forest populations. These challenges were also identified in a study of Kumar (2002), who assessed the net social benefits of joint forest management for local communities in India and showed that the regime reflected the social benefits of the rural non-poor, leaving the poorest in the village as the net losers. He suggests that management plans should include compensatory mechanisms to help the poorest.

The findings of this study are applicable only to those people living in Taita Hills, who belonged to an association or group engaged in forest conservation. The result of this study may have been different had the rest of the population of the area been interviewed. Suffice it to say, however, that the respondents' choices were biased against those who were granted some rights to manage the forests. Thus, the results of this study can not represent the views of Taita communities comprehensively. More in-depth understanding of the incentives for forest management could have been gained if we would have studied the socio-economic stratification of our respondents. The methodology used in this study can be criticised upon the aforementioned issues. However, the PRA tools used allowed a rapid way in to detect the socio-economical and ecological realities of the participants and enabled useful brainstorming and knowledge sharing sessions. We wanted to record the mindsets of the respondents firstly through individual responses to the questionnaire and afterwards through the group exercises in order to see whether or not the personal opinions and the ones

expressed within groups were in line with each other. This adds to the reliability of the study.

Bhattacharyaa and Basnyat (2003), who emphasise the importance of assessing empowerment status in joint forest management programmes, state that joint forest management resolutions are explicit with regard to the empowerment of local communities, but that the local people are seldom able to avail the opportunity from it due to their own socio-cultural and economic constraints. One aspect that we also need to consider is the relatively small sizes of the forests. The informants had accepted restrictions on these forests to regulate extractive commercial use. The remaining options are conservation and the non-extractive use of forest products. Prior to the enactment of the Forest Act 2005, conservation was the only option because access to government forest reserves was denied (although illegal timber extraction has still been a serious problem). Another reason for the willingness of the respondents to conserve relates to their observations and wider awareness of diminishing water yields. According to Lekasi et al. (2005), who conducted a PRA study in the Chawia area, farmers recalled trends in water availability and in soil fertility from the 1920s to 2005 and reported a crucial decrease in yields and soil condition since the 1960s due to the destruction of forests and the introduction of unsuitable species of exotic trees. In reality, water from these catchment areas goes beyond the geographical coverage of the study area. Perhaps the government should introduce external incentives to further encourage conservation efforts, as is done elsewhere with the Payment for Ecosystem Service (PES) (Turpie et al. 2008). Such external incentive schemes could encourage these communities to ensure sustained conservation of the forests and support both local livelihood and national and global interests.

Conclusions

This study showed that preservation of common resources such as water and biodiversity motivated these people to participate in forest management. Despite the weaknesses, threats and other constraints enumerated by the respondents, the benefits of forest conservation activities were emphasized. Two driving forces behind the will to participate in forest conservation are evident: first, a real concern about the state of the local environment and about the people's dependency on forest based livelihoods, and second, conservation efforts as the only means to grant local people access to planning and decision making and new employment opportunities. Our respondents offered positive feedback about the change from the former situation to the more participatory one. Nevertheless, following components in the conservation system still seemed to generate dissatisfaction, a lack of transparency within the groups, limited opportunities for conservation and use of forest resources as well as inadequate access to new information concerning forest management practises and legal rights.

The results of this study may facilitate further planning and decision-making regarding participatory forest management in Taita Hills region. The traditional knowledge concerning forest conservation could be more applied if more systematically aggregated and taken into consideration in various phases of the participatory forest management process. Both, the traditional knowledge, treasured by the local people and the contemporary knowledge about forest conservation practices should be more exposed and distributed.

ACKNOWLEDGEMENTS

We are grateful for the invaluable contribution of the communities of Ngangao, Chawia, Mbololo and Mwambirwa. We wish to thank our research assistant, Mr Amon Mghanga, as well as Mr Jonam Mwandoe and the forest guards who facilitated the translation work. We also appreciate the help of Dr Alfred Agwanda and Ezekiel Ogutu, who assisted us with the SPSS software. The study was made possible by funding from the Academy of Finland for the TAITA-TOO project at the Department of Geography, University of Helsinki (Geoinformatics in environmental conservation and community-based natural resource management in the Taita Hills, Kenya, http://www.helsinki.fi/science/taita).

