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AND

**IUCN – THE WORLD CONSERVATION UNION
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A Study on the Social, Economic and Environmental Impacts of Forest Landscape Restoration in Shinyanga Region, Tanzania

Prepared by:

G.C. Monela, S.A.O. Chamshama, R. Mwaipopo & D.M. Gamassa.

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ABBREVIATIONS AND ACRONYMS

^{0}C	Degrees Centigrade
ALIN	Arid Land Information Network
C	Index of dominance
D	Stump diameter
Dbh	Diameter at breast height
IUCN-EARO	International Union for Conservation of Nature -East African Regional Office
f	Form factor
FBD	Forestry and Beekeeping Division
FGD	Focused Group Discussions
FTPP	Forestry Trees and People Programme
G/g	Girth or basal area
H'	Shannon-Wiener Index of Diversity
ha	Hectare
HADO	Hifadhi Ardhi Dodoma (Dodoma Soil Conservation Project)
HASHI	Hifadhi Ardhi Shinyanga (Shinyanga Soil Conservation Project)
Ht/h_i	Tree height
IBAs	Important Bird Areas
ICRAF	International Centre for Research in Agroforestry (now World Agroforestry Centre)
IFAD	International Fund for Agricultural Development
IUCN	International Union for Conservation of Nature (World Conservation Union)
m asl	meters above sea level
m/m^2/m^3	meters, square meters, cubic meters
MDGs	Millenium Development Goals
MNRT	Ministry of Natural Resources and Tourism
N/sph	Number of stems or stems per hectare
NAFRAC	Natural Forest Resources and Agroforestry Centre
NASCO	National Agroforestry Steering Committee
NFP	National Forest Programme
NORAD	Norwegian Agency for Development Cooperation
NTFPs	Non-timber Forest Products
NWCS	Ngitili Wildlife Conservation Strategy
OKN	Open Knowledge Network
OXFAM	Oxford Famine
PEV	Participatory Economic Valuation
PRSP	Poverty Reduction Strategy Paper
R^2	Coefficient of determination
SE	Standard error of estimate
SFM	Sustainable Forest Management
SPSS	Statistical Package for Social Sciences
SUA	Sokoine University of Agriculture
TAFORI	Tanzania Forestry Research Institute
TASAF	Tanzania Social Action Fund
TaTEDO	Tanzania Traditional Energy Development Organisation
TEV	Total Economic Value
TOR	Terms of Reference
Tsh.	Tanzania Shilling
TTSA	Tanzania Tree Seed Agency

UNDP	United Nations Development Programme
URT	United Republic of Tanzania
USD	United States Dollar
V/V_i	Tree volume
WVT	World Vision Tanzania
YADEC	Youth Advisory Development Committee

EXECUTIVE SUMMARY

Background

The HASHI programme was launched in 1986 with the goal to address the severe and alarming land degradation problems in Shinyanga Region. Several programmes were carried out in earlier years with similar or related goals but the problem prevailed. Thus HASHI programme, building on the local situation and efforts by earlier programmes in Shinyanga region, has made big strides in facilitating restoration of large areas of Miombo and Acacia woodlands on individual farmer's land and on communal lands. However, it has remained less clear as to the real and tangible benefits these restored woodlands have provided in terms of household economies and strategies. A variety of important goods and services have been identified but these were yet to be quantified in terms of their economic contribution or how they reduce household labour demand. Similarly, equity considerations were yet to be analysed as to how having such forests reduces the length of time women have to spend collecting forest products. The MNRT through its FBD in collaboration with the IUCN-EARO, commissioned a ten people Taskforce to study the social, economic and environmental impacts of forest landscape restoration in Shinyanga Region, Tanzania. The specific objectives of the study were to: (i) carry out a detailed and statistically robust analysis of the contribution of the restored woodlands to household and village economies; (ii) carry out an analysis of the impact of such restoration on household labour budgets, and equity; (iii) carry out an analysis of the biodiversity that has been restored; (iv) carry out an analysis of the social and institutional aspects that have influenced the restoration of the woodlands (v) demonstrate the importance of forest restoration and tree natural resources to the economies of local people and importance of environmental goods and services in poverty reduction strategies at a national level (vi) provide a strong, robust and empirical case study of Tanzania at a start of mainstreaming the environment in national economic and development planning by integration in the PRSP process and contributing to the MDGs.

Methodology

The study was scheduled to take place from 12th July 2004 to 12th January 2005. Data collection took place from 18th July-29th August 2004. A total of 230 households in 12 sampled villages were surveyed. The activities undertaken included: (i) a rapid appraisal (pilot study) of the restoration effort to define in detail the parameters of the detailed assessment; (ii) implementation of the detailed assessment by a team with economic, social and biodiversity skills. Emphasis of the study was collection of high quality information, which is robust and statistically strong. This information was collected by a combination of methods comprising of flora and fauna inventories, checklists, market surveys, expert evaluations, PRA, Case studies, time lines, interviews with stakeholders from national to village levels, and detailed questionnaires with villagers and households practicing Ngitili and review of archive material and literature.

Main findings

The main study findings are as follows:
Biodiversity

Flora biodiversity

A total of 152 different trees, shrub and climber species were found in the surveyed Ngitili forests of Shinyanga Region. No new species was found. There are variations in species composition between the districts, but two major vegetation types were distinguished.namely: Bushland (*Acacia, Dalbergia*, and *Combretum* bushlands) in Shinyanga Urban, Meatu, Bariadi and Maswa districts (eastern side of the region); and regrowth miombo woodland in Kahama, Shinyanga Rural and Bukombe districts (western side of the region). Generally the regowth miombo vegetation had higher stocking, basal area, volume production, and tree species diversity compared to the bushland. The distribution of number of stems per hectare follows the usual expected reversed J-shaped trend with noticeable high number of trees of below 10 cm Dbh. The dominance of young trees is likely an indication of the regeneration that occurred during closure of highly degraded Ngitili to allow restoration in Ngitili where controlled grazing was practised.

Regeneration in Ngitili was largely through coppice regrowth and root suckers rather than through seeds. The two most regenerating species *Dichrostachys cinerea* and *Omorcapum trichocarpum* are indicators of degraded areas. Regenerants are generally few. Grass and herb cover is also generally low and is dominated by grass species, which are also indicators of degraded sites. The dominant tree species in terms of volume per ha in the surveyed Ngitili are: *Acacia tortilis*, *Acacia tanganyikensis*, *Acacia* senegal, *Acacia mellifera*, *Acacia kirkii*, *Acacia seyal* var. fistula, *Acacia drepanolobium*, *Acacia sieberiana,* and *Acacia polya cantha*. Other non-Acacia species are *Commiphora africana*, *Dalbergia melanoxylon*, *Combretum zeyheri*, *Cordia sinensis, Pterocarpus angolensis, Diplorhynchus condylocarpon* and *Albizia harveyi*. Individual Ngitili are well defined and of better quality in terms of wood stocking and tree species diversity compared to communal Ngitili. They are also in many cases permanent**.**

No relationship was found between species dominance in terms of volume production per hectare and extent of regeneration. This could be due to grazing pressure on palatable species, as well as limited adaptability to degradation by some of the species. The general pattern in the distribution of both basal area and volume in the Ngitili is not as expected for natural forests of mixed age and species. The distribution shows that small trees of 1 to 20 cm Dbh contribute to more volume and basal area per hectare. This is explained by presence of many trees of this size compared to very few large trees due to the fact that most of them are coppices and suckers arising after exploitation. The volume and basal area production found in the Ngitili in Shinyanga ($6.623 - 27.022$ m^3 ha^{-1}) is much lower than found in other miombo forests and bushlands in Tanzania ranging from $39 - 76$ m^3 ha^{-1} for miombo and $17 - 25$ m^3 ha^{-1} for bushland respectively due to over-exploitation of trees for firewood, poles and charcoal, leaving behind small trees.

In districts such as Kahama, Bukombe and Bariadi, the communal Ngitili are not a common feature. However, in Shinyanga rural district the situation is different as communal Ngitili are common. Strong ties to traditional norms on management of Ngitili among the communities in Shinyanga rural district may explain this compared to other districts. Stocking in terms of volume per hectare revealed no significant difference between HASHI and Non-HASHI villages. Similarly, biodiversity in terms of H' and C revealed no significant difference between the two.

The observed similarity between the Ngitili in HASHI and Non-HASHI villages is a great achievement since HASHI dealt with the most affected villages. It is likely that there was spillover effect regarding Ngitili establishment and management from HASHI to Non HASHI villages. There is no consistence of the species harvested in the different forests in the surveyed disticts. However, only trees of < 20 cm Dbh are harvested in Shinyanga Urban, Shinyanga Rural, Maswa and Meatu districts. In Kahama, Bukombe and Bariadi districts trees of up to 50 cm Dbh are harvested.

Fauna biodiversity

A total of 145 bird species were recorded from the region. Two districts (Maswa and Meatu) have higher bird species than the rest of the districts. Many bird species have emerged after the introduction of the Ngitili. Birds, mostly seed and insect eaters have easily recolonised habitats that were destroyed. There are 41 bird species with restricted ranges in Tanzania and seven of these species are found in the Shinyanga Region and its immediate environs. Bird species with restricted range in Shinyanga and its environs are Grey-breasted Spur fowl, Fischers Love Bird, Usambiro Barbet, Grey-chrested Helmet-Shrike, Rufous tailed Weaver and Steaky seed- eater.
Tanzania has 77 Important Bird Areas (IBAs) used for sheltering populations of birds that are endemic, threatened, restricted, or for large number congregations during certain periods. Shinyanga Region has six IBAs namely: (i) Lake Eyasi, (ii) Lake Kitangiri, (iii) Muyowosi-Kigozi Game Reserve, (iv) Ngorongoro Conservation Area, (v) Serengeti National Park (vi) Wembere Flood Plain. The Fischera Love Bird, black-headed Apalis, Welled Crane and Wattled Crane have a very restricted range mainly in Meatu and Shinyanga districts. That restricted range threatens the long-term survival of the species due to live bird trade (export), habitat destruction and bird pest control measures such as chemical spraying.

Shinyanga Region has a fair representation of shrubland and woodland mammals that are mostly found in the protected areas. While some have disappeared others have emerged. The Ngitili of Shinyanga mainly have small-bodied mammals or small to medium sized mammals. Larger mammals like elephant, buffalo, zebra that require larger home ranges have disappeared in all districts except in protected areas. All the districts that share boundaries with wildlife protected areas enjoy economic benefits from tourism. Kahama, Bukombe, Meatu and Bariadi get proportions of 25% of revenue accrued from tourist hunting. Meatu and Bariadi further enjoy financial or material support from Ngorongoro Conservation Area Authority and Serengeti National Park for some development services such as construction of schools, health centres and roads. It is only Maswa, Shinyanga Rural and Shinyanga Urban districts that do not enjoy these wildlife benefits. They do, however, have limited benefits from resident hunting of small and medium sized mammals. Ther are no elaborate strategies to conserve the wildlife that is emerging in the Ngitili.

The Shannon Index of biodiversity showed that Maswa was more diverse than the other districts in terms of bird species and Meatu had higher mammal diversity than the rest of the districts. The same pattern obtains for Maswa in terms of species bird richness and Kahama leads for mammals' richness. There are higher chances of encountering birds in Maswa and Kahama than in the rest of districts and Meatu offers higher chances encountering mammals than in the rest of the districts in the Region. Maswa and Kahama are closely similar in terms of bird species and Meatu and Bukombe are least similar in terms of bird species and their associated habitats. Maswa and Kahama districts look more similar and Meatu and Bukombe districts are the least similar in terms of bird species diversity. Ngitilis have restored the hitherto degraded landscape of Shinyanga region particularly in Shinyanga Rural, Maswa and Meatu districts.

There are not clear indication that the restoration is sustainable and worries linger on when it is observed that both human and livestock populations are rapidly increasing with a surging demand for biodiversity resources from the recovering landscape. A considerable variety of animal species have emerged or re-emerged in the restored woodlands as a consequence of the habitat provided by Ngitili. There are greater chances of finding animals in communal than individual Ngitili because the latter are more intensively used than the former. Despite the growing number of animals as a consequence of Ngitili, tourism potential is still low. Damage caused by animals from Ngitili is substantial sometimes compromising the value of benefits from Ngitili. Besides providing habitat for animals, Ngitili has opened doors for breeding ground of some seasonal bird species.

Economics

The values of economic contribution of goods and services from Ngitili to household economies in Shinyanga Region show that the values are higher for Kahama and Bukombe Districts relative to the other districts in Shinyanga Region. The cause of this is the stock of trees that is relatively higher in these districts due to better climate. The values for Bariadi district are also high due to the higher level of Ngitili awareness. The retrospective cost benefit analysis carried out at 10 percent discount rate using value of benefits from the time before woodlands restoration and the present situation shows a positive present value for the entire Shinyanga Region. The values of benefits from Ngitili manifest a multiplier effect generated through improvement of security for social services and improvement of sustainable land use management resulting from increased capacity of household to purchase farm inputs. The total monthly value of benefits from Ngitili per person in Shinyanga Region is estimated at Tsh. 14,046 (USD 14.0). This is higher than the national average consumption per person of Tsh. 8,500 (USD 8.5) per month in the rural areas of Tanzania. This portrays Ngitili as potentially a significant income source to supplement income from agriculture in Shinyanga region.

To a large extent the impact of the HASHI project in Shinyanga region has been positive. In five out of seven districts of Shinyanga region (71%), values of benefits from Ngitili were higher in the HASHI areas of concentration than in areas outside HASHI concentration except in Bariadi and Shinyanga Rural districts. The high level of Ngitili awareness and the HASHI support have caused this situation. The value of the contribution of benefits from individual Ngitili is higher than from the communal Ngitili because more goods and services are consumed from individual than from communal Ngitili (i.e. Apparently there is a higher propensity to consume goods and services from individual than communal Ngitili). Products used for construction of houses, charcoal and wild foods have higher value relative to other products from Ngitili in Kahama and Bukombe districts due to abundance of wood relative to other districts. Similarly wood works have higher value in these districts than in others. The values of other products are influenced by factors of locality but they seem to be comparable across the region. Whereas the values of the benefits accruing from Ngitili to a large extent are influenced by factors such as age of the Ngitili, size, education of Ngitili owner, household size of the Ngitili owner and gender of the owner, the most significant factors affecting the value of benefits from Ngitili are the age of the Ngitili and size of the Ngitili. High direct values to the household and village economies from Ngitili expressed by groups of species, come from fuel wood, fodder, timber and woodcraft and medicinal use. The low direct values to the household and village economies from Ngitili expressed by groups of species, come from wild foodstuffs (e.g. bush meat, fruits, vegetables), thatch-grass, fencing material, shade and shelter. Households could benefit more by concentrating production of goods and services from Ngitili that yield high direct values to household and village economies in order to maximize benefits and values.

Ngitili restoration has considerably reduced effort for collecting various forest products in all districts of Shinyanga Region. Significant gains in reduced effort to collect various products have been made in the collection of fuel wood, thatch grass, poles, fodder and water. Collection of fuel wood, water and fodder are often chores for females hence reduced time and workload is a great relief for women. The monetary value per household per day for the reduced effort in collecting various Ngitili products in Shinyanga Region was found to be: USD 0.70 for firewood collection, USD 0.50 for collecting poles, USD 0.80 for collecting fodder, USD 0.55 for thatch materials collection, USD 0.30 for collecting withies, USD 0.30 and USD 0.34 for domestic and livestock use of water respectively. The percentages of households whose economic well being at the family level has increased and improved as a consequence of values of benefits from Ngitili are as high as 64%. Values of benefits from Ngitili are widely used in support of school fees and other school contributions (USD 22.90 per household per year), diversification of nutrition options (e.g. fruits, vegetables, mushroom, edible insects, wild meat etc.); provision of forage for livestock and as a source of herbal medicine and health improvement (USD 8.90 per household per year), thatch grass and fuel wood. The role of Ngitili in providing safety net functions at critical times was realized and appreciated by people in the study area. The item identified to serve as numeraire in Shinyanga Region is one unit of livestock in form of cattle. There is a critical link between cattle (numeraire), livestock forage (fodder) and values from Ngitili.Therefore a unit of cattle is a numeraire identified for valuing different products from Ngitili.

Market opportunities identified in Shinyanga Region include: access to local markets and customers; diverse variety of tradable products from Ngitili; freedom to make land management decisions. Market constraints include: traditional free grazing; land scarcity; highly degraded land and forests, widespread illiteracy and poverty; harsh and dry weather condition; destructive animals, fire and sabotage; unwise and irresponsible use of communal resources; gender imbalance in land and tree tenure and ownership; lack of or narrow market for some products; conversion of Ngitili to farms; free exploitation of Ngitili by local herbalists, and ineffectual village environmental committees. Market prospects include: growing market opportunities due to expansion of towns and infrastructure; increasing diversity and value of Ngitili products; intensification of Ngitili management; increasing awareness on natural forest conservation; establishment and registration of more Ngitili, improvement and diversification of people's livelihoods and rise in incomes.

Social-Cultural and Institutional

People's understanding of Ngitili and the meanings given to the concept extend beyond Ngitili as simply the means through which people get their needs of fodder and wood products, to encompass the need to maintain the diversified livelihood needs of the people. Ngitili reference to a geographical space as a specific natural resource management regime has made more sense to those individuals and communities who have been able to use Ngitili in maintaining their multiple sources of sustenance, that include social esteem, income generation, solution for labour shortage, and other socio-cultural needs for their households and beyond. Ngitili is also understood as a long-term investment that provides space for balancing immediate household needs with such investments and also serves as reserve land for expansion of crop cultivation in future. New ways of using Ngitili as a resource have emerged as people integrate traditions with modern outlooks for their own benefit. At a general level, communal and individually owned Ngitili are found in all villages, the use of different terms such as mpaga, or pori notwithstanding. Despite the 'communal' nature of some Ngitili, the process of its establishment such as choice of area to establish the Ngitili was done arbitralily by Village governments, or by

a few representatives. In some cases Ngitili were established to meet national requirements such as protection of water supply sources. In many cases, especially where an organizational hierarchy for natural resource management is already in place, establishment of village or communal Ngitili was done through an open system of decision making through the Village Assembly. The choice of species for protection and regeneration has a long history but was a function of factors such as HASHI's programmes, indigenous knowledge, individual preferences and livelihood demands. People have the freedom to dispose off, exchange or sell Ngitili rights. However, this freedom is only possible for individually managed Ngitili that are located in areas that are not co-joined with other people's areas. There are restrictions when one wants to break off from communally owned Ngitili. Restored Ngitili have enabled some households to escape the drudgery of laborious tasks in order to buy food and other basic needs. Ownership and tenure rights give people the right of access albeit according to the rules and regulations guiding such access. The patterns of ownership and access to Ngitili have evolved from rigid patriarchal influences of the Wasukuma. In this regard, men own and control land and Ngitili. Women often require mens's consent on decisions regarding the harvesting of resources from Ngitili.

Men, normally benefit from timber harvests which women do not have control over. Women gain from easier availability of fuel wood and NTFP's. Gender divisions also remain rigid in the division of labour, making some individuals unable to benefit from the added opportunity of getting adequate fodder or adequate supply of grass for thatching. There are strong indications of the influence of socio-economic differentiation among or within communities and the benefits that individuals have gained through Ngitili. Successes realised from Ngitili are in some ways also widening socio-economic differentiation, as the most innovative households and individuals take advantage of the situation to capitalise on resource accumulation and, secure access to Ngitili products. The differences in ownership of cattle and land ownership are the most obvious indicators regarding differences in benefiting from Ngitili restoration and management. Those with bigger portions of land usually rent some of the area for which they are paid cattle in exchange. Resourceless people are therefore unable to own Ngitili especially in areas where one has to purchase land.

Socio-economic differentiation has brought the increasing tendency of some of the well-off people buying land from less economically endowed households, and therefore extending the imbalance in land holdings and ownership of Ngitili in future. The incentives that people have for Ngitili management include their ability to maintain their livelihood choices, opportunity for diversification, income generation, safety net functions in times of crises, and assured access to the products of communally managed Ngitili. People's appreciation of an improved environment and aesthetic, spiritual, cultural and medicinal values was quite obvious. Ngitili has also improved the natural resource base to some user groups such as traditional healers thus enhancing their already favourable position in the local community. In almost all villages, it was observed that there is a rich mixture of traditional and modern institutions in managing Ngitili. There is however no common pattern or system of management. Each community has its own rules and regulations for improved management of Ngitili. At individual level, practices guiding Ngitili management are handled by the individual, except in cases of hard core encroachers where the issue is taken forward to Hamlet or Village authorities. At the communal level, Sungusungu who report to the Council of Elders enforce regulations. This Council, in collaboration with Hamlet leaders usually institute the appropriate sanctions to the culprit. The existing institutional arrangements indicate a strong dependence on traditional bodies to enforce the rules and regulations as far as Ngitili management is concerned. This situation is because these traditional institutions, such as the Council of Elders cut across all hierarchies established by government and can sympathise with people of many categories in their communities.

Recommendations

The following measures at different levels of society and administration are recommended:

Strict observation of by-laws is necessary to ensure that Ngitili are properly managed (intensification of management for both individual and communal Ngitili). In dense Ngitili, appropriate tree management regimes (cutting frequency and pruning intensity) to promote fodder production should be studied.

Further studies are still needed on seasonality of biodiversity and on insects and other smaller animals in the study area. Application of satellite imagery and other remote-sensed data is still needed to track changes in the study area over time. The sustainability of Ngitili restoration and management is dependent on addressing several socio-cultural and institutional aspects that threaten the erosion of the natural resource base and hence Ngitili. Key among these are population growth rate vis-à-vis available land holdings, land scarcity and weakneses in conflict resolution mechanisms. The sustainability of Ngitili restoration therefore rests on the nature of the institutions currently entrusted with the management responsibility, and the degree to which they can keep on winning community trust in this mission. An important aspect here is enabling people to hold on to land resources so that they could maintain Ngitili and enjoy its products. The benefits of woodland restoration (Ngitili) through natural regeneration in Shinyanga Region are obvious. There is need to scale up this approach by dissemination to other places with similar or related problems.

Capture and use of lessons of experience from development initiatives other than those with which HASHI have worked in Shinyanga Region. Diversification of market for products from Ngitili through small-scale processing to diversify and add value to products from Ngitili. Investment in local Ngitili-related economic ventures by active involvement in enterprise development leading to improvement and enhancement of skills in business management. Wise use of both individual and communal Ngitili by instituting financial instruments that result in equitable sharing of the costs and benefits of damage of Ngitili by fire or unauthorized deliberate human action. Promotion of safety net functions of Ngitili for coping with household and village contingencies. Improvement of traditional uses of Ngitili while promoting non-traditional uses of Ngitili.

Promotion of household's access to markets locally and beyond by timely provision of relevant market information in order to maximize benefits from Ngitili. Documentation, repackaging and dissemination for use by local people, of relevant Ngitili-related innovative research achievements. Removal of barriers to Ngitili establishment, development and management. These barrires include perverse legal incentives such as punitive laws and regulations; and centralized issuance of logging permits presently needed for one to harvest protected tree species in own Ngitili. Promotion of management and use of high value broad groups of species and benefits from Ngitili with maximum multiplier effect. Capitalization on existing local and formal institutions to promote Ngitili. Carrying out further research on mechanisms for valuing products whose valuation is still unclear with conventional methods especially for non-market goods and services. Carrying out research in adding value to products from Ngitili and other forest resources.

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1.   INTRODUCTION

1.1   Study background

1.1.1 Environmental management and problems in Tanzania

Tanzania is endowed with about 33.5 million hectares of forests and woodlands that constitute about 38 percent of the total mainland area (MNRT, 1998). Extensive woodlands and unique forest ecosystems available in this huge forest resources endowment are potentially a very useful frontier for economic development of the country. Based on MNRT (1998), about 13 million hectares have been gazzetted as forest reserves including 83,000 hectares of industrial plantations. Water catchment forests cover about 1.6 million hectares. The area under private and community forestry is estimated to be 70,000-150,000 hectares including community woodlots such as Ngitili, mostly of small sizes (<1.0 ha). About 600,000 hectares are owned and managed by Local Governments. The 1999 Land and Village Land Acts cover 19 million hectares of forest (MNRT, 2001).

