



JOINT FOREST MANAGEMENT IN CHOME CATCHMENT FOREST RESERVE, TANZANIA: THE ROLE OF SOCIO-ECONOMIC AND INSTITUTIONAL FACTORS IN DETERMINING SUSTAINABLE FOREST CONSERVATION

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ABSTRACT

This study was conducted in Chome Catchment Forest Reserve, South Pare Mountains, Tanzania to assess the role of socio-economic and institutional factors in determining successful implementation of the Joint Forest Management approach. Data were collected through participatory rural appraisal techniques, household questionnaire surveys and key informant interviews. Data on timber resources were based on existing inventories and direct observations. It was observed that the volume of timber resources in the forest is among the highest known for the Eastern Arc forests. Over 72% of this volume consists of high value timber species, making this resource an extremely desirable option for income generation. Household income is at par with other Eastern Arc areas but existing land scarcity is relatively higher. Household plot sizes tend to be as small as (>0.44 ha) with population density of about 13 persons ha⁻¹. Farm plot fragmentation through inheritance is also high. Limited livelihood options, high timber demands and poor resources accessibility are the major drivers of illegal timber harvesting in the reserve by adjacent communities. Illegal timber harvesting was estimated at 100.7 thousand m³ per annum between 1998 and 2001. The implementation of joint forest management, centered on Village Environmental Councils, lacks clear guidelines on institutional responsibilities and duties leading to its failure. A number of other factors including corruption, policing difficulties and inadequate benefit sharing contribute to management failure. It is recommended that joint forest management be developed and implemented in a holistic framework which promotes alternative livelihood options; reduce

dependency on forest-based income and strength institutional structures through legal frameworks. It is proposed that the forest sector expand its management approach through adopting a multi-disciplinary approach which incorporates external sectors, particularly agriculture.

Key words: Joint Forest Management, - Eastern Arc, - Livelihoods, - Socio- economics, Institutions.

INTRODUCTION

Background and problem analysis

Previous top down approaches to forest conservation, as manifested by the protectionist policy, have not achieved desired conservation goals (Kessy, 1998). Tanzania's new Forest Policy (URT, 1998) stresses the need for community participation through Joint Forest Management (JFM), particularly in forests with high biodiversity and water catchment value. Most of these initiatives are pursued with the aim of conserving forested areas without prior consideration of possible socio-economic, ecological and institutional implications (Kessy, 1998; Wily, 1995). In most cases of collaborative management, the responsibility for implementation, distribution of benefits and associated legal and incentive frameworks are poorly defined (Monela & Kaoneka, 2000). Iddi (2002) highlighted a gap between policy and practice as a result of poor understanding of the responsibilities and benefits of communities. This is



exacerbated by the dilemma of finding the right locus for decision-making. Therefore, if societal needs, resource potential and institutions guiding resource use are not harmonized, the potential exists for negative outcomes on both the ecological (resources) and societal aspects emanating from an unresolved conflict of interests.

The Chome Catchment Forest Reserve (CCFR) and its current JFM present a suitable example for investigating these ideas. Previous studies (Sato, 1996; Msangi *et al.*, 2000; Malimbwi & Mugasha, 2001) have presented evidence of increased incidences of illegal timber harvesting in CCFR both before and even after the introduction of a JFM model. There has however been little or no investigation as to the effects of ecological, societal and institutional factors and their harmonization in determining the demand for forest resources and the success of JFM. It is hypothesized that the success of the JFM paradigm is strongly influenced by the degree of harmonization between these three variables. The current model is assumed to be grounded on institutional 'vacuum'.

Study objectives

The overall objective of this study was to establish possible gaps between theory and practice in the JFM model in Chome Catchment Forest Reserve (CCFR), South Pare Mountains, Tanzania.

Specifically, the study was to:

- Describe the socio-economic characteristics of communities at the forest fringe;
- Review the current status of CCFR in terms of the available timber resource and extent of illegal harvesting;
- Describe and assess strengths and weaknesses of existing local institutions in the context of JFM; and
- Identify opportunities and synergies to promote JFM success.