REFERENCES

Agrawal A & JC Ribot (1999). Accountability in decentralization: a framework with South Asian and African cases. *Journal of Developing Areas* 33: 4, 473–502.

Agrawal A & K Gupta (2005). Decentralization and participation: the governance of common pool resources in Nepal's Terai. *World Development* 33: 7, 1101–1114.

Andersson KP, CC Gibson & F Lehoucq (2006). Municipal politics and forest governance: comparative analysis of decentralization in Bolivia and Guatemala. *World Development* 34: 3, 576–595.

Arnstein SR (1969). A ladder of citizen participation. *Journal of the American Institute of Planners* 35, 216–224.

Baumann P (2000). Sustainable livelihoods and political capital: arguments and evidence from decentralization and natural resource management in India. *ODI working paper* 136. 44 p. Overseas Development Institute, London.

Beentje HJ (1988). An ecological and floristic study of the forests of the Taita Hills, Kenya. *Utafiti* 1: 2, 23–66.

Befu H (1977). Social exchange. *Annual Review of Anthropology* 6, 255–281.

Bhattacharya AK & B Basnyat (2003). Empowering people through joint forest management: a study from Madhya Pradesh, India. *International Forestry Review* 5: 4, 370–378.

Blaikie P (2006). Is small really beautiful? Community-based natural resource management in Malawi and Botswana. *World Development* 34: 11, 1942–1957.

Boserup E (1970). *Women's role in economic development*. 283 p. St. Martins, New York.

Brown D, Y Malla, K Schreckenberg & O Springate-Baginski (2002). From supervising subjects to supporting citizens: recent developments in community forestry in Asia and Africa. *Natural Resource Perspectives* 75. 4 p. Overseas Development Institute, London.

Burley J (1982). *Obstacles to tree planting in arid and semi-arid lands: comparative case studies from India and Kenya*. 52 p. The United Nations University, Tokyo.

Bytebier B (2001). *Taita Hills biodiversity project report*. 121 p. National Museums of Kenya, Nairobi.

Central Bureau of Statistics (2001). *1999 population and housing census: counting our people for development, vol. 1: population distribution by administrative areas and urban centres*. 415 p. Ministry of Finance and Planning, Nairobi.

Conservation International (2005). Biodiversity hotspots. *<http://www.biodiversityhotspots.org/ages/default.aspx>*. 23.11.2008.

Flowerdew R & D Martin (2005). *Methods in human geography: a guide for students doing a research project*. 366 p. Pearson Education Limited, Essex.

(GoK) Government of Kenya (1983). *District focus for rural development*. Government Printers, Nairobi.

(GoK) Government of Kenya (1994). *Kenya Forestry Master Plan*. 422 p. Government Printers, Nairobi.

(GRN) Government of the Republic of Namibia (1996). *Forestry Strategic Plan*. Ministry of Environment and Tourism, Windhoek.

(GRN) Government of the Republic of Namibia (2001). *Forest Act*. Ministry of Environment and Tourism, Windhoek.

Himberg N (2008). *Community-based ecotourism as a sustainable development option: case of the Taita Hills, Kenya*. 141 p. VDM Verlag Dr. Müller, Saarbrücken.

IDRC (2009). The International Development Research Centre. *<http://www.idrc.ca/en/ev-56615-201-1-DO_TOPIC.html>*. 16.04.2009.

Kenya Forest Working Group, Forest Department & Ngangao Community Forest Association (2004). *Participatory forest management plan: Ngangao forest, Taita-Taveta District*. 45 p. The East African Wild Life Society, Wundanyi.

Kumar S (2002). Does "participation" in common pool resource management help the poor? A social cost-benefit analysis of joint forest management in Jharkhand, India. *World Development* 30: 5, 763–782.

Lekasi JK, IV Sijali, P Gicheru, L Gachimbi & MK Nyagw'ara (2005). Agricultural productivity and sustainable land management project report on participatory rapid appraisal for Wusi Sub-location in the Taita Hills catchment. *SLM Technical Report* 10. 23 p. Kenya Agricultural Research Institute, Nairobi.