Despite this huge natural resource base, pressure on natural resources has progressively escalated and ecological degradation has become evident especially in arid and semi-arid areas in the country (Mascarenhas, 1991). Thus Tanzania is facing serious enviromental degradation problems of which the rapidly advancing deforestation, land and forest degradation, declining hydrological balance and erratic raifall are among the most critical manifestations (MNRT, 2001). Deforestation is estimated at a rate of between 130,000 and 500,000 hectares per annum (MNRT, 1998). The most plausible average figure is 91,000 hectares per year. Other problems include water pollution, fragmentation of habitats, biodiversity loss and soil erosion (NEAP, 1994; NCSSD, 1994). The underlying causes include: unsustainable land uses such as shifting cultivation, rapid population growth, impact of modern sector which has brought commercialization of agriculture and natural resources, government and market failures and more so because of the relationship between enviromental degradation and poverty in attempts to satisfy basic needs (Ahlback 1986, 1988, 1992; Monela, 1996; MNRT, 2001). The cattle have been usually blamed in the past – but the reasons are actually more insidious – commercialization of agriculture which lead to expansion of cultivation (especially cash crops of cotton, tobacco [though not so much now] and rice) which reduces the lands available for livestock to graze and then the livestock are blamed. Also there is a general lack of recognition of the importance of the environment and natural resources base as the primary building block in any efforts to reduce poverty in the context of the the Poverty Reduction Stratergy Paper (PRSP) and the Millenium Development Goals (MDGs).

Efforts to surmount these problems have involved the promotion of village and community forestry aimed at producing sufficient quantities of forest products and services to meet local demands while promoting forests contribution to global enviromental conservation (MNRT, 2001). During the 1970's, the World Bank financed an integrated development project in Shinyanga region that encouraged people to grow trees. Measurable success was seen in schools and missions. However, overall results were disproportionate with the inputs (MNRT, 1996). The Ministry of Natural Resources and Tourism (MNRT) through the Forestry and Beekeeping Division (FBD) has for many decades dealt with soil conservation problems in many parts of Tanzania, giving priority to areas where land and environmental degradation has reached alarming proportions such as Dodoma and Shinyanga regions. The Hifadhi Ardhi Dodoma (HADO) and Hifadhi Ardhi Shinyanga (HASHI) projects in Dodoma and Shinyanga regions respectively are cases in point (MNRT, 1996). Presently, the Vice-President's Office of the United Republic of Tanzania in collaboration with the National Enviroment Management Council (NEMC), are charged with the responsibility to coordinate national enviromental conservation efforts in the country. They are also responsible for coordination of efforts

to implement the PRSP and achievement of MDGs. Ngitili restoration by touching on the main pillars of sustainable development – Social, Economic and Environment- can potentially contribute significantly towards achievement of PRSP and MDGs.

Despite these efforts, environmental degradation has continued at a fast rate. Visible outcomes of environmental degradation have raised the awareness of political decision makers and the rural population on the importance of forest cover and trees to livelihoods of the society. In consequence, in the recent years, the government has realized that a more comprehensive approach is essential to bring about Sustainable Forest Management (SFM) in the country (MNRT, 1998). This approach takes into account broad and cross-sectoral linkages between the forestry and other sectors. The National Forest Programme (NFP) that is considered to be an instrument for implementing the National Forest Policy approved in 1998 and the related Legislation promulgates this pertinent approach for SFM in the country (MNRT, 2001). Through implementation of the NFP, it is possible to convert the raised awareness on the impending environmental degradation problem facing the country into effective action of required scale to ensure that the contribution of the forestry sector in the economy is increased and SFM achieved. At the local level, initiatives such as Ngitili restoration have been emerged to restore forests lost due to degradation and deforestation.

Among the key issues which have to be tackled are: (i) how to manage the land and woodland resources for sustainable development paricularly in the densely populated areas and arid and semi-arid zones (ii) how to effectively involve local people in various forest-based activities such as tree growing, harvesting, processing, marketing, wildlife management and beekeeping in order to contribute to rural development while distributing the accrued benefits between partcipants in an equitable way. The woodlands restoration approaches, that build on the traditional natural resource management systems such as Ngitili that is practiced in Shinyanga region, are one possible practical and cost-effective strategy to tackle such questions.

 The National Forest Policy upon which the NFP is based takes into account macroeconomic and other sectoral policies (mainly Land and Environment Policies) ranging from environmental conservation to sustainable development of the land based resources (MNRT, 1998). It reflects the mandated responsibility and coordinates multi-sectorally, the sustainable management and utilization of the land and natural resources in Tanzania. One key relevant macroeconomic policy is the Poverty Reduction Strategy that focuses on improving income and human development by tackling the constraints manifesting poverty that include poor governance, illiteracy, poor health, poor infrastucture and food insecurity. In light of the strategies for implementing the Poverty Reduction Strategy, the forest sector has a great role to play as regards environmental conservation, agricultural production and supply of water in addition to direct benefits related to contribution to the national economy and employment opportunities.

1.1.2 Land and forest management practices in semi- arid areas

According to (URT, 1991) Tanzania is a vast country with an area of 945,000 km^2 and with a tropical climate. It has a diverse ecology with different physiographic zones and a complex topography. As a consequence of its vastness and physical diversity, mainland Tanzania can be divided into ten ecological zones that require specific action to combat effects of environmental degradation (MNRT, 1989). Borrowing from that classification, the semi-arid areas that are of relevance to the present study fall under the following designated zones: (i) Zone II- an area of high population with extensive agriculture for cotton accomplished with overgrazing. Mwanza, Mara and some parts of Shinyanga belong to this zone. (ii) Zone III- an area characterized by overgrazing and migratory pastoralists. The

Maasai Steppe, parts of Dodoma and Singida regions belong to this zone. (iii) Zone VII- degraded lands of Dodoma under HADO and parts of Shinyanga under HASHI belong to this zone.

Historically, land and forest degradation on a massive scale took place in these arid and semi-arid areas that in the past, were extensively forested with woodlands and bushes (MNRT, 1996). The zones mentioned above are among the areas that suffered most with apparent consequences such as low and decreasing soil fertility, scarcity of water, deforestation and the related scarcity of forest products and severe land degradation. In many of these areas, land was extensively burned and forests and trees cleared for the eradication of tse-tse fly and quelea quelea birds (Otysina, 1993; MNRT, 1996). Similarly forests and trees were cleared to release land for agriculture and for grazing, consequently converting them to marginal lands. Cotton growing and tobbacco for foreign markets also contributed significantly to the problem. The increase of cotton production after World War II in Shinyanga region was achieved by extensive land use that led to demand for more arable land. Whereas before, arable land was divided only between food crops cultivation and pastures to the detriment of pastures; with expansion of cotton growing, it became necessary to share the land between food crops, cash crops and pastures. In consequence, the pressure on arable land increased and this led to further large-scale deforestation and shrinking in grazing land with attendant land degradation (MNRT, 1996). High investment was unavoidable to reclaim or recover such highly degraded areas. Much of these affected areas were utilized in an unsustainable way hence disrupting soil fertility and water supply in the surrounding areas (MNRT, 1989). It is the lack of planned and orderly transfer of suitable land to agriculture that led to this problem because a few years after clearing and cultivation, unsuitable areas for agriculture were denuded and made difficult to recover for forestry or productive pastures (MNRT, 1996).

The semi arid areas are also characterised by huge livestock populations. According to Ministry of Agriculture and Cooperatives and National Bureau of Statistics (2001), the cattle population in the country was estimated in 1998/99 at 16.4 million and that of goats and sheep at 11.6 and 3.5 million respectively. The average annual growth rates were 0.7% and 1.0% respectively. The carrying capacity of potential grazing land was conservatively assumed to be 20 million animal stock units. At these stocking levels, the concentration of livestock on tse-tse free areas with watering facilities resulted in a serious overstocking and environmental degradation we are witnessing today. In such areas as Sukumaland and the Maasai steppe, land degradation and declining productivity have become problems of national scale (NCSSD, 1994; NEAP, 1994). In Shinyanga region for instance, the region has been turned into one of the most deforested regions in the country (Leach and Mearns, 1988). Land degradation and soil erosion are rampant and not new phenomenon in the region. Impoverished vegetation cover is typical in most places. The continued use of land husbandry practices that are inappropriate plus the effect of the burgeoning human and livestock populations, have continued to accelerate land and forest degradation (Msangi, 1995).

Past efforts to destock in the semi-arid areas of the country have remained unsuccessful because viable options for savings, investment and food security have not been made available to cattle owners most of whom, are still largely shrouded in traditions and social status that have encouraged them to increase stock (Regional Government of Shinyanga, 1998). Pressure on common grazing land has had only partial significant impact on the behaviour of individuals (NEAP, 1994). The resulting pressure on grazing has in recent years kept herders in constant search for pasture and water. The problem has now extended to most of the mainland especially to the southern highlands (Mwalyosi, 1990). This newly emerged nomadic pastoralism can only have a limited future due to accelerating pressure and resulting conflict on land between farmers and herders. Across the country generally, burning of forests and woodlands for pasture still continues and will possibly continue in the short and medium term until the time when droughts will bring uncompromising massive animal destocking.

Furthermore, the current tendencies in agriculture and livestock production plus the pressure on the woodlands suggest that the current enviromental degradation is accelerating. The Tanzania Observer Newspaper of October 24, 2004 (Issue No. 473) reported that, the Usangu wetland which is the major upland catchment basin for the waters of the Rufiji River has become a desert due to human activities mainly pastoralism, agriculture, fishing and indiscriminate tree felling that have ravaged the area. In the patched desert, large herds of hundreds of cattle, sheep, donkeys, goats and dogs roam on the area in search of the remaining few grass and water from streamlets and wild animals. There are hardly any trees standing in the patches of deserts as herd boys, mainly from Sukumaland, have cut them down for cattle "bomas" and streams taming. In light of this problem, crosscutting strategic measures and institutional framework addressing all the stakeholders are necessary to come up with long-term sustainable solutions (MNRT, 2001; URT, 2002).

This entire problem is somewhat a question of changing attitudes and life styles in addition to changing production technology (NCSSD, 1994; NEAP, 1994). Zero grazing, fodder production, dermacation of designated grazing lands and pasture management have emerged in some areas and have made modest progress in Shinyanga region where, traditional systems of natural resource management and utilization have been developed to restore woodlands for household and communal use (Otysina, 1993). The development of agroforestry technologies in form of fodder banks, improved fallows and other conservation practices, have effectively utilized the existing traditional knowledge and practice to elicit farmers adoption and participation (Msangi, 1995). The inhabitants of Shinyanga region, have over the years, developed several natural resource management strategies to cope with the harsh environment that have prevailed in the region. The factors that have led to the development of such strategies include shortage of fodder during the dry season, severe droughts, seasonality of fodder availability, diseases and severe land pressure (Barrow, 1991). One of the most developed traditional management strategies is fodder reservation for dry season grazing of livestock using fodder reserves traditionally known as "Ngitili". According to Msangi (1995), Ngitili is a naturally reserved rangeland for grazing of livestock during the most critical periods of the dry season.

1.1.3 Livelihoods and natural resources management in Shinyanga Region

According to the Regional Government of Shinyanga (1998), the people in Shinyanga Region earn their living through a diverse range of activities. Over 90 percent of the region's population live in the rural areas and practice agro-pastoralism. Subsistence farming for food and cash crops as well as livestock keeping is among major livelihood strategies of the people. The average land area per household is three hectares and soil infertility has been increasing resulting in low crops yields. Very few people apply cattle manure although it is abundant. Cotton and tobacco are the main cash crops while sorghum and maize are the staple crops. In addition, such crops as paddy rice, sweet potatoes, cassava, beans, finger millets and groundnuts are cultivated. Livestock keeping is very important for the people. Other activities for the people in the region include: mining, casual labour, petty trading, beekeeping, lumbering and charcoal making and formal employment for government staff working in villages. Casual labour is particularly important to the poorest people both in urban and rural areas. These are the people who either have no productive assets or that their assets are inadequate. In the urban areas, the dominant forms of livelihood are formal employment and casual labour. Formal employment is a more guaranteed source of income than other sources. Comparable Studies in Morogoro region (Monela *et al.*, 1997, 2000) showed that rural households derived more than 50% of their cash income from sale of forest products, such as charcoal, honey, wild fruits and fuelwood. The same studies further showed that in peri-urban areas, households derived up to 70% of their cash income from the woodlands. However, not many households had the capacity to capture the forest-relared economic opportunities due to lack of capital.

The Regional Government of Shinyanga (1998) further shows that livelihood strategies of the people in Shinyanga region are strongly interlinked with the natural resource base endowment of the Region. The type and extent of economic activities as well as livelihood strategies are thus dependent on climate and the existing natural resource base. In the western part of Shinyanga Region where there is extensive forest coverage and rains are relatively stable, crop production is a more important activity than keeping livestock. In the more dry eastern part of the region, livestock keeping is an important activity on top of farming. Livelihoods in Shinyanga region have also been influenced by gender, norms and customs, individual wealth and access to resources. The acivities that earn most income are those in which the income accrues to men. This is due to gender differences and imbalance in the ownership and control of resources.

The historical impact of livelihoods on the natural resource base in the region especially before HASHI was launched in 1986 is generally negative. This is demonstrated by the apparent historical and present day land and forest degradation and its consequences in the region. Unsustainable crop production have over the years destroyed most forms of natural vegetation and particullarly trees in order to create space for subsistance agriculture and for cash crop production of cotton and tobacco for foreign markets. The removal of animal dung for use as household fuel has deprived the soil of the much-needed manure for nutrients on cropland. The environmental impact of grazing large herds of livestock on forests and land over the years is apparent across the region. Mining industry has also had its toll. Small-scale mining has affected forests and other types of vegetation culminating in widespread abandoned pits. Large areas of forest and other vegetation have been cleared for large-scale mining involving the contruction of miner's camps, building huts, and providing pit props and fuel wood. Replacement of the vegetation destroyed in the course of mining has been rare.

The programme to restore woodlands in the region initiated by HASHI was a culmination of many programmes that have been implemented in the region to rehabilitate the land and forests in order to improve livelihoods. Results of a study in Morogoro region (Monela *et al*. 1997) indicated that improving the living conditions of the rural people (reducing poverty), is the key issue to alleviate land use problems that accelerate land and forest degradation. Despite the contribution of Ngitili to livelihoods, rarely is this contribution acknowledged in quantitative terms by the District and Regional Govenments.

1.1.4 Context of the study

The HASHI programme was launched in 1986 with the goal to address severe land degradation problems in Shinyanga Region. Before it, there were several programmes carried out with similar purpose but the outcomes were generally not as expected. It is clear that through HASHI programme, building on the local conditions and efforts by earlier programmes in Shinyanga region, large areas of Miombo and Acacia woodlands have been restored on individual farmer's land and on communal lands. However, it has remained less clear as to the real and tangible benefits these restored woodlands have provided in terms of household economies and strategies. A range of important goods and services have been identified but these were not yet quantified in terms of their economic contribution, or how they reduce household labour demand. Equity considerations have not yet been analysed as to how having such forests reduces the length of time women have to spend collecting forest products.

The household and village level analysis carried out in the present study demonstrates the importance of forest and woodland restoration as well as the importace of tree based natural resources to the economies of local people. It is a strong robust and empirical case study for Tanzania (and other countries) at an important time when Tanzania has started the process of mainstreaming the

environment in national economic and development planning, and is working on ensuring that the environment is responsibly integrated in the Poverty Reduction Strategy Paper (PRSP) process. The analysis also demonstrates one way by which Tanzania is contributing to the Global Millennium Development Goals.

The MNRT through its FBD in collaboration with the International Union for Conservation of Nature-Eastern Africa Regional Office (IUCN-EARO), commissioned a study titled: a study on the social, economic and environmental impacts of forest landscape restoration in Shinyanga Region, Tanzania. The study was scheduled to take place from 12th July 2004 to 12th January 2005 by a ten people Taskforce. Data collection took place from 18th July-29th August 2004.

The study explored the impact of the HASHI project activities and documented best natural resources management practices, and lessons of experience for other parts of Tanzania with similar conditions, Furthermore, the study assessed how forest and land restoration have improved the livelihoods of the people and contributed to poverty reduction.

1.2 Objectives and terms of reference

The main objective of the study was to determine the social, environmental and economic contribution of the restored woodlands in improving people's livelihoods in Shinyanga Region. The more specific objectives were to: (i) carry out a detailed and statistically robust analysis of the contribution of the restored woodlands to household and village economies; (ii) carry out an analysis of the impact of such restoration on household labour budgets, and equity;   (iii) carry out an analysis of the biodiversity that has been restored; (iv) carry out an analysis of the social and institutional aspects that have influenced the restoration of the woodlands (v) demonstrate the importance of forest restoration and tree natural resources to the economies of local people and importance of environmental goods and services in poverty reduction strategies at a national level (vi) provide a strong, robust and empirical case study of Tanzania at a start of mainstreaming the environment in national economic and development planning by integration in the PRSP process and contributing to the Millennium Development Goals.

The hypotheses tested were: (i) Community based woodland restoration has contributed significantly to the socio-economic and ecological values of Shinyanga Region; and (ii) Traditional institutions are very important in the promotion of sustainable woodland management in Shinyanga Region.

1.2.1 Terms of reference and scope of work

The detailed Terms of Reference (TOR) for the study are presented as Annex 1. The activities undertaken in this study followed the following broad plan: (i) a rapid appraisal (pilot study) of the restoration effort to define in detail the parameters for detailed assessment; (ii) implementation of the detailed assessment by a team with economic, social and biodiversity skills; (iii) presentation of the assessment at a high level meeting in Dar es Salaam; and (iv) publication of the findings by the FBD of the MNRT and the IUCN-EARO. Emphasis of the study was collection of high quality information, which is robust and statistically strong. Management of the study was the task implemented by the Steering Group constituted by the FBD of the MNRT and IUCN-EARO.

1.2.2 Composition of the Task force

The Task force was constituted by two categories of members: Senior Task force members and fieldwork Task force members.
    (a) The Senior Task force members comprised of:

(i) Dr. Gerald C. Monela, Associate Professor of Forest economics, Sokoine University of Agriculture (SUA), Morogoro. In-chrage, Economics Section and Task force Leader.
(ii) Dr. Shabani A. O. Chamshama, Professor of Forest Biology, SUA, Morogoro. Incharge, Flora Biodiversity Section and Assistant Task force Leader.
(iii) Dr. Rose Mwaipopo, Senior Lecturer in Sociology, University of Dar es Salaam. Incharge, Social-Cultural and Institutions Section.
(iv) Mr. Deogratius M. Gamassa, Principal, College of African Wildlife Mweka, Moshi. Incharge, Fauna Biodiversity Section.

(b) The Fieldwork Task force members comprised of:
(i)   Mr. C.K. Ruffo - Retired Forester, TTSA. Biodiversty Section
(ii)   Mr. J.L. Tangwa - Forest Officer, FBD. Biodiversity Section
(iii)   Ms. A.B. Akida - Forest Officer, FBD. Economics Section
(iv)   Mr. L.P. Lusambo - Assistant Lecturer, SUA. Economics Section.
(v)   Mr. E.T. Minja - Forest Officer, HASHI. Social-Cultural and Institutions Section.
(vi)   Mr. J.Jamhuri - District Personnel Officer, Bukombe. Social-Cultural and Institutions Section.

1.2.3 Limitations of the study

A wide range of benefits had been identified from restored woodlands (Ngitili) in Shinyanga Region. However, quantification and valuing of all these benefits from a scratch in terms of economic contribution would require a similar range of studies of different scales and duration. Such studies are beyond the scope of this work.

The collection of information for various sections of the study involved the application of several methods in order to capture as much relevant information as possible. Despite this approach, some gaps in the available information became evident. This data paucity in certain aspects was filled through expert evaluations, literature, estimates and consultation with experienced people.

The economic contribution calculated in this report is based on the TEV approach. However, valuation of intangible benefits and non-market goods is sometimes associated with uncertainty that cannot be ruled out completely. Responses to questionnare and interviews relied on memory of historical events by the respondents in an environment where record keeping is non-existent. Sometimes people were interviewed on matters they consider to be confidential or of serious concern to them or their households. This has sometimes been a cause of discrepancies in the TEV studies of this nature. Weak governance in some Districts, Wards and Villages as well as some traditional customs and norms hindered data acquisition in some places.

Sampling intensities used for various sections of the study such as the flora inventory, fauna study and the social-cultural and economic surveys were efficient but not necessarily sufficient to yield true representative samples of the populations under study. Pilot survey experience and results showed that in some districts village and group Ngitili were many and large to the extent that assessment of them all was not practical given the resources and time at the disposal of the Tasforce. Similary the timing of the study and its duration had some implications on the seasonality of biodiversity especially the availability of some plants and animals. Satellite imagery and other remote-sensed data (aerial photography) for certain selected areas and villages in the study area that could have facilitated tracking of changes over time was not applied due to the inadequacy of time and funds. These limitations notwithstanding, it is our belief and conviction that the information and figures calculated

in this study can be safely perceived as belonging to the correct order of magnitude.

1.2.4. Organization of the report

The report is organised in four main Chapters. These are: Introduction; Study Methodology; Main Findings; and Conclusions and Recommendations. Except for the Introduction Chapter and the Recommendations Section, the other remaining Chapters are divided into three main sections of the study namely: biodiversity; economics; and social-cultural and institutional aspects.

The Introduction Chapter gives the background of the study, its objectives, scope of work, composition of the study Taskforce and limitations of the study. It also provides a review of natural resources management and conservation in relation to livelihoods and poverty reduction in semi-arid areas and Shinyanga Region. The Study Methodology Chapter describes the study area and methods and instruments used to collect information and data in the study area. It describes the preliminary assessment of Ngitili through a pilot study followed by the main detailed assessment of Ngitili. Furthermore it provides a description of data analysis and tools of analysis used. The Main Findings Chapter presents the outcome of the data and information analysis in the form that answers the TOR. Finally the Conclusions and recommendations are presented in the last chapter expressed in response to the TOR. References and Annexes are treated in the usual manner to enhance the descriptions presented in the chapters.

By organizing the report in this manner, the Taskforce hopes that different stakeholders might find it more user-friendly in addressing their interests and concerns.

2: STUDY METHODOLOGY
2.1 Study Area

2.1.1 Biophysical characteristics

Shinyanga Region is situated in northwestern part of Tanzania, South of Lake Victoria at about latitude 2 - 5^0 South and longitude 31 - 35^0 East. Mwanza, Kagera and Mara regions to the North, Arusha Region to the East, Singida and Tabora regions to the South and Kigoma Region to the West border the region. The Region has eight administrative districts (Shinyanga Rural, Shinyanga Urban, Maswa, Meatu, Kahama, Bukombe, Bariadi and Kishapu). In the present study, Kishapu district formed in 2003 was taken as part of Shinyanga Rural district (Figure 2.1). Shinyanga Region covers an area of 50,764 km^2 of which 31,140 km^2 is arable land, 12,079 km^2 grazable land and 7,544 km^2 forest reserves (HASHI, 2002).

Altitude varies between 1000 masl in the southeast to 1500 m asl in the north-east. The region is characterised by small hills, separated by mbuga plains and gentle slopes. Ecologically the region falls under the unimodal plateau. Mean annual rainfall is about 700 mm and it ranges from 600 mm in the east to 1200 mm in the west (HASHI, 2002). Rains begin in November and end in April/May. Rainfall is poorly distributed with high variability within and between seasons. Monthly temperatures vary between 27.6^0C to 30.2^0C maximum and 15^0C and 18.3^0C minimum. Hathout (1972) in HASHI-ICRAF (1997), described the soils of Shinyanga region. On hilltops, soils are moderately well drained greyish brown and sandy (ferric acrisols and oxisols). Moderately deep well drained, greyish brown sand loams (ferric luvisols) occur on the slopes. On the low-lying bottom lands, are the poorly drained black clays (cambisols and vertisols). Vertic soils are very extensive covering 47% of all soil types in the region.