METHODOLOGY

Study area description

Chome Catchment Forest Reserve is situated in the South Pare Mountains, forming part of the Eastern Arc forest system. Biodiversity values are high and five of the largest rivers in the Same District (NE Tanzania) originate here (Kalage, 2001). The CCFR is surrounded by 21 villages and a number of roads provide access from all directions. Land use in Same District is characterized by subsistence agriculture and free range livestock grazing, the latter occurring primarily in lowland areas. Same district is recognized as the least economically developed in the Kilimanjaro region, with a high dependence on local markets for generating agricultural income.

Data collection

Data were collected during 2001. Participatory rural appraisal (PRA) and group focal discussion were used to collect initial data and information used in designing subsequent sampling strategies for Phase 2. This led to the selection of two villages for a detailed investigation and household surveys. Kanza village was found on the western boundary of the CCFR, 0-3 km from the forest edge. Mhero village was located on the eastern boundary, 3-5 km from the forest edge. These villages were selected as representative of the range of conditions present in the CCFR region.

Phase two involved the design and administration of a detailed household questionnaire (Kingazi, 2002). The questionnaire was peer reviewed by fellow researchers at SUA and pre-tested at a neighbouring village (Bombo) in the eastern CCFR zone. A 10% sampling strategy was adopted to determine target sample size in each area. All surveys were administered by the first author. Information on a variety of socio-economic variables was collected including education, income generation and



household size. Data were also collected on the use of forest resources and management by households. Further interviews and discussions were conducted with key informants. Literature reviews and direct observation provided additional data.

Estimates on timber resources were based on existing inventories of CCFR timber resources conducted by Malimbwi and Mugasha (2001). This data includes estimates on species, stem numbers and timber volume based on basal and breast-height diameter (dbh). Details on methods used are outlined in Malimbwi and Mugasha (2001).

Data analysis

Participatory Rural Appraisal (PRA) data were assessed and confirmed through discussion between researchers and the community. PRA and key informants data were analyzed using content and structural-functional methods (Kajembe & Luoga,

1996) to highlight meaningful themes. Household questionnaire data were coded and quantitatively analyzed using the Statistical Package for Social Sciences (SPSS). Ecological data on the timber resource and illegal harvesting were analysed through Excel spreadsheet.

RESULTS AND DISCUSSION

Ecological factors: the timber resource

A substantial timber standing stock was found to exist in CCFR. Malimbwi and Mugasha (2001) estimated the average available stock in CCFR to be in the region of $658 \text{ m}^3\text{ha}^{-1}$, equivalent to a basal area of $44 \text{ m}^2\text{ha}^{-1}$ (Table 1). This is nearly double the basal area estimates from other Eastern Arc forest systems. Njana (1998) reported $22.4 \text{ m}^2\text{ha}^{-1}$ for North Kisara-Mamiwa Forest Reserve, while Omary (1994) estimated $23 \text{ m}^2\text{ha}^{-1}$ in Jozani Forest Reserve.

Table 1 Stand parameters (mean \pm std. dev.) for Chome Catchment Forest Reserve (CCFR) for trees $\geq 1\text{cm}$ diameter at breast height (dbh)

Zone	Area* (ha)	Stems per hectare	Basal area (m^2ha^{-1})	Volume (m^3ha^{-1})
Eastern	6 855	2 001 \pm 471	37 \pm 8	551 \pm 155
Western	5 247	2 079 \pm 501	51 \pm 2	765 \pm 194
Total	12 102	2 040 \pm 255	44 \pm 5	658 \pm 93

Source: Malimbwi & Mugasha (2001).

* Effective area excluding heath land and burnt areas.

About 72% of the average total volume per hectare consist of high value timber species. This includes *Ocotea usambarensis* (42%), *Ficalhoa laurifolia* (15%), *Syzigium guineense* (6%), *Parinari excelsa* (5%) and *Podocarpus latifolius/usambarensis* (4%). Key informants indicated that these timber species were in high demand in surrounding towns and areas. These facts contribute to making the CCFR timber resource extremely valuable and create a significant target for illegal timber harvesting. Socio-economic factors: household characteristics, livelihoods and timber demands.

Household characteristics

A total of 70 households (Kanza: $n = 33$; Mhero: $n = 37$) were successfully interviewed in the study area. The majority of the household heads interviewed were male (88.6%). Most household heads interviewed were over the age of 30 (31-43: 26%; 44-56: 37%; 56+: 27%). The majority (85.3%) of household heads had a primary level of education. A minority had attained a secondary (8.9%) or post-secondary (2.9%) level. Education levels can be important in determining successful adoption of new management innovations such as JFM. The



existence of minimum educational levels would be expected to reduce the transaction costs of such interventions.