Lise W (2000). Factors influencing people's participation in forest management in India. *Ecological Economics* 34: 3, 379–392.

Luukkanen O (1996). Kenya Forestry Master Plan reveals new forest resource trends. In Palo M & G Mery (eds). *Sustainable forestry: challenge for developing countries*, 359–369. Kluwer Academic Publishers, Netherlands.

Matose F & L Wily (1996). Institutional arrangements governing the use and management of Miombo woodlands. In Campbell B (ed). *The Miombo in transition: woodlands and welfare in Africa*, 195–219. CIFOR, Bogor.

Maundu PM & M Ogutu (1986). Agriculture and animal husbandry. In Were GS & R Soper (eds). *Taita Taveta District socio-cultural profile*, 77–100. Ministry of Planning and National Development & University of Nairobi, Nairobi.

Mbuthia KW (2003). *Ecological and ethnobotanical analyses for forest restoration in the Taita Hills, Kenya*. Ph.D. Thesis. 151 p. Miami University, Ohio, U.S.A.

Misra PK (1997). Potentialities of JFM: some reflections. *Wastelands News* 12: 4, 32–33.

Mogaka H (2002). Economic instruments for the reduction of forest biodiversity loss in Kenya. GEF/UNDP/FAO Cross Border Biodiversity project "Reducing biodiversity loss at selected cross-border sites in East Africa". *Economics Component Technical Report* 16. 43 p. Nairobi.

Morschel J, DM Fox & JF Bruno (2004). Limiting sediment deposition on roadways: topographic controls on vulnerable roads and cost analysis of planting grass buffer strips. *Environmental Science & Policy* 7: 1, 39–45.

Munyu W & D Wesonga (2005). *Technology and youth livelihood strategies: an impact study of the*

entrepreneurship and employment training programme. Report for the Global Education Partnership. 18 p. Global Education Partnership, United States.

Mwang'ombe J (2005a). Restoration and increase of forest connectivity in Taita Hills: surveys and suitability assessment of exotic plantations for restoration. A report. <*www.cepf.net/xp/static/pdfs/Final_EAWLS_TaitaHills.pdf*>. 15.04.2008.

Mwang'ombe J (2005b). *Participatory forest management plan for Mwambirwa and Mbololo forests*. 56 p. The East African Wild Life Society, Wundanyi.

Nygren A (2005). Community-based forest management within the context of institutional decentralization in Honduras. *World Development* 33: 4, 639–655.

Omoro LMA (1998). Women's participation in soil conservation: constraints and opportunities – The Kenyan experience. *Advances in Geoecology* 31: 2, 1463–1468.

Oyugi WO (2000). Decentralization for the good governance and development: the unending debate. *Regional Development Dialogue* 21: 1, 3–22.

Pejchar L & DM Press (2006). Achieving conservation objectives through production forestry: the case of Acacia koa on Hawaii Island. *Environmental Science & Policy* 9: 5, 439–447.

Pellikka P, M Lötjönen, M Siljander & L Lens (2009). Airborne remote sensing of spatiotemporal change (1955–2004) in indigenous and exotic forest cover in the Taita Hills, Kenya. *International Journal of Applied Earth Observation and Geoinformation* 11: 4, 221–232.

Potters J, D Reeb & MR Crollius (2002). The progress of participatory forestry in Africa. Presented at Second international workshop on participatory forestry in Africa. Defining the way forward: sustainable livelihoods and sustainable forest management through participatory forestry. <*ftp://ftp.fao.org/docrep/fao/006/Y4807B/Y4807B05.pdf*>. 15.12.2007.

Pretty JN (1995). *Regenerating agriculture: policies and practices for sustainability and self reliance*. 320 p. Earthscan, London.

Pretty JN, I Guijt, J Thompson & I Scoones (1995). *Participatory learning and action – A trainers guide*. 178 p. IIED, London.

Ribot JC (2002). *Democratic decentralization of natural resources: institutionalizing popular participation*. 38 p. World Resources Institute, Washington, DC.