Natural vegetation was originally woodland and bushland with species such as *Acacia, Brachystegia, Albizia, Commiphora* and *Dalbergia* (HASHI-ICRAF, 1997). However, during the 1920s and 1930s, large areas of land were cleared of bush and trees as part of a tse tse fly and quelea quelea bird eradication programme (HASHI-ICRAF, 1997). Since then, deforestation and bush clearing have continued. As a result, many areas turned tree less except for a few acacia and baobab trees. The vegetation has gradually reverted to an open bush savanna. Thus, except for Bukombe and Kahama districts, the region has a very low forest cover (Kaale, *et al.*, 2003).

2.1.2 Social-cultural characteristics

Shinyanga Region is dominated by WaSukuma, an agropastoral community. Lesser populated groups include WaSumbwa, and minorities from neighbouring Mara and Kagera Regions. The region is experiencing a fairly high population growth that has increased from 1,772,549 people in 1988 to 2,805,580 people in 2002 at a growth rate of 2.9% per annum (National Population Census, 2002). People practice mixed farming whereby cultivation is the major livelihood activity, followed by livestock keeping. Major cash crops are cotton and tobacco. Other crops such as paddy, cassava and maize serve both purposes of food and cash income.
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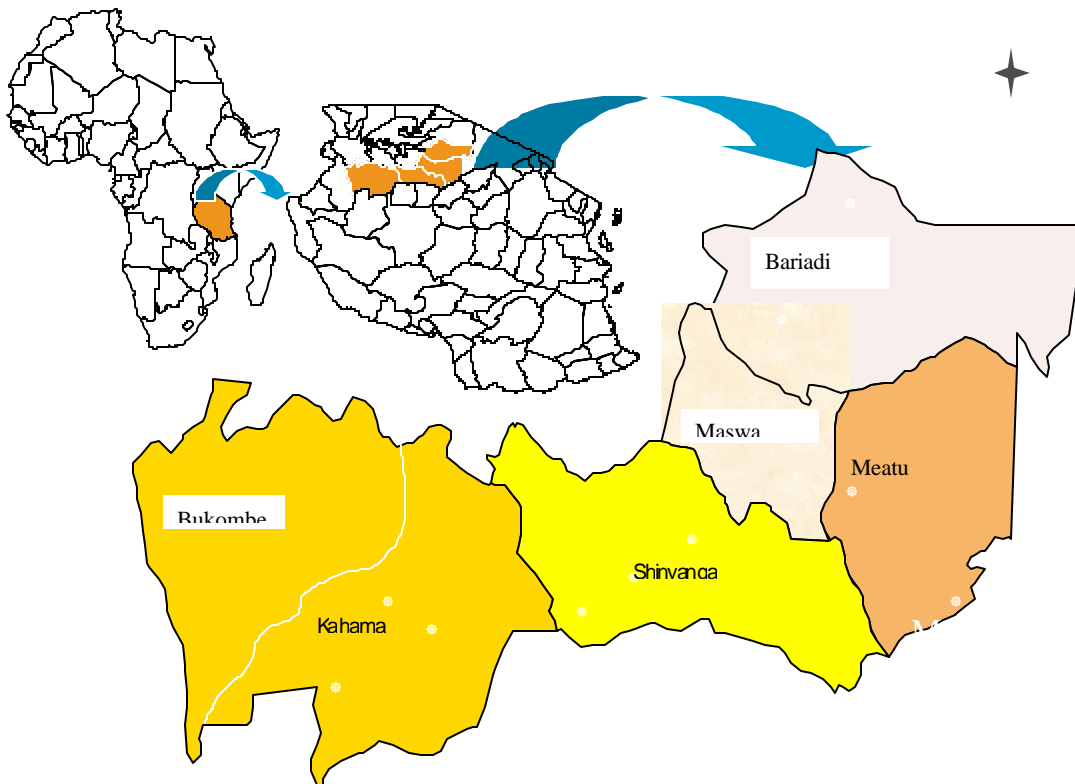
Figure 2.1: The Map of Africa and Tanzania inset showing the districts of Shinyanga Region (Adapted from HASHI, 2002).

Livestock keeping is very prominent and according to National estimates (2002) Shinyanga region posseses the largest number of cattle head among all regions in Tanzania. It is estimated that between 20-30% of the livetsock population in the country is found in Shinyanga (Machanya et al, 2003:4). Cattle are 'the traditional symbol of wealth and status, are assets that can be converted to money, food and farm implements, used for bride price, and source of family wealth and income' (Shinyanga, 1998). Livestok wealth is thus a central component in maintaining people's lifestyles. A small percentage of people also practice artisanal and small scale mining.

Despite having much production potential, according to the HBS (2000/01) Shinyanga region was consistently identified as poorer than the national average in terms of income poverty. Rural households mention that they frequently experience household food insecurity, influenced by the long dry spells experienced in the past two years1.

2.1.3 Institutions and organizations

The wealth in indigenous institutions and practices related to natural resource management in Shinyanga has been well documented (Mlenge, 2002). The strength of these institutions is still apparent today although policy influences and changing socio-economic reality have influenced the evolvement of institutional arrangements. Currently, most traditional systems of resource management try to synchronize with modern challenges and demands on natural resources in order to maintain a healthy resource base.

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[1] Household food security is referred to as having enough grain reserves to last for the whole year. "uhakika wa chakula ni ulime na kupata vyakula vya kutosha kukufikisha msimu unaofuata wa mavuno" (Ngaganulwa, 27/07/04)

HASHI is the most important institution in this regard, and is presently working with 426 communities in the region to promote woodland restoration and evinronmental conservation. HASHI was established in 1986 to address land degradation problems in Shinyanga region. In order to achieve its goal, community empowerment was imperative in implementation of its functions and activities. Several techniques were employed to ensure that communities were empowered to effectively participate in restoration and management processes. One of the strategies was to establish Village Environmental Committees (VECs) that have since acted as the 'formal' local structutres entrusted with environmental conservation. In addition to these formal structures, resource management is also organized by informal traditional structures such as Baraza la Wazee, that has significant clout in institution and enforcement of local rules and regulations regarding Ngitili management.

2.1.4 Land use, ownwership and tenure rights

The Tanzania Land Law and Policy recognizes customary land tenure arrangements. Thus land use patterns in the region are strongly influenced by Sukuma cultures and traditions. These have established rights of access to resources, land use practices such as bush fallow, and the predominance of live stock keeping (Shinyanga, 1998). Women, who may not automatically have ownership rights to the land, do at least have full control of low-income crops while men control cash crops such as cotton, despite the shared labour between the couples (op. cit, 2003:43). Traditional land use patterns are, however, increasingly challenged by pressure on land because of increased livestock populations, and population increases leading to increased fragmentation. Decreasing soil fertility is making farming unproductive but the farmers are not used to apply manure despite its availability (Machanya, et al, 2003).

2.1.5 Economic activities

The types of economic activities carried out in Shinyanga region are dependent on climate and the existing natural resource base. Livestock keeping is second to crop husbandry, the predominant economic activity in the region such that more than 90 percent of the region's population live in the rural areas and practice agro-pastoralism. Gender, norms, customs, individual wealth and access to resources have to a large extent influenced economic activities in the region. The activities that earn most income are those in which the income accrues to men. This is due to gender differences and traditional imbalance in the ownership and control of resources.

Based on the Regional Government of Shinyanga (1998), the people in Shinyanga region earn their living through a diverse range of activities. Subsistence farming for food and cash crops as well as livestock keeping rank high as main occupations in the region. Cotton and tobacco are the main cash crops while sorghum and maize are the staple crops. In addition, such crops as paddy rice, sweet potatoes, cassava, beans, finger millets and groundnuts are cultivated on varying scales. Other activities for the people in the region include: mining, casual labour, petty trading, beekeeping, lumbering and charcoal making and formal employment for government staff working in villages.

2.1.6 Demographic factors

Shinyanga region features as one of the highly populated regions in the country. The combined effect of this high human population and that of livestock has been critical in influencing the apparent alarming degradation in the region. The high population on the other hand has potentially offered the market for goods and services produced in the region. The major setbacks

inherent in the population are the looming poverty, high illiteracy particulary among women, and poor access to health services (Regional Government of Shinyanga, 1998).

2.1.7 Stakeholders in the study area

Restoration of the degraded landscape in Shinyanga has been made possible by participation of both local and international stakeholders. Since 1986, HASHI project that can be termed as the main catalyst in the process, has been working in collaboration with these stakeholders in implementing functions and activities related to natural resource management from problem analysis through implementation.

Each of these stakeholders (Table 2.1) is credited for either individual or collaborative contribution towards solving land use problems, and enhancing landscape restoration mainly through woodland conservation that have in turn elevated people's abilities to sustainable livelihoods.

Table 2.1 Stakeholders in the study area

Category	Stakeholder	Stake and role
Primary	-The people (individuals local communities)	-Key players, managers and users
	-Village governments and institutions	-Upholding rules and regulations regarding Ngitili restoration and management
	HASHI	-Flag bearer in woodland restoration and management in SHinyanga
Secondary	SUA, TAFORI, NASCO,	-Research and scientific assessment of Ngitili to find out options for optimizing contributions of Ngitili to people's livelihoods.
	WVT, YADEC, TASAF	-Training and Capacity Building
	TaTEDO, FTPP, TTSA	-Research and capacity building
	District Councils in Shinyanga	-Integration of afforestation and woodland restoration in annual District Development Plans
	Shinyanga Regional secretar	-Planning and mobilization of resources
	MNRT	-Planning and mobilization of resources
International	ICRAF Toten Eco-museum, O ALIN	-Scientific assessment of process -Promotion of indigenous knowledge and practice in natural resource management.
	OXFAM, UNDP*, IFAD*	-Donor
	NORAD	-Donor
	IUCN	-Donor

Key: * phase of support has been completed

2.2 Data collection

2.2.1 Pilot study methodology

2.2.1.1 Plan and main outcomes

The activities undertaken in this study followed the following broad plan:
 (i) A rapid appraisal (pilot study) of the restoration effort to define in detail the parameters of the detailed assessment, to test the instruments and solve problems encountered.
(ii) Implementation of the detailed assessment by a team with economic, social and biodiversity skills.
The purpose of the pilot study was to test the methodology, identify the problems and solve them before embarking on the main detailed assessment of Ngitili in Shinyanga Region. The Pilot Study in form of a rapid appraisal of the restoration effort was a requirement in the ToR. It took place for one week from 19th – 24th July 2004 and to that effect, all the team members travelled to Shinyanga on 18th July 2004. The Task force met on the 19th July 2004 at the Natural Forest Resources and Agroforestry Centre (NAFRAC) in Shinyanga to discuss and harmonize the working instruments, paid courtesy calls to the relevant offices, and got a briefing on NAFRAC activities. The meeting was also used to plan logistical matters and to prepare the itinerary for the pilot study.

NAFRAC provided the Task force with district and village registers for Shinyanga Region that were used to randomly select villages for the pilot study. The villages selected for the pilot study were Seseko and Iwelyangula in Seseko and Kitangili Wards respectively in Shinyanga (Urban) District. The itinerary for the pilot study is attached to this report as Annex 2. On Saturday 24th July 2004, the Task force convened a meeting to discuss lessons learnt, establish the way forward and prepare an itinerary for the main detailed data collection phase of the study. The pilot study report was prepared during this meeting (Annex 3). The data from the pilot study was included in the main study. The results of the pilot study show that methodologies for all components/sections of the study were appropriate and worked in keeping with the study objectives. There were a number of issues that emerged from the pilot study with a direct bearing on the suitability and performance of the study instruments used by different sections of the study. These were as follows:

(i) Communities in different areas understood the term Ngitili differently, consequently the methodology used to collect data had to be fine-tuned to reflect the Ngitili context adopted by HASHI.

(ii) Extended protocols fulfilled by Village Governments to visitors in the villages were perceived by villagers as an important and inevitable activity hence interfering with the work plan of the Task force.

(iii) Some data types required a combination of methods to capture. This aspect was incorporated during fine-tuning of the methodology.

(iv) In some areas, individual Ngitili were difficult to find while village or group Ngitili were found to be many and large. In consequence, the procedure for sampling was reviewed to cater for this reality.

(v) It was found that the seasonality of biodiversity (flora and fauna) and its impact on livelihood could to a large extent, not be covered due to the timing of the study.

(vi) There were some overlaps in the information collected by different sections of the Task force. Such overlaps were reconciled to avoid duplication of effort and to increase efficiency.

(vii) Application of satellite imagery and other remote sensed data was found to be useful

as an added advantage to study vegetation cover change over the years and areas of Ngitili. However, it became clear that it was not feasible given the prevailing situation for the study.

(viii)   It was realized that the present study when completed, among other things, is a complement of other related studies on Ngitili already undertaken in Shinyanga region; it is also a baseline on biodiversity from Ngitili and forms a benchmark for biodiversity aspects from Ngitili in the region.

(ix)   It became evident that the 5% sampling intensity for study villages proposed in the TOR was too high and not practical. Moreover, It became evident that the time allocated for the main detailed assessment of Ngitili was inadequate given the ambitious nature of the study.   Thus a definite recommendation to extend the time was agreed and effected.

2.2.1.2 Outcomes specific to sections

2.2.1.2.1 Biodiversity component of the study

The methodology was tested by collecting data in a pilot study and found to be appropriately working. The TOR requires that individual Ngitili be sampled at 5% sampling intensity whereas total enumeration be applied for village and group Ngitili. Pilot survey experience and information showed that some village and group Ngitili are many and large in some villages, thus the assessment of all of them is not practical given the resources and time at our disposal. Therefore, 5% sampling intensity was also applied to this category of Ngitili. Table 2.2 indicates the villages covered during pilot study, types and number of each Ngitili category and sample plots.

Table 2.2: Number of sample plots in village/sub-village and individual Ngitili

Village Name	No. of village/ sub-v Ngitili	No. individual Ngitili	No. of sample for village Ngitili	No. of plots individual Ngitili
Seseko	4	0	7	0
Iwelyangula	0	3	0	3

Furthermore the pilot study also showed that fauna biodiversity has a good amount of data some of which need to be collected using relatively sophisticated methods which take time to accomplish.

2.2.1.2.2 Economic component of the study

A combination of methods was used that included structured questionnaire, interviews, field observation, market survey, individual and group focused discussions and expert evaluations (Annex 3). The structured questionnaire was administered in each of the sample villages. A village register in each village was used to determine households to be sampled at 5% sampling intensity. In Seseko village, 15 households out of 312 were sampled whereas in Iwelyangula village 5 households out of 100 were sampled.   Different user groups in the village and key persons were interviewed. These included village elders, influential people in the village, herbalists, pottery makers, wild fruit and vegetable gatherers, herders, local petty traders, people

who are involved in charcoal production, and local artisans - carpentry and wood crafting among others. Data on quantities of goods and services from Ngitili and their prices and costs were collected through a combination of market survey, field observation and taking measurements complemented by interviews. Data on equity issues with respect to benefits from Ngitili were also collected.

The problems encountered include the following: (i) definition of Ngitili - it was understood differently by most respondents as compared to HASHI's definition. (ii) most respondents do not have references of their incomes and costs with reference to benefits from Ngitili (iii) due to lack of direct relationships between daily households' expenditure/income and Ngitili, it was rather hard for the respondents to give recall-data on household income and expenditure.(iv) slow understanding of some questions when semi- illiterate or illiterate respondents were encountered.(v) household heads for some selected households were not present.(vi) it took time to convince respondents to give data on their incomes; and (vii) lack of measurements, it was sometimes difficult to get conversions of products from Ngitili into monetary terms.

The following were some of the solutions to the problems encountered: (i) review and improvement of the questionnaire to accommodate changes to reflect the reality on the ground. (ii) prolonged discussions with respondents so as to harmonise the process e.g. to define Ngitili into different context as understood by respondents. (iii) taking measurements and recording of quantities of products consumed for subsistence in the household. (iv) use of proxy values and surrogate prices for non-market goods and services. (v) market survey on the "market day" for goods and services marketed only occasionally. and (vi) inviting both husband and wife to interviews in sample households in order to get correct information on matters influenced by gender roles and/or sex.

2.2.1.2.3 Social and institutions aspects of the study

These components of the study employed qualitative data collection techniques with the aim of collecting in-depth and descriptive detail on key issues related to people's livelihoods and Ngitili restoration (Table 2.3). The process documented people's narratives on their experiences, expectations, challenges and actual achievements with regard to Ngitili restoration as well as changes in their livelihood status owing to the process. Identification of respondents took into consideration project relevant and village relevant categorization for purposes of achieving an appropriate and representative sample.

Table 2.3: Summary of the data collection process

No.	Technique	Category	Objectives
1	FGD	Village representatives	To establish village basic overview or information related to Ngitili restoration, types and number of Ngitili, responsibilities, challenges
	FGD	Village representatives	Mapping key natural resources and Ngitili at the village
2	Timeline	Key informants -elders -traditional leaders -women	To learn about changes in institutional arrangements responsible for Ngitili management over time
3.	Institutional analysis	Selected key informants	To establish relationships and importance of institutions related to Ngitili management and people's livelihoods
4.	Case studies	Purposively selected households (successful, not-so-successful, non-Ngitili household) Key informants (local people, officials, heads of institutions, social categories)	To explore individual involvement and assessment of benefits from Ngitili restoration To examine livelihood changes, and challenges due to Ngitili restoration programme

2.2.1.2.4 Main detailed data collection Scenario.

Pilot study results indicated that the 5% sampling intensity for study villages proposed in the TOR was too high and not practical. Furthermore, the time allocated for the main detailed data assessment of Ngitili was inadequate. Based on the facts gathered from the pilot study, implementation of the scenario stipulated by the TOR would have required 16 weeks to accomplish the fieldwork. The extra time over and above that allocated for the fieldwork was 12 weeks with an enormous cost implication. Therefore, the Task force recommended purposeful sampling that covered all districts in the region by taking two villages from each district (one from HASHI-supported villages and another one from villages not supported by HASHI). The detailed account of the selected and implemented main detailed data collection scenario is presented in the pilot study report in Annex 3.

In brief, random stratified sampling was used to select villages that were studied thoroughly and in more detail. HASHI project staff provided district registers of all the villages in each district with whom, HASHI has worked with and those that HASHI has not worked with. In order to cater for intra and inter district variation, the sample was stratified by district. Some districts such as Bukome and Kahama have a much richer existing forest cover while some districts are rural or peri-urban based. Within each district one village with which HASHI has worked with and one village with which HASHI has not worked, were randomly selected. This implies that two villages in each district were sampled. Then within each of the randomly selected villages,

the goal was to have all communal Ngitili assessed since they were few. Individual Ngitili were randomly selected at 5% sampling intensity. This allowed collection of high quality data very carefully. The available overall funding and the time required per village influenced the actual number of villages sampled. Within each village an assessment was made of all the different types of Ngitili (village, group and individual/household /family) following general guidelines stipulated in the TOR. The instruments used for main data collection are presented in relevant sections that follow. The itinerary for the main detailed study is shown in Annex 4. The list of people met and villages sampled are shown in Annexes 5 and 6 respectively.

2.2.2. Biodiversity data collection and analysis

2.2.2.1. Flora inventory

Sampling design and plots layout

Sampling intensity adopted in this study was 5%. Synnot (1979) recommended that a sampling intensity of 0.5% to 0.7% for natural tropical forest inventory is sufficient. Plots were laid out systematically in each forest. Systematic layout of plots has the advantage of uniform coverage of the forest area. The procedure for layout of transects and plots was as follows: Within each forest, transects were established perpendicular to the longest side of the stratum: (i) the number of transects were decided on the basis of reasonable spread of the plots over the whole area and aimed at intervals between transects being greater than between plots. (ii) for better layout of transects, the first was established at half distance from the boundary.(iii) transects were drawn parallel to one another to the far side of the forest. (iv) the bearing on these transects was also noted. (v) then the total transect length was determined. (vi) the interval between plots was thereafter obtained by dividing the total transect length by the number of plots. (vii) the plots were then allocated systematically along the total length; and (viii)the first plot was established at half distance for them to be spaced out in a good way.

These procedures were done before the actual fieldwork in the survey planning session. After planning actual fieldwork followed. Table 2.3 shows the types of sampled Ngitili, their size and number of sample plots. A total of 158 temporary sample plots were established.

Plot shape and size

The common structure in most natural forests with variation in the distribution of age, size and species is the reversed J-shaped distribution of number of stems per hectare characterised by many small trees with the number decreasing with increasing tree sizes (Philip, 1983). The natural restored Ngitili in Shinyanga region were expected to have such structure and in order to measure approximately the same number of trees for each size class, circular concentric plots with radius depending on the breast height diameter (Dbh) of the trees were established and measurements taken as follows: (i) within 2 m radius: identification of herbs and grasses was done as well as count of trees (regenerants) less than 1 cm Dbh; (ii) within 5 m radius: all trees with Dbh ≥ 1 cm were recorded;(iii) within 10 m radius: all trees with Dbh ≥ 10 cm were recorded; and (iv) within 15 m radius: all trees with Dbh ≥ 20 cm were recorded. The instruments used are shown in Annex 3.

Similar shape and size of plots was used in the national inventory in Tanzania (Haule and Munyuku, 1994) and in several other small-scale natural forest inventories (Nduwamungu, 1996; Malimbwi and Mugasha, 2000). Species name and Dbh of all measured trees were recorded in each plot. Local tree identifiers were used to identify tree species for later translation into botanical names using the botanist who was one of the members of the task force. The number of stems was determined from the Dbh tally. The total height of the closest tree ("sample tree") to the plot centre was also measured and recorded. Annex 7 shows the field form that was used to record this data. Tree callipers were used to measure tree Dbh while total tree heights were measured using hypsometers. All cut stumps in a plot were also measured for stump diameter at 0.3 m from the ground.

Flora data analysis

Development of tree species list

Before the computation of various stand parameters, a tree species list was prepared. Botanical names for trees and shrubs list for all forests were listed. The list was arranged alphabetically and each tree given a code number to work with in the subsequent calculations.

Development of height/diameter equation

The surveyed Ngitili forests were earlier classified in this report into bushlands and regrowth miombo woodlands. Using the sample trees whose heights were measured, height diameter equations were developed separately for the two forest types as shown in Table 2.4. The equations were used to estimate the heights of trees that were measured for Dbh only.

Table 2.4: Surveyed Ngitili in Shinyanga Region

District	Ngitili No	Village	HASHI/Non HASHI	Area, ha	No. of plots	Ngitili type
Shinyanga Urban	1	Seseko	HASHI	3	2	Communal
	2	Seseko		3	2	Communal
	3	Seseko		3	2	Communal
	4	Seseko		1.5	1	Communal
	5	Iwelyangula	Non HASHI	2	1	Individual
	6	Iwelyangula		2	2	Individual
Shinyanga Rural	7	Usanda	HASHI	13	9	Communal
	8	Usanda		8.6	6	Individual
	9	Chembeli	Non HASHI	16	11	Communal
Meatu	10	Mwambegwa	HASHI	27	19	Communal
	11	Mwambegwa		3	2	Individual
	12	Chambala	Non HASHI	3	2	Individual
	13	Chambala		3	2	Individual
	14	Chambala		4	3	Communal
Maswa	15	Mwashegeshi	HASHI	10	7	Communal
	16	Mwashegeshi		4	3	Individual
	17	Mwashegeshi		6	4	Individual
	18	Nyashimba	Non HASHI	8	6	Individual
	19	Nyashimba		12	8	Individual
Bariadi	20	Mbiti	HASHI	17	12	Individual
	21	Mbiti		12	8	Individual
	22	Mwamnemha	Non HASHI	4	3	Individual
	23	Mwamnemha		4	3	Individual
	24	Mwamnemha		7	5	Individual
	25	Mwamnemha		2	1	Individual
Kahama	26	Wendele	HASHI	7	5	Individual
	27	Wendele		2.3	2	Individual
	28	Busindi	Non HASHI	7	5	Individual
	29	Busindi		8	6	Individual
Bukombe	30	Businda	HASHI	12	8	Individual
	31	Businda		4	3	Individual
	32	Bulega	Non HASHI	7		Individual

Table 2.5 Height diameter equations for different types of woodlands in Ngitili

Vegetation type	Equation	R^2	SE	Number Observations
Bushlands	$Ht = 1.8248 \times (Dbh)^{0.431554}$	0.65	1.25	100
Regrowth Miombo	$Ht = 1.717145 \times Dbh^{0.554589}$	0.71	1.43	34

Where:

Ht = total tree height in metres;
Dbh = tree diameter at breast height;
R^2 = the coefficient of determination;
SE = the standard error of estimate.