Most household heads were married (90%). These households were more likely to be involved in both on and off-farm income activities, while households with unmarried heads were mainly restricted to off-farm activities. Mtama (1997) suggests that married households increase labour availability in a household, promoting production. There were on average 6.3 members in a household, with 58% of these being under the age of 18. This indicates a future potential increase in demand for resources. The availability of labour at the household level may serve to increase the chances of individuals becoming involved in forest management activities. This however should be balanced by the realization that larger households will have larger effects on the resource to be managed by virtue of there being more consumers.

The average plot size per household was 0.44 ha, with 67.1% of households owning land parcels of 0.04 to 0.4 ha. Only 4.4%

had parcels exceeding 1.2 ha. Other Eastern Arc areas have reported average parcels sizes in the range of 1.0 to 2.5ha, suggesting that the CCFR is under relatively high pressure for land in the Eastern Arc (Kaoneka 1993; Mbeyale, 1999; Njana, 1998; Washa, 2002). Average density was 13 persons ha⁻¹, supporting general observations that land scarcity is a problem. Most land was acquired through inheritance (90%). Land scarcity, high densities and continued plot fragmentation generate high demands for resources, particularly off-farm natural resources, which threaten the long-term objectives of JFM and may reach unsustainable levels. This is exacerbated by land degradation in existing lands neighbouring CCFR.

Income

Average monthly gross household income was estimated at TAS 35.9 thousand (Tables 2). Similar monthly values (TSH 37.7 thousand) were reported for households in Kwelikwiji village, -Nguru mountains (O’Kting’ati *et al.*, 2000).

Table 2 Average gross cash household income from different sources in the studied villages

Description	Average value (000 TAS hh ⁻¹ yr ⁻¹)		
	Mhero (Western)	Kanza (Eastern)	All
Cash crops ¹	131.2	20.1	78.7
Other sources ²	286.4	426.2	352.4
Total annual income	417.6	446.3	431.1
Total monthly income	34.8	37.2	35.9

Source: This study (2001)

¹ onions, coffee, beans, tomatoes, sugar cane, Irish potatoes, cabbages

²livestock, minor crops, off-farm activities.

Cash crops contributed only 18% of total average income. The two villages did differ significantly in this regard, with Kanza households indicating a low dependence on cash cropping (5% of income) while in Mhero this contribution was around 31%. The 2000/01 household budget survey (NBS, 2002) indicated that households with

a dependence on agriculture were generally of a lower income status.

The main sources of off-farm income were hired/casual labour (47.1%), petty businesses (31.4%) and sales of livestock (27.1%). Carpentry and pit sawing was reported to account for 5.8%. The remainder



was from miscellaneous activities including tailoring and bee-keeping. The relatively low reported dependence on timber-related activities (carpentry, pit-sawing) contrasts sharply with observations and estimates of timber availability and harvesting from other sources. The exact form of hired/casual labour was not defined as few respondents were willing to provide details. The main observed form of labour was however related to hauling of illegally harvested timber, particularly in Kanza village. This suggests an important role for timber-related activity as an income source for these households which were under-reported in the questionnaire.

Petty businesses usually involved women based in small shops and stalls selling a variety of products sourced from lowland areas. The importance of livestock is positive as livestock production has a low impact on biodiversity loss in the Eastern Arc (Moshi, 1997).

Forest use and timber demand

Forest-based household subsistence needs were identified as firewood, construction materials (timber, poles, and withies), edible products (fruits, vegetables, mushrooms and honey), medicinal herbs and compost manure. In addition, timber serves as an important commercial forest product. A plank of sawn-wood (2'x 6'x 12ft) of *O. usambarensis* was sold for 1000 - 1200 TAS (farm gate prices 2001/2002).