Ribot JC (2006). *Choose democracy: environmentalists' socio-political responsibility*. Global Environmental Change 16: 2, 115–119.

(RoK) Republic of Kenya (2005). *The Forest Act 2005*. Kenya Gazette Supplement No 88 (Acts No 7). 76 p. Government Printer, Nairobi.

(RoK) Republic of Kenya (2008). *Taita District Development Plan 2008–2012*. A Globally Competitive and Prosperous Kenya. Zero Draft June 2008. 142 p. Ministry of State for Planning, National Development and Vision 2030, Nairobi.

Salomao A & F Matose (2007). Towards community-based forest management in Mozambique: can this make a difference? – Community-based natural resources management of Miombo woodlands in Mozambique. *Miombo woodland: Policies and Incentives*. 36 p. CIFOR, Harare, Zimbabwe.

Saxena KG, KS Rao, KK Sen, RK Maikhuri & RL Semwal (2001). Integrated natural resource management: approaches and lessons from the Himalaya. Conservation Ecology 5: 2, 14. <*http://www.consecol.org/vol5/iss2/art14*>. 16.09.2009.

Selener D (1997). *Participatory action research and social change*. 384 p. The Cornell Participatory Action Research Network, Cornell University, NY.

Soini E (2005). Livelihood capital, strategies and outcomes in the Taita hills of Kenya. *ICRAF working paper* 8. 48 p. World Agroforestry Centre, Nairobi.

Thomson T & K Schoonmaker Freudenberger (1997). Crafting institutional arrangements for community forestry. Community forestry field manual 7. FAO. <*http://www.fao.org/docrep/w7483e/w7483e0a.htm*>. 10.12.2008.

Turpie JK, C Marais & JN Blignaut (2008). The working for water programme: evolution of a payments for ecosystem services mechanism that addresses both poverty and ecosystem service delivery in South Africa. *Journal of Ecological Economics* 65: 4, 788–798.

UNCED (1992). *Report of the United Nations conference on environment and development: Earth Summit Agenda 21*. 300 p. United Nations, New York.

Uphoff N (1992). Monitoring and evaluating popular participation in World Bank-assisted projects. In Bhatnagar B & AC Williams (eds). Participatory development and the World Bank: potential directions for change. *World Bank discussion paper* 183, 135–153. The World Bank, Washington D.C.

Ville J (1994). Taita Hills – Should man and wildlife be divorced? *Swara* 6, 23–25. Nairobi.

White A & A Martin (2002). *Who own the world's forests?* 30 p. Forest Trends, Center for International Environmental Law, Washington D.C. USA.

WSSD (2002). *Report of the United Nations of World Summit on sustainable development*. 170 p. United Nations, New York.

Appendix 1. The self-completion questionnaire included both structured and open-ended questions.

1. Have you noticed any changes in forest management in your area? Please, explain.
2. What kind of initiatives have been created concerning forest management?
3. Which kind of community forest management are you involved in? (Structured)
4. How did you get involved in forest management? (Structured)
5. How many group members are you?
6. How long have you participated in forest management? (Structured)
7. What activities do you undertake when you participate in forest management? (Structured)
8. What motivates you to participate in community forest management? (Structured)
9. What kind of tangible benefits do you obtain from participating in community forest management? (Structured)
10. Indicate the type of employment that has arisen during your participation in forest management. (Structured)
11. Please, rank in order of preference (1–10) the benefits you obtain from the forest for domestic use. (Structured)
12. How many hours per week do you approximately use for participatory forest management?
13. Please, estimate your personal average monthly income, generated from participatory activities, in respect to the following seasons?
14. What are your expectations regarding forest management?
15. What is your position in participatory forest management system? (Structured)
16. What traditional practices of forest management are applied in this forest?
17. What is good about the way the forest management is organized?
18. What negative factors can you find about the way the management is organized?
19. How would you like to see the management system reorganized?
20. What knowledge and skills have you gained along with the new responsibilities on forest management?
21. How have your sources of livelihood changed since you started participating in community management? (Structured)
22. Please, specify the possible factors that have improved your livelihood.
23. What are your other views regarding your participation in forest management that has not been covered in this interview?