Forest stands density, basal area and volume

From the tree measurements the basic stand parameters were calculated, and these were; stand density in terms of number of stems per ha (N), basal area (G, m^2 ha^{-1}) and volume (V, m^3 ha^{-1}). A single tree volume equation was used to calculate the volume of each tree. The equation was:

$$V_i = fg_ih_i$$

Where: V_i = the volume of the ith tree (m^3);
h_i = the total height of the ith tree (m);
g = the tree basal area (m^2); and
f = form factor (in this case the form factor used was 0.5).

This equation was adopted after existing volume equations for the miombo woodlands (Malimbwi *et. al.*, 1994, Chamshama *et al.,* 2004) were found to overestimate volume per hectare. This was due to differences between the miombo woodlands in which those equations were constructed and the woodlands in Shinyanga region.

The volume of harvested trees in a plot were estimated using the equation developed by Chamshama *et al.* (2004):

$Vi = 0.000047 \times (D) 2.56$

Where: V_i = the volume of the ith tree (m^3);
D = the stump diameter at 0.3 m from the ground; and
2.56 = regression coefficient.

Plant biodiversity

Plant diversity was examined using Index of dominance (C) and Shannon-Wiener index of diversity (H').

Index of dominance (C)

The index of dominance is a measure of the distribution of individuals among the species in a community. This index is also called Simpson's index of diversity and is equal to the probability

of picking two organisms at random that are of different species (Krebs, 1989). The greater the value of dominance index, the lower is the species diversity in the community and vice versa. This index is calculated as described by Misra (1989).

$$C = \sum (n_i/N)^2$$

Where   C is the Index of Dominance;

n_i is the number of individuals of species i in the sample;

N is the total number of individuals (of all species) in the sample and $\sum$ is the summation sign.

Shannon-Wiener index of diversity (H')

The most widely used index of diversity, which combines species richness and evenness and also not affected by sample size, is the Shannon-Wiener index of diversity. Krebs (1989), explained Shannon-Wiener index of diversity as a measure of information content of a sample and since information content is a measure of uncertainty, the larger the value of H', the greater the uncertainty. The index increases with the number of species in the community but in practice, for biological communities H' does not exceed 5.0 (Krebs, 1989). The index is calculated as follows (Kent and Coker, 1992):

$$H' = -\sum_{i=1}^{s} (P_i \log_a P_i)$$

Where: H'   is the Shannon index of diversity;

s   is the number of species;

P_i is the proportion of individuals or the abundance of species i in the sample;

$\log_a$ is the logarithm to base a (any base of logarithm may be taken).

These diversity indices were calculated separately for each district. The separate analysis will allow comparison of tree species abundance in the districts.

2.2.2.2 Study methodology – fauna section

There are several methods that can be used to collect fauna biodiversity data. Sample sizes and sampling intensities influence the data analysis and the subsequent results. In this study, due to limitations of resources and time, the listed methods were used for the purpose of generating data that would give results on birds and mammals species list, relative abundance, richness, diversity and similarity at both regional and district levels. Data was not collected on other fauna – reptiles and insects among others. The selection of these methods was influenced by a one-week pilot study conducted in two villages in Shinyanga Urban District. The timing of the pilot study, which was conducted in the peak of the dry season, was not suitable for collecting data on invertebrates like butterflies, insects, frogs which would otherwise be abundant in the wet season.

2.2.2.2.1 Interviews

Field based interviews were conducted to collect wildlife biodiversity data by accessing local people's indigenous knowledge and skills. One or two local community guides, from the village or ward, accompanied the task force. Before the exercise started the task force leader briefed the

guides on the purpose of the survey and its benefits to the community. Using their local knowledge, the guides identified, in their local vernacular or Kiswahili, birds and mammals that were sighted or inferred by indices.

The social and economic survey team was asked to collect, on behalf of the fauna biodiversity team, the following information:

a. Wild animals and birds than were commonly found in the Ngitili
b. Wild animals and birds that were considered to have disappeared and those that had emerged after the establishment of Ngitili
c. Wild animals and birds that destroyed crops, or prey on livestock
d. Values of wild animals

2.2.2.2.2 Transect survey (Observations)

In each sample Ngitili transects were set at intervals of 100 m apart. The survey team walked along transect following a pre-determined compass bearing and recorded observations and sighting of birds and mammals. Also presence of birds or mammals was recorded through inferred observed indices like dung, foot-prints, claw marks, animal parts, nests, egg shells and feathers.

Searching
On each transect, the survey team demarcated a 15m-radius sample plot after every 100 m. In this plot, the team searched and recorded sighted dung and nests according to species. The team paid attention on tall trees where small and poorly constructed nests like those of African mourning dove or Namaqua dove, could be easily missed. Ground nests were hard to find but were searched.

Calls

On each sample plot, the survey team stood quiet for about five minutes, listened and recorded bird and mammal calls.

2.2.2.2.3. Capture

Trapping

Twenty medium Sherman traps (23 cmx9.5 cmx8 cm) were placed on a transect line at 20m intervals. A mixture of peanut butter and maize flour were used as bait. All traps were checked twice a day at dawn and dusk. Traps in exposed areas were closed during the day to prevent them from exposure of high temperatures that would jeopardize the welfare of the animals. Trapped mammals were identified, recorded, marked and released in the wild.

Mist netting

 Points were established at 200 m interval along a transect line. Mist netting for birds was done by putting up nets around different habitat types in the selected areas. Nets were opened at dawn, closed at dusk and moved the next day to a new habitat type. Nets were checked every after one-hour interval and birds were released soon after they were identified.

2.2.2.2.4. Field identification procedures

The survey team always carried the following field guide-books; African Mammals (Jonathan Kingdon) and Birds of Southern Africa and a pair of binoculars which aided field identification of birds and mammals. The community local guides provided names in venarcular or Kiswahili. The survey team showed the guides coloured illustrations or birds or mammals from the guide-books and were asked to identify the bird or mammal that matched with the local name.

2.2.2.2.5. Data analysis

The following parameters were established from the data obtained from the different surveys. In this study sampling units were districts and the region was the study area. Data was analysed at both sample and study area levels.

Total species list

Total species list was compiled for each of the sample units (districts) and the species relative abundance was calculated therefrom.

Relative abundance

This is the average number of individuals per sampling unit:

$$\bar{x} = \frac{\sum_{i=1}^{n} x_i}{n}$$

where: x_i = the number of individuals in sampling unit i and n = the number of sampling units (Anon, 1998)

Species richness

It is the average number of species per unit sampling unit:

$$\bar{y} = \frac{\sum_{i=1}^{n} y_i}{n}$$

where: y_i = the number of species in sampling unit i and n = the number of sampling units. (Anon, 1998).

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Similarity indices

This is calculated for different sample units. Similarity index was used to compare two sample units with differences in the number of species they possessed, e.g. one with x number of species and the other with y number of species, and with z species occurring in both communities. The index of similarity is given by:

$Si = 2z/x+y$

Where:

Si = similarity index

Z = Species occurring in both communities

X = Number of species in community A

Y = Number of species in community B

Using the above relation, similarities between different sample units were obtained.

Species diversity

Relative Family Diversity = <u>Number of species in family x   X 100</u>

Total number of all species

A Shannon-wiener index of diversity, H', (Shannon-wiener, 1949) was also calculated for animals at each sub habitat. The formula for calculating the diversity is: $H = - \sum p_i \log p_i$

$i=1$

s= Number of species

p_i= The proportion of the total number of individuals represented by the ith species

In this study species richness was given by the total number of species occurring in an sample unit and local diversity/alpha diversity i.e. number of species weighted by their relative abundances, usually expressed as the Shannon-Wiener function, was used, also, Simpson index of diversity and this is because species diversity considers both the species richness and evenness.

Shannon Index (H) is used to quantify species diversity for comparison. H is given by,

$$H = -\sum_{i=1}^{s} (P_i)(\log_2 P_i)$$

Where:
H= Shannon index,
S= Number of species,
$\log_2$= Natural log,

Pi=Proportion of individuals of the total sample belonging to the ith species.

Simpson index of diversity (D) is given by:

$$D = 1-\sum_{i=1}^{s} (Pi)^2$$

where:
       D = Simpson's index of diversity.
       Pi = Proportion of individuals of species I in the community.

2.2.3 Economic data collection and analysis

Data were collected through structured questionnaire surveys in sample villages; checklists and interviews with key stakeholders; In addition market surveys, expert evaluations, participant observations, spontaneous exchange and informal discussions were also used. In rare cases literature figures were used (Annex 8).

Household and village questionnaires were used to estimate the household use of goods and services in terms of quantities consumed and sold, prices and sources of collection. They were also used to collect information on the time spent to collect and harvest different forest products to form the basis for calculating the reduction in effort for collecting products from Ngitili. Checklists guided interviews with key stakeholders in villages and districts to get information and to crosscheck household and village information on goods and services from Ngitili and quantities and prices used. Market surveys, expert evaluations and participant observation were used to obtain economic and other data. Generally, the instruments used were tailored to address individual economic aspects stipulated in the TOR. A total of 124 households were surveyed in the study area. The distribution of this sample size in different districts was as follows: Bariadi: 21; Bukombe: 14; Kahama: 21; Maswa: 16; Meatu: 18; Shinyanga (Rural): 11; and Shinyanga (Urban): 23.

In order to calculate the value of the benefits from actual harvest and use of benefits from Ngitili, information on the quantity of goods and services consumed or sold was gathered covering a specified period of time (one year, month, week or day). The data collected were compiled, coded, entered into the computer and analysed using computer packages mainly the Statistical Package for Social Sciences (SPSS) and Excel. These were applied to compute the required economic information as well as descriptive and inferential statistics used to test the robustness of the data.

Based on the TOR, the analysis focused on determination of the value of the economic contribution of benefits from Ngitili and improvement of people's livelihoods that Ngitili provide under the current use and management regimes. This is calculated as the Total EconomicValue (TEV) of benefits obtained in the period of one year. Prices of timber products were obtained from market prices. Actual timber harvest levels were estimated from questionnaire, checklists and estimates. Prices of Non-timber Forest Products (NTFPs) were obtained in a variety of ways depending on the type and nature of the product. Current use estimates of NTFPs were based on the market surveys, questionnaire and checklists. Benefits from wildlife were mainly bush meat. Current use estimates and prices of bush meat were based on questionnaire and checklists. Values of water were calculated through estimates of direct domestic and livestock use by communities who benefit from Ngitili. Biodiversity value was

calculated based on the flora and fauna inventory prices of different products.

Key assumptions and considerations in the calculations of the economic contribution of Ngitili are as follows: (i) a discount rate of 10 percent recommended by the World Bank is chosen. (ii) the exchange rate used throughout is USD 1 = Tsh 1,000. (iii) values for benefits and costs are annual values for actual harvest levels. In the conversion to present values, an infinite time horizon is adopted except where a terminating annual series with a time horizon, n, is indicated. (iv) the Present Value (PV) of an infinite annual series is calculated using the capitalization formula for terminating annual series, as time horizon approaches infinity such that: $PV = a/r$, where, PV= Present Value; a = is the annual value; r = discount rate. (v) PV in this case is simply the annual value divided by the discount rate; and when the discount rate is 10 percent, the PV is calculated by multiplying the annual value by 10; and (vi) for the terminating annual series, the conversion is done according to the capitalization formula,

$$PV = a \left\{ \frac{(1+r)^n - 1]}{r(1+r)^n} \right\}$$

Where, PV is the present value, a is the annual value, r is the discount rate and n is the time horizon in years (MNRT, 2003). The value of the potential economic contribution of the remaining stocks of flora and fauna from Ngitili was not calculated because collected flora and fauna inventory data do not provide possibility to estimate quantity of various potential goods and services that can be derived from these Ngitili stocks.

2.2.4 Social-cultural and institutions data collection and analysis

These components of the study employed qualitative data collection techniques with the aim of collecting in-depth and descriptive detail on the key issues related to people's livelihoods and Ngitili restoration. The process documented people's narratives on their experiences, targets, challenges and actual achievements with regard to Ngitili restoration and the changes in their livelihood status that they have realised in the process. The identification of respondents took into consideration project relevant and village relevant categorization for purposes of achieving an appropriate and representative sample. The main data collection techniques used were: PRA, semi-structured interviews, cases study approach and Focused Group Discussion (FGD). The detailed account of the data collection methodology for this section is shown in Annex 9.

3. STUDY FINDINGS

3.1 Biodiversity

3.1.1 Flora biodiversity findings

3.1.1.1 Tree species composition

A total of 152 different tree, shrub and climber species were found in the surveyed Ngitili forests of Shinyanga region. The checklist showing these species is shown in Annex 10. Although there are variations in species composition between the districts, two major vegetation types were easily distinguished. These were bushland (*Acacia, Dalbergia*, and *Combretum* bushlands) in Shinyanga Urban, Meatu, Bariadi and Maswa districts (eastern side of the region); and regrowth miombo woodland in Kahama, Shinyanga Rural and Bukombe districts (western side of the region). These observations are inline with those of Otsyina (1993).

3.1.1.2 Stocking

The average numbers of stems per hectare for each district are shown in Table 3.1. The distribution of number of stems per hectare follows the usual expected reversed J-shaped trend (Figure 3.1) with noticeable high number of trees of below 10 cm Dbh. The dominance of young trees is likely an indication of the regeneration that occurred during closure of highly degraded Ngitili to allow restoration or regeneration in Ngitili where controlled grazing was practised. This distribution is also influenced by harvesting pressure of larger trees for firewood, charcoal, poles as observed during field work.

Miombo species regenerate largely through coppice regrowth and root suckers rather than through seeds as seeds have low dispersability, there is no long-lived seed store and there is low survival of seedlings early in life (Chidumayo *et al.,* 1996). A similar situation was observed in the Ngitili during field work. High regeneration may arise from disturbances such as harvesting and grazing and miombo woodlands/bushlands are remarkably resilient to these disturbances, because the trees produce profuse coppice shoots and root suckers (Chidumayo *et al.,* 1996).

Table 3.1 Stand parameters by district for the surveyed Ngitili in Shinyanga Region

District	N	G	V	*Shannon-Wiener index diversity (H')*	*Index of dominance (C)*
Kahama	6553	5.762	19.604	3.669	0.041
Shinyanga Rural	3232	3.842	10.077	3.510	0.042
Bukombe	2508	5.859	27.022	3.176	0.075
Bariadi	2958	3.866	9.176	2.841	0.108
Maswa	2602	4.555	10.292	2.544	0.106
Meatu	1964	5.806	14.176	2.202	0.164
Shinyanga Urban	4253	3.394	6.623	1.874	0.292

Kahama district

Shinyanga rural district

Bukombe district

Bariadi district

Maswa district

Meatu district

Shinyanga urban district
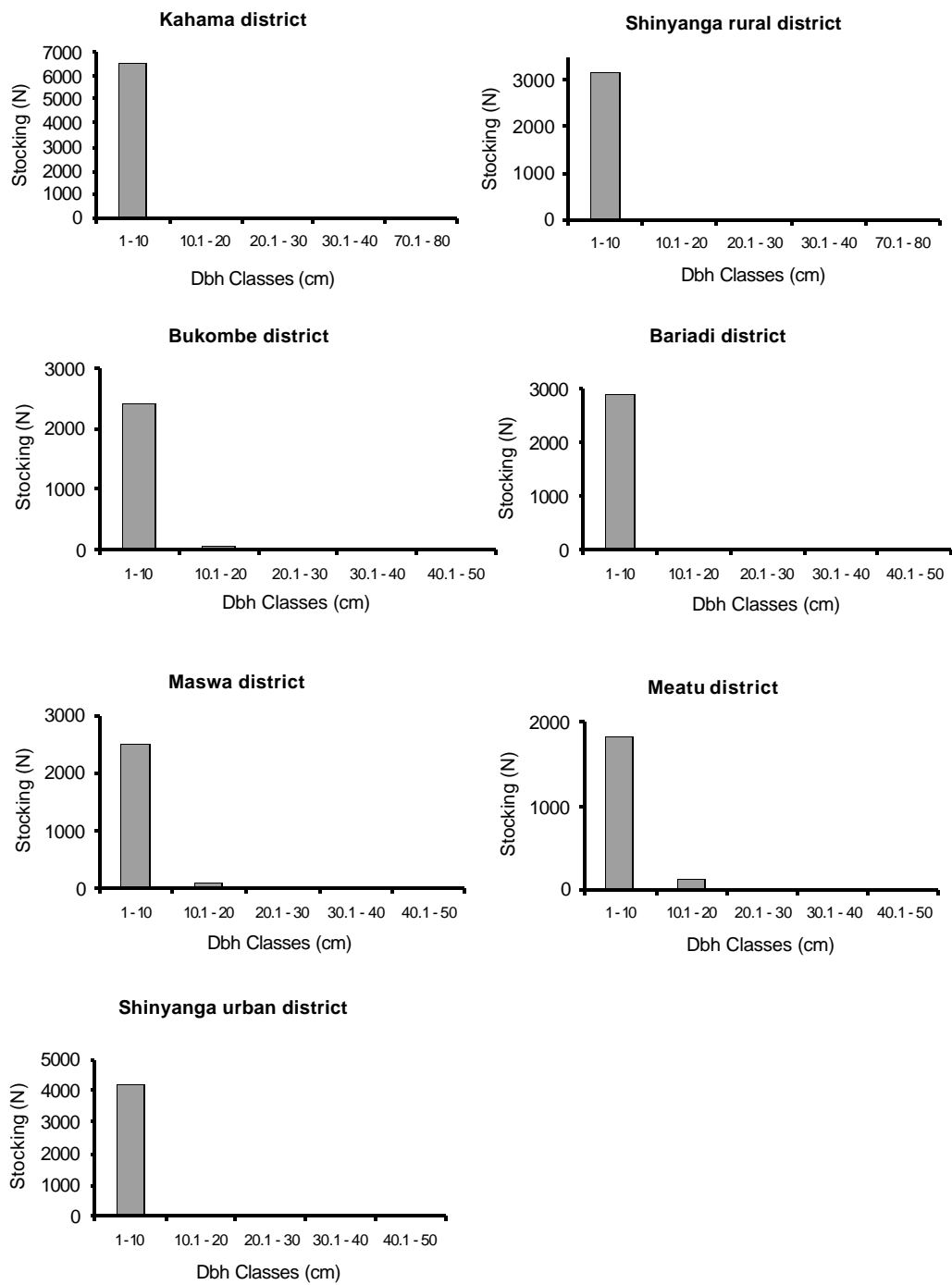
Figure 3.1: Forest stocking distribution for the surveyed Ngitili per district in Shinyanga Region.

On the other hand, heavy browsing and late fires are detrimental to tree regeneration (Chidumayo *et al.,* 1996). While overgrazing has been observed as a major problem in some of the Ngitili thus negatively affecting regeneration, forest fires are not very common.

The ten most regenerating tree species are shown in Table 3.2 while Appendix 11 shows a list of all regenerating tree species and number of regenerants per hectare. The total regeneration is 1294 sph from 74 species. Chamshama *et al.,* (2004) found regeneration ranging from 10337 to 16919 sph in miombo forests of Morogoro.

It is noteworthy that the two most regenerating species *Dichrostachys cinerea* and *Omorcapum trichocarpum* are indicators of degraded areas, an indication of the extent of degradation of the Ngitili, which could explain the low regeneration found. The study has not shown any relationship between species dominance in terms of volume production per hectare and extent of regeneration. This could be due to grazing pressure on palatable species, as well as limited adaptability to degradation by some of the species. Reduction of grazing pressure and restriction of use of the Ngitili are among management practices to promote regeneration.

Table 3.2. Ten most regenerating trees species in Ngitili in Shinyanga region

Species	SPH
Dichrostachys cinerea	233
Omorcapum trichcarpum	101
Commiphora africana	71
Maerua parvifolia	71
Margartaria discoidea	51
Acacia drepanalobium	46
Catunaregum spinosa	36
Combretum mole	30
Mayternus senegalensis	30
Combretum zeyheri	30

3.1.1.3 Basal area and wood volume

The average volume and basal area for each surveyed district are given in Table 3.1. The distribution of both basal area and volume in these Ngitili forests is shown in Figure 3.2. The general pattern is not expected for natural forests of mixed age and species. The distribution shows that small trees of 1 to 20 cm Dbh contribute to more volume and basal area per hectare. This is explained by presence of many trees of his size compared to very few large trees due to the fact that most of them are coppices and suckers arising after exploitation.

The volume and basal area production found in the Ngitili in Shinyanga (6.623 – 27.022 m^3 ha^{-1}) is much lower than found in other miombo forests and bushlands in Tanzania ranging from 39 – 76 m^3 ha^{-1} for miombo and 17 – 25 m^3 ha^{-1} for bushland respectively (Malimbwi *et al.,* 1994; Chamshama *et al.,* 2004). This is mainly due to exploitation of trees for firewood, poles and charcoal, activities that were evident at the time of data collection leaving behind small trees.
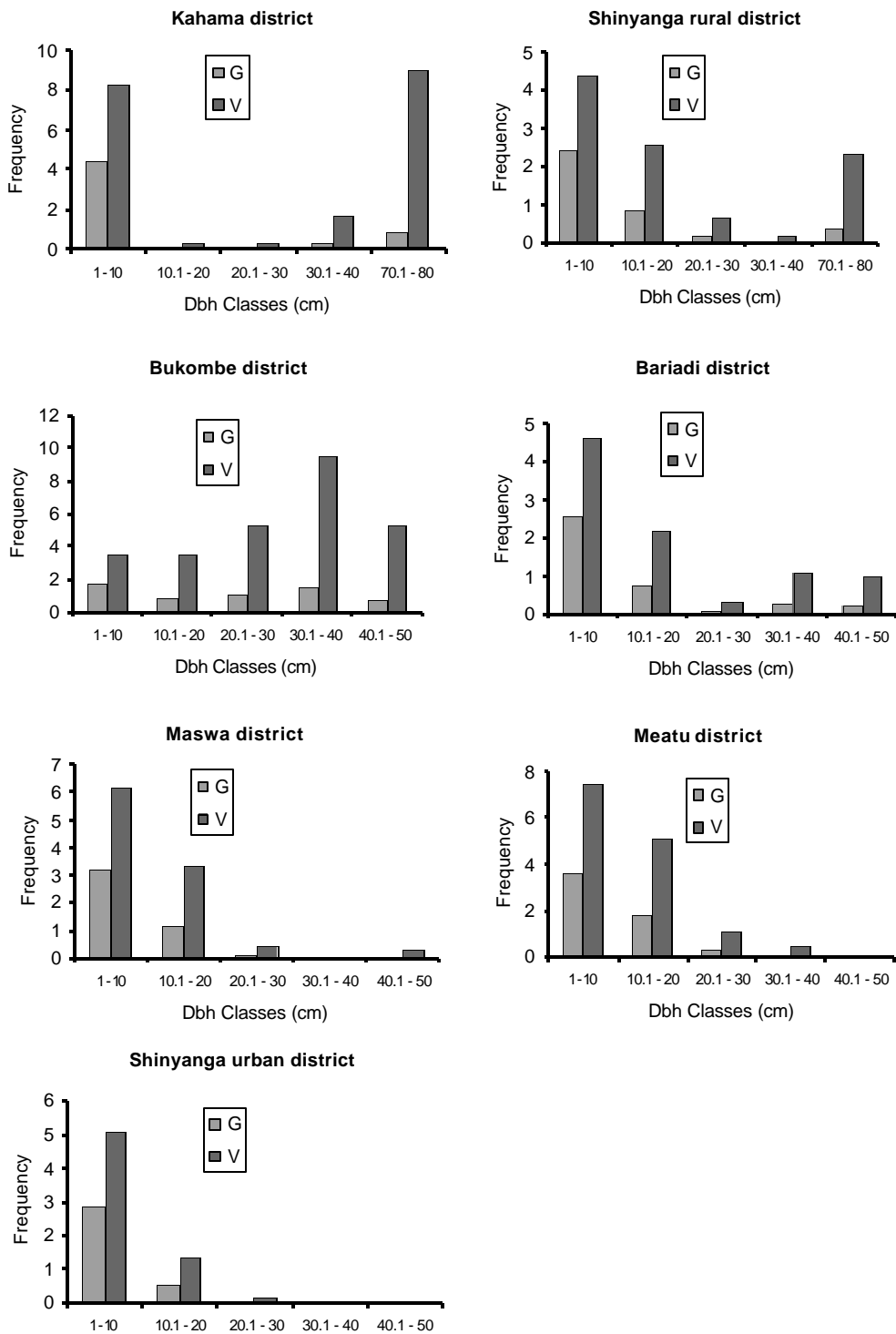
Figure3.2 Volume and basal area per hectare distribution for the surveyed Ngitili forests of Shinyanga region.