Tree planting is one of the few positive socio-cultural activities currently linked to timber use, and practiced by 85.7% of respondents. The average number of planted trees per household was about 78 tree hh^{-1} , distributed over an average of 3 tree plots. The two villages differed, with Mhero planting 140 trees hh^{-1} and Kanza only 16 trees hh^{-1} . The figure for Mhero is more or less similar with the Tanzanian average of 126 trees hh^{-1} during 1998/1999 (Aalbæk, 1999) while that for Kanza village is significantly different from the two

averages. It was therefore, noted that tree planting was on average higher in Mhero, probably due to relatively inaccessibility of natural timber resources. This indicates households are willing and able to invest in tree planting when access to natural timber is reduced – a classic example of resource substitution. Commonly planted tree species include *Annona sp.*, *Percia americana*, *Artocarpus heterophylla* and *Psidium guajava*. These species were favoured for producing edible fruits and fuelwood. Timber producing species were rarely planted and little planning was evident. For example, there was little awareness of the need for temporally staggered plantings in order to ensure a sustainable timber harvest over the long term. This suggests that the potential for developing a sustainable buffer zone to satisfy timber demands remains low and highlights the need for education relating to tree planting.

Most households (95.6%) identified firewood as their main heating and cooking fuel source. The bulk (97%) was obtained in a 5 km radius from the household. The two villages differed again, with Kanza collecting 67% of firewood in the CCFR while Mhero collected 3%. The reason for this difference as substantiated by the planting rates given above, is that no planted fuelwood plots exist in Kanza, while Mhero had established private fuelwood plots of *Acacia mearnsii*. The average fuelwood consumption in the study area is 3 head-loads $hh^{-1} week^{-1}$, equivalent to $1.2m^3 hh^{-1} month^{-1}$. These are similar to consumption patterns in other Tanzanian forests (Njana, 1998; Luoga *et al.*, 2000).

Timber was primarily (86%) for satisfying household construction requirements. The low reported dependence on natural timber resources was not supported by direct observation and field-based surveys. Lack of alternative timber sources thus constrains the willingness of some households to conserve in the CCFR. PRA discussions



highlighted the existence of potential alternatives including border trees (*Eucalyptus sp.*), over-mature *O. usambarensis* trees and dead logs in the reserve. These “shadow” demands also highlight the existing demand for commercial timber and thus that illegal timber use is currently an important livelihood option.

The GEF-Cross Border Biodiversity Project revealed an alarming increase in illegal timber harvesting in parts of the Same District in 2001 e.g. 20 freshly felled stumps of *O. usambarensis* and *P. usambarensis* in an area of about 0.4 ha (Kalage, K.S., GEF Project Manager, Same Site). Stump surveys conducted during the current study identified *O. usambarensis* as the main illegally harvested species. Average extraction volumes were estimated at $28.2 \text{ m}^3 \text{ ha}^{-1} \text{ yr}^{-1}$, equivalent to 402.8 thousand m^3 of illegally harvested commercial timber from CCFR. High use areas extended up to 3 km into the CCFR on the eastern side. The western boundary was less compromised, with high use areas observed along forest roads up to 1.5 km from the forest edge. Sato (1996) attributed these levels of illegal harvesting in CCFR to chronic poverty. The pattern of greater intrusion into the forest along the western boundary is probably linked to Kanza’s greater proximity to the CCFR boundary. This pattern conforms to studies where communities were observed to focus legal and illegal use in areas immediately adjacent to their households, particularly where these fell inside the recognised borders of their specific hamlet (Njana, 1998; Kaboggoza, 2000).

Forest fire burning

Forest fires are an important threat in CCFR, occurring on a roughly annual basis (Gyori, H., District Catchment Forest Officer, Forestry & Bee-keeping Division, pers. comm.). Little data exists on the impacts of fire but losses would be expected to be significant. One of the

largest incidents resulted in the loss of 300 ha of natural forest in 1997. Respondents reported the main causes as cigarette smokers (40.3%), pit-sawyers (22.6%); honey harvesters (16.1%); fires started by herders for heating (13%); hunting (4.8%); and rituals, arson or fanaticism (3.2%).

Institutional factors: institutions, management failures and benefit sharing

The biodiversity and water catchment values of CCFR are not compatible with the levels and extent of commercial timber extraction described above hence require active management. The lack of awareness of traditional management structures by households (68.1%) has required the implementation of Joint Forest Management (JFM) as the preferred current approach. JFM is implemented through a variety of institutional structures centered on Village Environmental Councils (VEC). These are composed of community representatives, traditional elders, relevant experts and local government stakeholders and officers with links to forest management. Their effective mandate is to ensure that legal community forest-based needs are met while maintaining and improving the integrity of forest cover.

The majority of households were aware of VEC’s (87.3%). Levels of satisfaction with the councils differed (Mhero: 97.3%; Kanza: 40.0%). Mhero residents identified water provision and tree planting as important services provided by their VEC. This was promoted by farmers’ associations which have recognized the water catchment value associated with CCFR. The greater use of CCFR resources by Kanza households results in greater potential for conflict with the VEC. Local perceptions were thus hostile and the Kanza VEC was seen as an instrument serving the interests of the Forest Departments and not local communities. Informal discussion with women in Kanza indicated mutual misunderstanding of JFM guidelines and enforcement. One example



was reported harassment by council members of women during firewood collection in the CCFR. Firewood collection is allowed under JFM, subject to inspection by the VEC.

This suggests that VEC members are unclear on rules governing the legal collection of minor forest products. Alternatively, the need for inspection of minor forest product collection may be misconstrued by the women as harassment and requires raising awareness of JFM rules. For these women, the only obvious rules related to the restriction and policing of illegal timber harvesting and pit-sawing operations. Thus there was evidence of reduced management effectiveness in some villages such as Kanza because of lack of benefits associated with JFM.

Experiences here and elsewhere (S. Kingazi, pers. obs.) show that membership composition, norms and rules vary widely between communities at both local and national levels. A lack of accountability, expressed by a lack of elections or change-over, result in VEC failure to maintain consonance with changing local conditions and needs. This adaptability, which contributes to successful implementation of JFM at the local scale, must be balanced by a degree of national standardization in JFM approaches. This is vital for consistent implementation of JFM approaches which work towards common national goals of forest management and conservation.

While JFM approaches have brought communities and the Forest Department together with the aim of sharing management of forests, VEC's in the CCFR remain heavily dependent upon the Forest Department for daily forest protection and management activities, convening meetings, record maintenance and preparation of management plans. The unequal distributions of resources and responsibilities have resulted in VEC's becoming

subordinate to more powerful government stakeholders. This suggests that local communities lack real input into the JFM process and that the ideals of shared management and decision-making are not being realized. More direct conflicts were reported between VEC's and assistant forest officers or forest guards. The latter were dissatisfied by the formation of VEC and the subsequent sharing of power. This was exacerbated by the VEC's lack of jurisdiction and recognition by government structures. Reported incidents of forest department officers colluding with illegal harvesters have also served to build a lack of trust between communities and government stakeholders.

Benefit-sharing

PRA discussions and key informants indicate that current benefits associated with JFM, such as firewood collection, are not markedly different from benefits associated with past systems and most households have failed to distinguish these systems based on benefit criteria. Studies elsewhere have shown that tangible benefits from JFM, have until recently been meager, unreliable and captured mostly by local elites (Sethi & Khan, 2001). Kigula (2001) found that JFM can succeed if stakeholders are confident of receiving anticipated benefits. These benefits, given in return for forest conservation and regeneration activities, include provision of forest products as well as shares in the final timber harvest. Intangible benefits, such as the recognition of water catchment values by Mhero households, can also contribute to satisfaction with JFM. Eco-cultural tourism linked to CCFR may also add tangible benefits. A gross income of over 20 million TAS was collected between 1998 to 2001 in Same District alone (Akitanda, P., Kilimanjaro Regional Catchment Forest Manager, pers.comm.). Improving livelihoods through such alternative options is one of the ways to attain sustainable forest management (Sethi & Khan, 2001).



Other factors influencing joint forest management of Chome CFR

Control of illegal harvesting is complicated by the presence of powerful stakeholders, such as retired government employees and businessmen with vested interests in illegal timber harvesting. These stakeholders can have a profound influence on decision-making processes and development of rules at a number of levels (FAO, 1997). Policing JFM rules is complicated by the high accessibility and proximity of CCFR to a major highway (Arusha-Dar es Salaam). Illegal harvesters have also adopted strategies to avoid times of high policing activity e.g. working at night. These place pressure on the existing limited policing resources. Weak linkages, and in some cases overt mistrust, between various government institutions in the judiciary, police and forestry of Same District contribute to difficulties of JFM at the local scale /synergy in curbing illegal timber harvesting and business.