However some trees are left un-harvested in some districts that have relatively little pressure for those products such as Bukombe and Kahama districts. In other situations, the Ngitili were established a few years ago, and are thus still composed of small trees.

3.1.1.4 Dominance

Figure 3.3 shows the dominant tree species in terms of volume per ha in the surveyed Ngitili in each district. With exception of regrowth miombo woodlands of Shinyanga rural, and Bukombe districts, the Ngitili in the rest of districts are dominated by acacia species. The specific dominant species are: *Acacia tortilis, A. tanganyikensis, A. senegal, A. mellifera, A. kirkii, A. seyal var. fistula, A. drepanolobium, A. sieberiana,* and *A. polyacantha*. Other non-*Acacia* species are *Commiphora africana, Dalbergia melanoxylon, Combretum zeyheri, Cordia sinensis, Pterocarpus angolensis, Diplorhynchus condylocarpon* and *Albizia harveyi*. These *Acacias* are pioneer species i.e. species that are first to colonize degraded areas. Their dominance suggests that the woodlands are recovering.

However, it has been observed that the *Acacia* species such as *Acacia polyacantha, A. nilotica* and *A. tortilis* area important browse species known in the region (Mlenge, 2002). It may be possible therefore that the local people managing the Ngitili are doing some management practices to promote regeneration of these species. This may be the case since the primary objective of Ngitili management is the provision of fodder during dry seasons.

3.1.1.5 Plant Diversity

Index of Dominance (C)

In this study the C values for each district are given in Table 3.1. There is relative high diversity of tree species especially for Kahama (0.041), Shinyanga Rural (0.042) and Bukombe districts (0.075) compared to other districts. At Mkindo forest reserve in Morogoro rural district, the C value was 0.085 for the miombo woodland (Malimbwi and Mugasha, 2001). The C values of 0.092 and 0.065 were observed in public lands and reserved forest respectively for the miombo woodland at Kitulangalo near Morogoro (Zahabu, 2001). The C values for Ngitili forests of Kahama, Shinyanga Rural and Bukombe districts therefore indicate high species richness compared to other forests of similar vegetation types in Morogoro.

Shannon-Wiener Index of Diversity (H')

The Shannon-Wiener Index of Diversity (H') values calculated using natural logarithms for each district are shown in Table 3.1. This value also shows that tree species diversity in Ngitili forests of especially Kahama (3.669), Shinyanga Rural (3.51) and Bukombe districts (3.176) is high compared to others. The H' values observed at Mkindo in Morogoro was 3.162 and in another study, H' values were observed to be 2.90 and 3.13 in public land and reserved forest for miombo woodland at Kitulangalo area (Zahabu, 2001). This further suggests that the Ngitili forests of Kahama, Shinyanga Rural and Bukombe districts have high species richness compared to other studied forests in Morogoro.

Kahama district

Others 35%
Acacia tanganyikensis 46%
Albizia harveyi 3%
Diplorhynchus condylocarpon 3%
Pterocarpus angolensis 4%
Combretum zeyheri 9%

Shinyanga rural district

Others 38%
Brachystegia spiciformis 25%
Afzelia quanzensis 24%
Acacia tortilis 4%
Diplorhynchus condylocarpon 4%
Sclerocarya birrea subsp. multifoliolata 5%

Bukombe district

Others 37%
Julbernardia globiflora 17%
Pericopsis angolensis 16%
Brachystergia boehmii 13%
Parinari curatellifolia 8%
Brachystegia spiciformis 9%

Bariadi district

Others 34%
Acacia polyacantha 20%
Commiphora africana 17%
Acacia senegal 7%
Balanites aegiptiaca 8%
Albizia harveyi 14%

Maswa district

Others 25%
Acacia tortilis 23%
Acacia mellifera 8%
Acacia polyacantha 11%
Acacia seyal var. fistula 20%
Acacia drepanolobium 13%

Meatu district

others 13%
Cordia sinensis 3%
Acacia kirkii 3%
Commiphora africana 10%
Acacia senegal 15%
Acacia tortilis 56%

Shinyanga urban district

Others 20%
Acacia tortilis 31%
Acacia mellifera 5%
Dalbergia melanoxylon 7%
Acacia drepanolobium 13%
Acacia sieberiana 24%

Figure 3.3: Dominant tree species in terms of volume per ha in the surveyed Ngitili in Shinyanga Region.

3.1.1.6 Ground cover of the studied Ngitili in Shinyanga Region

Table 3.3 shows average percentage ground cover for the surveyed Ngitili in Shinyanga region. Different species of grasses and herbs found in each of the surveyed district and their dominance are given Table 3.4. Generally, the average percentage ground cover figures are small as expected for woodlands. This may be attributed by the fact that the survey was carried out at the peak of dry season and heavy grazing had already occurred. During dry season most woodland trees shed off their leaves and grasses and herbs get dried and the forest floor become open. In the wet season the forest floor becomes fully occupied by grasses and herbs. On the other hand, the observed ground floor situation could be ascribed to grazing pressure since Ngitili are primarily used as grazing fields.

Table 3.3: Average percentage ground cover for the surveyed Ngitili in Shinyanga region.

District	Kahama	Shiny. Rura	Bukombe	Bariadi	Maswa	Meatu	Shiny. Urb
Average Percentage ground cove	38	16	14	25	30	7	15

Table 3.4 shows a higher occurrence of *Aristida, Eragrostis* and *Cynodon* grasses. The dominance of these grasses in Ngitili has also been shown in other studies in Shinyanga (Pajot, 1996; Rubanza, 1998). *Aristida, Eragrostis* and *Chloris* are considered to be indicators of overgrazed areas when they predominate (Pajot, 1996). Most of the herb species with high occurrence in Ngitili have also been documented in other studies in Shinyanga (Pajot, 1996; Rubanza, 1998).

Table 3.4. Occurrence of grasses and herbs in Ngitili in Shinyanga region

Grass species	Frequency	Herb species (contd)	Frequency
Aristida	99	*Sida*	4
Eragrostis	42	*Ocimum suave*	3
Cynodon	32	*Hygrophylla*	3
Setaria	30	*Indigofera*	2
Themeda	21	*Barleria*	2
Chloris	20	*Aloe*	2
Hyparrhenia	13	*Sphaeranthus*	2
Digitaria	12	*Anisotes dumosus*	2
Cymbopogon	6	*Tephrosia*	1
Sporobolus	6	*Spermacoce*	1
Panicum	4	*Gierbera*	1
Penisetum	4	*Abutilon*	1
Ryncheritrum	1	*Sansevieria*	1
		Cissus	1
Herb species		*Cyperus*	1
Leucas stricta	14	*Triumfetta*	1
Monechma debile	11	*Hibiscus*	1
Achyranthes aspera	9	*Ipomoea kituiensis*	1
Waltheria indica	7	*Trichodesma zeylanicum*	1
Leonotis nepetifolia	5	*Sesamum angustifolium*	1

3.1.1.7 Comparison between different types of studied Ngitili in Shinyanga region

The Sukuma are agro pastoral keeping cattle and at the same time grow food crops and cotton. Ngitili is a customary land-use system being an enclosure for management of natural regeneration to enhance biodiversity and livelihood security in rural communities. This land use developed due to acute animal feed shortages a long way back since the chiefdom era.

According to Mlenge (2002), individual/family and communal Ngitili evolved. All land that is not under cultivation and is suitable for dry season grazing forms the communal Ngitili that is accessible to everybody. Family Ngitili on the other hand is made of arable land that is in fallow.

This study revealed that individual Ngitili are well defined and of better quality in terms of wood stocking and biodiversity compared to communal Ngitili (Table 3.5). Studies comparing wood stocking and biodiversity in individual and communal Ngitili are lacking. Documented superiority of individual compared to communal Ngitili has only been shown for fodder dry matter yield (Pajot, 1996; Rubanza, 1998).

This study showed also that individual Ngitili are in most cases permanent based on the customary land tenure arrangements where land is inherited in accordance with lineage. Within a clan there are strong tenure and security of rights that are recognized at village government level. The fact that individual Ngitili are in most cases permanent is contrary to previous definition that they occur on fallow land. In districts such as Kahama, Bukombe and Bariadi communal Ngitili are not a common feature. However, in Shinyanga rural district the situation is different as communal Ngitili are common. Strong ties to traditional norms on management of Ngitili among the communities in Shinyanga rural district may explain this compared to other districts.

Table 3.5. Stocking of different types of studied Ngitili in Shinyanga Region

District	COMMUNAL					INDIVIDUAL				
	N	G	V	H'	C	N	G	V	*H'*	C
Kahama						6553	5.762	19.604	3.669	0.041
Shinyanga Rural	3257	4.699	12.652	3.440	0.046	3148	0.987	1.497	1.977	0.221
Bukombe						2508	5.859	27.022	3.176	0.075
Bariadi						2958	3.866	9.176	2.841	0.108
Maswa	1314	6.156	15.768	1.785	0.245	3032	4.022	8.466	2.378	0.125
Meatu	1824	6.496	16.007	1.783	0.253	2480	3.274	7.463	1.583	0.302
Shinyanga Urban	4782	2.942	5.051	1.371	0.445	3020	4.45	10.291	1.494	0.341

3.1.1.8 Comparison between the Ngitili in HASHI and non-HASHI areas of Shinyanga Region

Table 3.6 shows tree stocking and biodiversity in both HASHI and Non-HASHI managed villages. A paired *t*-test was done to test if there were significant differences between the two in terms of stocking and biodiversity. The stocking in terms of volume per hectare revealed no significant difference between HASHI and Non-HASHI villages (tabulated $t_{0.05, \ 6}$ was 1.96 > calculated *t* of 0.75). Similarly, biodiversity in terms of H' and C revealed no significant difference between the two.

HASHI was established in 1986 with the objective to determine those areas most in need of restoration, go to villages and work with them to set aside degraded land for restoration (Kaale *et*

al., 2003). With this background information in mind, the observed similarity between the Ngitili in HASHI and Non-HASHI villages is a great achievement since HASHI dealt with the most affected villages and now are of similar forest conditions. It is also likely that there was spillover effect on Ngitili establishment and management from HASHI to Non HASHI villages. This can explain why there is no real difference between HASHI and Non-HASHI areas. Mlenge (2002) also supports this by saying "HASHI support had a positive impact on the environment in Shinyanga region. There is noticeably more vegetation than in 1986 when the project started"

Table 3.6 Stocking comparison between HASHI and Non-HASHI Ngitili

District	HASHI					NON-HASHI				
	N	G	V	*H'*	*C*	N	G	V	*H'*	*C*
Kahama	5281	5.897	21.769	2.877	0.089	7444	5.668	18.088	3.444	0.045
Shinyanga Rural	3589	5.403	14.859	3.248	0.058	2745	1.714	3.557	2.789	0.089
Bukombe	2744	4.735	18.016	2.787	0.108	1989	8.331	46.835	2.998	0.072
Bariadi	2816	3.238	7.15	2.280	0.22	3194	4.912	12.553	2.834	0.079
Maswa	1725	5.099	12.312	2.372	0.115	3480	4.011	8.271	1.853	0.081
Meatu	1626	6.549	16.321	1.483	0.304	2979	3.575	7.74	1.907	0.198
Shinyanga Urban	4782	2.942	5.051	1.371	0.445	3020	4.45	10.291	1.494	0.341

3.1.1.9 Harvested tree species in the surveyed Ngitili of Shinyanga Region

Table 3.7 shows harvested tree species for each of the surveyed districts of Shinyanga region. It can be observed that there is no consistence of the species harvested in the different forests. However, from the analyzed data, it is clearly seen that only trees of < 20 cm Dbh are harvested in Shinyanga Urban, Shinyanga Rural, Maswa and Meatu districts. In Kahama, Bukombe and Bariadi districts trees of up to 50 cm Dbh are harvested. These observations correspond well to the availability of trees in these forests and explain the forests structures observed in Figure 3.2.

Table 3.7. Harvested tree species in the surveyed Ngitili of Shinyanga region

BUKOMBE DISTRICT	MASWA DISTRICT	BARIADI DISTRICT
Brachystergia boehmii	*Acacia tortilis*	*Acacia polyacantha*
Pterocarpus angolensis	*Terminalia stuhlmanii*	*Acacia nilotica subsp. Indica*
Julbernardia globiflora	*Acacia polyacantha*	*Commiphora caerulea*
Brachystegia spiciformis	*Acacia seyal var. fistula*	*Ormocapum trichocarpum*
Vitex doniana	*Ziziphus mucronata*	*Dalbergia melanoxylon*
Burkea africana	*Acacia mellifera*	*Albizia harveyi*
Kigelia africana	*Diospyros fischeri*	*Diospyros fischeri*
Hymenocardia acida	*Balanites aegiptiaca*	*Lannea humilis*
Albizia versicolor	*Acacia drepanolobium*	*Acacia drepanolobium*
Combretum adenogonium	*Catunaregam spinosa*	
Combretum molle	*Commiphora africana*	**SHINYANGA RURAL DISRICT**
Annona senegalensis	*Cordia sinensis*	*Brachystegia spiciformis*
Pseudolachnostylis maprounefolia	*Grewia similes*	*Cassipourea mollis*
Multidentia crassa	*Commiphora caerulea*	*Ochna holstii*
Hexalobus monopetalus var obovatus	*Lannea humilis*	*Combretum molle*
Xylopia antunesii		*Zanha africana*

Terminalia sericea	**MEATU DISTRICT**	Margaritaria discoidea
Albizia harveyi	Acacia mellifera	Diplorhynchus condylocarpon
Parinari curatellifolia	Acacia tortilis	Albizia tanganyikensis
Vitex mombassae	Commiphora africana	
	Acacia Senegal	
KAHAMA DISTRICT	Cordia sinensis	
Combretum zeyheri		
Pterocarpus angolensis	**SHINYANGA URBAN DISTRICT**	
Terminalia sericea	Acacia sieberiana	
Crossopteryx febrigua	Ormocapum trichocarpum	
Combretum psidioides		

3.1.1.10 Scale and extent of Ngitili within the studied area of Shinyanga Region

Ideally estimation of areas for the Ngitili occurring in each village of Shinyanga region was supposed to be done by means of either satellite imagery or aerial photo interpretation. Since the time allocated for this exercise was not enough to carry out that exercise, literature search of existing information on extent and sizes of Ngitili was done.

The most popular approximation of Ngitili sizes was that by HASHI (2001). Table 3.8 shows the recorded Ngitili in Shinyanga region between 1991 – 2002 (Kaale *et al.*, 2003). This data is from 172 surveyed villages out of the total 833 villages in the region.

Table 3.8 Known extent of Ngitili in Shinyanga region

District	Communal*	Individual	Total
Bariadi	13,696	6,191	19,887
Kahama	7,468	2,941	10,409
Maswa	2,632	4,336	6,968
Meatu	4,535	9,620	14,155
Shy (R)	15,953	7,806	23,759
Shy (U)	1,979	245	2,224
Bukombe	330	390	720
Total	46,593	34,206	78,122

Source: Kaale *et al.,* (2003)

*Communal Ngitili are composed of: Dagashida, Prisons, Religious institutions, Fork Development College, Traditional Healers Association, Schools, Villages and Groups.

3.1.2 Fauna biodiversity findings

3.1.2.1 Wildlife (Birds and Mammals)

3.1.2.1.1. Birds

A total of 145 bird species were recorded from the region and the checklist is shown in Appendix 12. Figure 3.4 shows the 27 most common bird species in the region. Figures 3.5 and 3.6   show the two districts (Maswa and Meatu) that have higher bird species than the rest of the districts. Appendices 12a – 12e are bird lists for the five districts of the region. Many bird species have

emerged after the introduction of the Ngitili as demonstrated in appendices 12f – 12j. Birds, mostly seed and insect eaters easily recolonise habitats that were destroyed. Tanzania's rich biodiversity is inextricably linked to the diverse and varied landscape, climate and altitude habitats which, influences distribution of resident and migratory birds. Some birds are restricted to particular biomes and habitats. Such habitats shelter species with restricted ranges less than 50,000 km^2. There are 41 bird species with restricted ranges in Tanzania and seven of these species are found in the Shinyanga region and its immediate environs. Bird species with restricted range in Shinyanga and its environs are Grey-breasted Spur fowl, Fischers Love Bird, Usambiro Barbet, Grey-chrested Helmet-Shrike, Rufous tailed Weaver and Steaky seed- eater.

Birds dominate the land scape everywhere in Tanzania but rapidly changing of the environment, through alteration of habitats some areas become restricted sites for certain bird species. These areas are called Important Bird Areas (IBAs). Tanzania has 77 IBAs, and Shinyanga has 7 IBAs namely: Lake Eyasi, Lake Kitangiri, Muyowosi-Kigozi Game Reserve, Ngorongoro Conservation Area, Serengeti National Park, and Wembere Flood Plain.

IBAs are important for sheltering population of birds that are endemic, threatened, restricted, or for large number congregation during certain periods. Tanzania has 31 threatened species and Shinyanga environment has two species namely, Wattled Crane in the Muyowosi- Malagarasi wetland and Black-Headed Apalis in Wembere Flood Plains.

3.1.2.1.2 Bird conservation

The Fischera Love Birds have a very restricted range maily in Meatu and Shinyanga districts. That restricted range threatens the long-term survival of the species for three main reasons: (i) Live Bird trade – it is highly going out for livebird export. Efforts are in place to reduce hunting quota for this bird but an ideal situation would probably be to introduce export monitoring
(ii) Habitat destruction. The habitat of birds is progressively being destroyed mainly by clearing to open up farms and settlements; and (iii) Pest bird. The Fischers Love Bird is a notorius pest to farms. It feeds on millet, rice and maize seeds. Farmers clear the birds' habitat in a bid to control its destruction on their crops. They also destroy their nests just before hatching. Occasionally the birds suffer from chemical sprays when the same habitat is occupied by quelea quelea. The two threatened wetland bird species, the Welled Crane and Black-headed Apalis remain threatened. The Muyowosi-Malagarasi wetland, the habitat for the Wattled Crane has been declared as Ramsar Site that gives an improved status of the Crane. The Wembere flood Plains have not attained any significant conservation status, thus the Apalis remains seriously threatened.
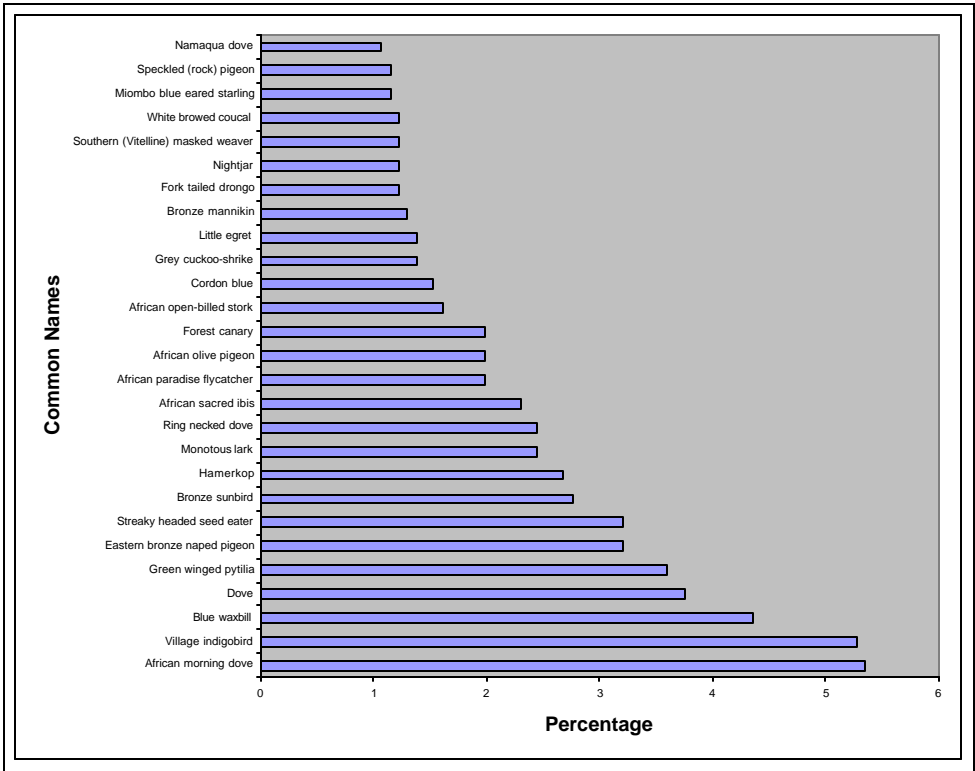
Figure 3.4: Birds of Shinyanga Region
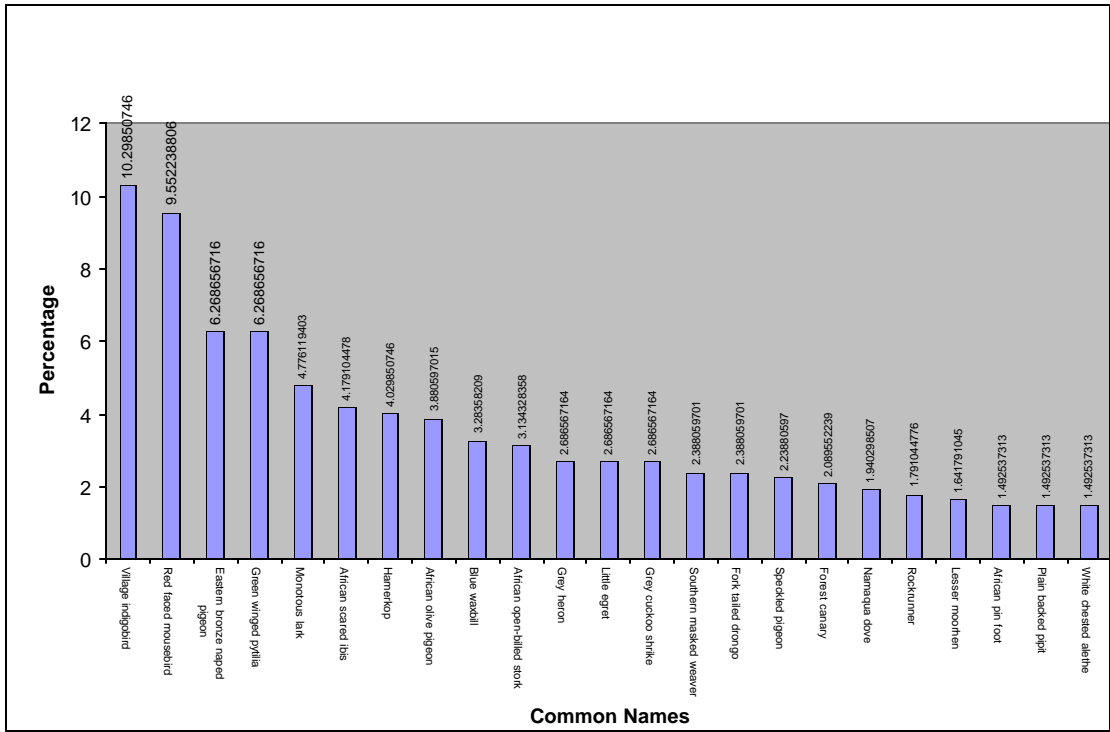
Fig
ure 3.5: Birds of Maswa District, Shinyanga region
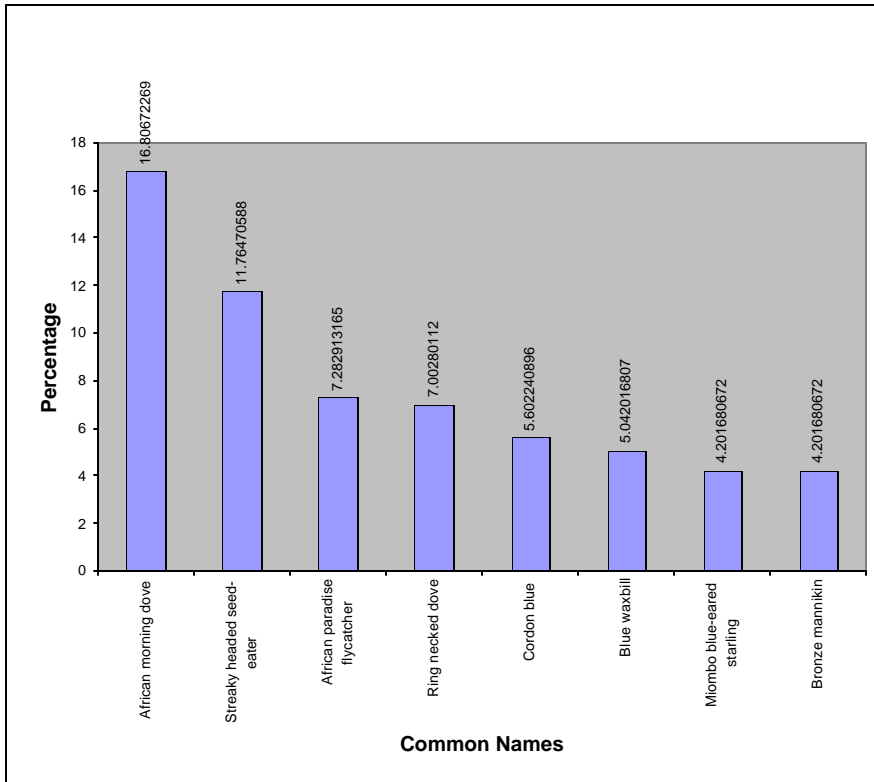
Figure 3.6: Birds of Kahama District, Shinyanga region.