Conclusion

The synergistic effects between these various ecological, socio-economic and institutional strongly suggest the need for a much more holistic approach than has been practiced to date. An example of such as approach is Peden's (2000) transdisciplinary model which seeks to cut across component disciplines. This would involve the stakeholders at all levels - government, NGOs, donor funded projects and the households themselves. At the same time these stakeholders must assess forest management in the context of broader factors which influence sustainable use and management. This includes considering the role of agricultural technologies, including intensification of production, and broader social and economic pressures which influence users and institutions. The need for comprehensive incentives, tangible benefits combined with appropriate costs, is crucial to guiding appropriate resource use. A management strategy based on using the

trans-disciplinary view and multidisciplinary approach could provide a viable option and deserves further investigation in the JFM context.

Households surrounding the CCFR exhibit poverty levels typical of other Eastern Arc communities but are unusual in their high density and land scarcity. This generates a high demand for resources in a concentrated area. Of particular concern is growing demand for timber in neighbouring areas and an age structure which suggests further population growth and higher densities in an already high density area. Improving productivity of existing lands through simple novel technologies should be promoted. The high value and volume of timber resources in the CCFR make it a highly lucrative option as an income source to satisfy these needs. The importance of off-farm income, which appears to be largely based on timber use, is a result of these factors. Identifying and developing alternative sources of on-farm, and particularly off-farm income is vital to addressing this problem. Investigating the sustainability of alternative timber sources such as tree planting, use of border trees and collection of over-mature and dead logs within the reserve boundaries is also a priority.

Village Environmental Councils have shown some success in areas of low resource conflict but are vulnerable to a number of internal and external institutional factors. Corruption, inadequate enforcement capacity, weak institutional linkages and lack of recognized and tangible benefits to households were identified as factors reducing management success. The lack of clear jurisdiction and mandates combined with a lack of awareness of JFM guidelines by households and council members result in conflict with user households. Combined with a lack of resources and reduced responsibilities, these conflicts expose them to subordination by more powerful government structures. They are thus relegated to simple implementing agents for



the policies of these dominant structures.

The above threats and opportunities indicate that the newly formed joint forest management is at cross road. A more holistic multi-disciplinary or trans-disciplinary approach is required, particularly in the linkages between agriculture, off-farm income and forest conservation. Further research in this direction is strongly recommended.

REFERENCES

- Aalbak, A. (1999). Farmer tree planting in Tanzania. In: *Proceedings of a Workshop on Off-Forest Tree Resources of Africa*. (Edited by Malimbwi, R.E. et al.). 12-16 July 1999, Arusha, Tanzania, pp 156-170.
- Iddi, S. (2002). Community Involvement in Forest Management: First Experiences from Tanzania: The Gologolo Joint Forest Management Project case study. *Proceedings of the International Workshop on Community Forestry in Africa. April 26 – 30, 1999*. FAO/FTPP/GTZ/Republic of Gambia, Banjul. pp 153-162.
- Kaboggoza, J.R.S. (2000). Forest resource-based conflicts in Uganda. In: W.S. Gombya-ssebajjwe and A.Y. Banana (eds). *Community-based forest Resource Management in East Africa*. Makerere University Printer, Makerere University, Uganda. Pp 55-62.
- Kajembe, G.C. and Luoga, E.J. (1996). Socio-economic aspects of tree-farming in Njombe district. Report to the natural resource Conservation and land use project (HIMA-Njombe). Sokoine Univeristy of Agriculture, Morogoro, Tanzania. 126 pp.
- Kalage, K.S. (2001). *Same Site Project Brief*. UNPD/GEF Cross-Border Biodiversity Project, Tanzania Component URT/G31, 48 pp.
- Kaoneka, A.R.S. (1993) Application of economic analyses and mathematical programming in land use planning at the village level in the West Usambara Mountains. Ph.D. report No. 2, Department of Forestry, Agricultural University of Norway, Aas, 177 pp.
- Kessy, J.F. (1998). *Conservation and Utilization of Forest Resources in the East Usambara Forest Reserves: Conventional Views and Local Perspectives*. Tropical Forest Management Papers no. 18 Wageningen Agricultural University. The Netherlands, pp 51-59.
- Kigula, J.J. (2001). *Joint Forest Management for Chome Catchment Forest Reserve between the Forestry and Beekeeping Division and The Community surrounding the Reserve in Same District*. Report to UNDP-GEF East African Cross Border Biodiversity Project Tanzania component. 21 pp.
- Luoga, E.J., Witkowski, E.T.F. and Balkwill, K. (2000). Subsistence Use of Wood Products and Shifting Cultivation within Miombo Woodland of Eastern Tanzania: with some notes on commercial uses. *South African Journal of Botany*, 66: 72-85.
- Malimbwi, R.E. and Mugasha, A.G. (2001). *Inventory report for Chome Catchment Forest Reserve in Same, Tanzania*. Forest and Bee-keeping Division, South Kilimanjaro Catchment Forest Project/FORCONSULT Morogoro, 39 pp.
- Mbeyale, G.E. (1999). Socio-economic assessment of the factors influencing building poles consumption, conservation and management of the Amani Forest Nature Reserve, in East Usambara, Tanga, Tanzania. MSc Thesis, Sokoine University of Agriculture, Morogoro, Tanzania. pp 23-40.
- Monela, G.C. and Kaoneka, A.R.S. (2000). Property rights and incentives to manage forest sustainably in Tanzania. *Proceedings of the Workshop on "Operationalization of Forest Policy: Opportunities and Challenges"* (Edited by D.T.K. Shemwetta & Y.M. Ngaga). 28th February 2000, Sokoine University



- of Agriculture/ TAF/IFRI, Morogoro, pp 30-40.
- Moshi, E.R.F. (1997). Inventory of indigenous agro-forestry systems in practice in the West Usambaras. Unpublished Dissertation for Award of MSc. Degree at Sokoine University of Agriculture, Morogoro, Tanzania. 172 pp.
- Msangi, T.H., Norden, L., Mhando, L.M., Mabula, C.K., Shoo, M.E. and Shangali, C.F (2000). Reconnaissance survey of three hydrological monitoring areas in Chome Catchment Forest Reserve, South Pare Mountains (Draft report). Tanzania Forestry Research Institute (TAFORI), Lushoto, 58 pp.
- Mtama, L.Y. (1997). *Factors Influencing Female-headed Households Involvement in the Sasakawa Global 2000 Project in Rukwa Region*. MSc. Thesis, Sokoine University of Agriculture, 96 pp.
- NBS. (2002). Household Budget Surveys. National Bureau of Statistics, Dar es Salaam. 188 pp.
- Njana, R. (1998). Involvement of local people in the management of Catchment Forest Reserves in Tanzania: A case study of North Mamiwa-Kisara Catchment Forest Reserve. Unpublished Dissertation for Award of MSc. Degree at Sokoine University of Agriculture, Morogoro, Tanzania, 137 pp.
- O'king'ati, A., Monela, G.C. & Moshi, E.R.F. (2000). Farming systems in the deforested areas: a case study of Kwelikwiji area, Morogoro, Tanzania. *Tanzania Journal of Forestry & Nature Conservation*, 73: 1-8.
- Omary, O.B. (1994). Forest Inventory in Zanzibar and Associated Management Problems. In: *Workshop Proceedings on Information Acquisition for Sustainable Natural Forest Resources of Eastern, Central and Southern Africa* (Edited by Malimbwi and Luoga). 31/10-04/11/1994, Arusha Tanzania, pp 51-62.
- Peden, D. (2000). "Is there a Doctor on Farm? Managing Agro ecosystems for better Human Health". Paper presented in the Annual Meeting on International Centres week of Consultative Group for International Agricultural Research held in IDRC, Ottawa, 25th October 2000. 48 pp.
- Sato, M. (1996). *Socio-economic Baseline Surveys*. The Kilimanjaro Village Forestry Project Phase II. Oriental Consultant Co. Ltd, Japan International Co-operation Agency (JICA), Same Tanzania, pp 69 + appendices.
- Sethi, P. and Khan, A. (2001). Structuring financial empowerment for localized development within JFM: Examples from Madhya Pradesh, India. *Sustainable Development* 9 (2): 10-24.
- URT (1998). National Forest Policy, Ministry of Natural Resources and Tourism, Forestry and Beekeeping Division. United Republic of Tanzania, Dar es Salaam, pp 59.
- Washa, L.F. (2002). Assessment of on-farm and off-farm income generating activities in Kisarawe District. MSc Thesis, Sokoine University of Agriculture, Morogoro, Tanzania. 50 pp.
- Wily, L. (1995). *Collaborative Forest Management (Villagers and Government): The case of Mgori Forest Tanzania*. Orgut Consulting AB and Action Network, Nairobi, Kenya, pp 31.