3.1.2.1.3 Mammals

Shinyanga region has a fair representation of shrubland and woodland mammals which are mostly found in the protected areas. Figure 3.7 shows the most sighted mammals. Table 3.9 shows mammals that are considered to have disappeared and are not likely to emerge under current conditions. Annexes 13a – 13e show mammals that emerged after introduction of Ngitili in the districts of Meatu, Bariadi and Kahama. Where there are high human densities or massive habitat destruction it is the small- bodied mammals that disappear last and emerge soon after habitat recovery. The Ngitilis of Shinyanga mainly have small-bodied mammals or small to medium sized mammals. The presence and distribution of mammals is influenced by habitat and home range. Larger mammals like elephant, buffalo, zebra etc. require larger home ranges and that's why they have disappeared in all districts except in protected areas. Ngitilis are generally small in size. They will only accommodate small and medium sized mammals. They have limited potential both for hunting or game viewing tourism. Such an opportunity can only be created when several and ecologically conserved Ngitilis will be linked together to form a large ecological unit.

Table 3.9: Mammals that are considered to have disappeared in Shinyanga Region (except in National Parks and Game Reserves)

	Kiswahili	Common name	Species name	Family
1.	Nyati, mbogo	Buffalos	*Syncerus caffar*	*Bovidae*
2.	Tembo, Ndovu	Elephants	*Loxodonta africana*	*Elephantidae*
3.	Punda milia	Common zebras	*Equus quagga*	*Equidae*
4.	Simba	Lions	*Panthera leo*	*Felidae*
5.	Faru	Black rhino	*Diceros bicorn*	*Rhinocerotidae*
6.	Nyumbu	Wildebeest	*Connochaetes taurinu*	*Bovidae*
7.	Twiga	Masai giraffe	*Giraffa camelopardal*	*Giraffidae*
8.	Chui	Leopard	*Panthera pardus*	*Felidae*
9.	Bawala pongo	Bushbuck	*Tragelaphus scriptus*	*Bovidae*
10	*Korongo*	Roan antelope	*Hippotragus equines*	*Bovidae*
11	*Twiga njong*	Gerenuk	*Litocranius walleri*	*Bovidae*
12	Tandala	Greater kudu	*Tragelaphus strepsice*	*Bovidae*
13	Tandala ndogo	Lesser kudu	*Tragelaphus imberbis*	*Bovidae*

3.1.2.1.4 Wildlife benefits

There are direct and indirect wildlife values that are enjoyed by people in Shinyanga region. It is a policy decision by the Tanzania Wildlife Department that all the districts that share boundaries with wildlife protected areas enjoy economic benefits from tourism. Kahama, Bukombe, Meatu and Bariadi get proportions of 25% of revenue accrued from tourist hunting. This revenue actually gets to the rural people indirectly through their District Governments. Meatu and Bariadi further enjoy financial or material support from Ngorongoro Conservation Area Authority and Serengeti National Park for some development services such as construction of schools, health centres and roads. It is only Maswa, Shinyanga Rural and Shinyanga Urban districts that do not enjoy these wildlife benefits. They do, however, have limited benefits from resident hunting of small and medium sized mammals.

3.1.2.1.5 Widlife conservation issues

There are no elaborate strategies to conserve the wildlife that is emerging in the Ngitilis. Traditionally the people of Shinyanga region have an affinity for wildlife meat, so the emerging wildlife is frequently hunted. NAFRAC should develop the Ngitili Wildlife Conservation Strategy (NWCS) that will conduct consevartion awareness activities and encourage community and individual Ngitili owners to monitor wildlife status and reward communities that show verifiable improved wildlife conservation. Ngitili is a fairly sound conservation strategy but is focused on forests than wildlife. The proposed strategy could be focused on raising awareness to protect wildlife emerging in Ngitili.

3.1.2.1.6 Indicative parameters

Biodiversity parameters like indices, abundance, richness and similarity give a quick interpretation of ecological and variables that influence the status of the biodiversity. In the present study the Shannon Index was used to determine how diverse were the sample units (districts). Results showed that Maswa was more diverse than all districts in terms of bird species and Meatu had higher mammal diversity than the rest of the districts (Table 3.9). The same pattern obtains for Maswa in terms of species bird richness and Kahama leads for mammals' richness (Table 3.10). There are higher chances of encountering birds in Maswa and Kahama than in the rest of districts and Meatu offers higher chances encountering mammals in the rest of the districts in the region (Table 3.11). Maswa and Kahama are closely similar in terms of bird species and Meatu and Bukombe are least similar in terms of bird species and their associated habitats (Table 3.12)

Table 3.10: Indices of biodiversity by district in Shinyanga Region.

District	Shannon-bird	Simpson-bird	Shannon-mammals	Simpson-mammals
Maswa	3.44731	0.956	0.6365	0.444
Kahama	3.17238	0.935	1.16828	0.64
Bariadi	3.34338	0.955		
Meatu	2.61469	0.899	2.10695	0.86
Bukombe	2.14211	0.819		
Shinyanga region	4.284	0.978	2.606	0.9

When using Shannon: - The higher the indices the more diverse the area is (Maswa in terms of birds 3.44731 is more diverse than the rest of other areas, Bukombe is the least 2.14211. For Mammals Meatu is leading with 2.10695).

Table 3.11: Species richness by district in Shinyanga Region

District	Birds	Mammals	Reptiles
Maswa	10.6	0.4	
Kahama	9.8	0.8	0.02
Bariadi	8.2	0.02	
Meatu	4.2	2.2	0.02
Bukombe	3.4	0.02	

The higher the value the more rich the area is (Maswa in terms of Birds 10.6 is richer than the rest of other areas Bukombe is the least with 3.4. For Mammals Kahama is leading with 0.8. The higher the value the higher the chance to encounter the animals. The higher the similarity index the more similar the areas are. Thus Maswa and Kahama districts look more similar (0.196) and Meatu and Bukombe districts are the least similar in terms of bird species diversity (0.053).

Table 3.12: Relative fauna abundance by district in Shinyanga Region.

District	Birds	Mammals	Reptiles
Maswa	134	0.6	
Kahama	72.2	2	0.2
Bariadi	42	0.2	
Meatu	11	6	0.2
Bukombe	28.4	0.2	

Table 3.13: Similarity index by districts in Shinyanga Region.

District	Birds
Maswa-Kahama	0.196
Maswa-Bariadi	0.064
Maswa-Meatu	0.027
Maswa-Bukombe	0.114
Kahama-Bariadi	0.133
Kahama-Meatu	0.114
Kahama-Bukombe	0.091
Bariadi-Meatu	0.097
Bariadi-Bukombe	0.172
Meatu-Bukombe	0.053

3.2.Economics findings

3.2.1 Overall economic contribution of Ngitili to livelihoods

3.2.1.1 Values of forest goods and services from Ngitili

The current values (expressed as annual values of actual harvest) of economic contribution of goods and services from Ngitili to household economies in Shinyanga Region for both households in HASHI areas of concentration and households outside HASHI areas of concentration are presented in Table 3.14a and the present values of the same benefits are presented in Table 3.14b. The values of these economic benefits are higher for Kahama and Bukombe Districts relative to the other districts in Shinyanga Region. The cause of this is the stock of trees that is relatively higher in these districts due to better climate. The inventory results for the flora study confirm that these districts are better stocked with trees than other districts. The values for Bariadi district are also high due to the higher level of Ngitili awareness.

These values of benefits from Ngitili used to improve people's livelihoods have a multiplier effect generated through improvement of security for social services and improvement of sustainable land use management resulting from increased capacity of households to purchase farm inputs. In Tanzania, agriculture presently provides slightly over one half (51%) of total household income. Despite this apparent importance of agriculture especially in rural areas, some 40 percent of rural household income is derived from sources outside household's own farm production (Household Budget Survey, 2002).

The calculated values of benefits from Ngitili to household and village economies shows that Ngitili is potentially a significant income source to supplement income from agriculture to diversify people's livelihoods and strategies in Shinyanga region. The Household Budget Survey (2002) states that poverty is still a looming challenge especially in the rural areas of the country. The comparison of income poverty levels by region, identify Shinyanga region as one of the four regions in the country that are consistently identified as poorer than average. The other regions are Lindi, Mara, and Singida. From Table 3.14a, the total monthly value of benefits from Ngitili per person in Shinyanga Region is estimated at TSh. 14,046 (USD 14.0). This is higher than the national average consumption per person of Tsh. 8,500 (USD 8.5) per month in the rural areas of Tanzania (Household Budget Survey, 2002). Consumption here refers to overall consumption of the household taking into account crops, livestock, natural resources and business among others. Table 3.15 presents values of economic contribution of goods and services from Ngitili disaggregated between households in HASHI areas of concentration and households outside HASHI areas of concentration.

In five out of seven districts of Shinyanga region (71%), values were higher in the HASHI areas of concentration than in areas outside HASHI concentration except in Bariadi District and Shinyanga Rural districts. The high level of Ngitili awareness and the HASHI support have caused this situation. Therefore to a large extent the impact of the HASHI project in Shinyanga region has been positive. Interviews results in Bariadi District showed that high Ngitili awareness in that district was a consequence not only of HASHI, but also of deliberate and focussed political campaigns mounted during the late 1980s some years after HASHI had been launched in 1986. Table 3.16 presents the value of the economic contribution of goods and services from individual and communal Ngitili. Interview results showed that households have a higher propensity to consume goods and services from their own individual than communal Ngitili partly because individual Ngitili are subject to less regulation relative to communal ones.

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Furthermore, communal Ngitili are sometimes closed down in order to either enhance natural regeneration or as a way to defer benefits to meet future household or village contingencies. Total Ngitili coverage in Shinyanga region is 78,122 hectares of which 46,593 hectares are communal Ngitili and 34,206 hectares are individual Ngitili (Kaale, *et al.*, 2003). This Ngitili coverage was in only172 villages. The total Ngitili coverage in 833 villages of Shinyanga region is 377,756 hectares.   Despite the relatively larger area coverage by communal Ngitili, relatively higher values of benefits are accrued from individual than communal Ngitili.

Table 3.14a: Values of economic contribution of goods and services from Ngitili to household economies in Shinyanga Region. (Current value means annual value of actual harvest levels. When this is compounded or discounted at a discount rate it gives the present value).

District	Average annual household value from Ngitili				Total annual household value				Average monthly value person (from Ngitili)				Total monthly value per person			
	Current value		Present value		Current value		Present value		Current values		Present values		Current values		Present values	
	Tsh.	USD	Tsh.	USD	Tsh	USD	Tsh	USD	Tsh	USD	Tsh	USD	Tsh	USD	Tsh	USD
Shinyanga (U)	163,752	163.752	1637520	1637.52	727,424	727.424	7274240	7274.24	2,274.3	2.3	22743	22.743	10,103	10.10	101031	101.031
Shinyanga (R)	152,577	152.577	1525770	1525.77	399,665	399.665	3996650	3996.65	1,589.3	1.6	15893	15.893	4,163	4.16	41632	41.632
Meatu	493,191	493.191	4931910	4931.91	1,202,142	1202.142	12021420	12021.42	3,736.3	3.7	37363	37.363	9,107	9.11	91071	91.071
Bariadi	900,522	900.522	9005220	9005.22	4,768,204	4768.204	47682040	47682.04	7,504.4	7.5	75044	75.044	39,735	39.74	397350	397.35
Maswa	502,337	502.337	5023370	5023.37	965,818	965.818	9658180	9658.18	5,980.2	6.0	59802	59.802	11,497	11.50	114978	114.978
Kahama	719,956	719.956	7199560	7199.56	1,399,826	1399.826	13998260	13998.26	5,454.2	5.5	54542	54.542	10,604	10.60	106047	106.047
Bukombe	1,190,768	1190.768	11907680	11907.68	1,574,115	1574.115	15741150	15741.15	9,923.1	9.9	99231	99.231	13,117	13.12	131176	131.176

Table 3.14b: Present values (PV) of the economic contribution from Ngitili to household economies in Shinyanga Region

District	Current total average annual household value from Ngitili (household + communal)		Present value (= Current value/0. 1)	
	(Tsh)	*(USD)*	*Tsh*	*USD*
Shinyanga (U)	206,356	206.356	2,063,560	2,063.56
Shinyanga (R)	206,832	206.832	2,068,320	2,068.32
Meatu	493,761	493.761	4,937,610	4,937.61
Bariadi	900,600	900.6	9,006,000	9,006
Maswa	502,994	502.994	5,029,940	5,029.94
Kahama	719,956	719.956	7,199,560	7,199.56
Bukombe	1,190,768	1,190.768	11,907,680	11,907.68

Table3.15: Annual values of benefits from Ngitili per household disaggregated between households in HASHI concentration areas and households outside HASHI concentratio n areas.

District	HASHI concentration areas				Areas outside HASHI concentration areas			
	Current value		Present value		Current value		Present value	
	Tsh.	USD	Tsh.	USD	Tsh	USD	Tsh	USD
Shinyanga (U)	129625.1	129.6251	1296251	1296.251	40937.49	40.93749	409,375	409.3749
Shinyanga (R)	66154.62	66.15462	661546.2	661.5462	87184.62	87.18462	871,846	871.8462
Meatu	203206.6	203.2066	2032066	2032.066	165269	165.269	1,652,690	1652.69
Bariadi	375212.6	375.2126	3752126	3752.126	576455.4	576.4554	5,764,554	5764.554
Maswa	286524.8	286.5248	2865248	2865.248	223260.6	223.2606	2,232,606	2232.606
Kahama	310432	310.432	3104320	3104.32	276906.2	276.9062	2,769,062	2769.062
Bukombe	1058429	1058.429	10584290	10584.29	132303.6	132.3036	1,323,036	1323.036

Table 3.17 presents the value of the economic contribution to households of different products from Ngitili in Shinyanga Region. The Present Values of this economic contribution to households of different products from Ngitili at 10 percent discount rate is presented in Annexes 14a – 14g. There are many products obtained from Ngitili that include timber and non-timber products. Across Shinyanga region the values of benefits from Ngitili assessed for individual products vary across districts. Products used for construction of houses, charcoal and wild foods and have higher value relative to other products from Ngitili in Kahama and Bukombe districts due to abundance of wood relative to other districts. Similarly wood works have higher value in these districts than in others. The values of other products are influenced by factors of locality but they seem to be comparable across the region.

Table3.16: Comparison of values of benefits from Ngitili between individual and communal Ngitili in the sampled villages, Shinyanga Region.

District	Household value per Village				Communal value per Village				Household Ngitili values per district				Communal Ngitili values per district			
	Current value		Present value		Current value		Present value		Current values (000)		Present values (000)		Current values (000)		Present values (000)	
	Tsh.	USD	Tsh.	USD	Tsh	USD	Tsh	USD	Tsh	USD	Tsh	USD	Tsh	USD	Tsh	USD
Shinyanga (U)	140826720	140,827	1408267200	1,408,267.20	36,639,246	36639.246	366392460	366392.46	3098187.84	3098.18784	30981878.4	30981.8784	806063.412	806.063412	8060634.1	8060.634
Shinyanga (R)	58283650	58,284	582836500	582,836.50	20,726,364	20726.364	207263640	207263.64	12181282.85	12181.28285	121812828.5	121812.8285	4331810.076	4331.81008	43318101	43318.10
Meatu	197276400	197,276	1972764000	1,972,764.00	228,035	228.035	2280350	2280.35	14203900.8	14203.9008	142039008	142039.008	16418.52	16.41852	164185.2	164.1852
Bariadi	579936168	579,936	5799361680	5,799,361.68	50,397	50.397	503970	503.97	71912084.83	71912.08483	719120848.3	719120.8483	6249.228	6.249228	62492.28	62.49228
Maswa	245140456	245,140	2451404560	2,451,404.56	320,601	320.601	3206010	3206.01	18875815.11	18875.81511	188758151.1	188758.1511	24686.277	24.686277	246862.77	246.8627
Kahama	295181960	295,182	2951819600	2,951,819.60	0	0	0	0	63464121.4	63464.1214	634641214	634641.214	0	0	0	0
Bukombe	664448544	664,449	6644485440	6,644,485.44	0	0	0	0	85049413.63	85049.41363	850494136.3	850494.1363	0	0	0	0

* Number of households per district is drawn from National Population Census, (2002).

Table 3.17: Values by district, of the economic contribution to household economies of different products from Ngitili in Shinyanga Region. (The values in Tshs. can be derived using the following exchange rate: 1 USD = 1,000 Tshs).

Uses	District											
	Shinyanga (U)				Shinyanga (R)				Meatu			
	Percent of households involved in the sample village	Average annual household income (USD)	Average annual village income (USD)	Average annual district income (USD)	Percent of households involved in the sample villages	Average Annual household income (USD)	Average annual village income (USD)	Average annual district income (USD)	Percent of households involved in the sample villages	Average annual household income (USD)	Average annual village income (USD)	Average annual district income (USD)
Timber	05	2.04336	1757.2896	38660.3712	09	0.1020688	39.39856	8234.298371	06	21.20152	8480.608	610603.776
Fuelwood	74	7.846502	6747.99172	148455.8178	54	7.348954	2836.696	592869.515	73	83.80836	33523.344	2413680.768
Poles	26	2.077416	1786.57776	39304.71072	18	0.1531032	59.09784	12351.44756	22	12.62738	5050.952	363668.544
Withies	16	2.247696	1933.01856	42526.40832	18	1.224826	472.7828	98811.61272	38	1.870722	748.2888	53876.7936
Water	27	3.480523	2993.24978	65851.49516	10	6.124128	2363.913	494057.9023	11	1.365627	546.2508	39330.0576
Honey	10	3.269376	2811.66336	61856.59392	18	2.526203	975.1144	203798.9008	06	1.371863	548.7452	39509.6544
Wild animals	09	3.269376	2811.66336	61856.59392	27	1.633101	630.377	131748.7901	12	0.09353612	37.414448	2693.840256
Edible insects	13	0.34056	292.8816	6443.3952	17	0.6124128	236.3913	49405.79023	05	0.07482889	29.931556	2155.072032
Medicinal plants	12	1.089792	937.22112	20618.86464	36	1.946962	751.5273	157069.2124	17	112.2433	44897.320	3232607.040
Mushroom	17	6.21522	5345.0892	117591.9624	10	0.6124128	236.3913	49405.79023	06	0.1870722	74.82888	5387679.36
Thatching materia	65	3.06504	2635.9344	57990.5568	33	0.4593096	177.2935	37054.34267	27	1.558935	623.574	44897.328
Fodder	22	6.13008	5271.8688	115981.1136	10	6.966196	2688.952	561990.8961	11	26.19011	10476.044	754275.168
Wild vegetables	43	3.269376	2811.66336	61856.59392	09	0.0765516	29.54892	6175.723778	39	4.489734	1795.8936	129304.3392
Charcoal	13	98.08128	84349.9008	1855697.818		0	0	0	17	4.489734	1795.8936	129304.3392
Pottery	05	19.85465	17074.999	375649.978		0	0	0	06	13.4692	5387.680	387912.960
Carvings	04	1.471219	1265.24834	27835.46348		0	0	0		0	0	0
Carpentry					08	122.7888	47396.477	9905863.651	06	200.5414	80216.560	5775592.320
Materials for mats									10	3.117871	1247.1484	89794.6848
Fruits									06	4.489734	1795.8936	129304.3392
TOTAL		163.7515	140826.2608	3098177.737		152.575	58893.961	12308837.873		493.191	197276.371	14203898.704

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Table 3.17 (Continued): Values by district, of the contribution to household economies of different products from Ngitili in Shinyanga Region. (The values in Tshs. can be derived using the following exchange rate: 1 USD = 1,000 Tshs).

Uses	District											
	Bariadi				Maswa				Kahama			
	Percent of households involved in the sample villages	Average annual household value (USD)	Average annual village income (USD)	Average annual district value (USD)	Percent of households involved in the sample villages	Average annual household value (USD)	Average annual village value (USD)	Average annual district value (USD)	Percent of households involved in the sample village	Average annual household value (USD)	Average annual village value (USD)	Average annual district value (USD)
Timber	19	481.5938	31014.64072	3845815.449	13	1.788684	872.877792	67211.58998	10	31.82829	13049.5989	2805663.764
Fuelwood	75	114.2691	73589.3004	9125073.250	67	105.8305	51645.284	3976686.868	57	10.18505	4175.8705	897812.1575
Poles	44	4.378126	2819.513144	349619.6299	37	1.49057	727.39816	56009.65832	62	3.315447	1359.33327	292256.6531
Withies	12	364.8.438	234.9594072	29134.96649	25	1.341513	654.658344	50408.69249	43	0.5967805	244.680005	52606.20108
Water	18	26.26875	16917.075	2097717.300	12	13.60145	6637.5076	511088.0852	29	48.40553	19846.2673	4266947.470
Honey	06	729.6876	469.9188144	58269.93299	06	0.3726425	181.84954	14002.41458	24	102.1158	41867.478	9001507.770
Wild animals	07	72.96876	46.99188144	5826.993299	13	7.154736	3491.511168	268846.3599		0	0	0
Edible insects		0	0	0	12	0.8347192	407.3429696	31365.40866	24	1.591415	652.48015	140283.2323
Medicinal plants	06	204.3125	131577.250	16315579.000	12	111.7928	54554.8864	4200726.253	14	63.65659	26099.2019	5611328.409
Mushroom		0	0	0		0	0	0	38	1.989268	815.59988	175353.9742
Thatching material	25	3.648438	2349.594072	291349.6649	37	1.49057	727.39816	56009.65832	52	5.304716	2174.93356	467610.7154
Fodder	06	0.4378126	281.9513144	34961.96299	19	10.06135	4909.9388	378065.2876	05	84.87545	34798.9345	7481770.918
Wild vegetables	13	3.064688	1973.659072	244733.7249	25	1.49057	727.39816	56009.65832	30	4.177464	1712.76024	368243.4516
Charcoal	07	236.4188	152253.7072	18879459.693	19	23.25289	11347.41032	873750.5946	10	254.6263	104396.783	22445308.345
Pottery	07	18.16922	11700.97768	1450921.232	06	2.794819	1363.871672	105018.1187		0	0	0
Carvings	06	230.4937	148437.9428	18406304.907		0	0	0		0	0	0
Carpentry		0	0	0	13	219.0393	106891.1784	8230620.737	09	107.0226	43879.266	9434042.190
Materials for m		0	0	0			0	0		0	0	0
Fruits	06	9.734033	6268.717252	777320.9392			245140.456	18875815.112	05	0.2652358	108.746678	23380.53577
TOTAL		900.5221	579936.1988	71912088.646		502.337	490280.9675	37751634.496		719.956	295181.933	63464115.785

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Table 3.17 (Continued): Values by district, of the contribution to household economies of different products from Ngitili in Shinyanga Region. (The values in Tshs. can be derived using the following exchange rate: 1 USD = 1,000 Tshs).

Uses	Bukombe District			
	Percent of household involved in the sample villages	Average annual household value (USD)	Average annual village Value (USD)	Average annual district value (USD)
Timber	59	71.74166	42184.09608	5399564.298
Fuel wood	64	13.09285	7698.5958	985420.2624
Poles	29	2.869666	1687.363608	215982.5418
Withies	36	8.967707	5273.011716	674945.4996
Water	21	34.041.42	20016.35496	2562093.435
Honey	14	2.391389	1406.136732	179985.5017
Wild animals	07	0.7174166	421.8409608	53995.64298
Edible insects	36	0.4782777	281.2272876	35997.09281
Mushroom	36	2.869666	1687363.608	215982.5418
Medicinal plants	07	10.76125	6327.615	809934.720
Thatching materials	36	2.15225	1265.523	161986.944
Fodder	07	1.147867	674.945796	86393.06189
Vegetable	29	2.15225	1265.523	161986.944
Fruits	43	2.869666	1687.363608	215982.5418
Carpentry	14	1021.601	600701.388	76889777.664
Pottery	07	12.9135	7593.138	971921.664
TOTAL		1190.768	700171.4872	89621950.356

The values of benefits from Ngitili are to a large extent influenced by size and age of Ngitili. The average household Ngitili sizes and ages by district are shown in Table 3.18. These results show that the relative sizes of individual Ngitili vary from small to large. In Shinyanga (Urban) and Shinyanga (Rural), population pressure has limited size of Ngitili due to land scarcity. In Bukombe and Kahama districts, size of Ngitili is limited by presence of accessible natural forests that are used to meet the household demand for forest products. In Meatu, Maswa and Bariadi districts the size of Ngitili is fairly large because the huge livestock population in these districts have raised awareness for conservation in order to meet grazing needs through Ngitili. Results also show that most Ngitili were established after HASHI has been launched in 1986.

Table 3.19 sumarises factors influencing values of goods and services from Ngitili. Study results show that besides age and size of the Ngitili, the benefits accruing from Ngitili to a large extent are influenced by other factors such as, education of Ngitili owner, household size of the Ngitili owner and gender of the owner. When these factors were individually statistically tested through simple linear regression analysis, they were each found to significantly influence the value of benefits from Ngitili. However, a relatively high degree of multicollinearity was found among these factors because of the high correlation that exist between them. This necessitated a multiple linear regression analysis of these factors against the values that accrued from Ngitili in each district. The results are as summarized in Table 3.19. These results show that the most significant factors affecting the value of benefits from Ngitili in the study area assuming comparable stocks levels are: the age of the Ngitili and size of the Ngitili.

More benefits are realized from large size Ngitili than from small ones if they are of similar age and stocks. In addition, relatively old Ngitili if properly maintained, contain big dimension trees that yield more products and hence more benefits. Data actually demonstrate this in Bukombe and Kahama districts where Ngitili are relatively old. In addition, relatively old Ngitili have more animals provided they are properly managed. Flora and Fauna inventory data carried out in the present study confirms this argument.

Table 3.18: Average size and age for household Ngitili in Shinyanga Region.

Aspect	DISTRICT						
	Shinyanga(U)	Shinyanga(R)	Meatu	Maswa	Bariadi	Kahama	Bukombe
Range of sizes (ha)	0.1-0.6	0.4 -4	0.8-800	2.4 -110	0.4 -480	0.4 -40	0.4 – 9.6
Average size (ha)	0.08	1.2	84	23.6	41.2	11.6	3.2
Range of ages (years)	2-18	2-30	1-28	3-43	3-40	3-51	3-18
Average age (years)	2.0	12	13	12	12	13	7

Table 3.19: Factors influencing values accrued from Ngitili in Shinyanga Region

District	Factors affecting values Ngitili	Statistically significant factors	Level of significance
Maswa	Age of Ngitili, Gender, Household size	Age of Ngitili	5%
Meatu	Ngitili size, Age of Ngitili, Household size, Education	None	-
Bukombe	Ngitili size, Household size	None	-
Bariadi	Ngitili size, Education	Ngitili size	5%
Shinyanga (R)	Ngitili size, Education, Household size	None	-
Shinyanga (U)	Ngitili size, Education level	None	-
Kahama	Ngitili size, Age of Ngitili	Ngitili size	5%

3.2.2 Assessment by broad groups of species of the direct values to the household and village economies

Table 3.20 shows by district, the most important products from Ngitili used by households to improve their livelihoods. The list covers products that generate significant direct values to households and village economies. The number of products obtained from different species could not be assessed. Table 3.21 shows these direct values by broad groups of species from Ngitili to the household and village economies in Shinyanga Region. The Present Values of these direct values by groups of species from Ngitili at 10 percent discount rate are presented in Annex 15. Results show that the high direct values to the household and village economies from Ngitili expressed by groups of species, come from fuel wood, fodder, timber and woodcraft and medicinal use. The low direct values to the household and village economies from Ngitili expressed by groups of species, come from wild foodstuffs (e.g. bush meat, fruit, vegetable), thatch-grass, fencing material, shade and shelter. Households could benefit more by concentrating production of goods and services from Ngitili that yield high direct values to household and village economies in order to maximize benefits and values.

Based on the study results the values of benefits from animal species found in Ngitili by broad groups of animal species are presented in Table 3.22. The list of the most destructive wild animals and estimated costs they annually cause to crops/livestock in Shinyanga Region is presented in Table 3.22.

Table 3.20: Most important products from Ngitili by districts in Shinyanga Region.

District	Ngitili Product (s)
Shinyanga (U)	Fuelwood, thatching materials, vegetables, water, fodder, poles, mushroom, charcoal
Shinyanga (R)	Fuel wood, thatching materials, vegetables, water, fodder, poles, mushroom, charcoal
Meatu	Fuel wood, vegetable, withies, poles, wild animals, medicinal plants, fodder, materials for mats
Maswa	Fuel wood, poles, thatching grass, fodder, vegetables, charcoal
Bariadi	Fuelwood, poles, thatching material, timber, water, withies, charcoal, carvings
Kahama	Poles, fuelwood, thatching materials, vegetables, timber, withies, water, honey, mushroom, charcoal
Bukombe	Timber, fuel wood, poles, withies, fruits, mushroom, vegetables

Table 3.21:Direct values by broad groups of species from Ngitili to the household and village economies in Shinyanga Region

Economic use	District								
	Shinyanga Urban			Shinyanga Rural			Meatu		
	No. of spec	Quantity annually consumed	Average household ann value (Tsh)	No. Species	Quantity annually consumed	Average household annual value (Tsh)	No. Species	Quantity annually consumed	Average household annual value (Tsh)
Medicinal	6	80 kg	1,089	41	75 kg	1,946	10	20 kg	112,243
Nutritional (fru vegetable)	7	95 kg	3,269	3	310 kg	76	19	92 kg	8,978
Fuel wood	13	576 headloads	7,846	11	1440 headloads	7,348	20	6720	83,808
Timber & wood	7	Various	6,367	11	Various	1,479	10	various	
Fodder	3	360 bundles	6,130	4	1092 bundles	6,966	4	1,680 bundle	26,190
Fencing	1		-	3	-		10	-	-
Bush meat	11	30 kg	3,269	17	42 kg	1,633	18	15 kg	93
Thatch grass	2	98 bundles	3,065	2	120 bundle	469	2	75 bundles	1,558
Shade, shelter	2	-	-	6	-	-	7	-	-

Table 3.21(continued): Direct values by broad groups of species from Ngitili to the household and village economies in Shinyanga Region.

Economic use	District								
	Maswa			Bariadi			Kahama		
	No. Species	Quantity annually consumed	Average household annual value (Tsh)	No. Species	Quantity annually consumed	Average household annual value (Tsh)	No. Species	Quantity annually consumed	Average household annual value (Tsh)
Medicinal	49	45 kg	111,792	35	24 kg	204,312	40	35 kg	63,656
Nutritional (fruits& vegetable)	5	56 kg	1,490	8	57 kg	12798	4	70 kg	4,442
Fuel wood	21	230 ox-carts	105,830	20	223 ox-carts	114,269	17	384 ox-carts	10,185
Timber & woodcraft	9	Various	4,619	13	various	52,901	15	various	35,739
Fodder	5	540 bundles	10,061	2	24 bundles	437	3	1600 bundles	84,875
Fencing	4	-	-	5	-	-	2	-	-
Bush meat	17	100 kg	7,154	14	9 kg	73	11		
Thatch grass	2	85 bundles	1,490	2	125 bundles	3,648	2	130 bundles	5,304
Shade, shelter	11	-	-	2	-	-	7	-	-

Table 3.21(Continued): Direct values by broad groups of species from Ngitili to the household and village economies in Shinyanga Region.

Economic Use	Bukombe		
	Number of species	Quantity annually consumed	Average household annual value (Tsh)
Medicinal	15	15 kg	10,761
Nutritional (fruits& vegetable	11	60 kg	5,021
Fuel wood	7	547 headloads	13,092
Timber & woodcraft	20	Various	83,577
Fodder	1	48 bundles	1,147
Fencing	-	-	-
Bush meat	7	16 kg	717
Thatch grass	2	95 bundles	2,152
Shade, shelter	-	-	-

Table: 3.22 List of the most destructive wild animals and estimated costs they annually cause to crops/livestock in Shinyanga Region.

District	Animal Name		Average annual cost household		Total cost of damage household (Current value)		Present value	
	Local name/crop destroyed	English name	Tsh	USD	Tsh	USD	Tsh	USD
Shinyanga (U)	Msongwe (bird)-destroy rice	Bird	22,000	22	32,500	32.5	325000	325
	Nhulu (bird) – destroy millet	Bird	10,500	10.5				
Shinyanga (R)	Nungu nungu – destroy maize	Porcupine	12,000	12	50,000	50	500000	500
	Panya– destroy maize	Rat	5,000	5				
	Kwale- destroy rice	Bird	18,000	18				
	Swaloy cassava	Antelope	15,000	15				
Meatu	Nungu nungu – destroy maize, potatoes	Porcupine	17,500	17.5	107,500	107.5	1075000	1,075
	Ngili- destroy maize, potatoes,millet	Warthog	10,000	10				
	Monkeys - destroy cotton, maize, millet, potatoes	Monkey	35,000	35				
	Hyena- cattle, goats	Hyena	24,000	24				
	Pigs- destroy maize, potatoes, millet	Bush pig	21,000	21				
Maswa	Nungu nungu – destroy maize, potatoes	Porcupine	4,000	4	89,500	89.5	895000	895
	Monkeys- destroy maize	Monkey	8,500	8.5				
	Fungo- destroy maize, cotton	Jackal	32,000	32				
	Hyena - destroy cattle, goats	Hyena	45,000	45				
Bariadi	Nungu nungu- destroy maize, potatoes	Porcupine	11,900	11.9	67,900	67.9	679000	679
	Monkey - destroy maize, cotton	Monkey	19,000	19				
	Funa - destroy groundnuts	Moul	12,000	12				
	Hyena - cattle, goats	Hyena	25,000	25				
Kahama	Monkey - destroy maize, cotton	Monkey	13,500	13.5	35,500	35.5	355000	355
	Nungu nungu – destroy maize, potatoes	Porcupine	7,000	7				
	(Hyena - destroy cattle, goats	Hyena	15,000	15				
Bukombe	Hyena - destroy cassava	Hyena	5,000	5	60,000	60	600000	600
	Kwelea kwelea – destroy rice	Queleaquelea bird	24,000	24				
	Monkeys - destroy cassava, maize	Monkey	16,000	16				
	Kwale - destroy maize	Guinea fowl	8,500	8.5				
	Kanga - destroy maize	Guinea fowl	6,500	6.5				
Average Annual cost per household in the Region					**63,270**	**63.27**	**632700**	**633**

3.2.3 Assessme nt of the contribution of Ngitili to a reduced effort to collect certain forest products

Time spent in collecting and harvesting different products from Ngitili is basic in calculating extraction costs since it is the main cost involved at household level. Table 3.23a shows that Ngitili restoration has considerably reduced effort for collecting various forest products in all districts of Shinyanga Region. Significant gains in reduced effort to collect various products have been made in the collection of fuel wood, thatch grass, poles, fodder and water. Collection of fuel wood, water and fodder are often chores for females hence reduced time and workload is a great relief for women. Monetary value of the Reduced effort in collecting various forest products from Ngitili in Shinyanga Region is shown in Table 3.23b. A survey by IUNC (2000) showed that labour cost per day used for harvesting and transporting fuelwood by women harvesting it free from natural forests and selling it on retail price was estmated at Tsh. 1000 per day relative to earnings of Tsh 18,000 per month. This clearly shows the labour cost is fairly significant.

Table 3.23a: Reduced effort in hours per day for collecting various forest products from Ngitili in Shinyanga Region

ASPECT	SHY (U)	SHY (R)	MEATU	BARIADI	MASWA	KAHAMA	BUKOMBE
Firewood collection	3	5	6	2	5	2	2
Poles collection	1	0	5	2	5	3	1
Collection of withies	0	0	4	1	5	2	1
Thatching materials	2	1	1	4	6	3	2
Domestic water	1	0	2	2	1	1	2
Fodder	2	4	6	3	5	4	4
Water for livestock use	0	0	2	4	1	2	3

Table 3.23b: Monetary value of the Reduced effort in collecting various forest products from Ngitili in Shinyanga Region (The values in Tshs. can be derived using the following exchange rate: 1 USD = 1,000 Tshs).

ASPECT	Value in USD						
	SHY (U)	SHY (R)	MEATU	BARIADI	MASWA	KAHAMA	BUKOMBE
Firewood collection	0.60	1.00	1.20	0.40	1.00	0.40	0.40
Poles collection	0.20	0.00	1.00	0.40	1.00	0.60	0.20
Collection of withies	0.00	0.00	0.80	0.20	1.00	0.40	0.20
Thatching materials	0.40	0.20	0.20	0.80	1.20	0.60	0.40
Domestic water	0.20	0.00	0.40	0.40	0.20	0.20	0.40
Fodder	0.40	0.80	1.20	0.60	1.00	0.80	0.80
Water for livestock use	0.00	0.00	0.40	0.80	0.20	0.40	0.60

The reduced effort for collecting various products has released labour as an asset that households have conveniently utilized for performance of other economic activities to improve their livelihoods. Interview results showed the following benefits and strategies as a consequence of reduced effort for collection of forest products from Ngitili: (i) Women workload for domestic chores especially collecting forest products for household use has been significantly reduced, (ii) Reduced time for collecting forest products has socially reduced, the time women stay outside their homes consequently have reduced household conflicts between husband and wife emanating from jealousy, and (iii) Time for both men and women to look after their children and attend to other social and economic obligations for development has increased.

3.2.4 Assessment of the increased and improved economic well being at the household level in terms of nutrition, health, housing and seasonal use of Ngitili

Study results show that, values of benefits from Ngitili are widely used in support of school fees and other school contributions, diversification of nutrition options (e.g. fruits, vegetables, mushroom, edible insects, wild meat etc.); provision of forage for livestock and as a source of herbal medicine and fuel wood. Table 3.24 shows the percentages of households whose economic well being at the family level has increased and improved as a consequence of values of benefits from Ngitili.

The products from Ngitili mostly accessed and used by households to diversify and improve their livelihoods are fuel wood, fodder, medicine and wild food. The annual contribution of Ngitili to the household educational and health services amount to USD 22.90 and USD 8.90 respectively. The size, age and proliferation of Ngitili in the districts are among the determining factors on the level of the value of benefits that can be reaped from Ngitili.

Table3.24: Percentage contribution of the values of benefits from Ngitili in supporting various services in a household in Shinyanga Region.

Aspect	District						
	SHY (U)	SHY (R)	Meatu	Bariadi	Maswa	Kahama	Bukombe
1. Percentage of households which use Ngitili in supporting school fees and other school contributions	10	28	61	33	38	38	44
2. Percentage of households, which use Ngitili to diversify nutrition options (e.g. fruits, vegetables, mushroom, edible insects, wild meat etc.)	16	14	8	7	25	30	55
3. Percentage of households that use Ngitili as a source of forage for livestock.	37	14	11	10	18	23	33
4. Percentage of households which use Ngitili as a source of medicinals	5	36	16	8	13	14	6
5. Percentage of households which use Ngitili as source of fuelwood*	63	54	72	57	62	57	64

*Due to the quest for financial income, some household sell all the fuel wood and use other energy sources to meet household needs.

3.2.4.1 Nutrition improvement

Study results show that, quality of diet and nutrition have improved through increased variety of food stuffs collected from Ngitili and also through increased production and access of wild foodstuffs from Ngitili. Ngitili-related foodstuffs whose production have been boosted by Ngitili are: wild fruits, wild vegetables, honey, milk, bush meat, mushroom and edible insects. Supply of milk is strongly influenced by Ngitili because livestock forage and fodder are obtained from Ngitili especially during the critical dry season or during drought. Table 3.24 shows the percentage of households that use Ngitili to diversify nutrition options. Apparently, districts in the western side of Shinyanga region, which have more forest cover and hence richer Ngitili in terms of vegetation, have more households that use Ngitili to diversify nutrition. Table 3.25 presents consumption levels for various foodstuffs collected from Ngitili by district. Values for these foodstuffs are presented in Tables 3.17 and 3.21. Respondents informed that before Ngitili, most of these foodstuffs were not present or were inaccessible.

Table 3.25: Household annual consumption of Ngitili-related food stuffs by districts, in Shinyanga region.

Foodstuff item	DISTRICTS						
	Shinyanga (U	Shinyanga (R	Meatu	Maswa	Bariadi	Kahama	Bukombe
Vegetables	75 kg	300 kg	52 kg	48 kg	12 kg	40 kg	25 kg
Edible insects	2 kg	45 kg	6 kg	8 kg	3 kg	5 kg	7 kg
Milk	1460 litres	96 litres	720 litres	360 litres	720 litres	200 litres	180 litres
Bush meat	30 kg	12 kg	15 kg	10 kg	9 kg	6 kg	16 kg
Mushroom	104kg	36 kg	30 kg	6 kg	-	2 kg	4 kg
Honey	2 litres	130 litres	22 litres	20 litres	20 litres	15 litres	25 litres
Fruits	20 kg	35 kg	40 kg	8 kg	45 kg	30 kg	35 kg

3.2.4.2 Health improvement

Respondents in the study area indicated health improvement as one important impact of Ngitili to households and villages in the study area. Tangible improvements in health are mainly due to improved access to herbal medicine as well as increase in quantities consumed. Table 3.24 shows the percentages of households that use Ngitili as a source of herbal medicines. The apparent variation among districts could be influenced by a number of factors including number of traditional healers in the district, availability of alternative places to get treatment and education level among the people. Based on information collected from local herbalists in the sample villages for all districts, the type of plant species used, type of parts used, and type of diseases cured are presented in Table 3.26. Household respondents in villages as well as traditional healers indicated that the use of herbal medicine has increased in the villages partly due to improved availability of herbs but also due to the high cost of modern treatment. Another reason is that some health problems are locally believed to be treatable only by traditional healers such as impotence, fiancée attraction (love enhancing medicine), treatment of evil spirit and scrotal elephantiasis. In this respect, improved access of local medicine due to Ngitili is a significant contribution to people's livelihoods in the study area. Regarding the health of children, respondents indicated that through Ngitili contribution, health of children in the study area has

improved through better nutrition, improved childcare by parents whose presence at home has increased and improved access and availability of local medicine.

Table 3.26: Broad group of species with direct values for medicinal use to the household and village economies in Shinyanga Region.

Kahama District

Species Name		Parts used	Life for	Disease cured
Kiswahili/Local name	Scientific Name			
Mwembepori	*Ozoroa sp*	Roots	T	Menstruation problems, female fertility
Msana	*Combretum zeyheri*	Roots	T	Menstruation problems
Mnazi pori	*Parinari curatellifolia*	Roots	T	Menstruation problems
Mtundwa	*Ximenia caffra*	Roots	T	Menstruation problems
Mzimya	*Terminalia sericea*	Roots	T	Stomach problems (gas),
Mkonze	*Manilkara mochisia*	Roots	T	Stomach problems (gas),
Mkomamamga	*Pudica granutum*	Roots	S/T	Coughing,
Msalasi	*Friesodielsia oborata*	Roots	T	Female infertility
Nungubashie	*Vepris glomerata*	Roots	T	Female infertility
Ngengwambula	*Entada abyssinica*	Roots		Body swelling
Nghangachalo	*Mystroxylon aethiopicus*	Roots		Attraction/Good luck
Nengonengo	*Securidaca longipedunculta*	Roots		Mental, migraine
Lonzwe	*Euphorbia sp.*	Roots		Mental, cough, Mens' vigour
Kalilila	*Cadaba adenotricha*	Roots		Mental, Love attraction
Mdaga	*Albizia anthelmintica*	Roots		Migraine
Lusunga,	-	Roots		Cough
Gobeko	*Combretum longispicatum*			
Mwachongoko	*Catunaregum spinosa*	Roots		Mens' vigour
Mpala	*Hymenocardia acida*	Roots		Infertility in women
Mlembu	*Ximenia americana*	Roots		Infertility in women
Itula	*Solanum sp.*	Fruits		Boils
Gulumati		roots		Prevent vomiting
Msingisa	*Maerma sp.*	Roots		Acidity
Mtundulu	*Dichrostchys cinerea*	Roots		Acidity
Motomoto		Leaves		Acidity
Nyahinga		Roots		Attraction/good luck
Ndagozabasha		Tuber		Convulsion
Mkalya	*Zanha africana*	Roots		Asthma
Tangamwaka	*Cissus cornifolia*	roots		*Mchango wa kike*

Shinyanga (R) District

Mikubang'hobi,		Roots		Abdominal problems
Mihale	*Acacia nilotica ssp ludica*	Roots	T	Legs pain
Masagala	*Anisotes dumosus*	Roots	S/T	Measles
Msubata	*Diospyros fischeri*	roots	T	Stomach ache
Sang'wasang'wa	*Thylachium africunum*	roots	S/T	Infertility in women
Nkalya	*Zanha africana*	roots	T	Hernia
Mpumbula	*Calotropis procera*	Roots	T	Convulsion
Nengonengo	*Securidaca longepedunculata*	Roots	T	Abdominal problems, Migraine
Bukwelae		Roots		Abdominal problems, infertility in women
Bulatula		Roots		Abdominal problems
Mtundulu	*Dichrostchys cinerea*	Roots	S/T	Rescue from evil spirits
Mtinje	*Lannea humilis*	Roots	T	Bilharzia
Maditula		Roots		Infertility in women
Shepashepa	*Opilia amantacea*	Roots	S	Horoscope and Luck
Kalilila	*Cadaba adenotricha*	Roots	S	Love

Msana	*Combretum zeyheri*	bark	T	Stomach ache, anaemia
Mlundlunda	*Cassia abreviata*	roots	T	*Tambazi*
Msasi	*Friesodielsia obovata*	roots		Infertility in women, hiccups
Nkwidazagamba	*Albizia versicolor*	roots	T	Mens' vigour
Mgili	*Terminalia stuhlumanii*	roots	T	Yellow fever, mtoto aliyebemendwa
Msomnanjala	*Harrisonia abyssinica*	bark	S	Gas (stomach)
Ndagolabashi		Bark, roots		*Mchango kwa watoto*
Nungushikiti	*Vepris glomerata*		T	Stomach ache
Nungu	*Zanthoxylum chaylybeum*		T	Ulcers
Mwarubaini, Mtundulu	*Azadirachta indica,* *Dichrostachys cinerea*	Roots & leaves	T T	Cough
Likale, Ndulele, Ng'onge, Mwarobaini,	*Solanum sp.* *Azadirachta indica,*	Leaves, roots	S T	Polio, Convulsion, ey es problems
Cristmass tree, Eucalyptus, Pendeza, Nyanya, Somanjala, Mizandemi, Ntendegwa,	*Delonix regia* *Eucalyptus sp.* - *Perscum esculenta* *Harrisonia abyssinica* *Phyllanthus reticulatus* -	Flower, bark, seeds	T T H S S	Infertility in women, stomach ache, labour

Maswa District

Mkwemambula, Jitashengwa	*Entada abyssinica* -	roots	T	*Miguu kupasua*, heartburn headache, convulsion,
Nalinwa		roots		Heartburn, headache
Lipumbula, Ng'ombeyahasi	*Calotropis pricera* -	Roots, leaves	T	Vigour in man, TB, rectal prolapse
Nengonengo, Mwatia, Lidosheng'wa	*Securidaca longepedunculata,* *Zanha africana* -	Roots	T T	Mental disturbance
Sasaboya, Mgumo,	- *Ficus stuhlmanii*	Roots bark	T	*Tambazi*
Jolwambogo, Pilipili, Lidasheng'wa	- - -	roots		Stomach ache
Kulungu, Ngalilije, Twegombeshi, So	*Pterocarpus tinctorius* - - -		T	Charm for luck
Lipumbula	*Calotropis procera*	roots	S/T	Typhoid
Tindila, Nungu	_ *Ipomoea kituiensis ssp. Massaiensis*	roots	S	Tonsillitis
Kandaga		roots		Human & cow medicine
Tulatula	*Solanum sp.*	roots	S	Back pain, wounds
Chemu, Tundu, Gakama Lonzwe, gata, subata, sayu	- *Acacia nigrecens* *Elacodendron schechterianum* *Euphorbia sp.* - *Diospyros fischeri* *Lannea schweinfrthii*	roots Roots, leaves	T T S S/T T	Infertility in women Fever, anaemia, acidity, Heartburn
Mchongoma, Lujamizi	*Senna siamea* *Combretum adenogonium*	Leaves, roots	T T	Body swellings
Mlinga, Lusunga, Jiduha	*Lannea humilis* - -	roots	T	Bilharzia
Mngilii,	*Terminalia stuhlumanii*	Leaves	T	Head ache

Gobeko Gugunu, Bapa, Igaka,	*Combretum longispicatum* *Ziziphus mucronata* *Markhamia obtusifolia* *Aloe sp.*	Roots	S/Br T T H/S	Mental
Nama, Ilobashi, Kondoamali	- *Combretum obovatum* -	Leaves	T	Paralysis
Gumo, Gunga, Mpande	*Ficus stuhlmanii* *Acacia tortilis* *Strychnos potatorium*	Leaves	T T T	Charm
Tunduru, Lubiso, Gunga, Ilula	*Dichrostachys cinerea* - *Acacia tortilis* *Acacia drepanolobium*	Roots	T/S T T	Potency enhancement

Bariadi District

Ijunjuda, Mpande, Ngada, Kalalanghuba	- *Strychnos potatorium* *Albizia anthelmintica* *Erythrina abyssinica*	Roots, leaves	T T	Infertility in women
Mponda, Ningiwe, Kaguha	*Commiphora africana* *Turraea fischeri* *Teclea simplicifolia*	Roots	T T S/T	Tambazi
Mchongoma, Mmale,	*Senna siamea* *Lonchocarpus capassa*	Leaves	T T	Gonorrhoea
Ningiwe, Sasi, Kumbambizo	*Turraea fischeri* *Friesodielsia obovata* *Crossopteryx febrifuga*		T T T	Cough
Lubisulugosha		Roots		Dizzy
Nama, Ilulambuli, Gwata, Gunga	- *Ormocarpum trichocarpum* *Acacia senegal* *Acacia tortilis*	Bark	S/T T T	TB
Mponda, Mtunduru, Sulula	*Commiphora africana* *Dichrostchys cinerea* -	Bark	S S/T	Bed wetting
Gakama	*Elaeodendron schlechterianum*	Roots	T	Body swelling
Muotabalashi, Lonzwe, Pilipili Ng'watia, Nengonengo,	- *Euphorbia sp.* - *Zanha africana* *Securidaca longipedunculata*	Bark, branches Roots	S/T T T	Heartburn, mental, *Mchango* Hernia, head ache
Nkulungu		Roots		Horoscope and Luck
Ndagwasa, Melemecha		Roots		Infertility in women
Nkolobiche		Roots		Potency enhancement
Ngwihunge, Nanga, Mgili, Mnungu	*Terminalia stuhlmannii* *Zanthoxylum chalybeum*	Roots, bark	T T	Convulsion
Salasala		Roots		Spleen

Bukombe District

Mgemwambula,	*Entada abyssinica*	Roots	T	Swelling of legs
Msana	*Combretum zeyheri*	Fruits	T	Infertility in women
Mlbanga	*Aformosia angolensis*	Roots	T	Paralyse, Stomach pain
Mnengonengo	*Securidaca longipedunculata*	Roots	T	Head ache
Nyanya, Nago, Ndago	*Berchemia discolor*	Roots, bark		Pneumonia, prevent vomiting

		Roots	T	Abdominal problems,
Mbaba, Bapa, Kaguha,	*Markharmia obtusifolia*	Roots	T	Abdominal problems, Infertility in women
Mngochangoko, MasangugabadeniPi wandeme	*Catunarega spinosa*	Roots	T	Charm
			T	
Subata	*Diospyros fischeri*	Leaves	S/T	Joints pain
Mbelebele	*Strophanthus eminii*	Roots	T	*Mchango wa kike*

Sinyanga (U) District

Mtundulu	*Dichrostchys cinerea*	Roots	S/T	Abdominal problems
Mbulatula		Roots		Abdominal problems
Migunga	*Acacia tortilis*	Leaves	T	Boils
Mihale	*Acacia nilotica ssp indica*	Bark	T	Tonsillitis
Gobeko	*Combretum longispicatum*	Roots	Br	Infertility in women
Mgili	*Terminalia stuhlumanii*	Bark, roots	T	Jaundice

Meatu District

Ibingobingo Isubata	*Diospyros fischeri*	Leaves	S/T	Body swellings,
Ipumbula	*Calotropis procera*	Leaves	S/T	Heartburn , head ache, *nzoka ya watoto*
Ntangala	*Delonix procera*	Bark, leaves	T	*Mguu kuwaka moto*
Mgala		Roots		Bed wetting
Lweja	*Croton menyhartii*	Roots	T	Gynaecological
Mondo, Ningwiwe, Nguswanguruwe	*Entandrophragma bussei* *Turraea fischeri* -	Roots	T S/T	Abdominal problems, syphilis, gonorrhoea
Mgili	*Terminalia stuhlumanii*	roots	T	Ulcers, jaundice

3.2.5 Improved housing and seasonal use of Ngitili products for safety net functions

Households in the study villages are thatched by grass as a cheap available material in the area but also as a traditional norm as shown in Table 3.27. Respondents indicated that over the years, thatch material had dwindled in most villages. Ngitili has served as a reliable and readily available source of thatch grass that has significantly reduced the effort households use to collect thatch grass. Respondents also indicated that villagers in most villages now praise Ngitili by a saying that '*We are getting thatch grass in places where there was not any before, and dry season springs are beginning to appear again".* Furthermore, the frequency of building houses and replacement of thatch grass on houses has also increased among households in villages. Some households have managed to replace thatch grass with higher value thatch material such as corrugated iron sheets as a consequence of improved livelihood due to benefits from Ngitili as shown in Table 3.28.

Table 3.27: Percentage of households that have used thatch grass for roofing their houses in the surveyed villages in Shinyanga Region.

District	Percent of households
Shinyanga (U)	47
Shinyanga (R)	28
Meatu	31
Maswa	56
Bariadi	42
Kahama	69
Bukombe	67

Table 3.28: Percentage of households that have replaced thatch grass by corrugated iron sheets in the surveyed villages in Shinyanga Region.

District	Percent of households
Shinyanga (U)	05
Shinyanga (R)	13
Meatu	15
Maswa	11
Bariadi	08
Kahama	17
Bukombe	10

Respondents indicated that seasonality in the use of products from Ngitili for subsistence is an important aspect related to improvement of social security of households and villages. As quoted earlier, the Household Budget Survey (2002) identifies Shinyanga region as one of the four regions in Tanzania that are poorer than average. This poverty is more intense in the rural areas. It is therefore expected that most households in the study area are also poor and therefore prone to vagaries of poverty such as hunger, drought, shortage of fodder during the critical dry season, floods and other contingencies. Traditionally, Ngitili have saved and continue to save households at critical times as a source of food, medicine, construction material, fuel wood, livestock forage and fodder among other uses. In this context, Ngitili provide safety net functions for households and villages. It essentially serves community especially women, as buffer source of foodstuffs and other forest products for survival at critical times. Respondents indicated that life without Ngitili would be impossible for them.

3.2.6 Cost-benefit analysis from the time before Ngitili and the present situation

A retrospective cost benefit analysis from the time before woodlands restoration started in 1985 and the present situation was carried out based on values of benefits (gross) at household level. Values of benefits from Ngitili for the present situation were obtained from data collected in the present study. Values of benefits to households and livelihood status before HASHI started were obtained for the year 1985 based on literature (HASHI, 2002), expert evaluation by experienced HASHI staff and baseline information from before 1985. These values are averages for the region but estimated in a specific site. The present value of the change in benefits to households from the time before woodland restoration and present situation was determined using a 10 percent discount rate. The results of the Benefit Cost analysis are presented in Table 3.29. These results show a positive present value of Tsh. 2,369,694,924 (USD 2,369,694) for the entire Shinyanga Region.

Table 3.29: Results of retrospective Cost Benefit Analysis from the time before woodland restoration and the present situation in Shinyanga Region.

Product	Total in 1985 (Tshs)	Compoun-ding factor a 10%	Average Value benefits of 1985 at 2004 (Tshs)	Average value of benefits per household as of 1985 compounded to 2004 (Tshs)	Value of benefits per household at 2004 (Tshs)	Average. incre Value of benefits from Ngitili (Tshs)	Average in value of benefits from Ngitili (USD)	Average increase in Value of benefits in the region (current value)		Present value	
								Tsh	USD	Tsh	USD
Timber	284.5	6.727	1,913.8	10,686.4	25,266.0	14,579.6	14.6	942,048,291.54	942,048.29	9420482915	9,420,483
Poles	187.5	6.727	1,261.3	7,042.9	3,844.0	-3,198.9	-3.2	- 06,691,248.28	- 206,691.25	-2066912483	-2,066,912
Withies	25	6.727	168.2	939.0	2,372.0	1,433.0	1.4	92,588,746.10	92,588.75	925887461	925,887
Thatch grass	50	6.727	336.4	1,878.1	2,525.0	646.9	0.6	41,799,026.19	41,799.03	417990261.9	417,990
Bush meat	300	6.727	2,018.1	11,268.6	1,848.0	-9,420.6	-9.4	-608,701,270.84	- 608,701.27	-6087012708	-6,087,013
Edible insects	3.75	6.727	25.2	140.9	561	420.1	0.4	27,147,104.71	27,147.10	271471047.1	271,471
Vegetables	6	6.727	40.4	225.4	2,673.0	2,447.6	2.4	158,151,063.14	158,151.06	1581510631	1,581,511
Fruits	12.5	6.727	84.1	469.5	2,479.0	2,009.5	2.0	129,840,275.05	129,840.28	1298402751	1,298,403
Grazing land (fodd	100	6.727	672.7	3,756.2	19,400.0	15,643.8	15.6	1,010,808,952.39	1,010,808.95	10108089524	10,108,090
Water	1095	6.727	7,366.1	41,130.3	19,040.0	-22,090.3	-22.1	- 427,343,431.38	-1,427,343.43	-14273434314	-14,273,434
Woodfuel	390	6.727	2,623.5	14,649.2	48,853.0	34,203.8	34.2	2,210,047,416.30	2,210,047.42	22100474163	22,100,474
					NET INCREAS	**36,674.6**	**36.7**	**2,369,694,924.93**	**2,369,694.92**	**23696949249**	**23,696,949**

Since the present study covers a variety of values of goods and services from Ngitili, the values of the economic contribution are insensitive to changes in any particular price or cost estimate. Therefore, sensitivity analysis was conducted focusing on discount rate as a variable for which value s of the economic contribution from Ngitili may be sensitive. The variation of the discount rate was made at 5 and 15 percent. The results of the sensitivity analysis are presented in Table 3.30 at 5% discount rate and Table 3.31 at 15% discount rate. The present value at 5 percent discount rate is positive and substantially large while the present value at 15% discount rate is negative. This implies high inflation rate in the 1985 prices relative to the 2004 prices.

3.2.7 Impact of value of benefits from Ngitili on the household livelihood strategies

The benefits from Ngitili have influenced household and village economies in the different ways in Shinyanga Region. This has pushed households to change their approach and strategies in order to cope with the emerging demands. These changes include the following: (i) Through value of benefits from Ngitili, land use related conflicts among local land users have been reduced especially those related to land uses such as grazing of livestock, collection of wild foodstuffs and collection of fuel wood and charcoal, (ii) Seasonal availability of bene fits from Ngitili has increased the capacity of household and village economies to meet or cope with household and other contingencies, (iii) Benefits from Ngitili have promoted gender balance by enabling males to easily accommodate or attend roles traditionally perceived as female roles, (iv) Values of benefits from Ngitili have enabled households to keep and easily graze livestock including oxen especially around homesteads thus improving cultivation. This has enabled households to afford time for income generating activities such as local petty business, gardening, pottery making and leisure for health, (v) Values of benefits from Ngitili have enabled parents to graze cattle around homesteads hence releasing their children to attend school instead of looking after livestock, and (vi) Values of goods and services from Ngitili has raised income to households hence increasing the possibility for hiring labour, paying different fees, raising levels of nutrition, improving diet, health and housing.

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Table 3.30: Results of the sensitivity analysis on the values of the economic contribution from Ngitili in Shinyanga Region.

Product	Total value in 1985 (Tshs)	Compound-ing factor 5%	Average value of benefits of 1985 at 2004 (Tshs)	Aerage value of benefits per household as of 1985 compounded to 2004 (Tshs)	Value of benefits per household at 2004 (Tshs)	Average increase in Value of benefits from Ngitili (Tshs)	Average increase in value of benefits from Ngitili (USD)	Average increase in value of benefits in the Region (current values)		Present value	
								Tsh	USD	Tsh	USD
Timber	284.5	2.653	754.8	4,214.5	25,266.0	21,051.5	21.1	1,360,221,670.20	1,360,221.67	13602216702	13,602,217
Poles	187.5	2.653	497.4	2,777.6	3,844.0	1,066.4	1.1	68,906,321.14	68,906.32	689063211.4	689,063
Withies	25	2.653	66.3	370.3	2,372.0	2,001.7	2.0	129,335,088.69	129,335.09	1293350887	1,293,351
Thatch grass	50	2.653	132.7	740.7	2,525.0	1,784.3	1.8	115,291,711.37	115,291.71	1152917114	1,152,917
Bush meat	300	2.653	795.9	4,444.1	1,848.0	-2,596.1	-2.6	167,745,159.78	167,745.16	1677451598	1,677,452
Edible insects	3.75	2.653	9.9	55.6	561	505.4	0.5	32,659,056.10	32,659.06	326590561	326,591
Vegetables	6	2.653	15.9	88.9	2,673.0	2,584.1	2.6	166,970,185.36	166,970.19	1669701854	1,669,702
Fruits	12.5	2.653	33.2	185.2	2,479.0	2,293.8	2.3	148,213,446.34	148,213.45	1482134463	1,482,134
Grazing land (foo	100	2.653	265.3	1,481.4	19,400.0	17,918.6	17.9	1,157,794,322.74	1,157,794.32	11577943227	11,577,943
Water	1095	2.653	2,905.0	16,221.0	19,040.0	2,819.0	2.8	182,146,374.02	182,146.37	1821463740	1,821,464
Woodfuel	390	2.653	1,034.7	5,777.3	48,853.0	43,075.7	43.1	2,783,290,360.69	2,783,290.36	27832903607	27,832,904
				NET INCREASE	**92,504.5**	**92.5**		**5,977,083,376.87**	5,977,083.38	59770833769	59,770,834

Table 3.31: Results of th e sensitivity analysis on the values of the economic contribution from Ngitili in Shinyanga Region.

Product	Total value in 1985 (Tshs)	Compound ing factor 15%	Average value of benefits of 1985 at 2004 (Tshs)	Average value of benefits per household as of 1985 compounded to 2004 (Tshs)	Value of benefits per household at 2004 (Tshs)	Average increase in value of benefits from Ngitili (Tshs)	Average increase in value of benefits from Ngitili (USD)	Average increase in value of benefits in the Region (current value)		Present value	
								Tsh	USD	Tsh	USD
Timber	284.5	16.367	4,656.4	26,000.3	25,266.0	-734.3	-0.7	- 47,443,944.67	-47,443.94	-474439446.7	-474,439
Poles	187.5	16.367	3,068.8	17,135.5	3,844.0	-13,291.5	-13.3	- 858,817,063.00	-858,817.06	-8588170630	-8,588,171
Withies	25	16.367	409.2	2,284.7	2,372.0	87.3	0.1	5,638,637.47	5,638.64	56386374.7	56,386
Thatch grass	50	16.367	818.4	4,569.5	2,525.0	-2,044.5	-2.0	- 132,101,191.07	-132,101.19	-1321011911	-1,321,012
Bush meat	300	16.367	4,910.1	27,416.8	1,848.0	-25,568.8	-25.6	- 1,652,102,574.40	-1,652,102.57	-16521025744	-16,521,026
Edible insects	3.75	16.367	61.4	342.7	561	218.3	0.2	14,104,588.42	14,104.59	141045884.2	141,046
Vegetables	6	16.367	98.2	548.3	2,673.0	2,124.7	2.1	37,283,037.07	137,283.04	1372830371	1,372,830
Fruits	12.5	16.367	204.6	1,142.4	2,479.0	1,336.6	1.3	86,365,220.73	86,365.22	863652207.3	863,652
Grazing land (fod	100	16.367	1,636.7	9,138.9	19,400.0	10,261.1	10.3	663,008,517.87	663,008.52	6630085179	6,630,085
Water	1095	16.367	17,921.9	100,071.3	19,040.0	-81,031.3	-81.0	- 5,235,758,189.35	-5,235,758.19	-52357581894	-52,357,582
Woodfuel	390	16.367	6,383.1	35,641.8	48,853.0	13,211.2	13.2	853,625,721.69	853,625.72	8536257217	8,536,257
					NET INCREASE	-95,431.3	-95.4	- 6,166,197,239.22	-6,166,197.24	-61661972392	-61,661,972

3.2.8 Standard mechanisms developed for valuing the different products

Among the key tasks of this study was to establish, where possible, standard mechanisms for valuing the different products from Ngitili as presented in Table 3.32. By application of the Total Economic Value (TEV) approach, different products from Ngitili can be grouped into the following categories: Use values which comprise direct use values, indirect use values and option values. Direct use values from Ngitili are: timber, poles, fuel wood, withies, herbal medicine, hunting and wild foodstuffs. Indirect use values are biodiversity, water yield in form of dry season springs, microclimate, control of erosion, ritual and worship services. Option values comprise of deferred use of resources. Non-use values are existence value and bequest values. Existence values refer to benefits by virtue of existence of the resource. Bequest values are benefits reserved for future generations. Based on Gichere (2001), the valuation of forests may be carried out through the following approach:

(i) determination of the total values of the products that can be directly sold such as fuel wood, poles and withies (ii) taking the equivalent of prices of direct substitutes such as the cost that would be borne in the absence of wood as a source of energy (iii) costing the harvesting of products that are not directly sold to the market (iv) costing the preventive measures that are taken to safeguard degradation and (v) carrying out Participatory Economic Valuation (PEV).

In a subsistence economy, PEV can be used to value forest products, particularly non-timber forest products that are not traded in conventional markets, but are important to livelihoods of the local communities (Sikoyo, 2001). Consequently, PEV methodology can serve as a link between local economic systems and cash values. Its application requires data on forest use and values at the non-market subsistence level. The methodology uses a numeraire for valuing forest products instead of cash. The numeraire, is anything which forms part of the local socio-economy with wide local significance as an item of value, and which can be easily translated into a monetary value. Key steps in the PEV methodology include: (i) establishment of a range of activities in the domain of the local community (ii) definition of the numeraire to be used for valuing the products, (iii) determination of the relative value of different products, (iv) establishment of values of different forest uses relative to each other and relative to the numeraire, and (v) establishment of the price of the numeraire commodity which provides the means to translate forest products uses into cash values. In this methodology, pictures are often used to refer to different forest products. Different communities adopt different numeraire depending on the nature of their socio-economy. Through questionnaire and interviews, the item identified to serve as numeraire in Shinyanga Region is one unit of livestock in form of cattle. The number of cattle units one owns is a measure of wealth and social status of a person. A person who does not own cattle is perceived as being poor while a person who owns a hundred or above is perceived as being rich. According to the Shinyanga Human Development Report (The Regional Government of Shinyanga, 1998), the people in Shinyanga Region have so much faith in cattle that they use their time caring for cattle at the expense of their own life. Similarly cattle are used as insurance for critical times thus serves as storage of value. They are regarded as crucial for survival. Poor people who do not own cattle are more vulnerable to natural disasters such as floods or drought, as they cannot cushion their impact by selling animals. This explains the huge herds of cattle prevalent in the entire Shinyanga Region. Literally, most products with significant value are ultimately translated into cattle values. Therefore a unit of cattle is a numeraire identified for valuing different products from Ngitili. It goes without saying that there is a critical link between cattle (numeraire), livestock forage (fodder) and values from Ngitili. However, decisions over cattle are traditionally and in practice vested by the patriarchal society, in men (Regional Government of Shinyanga, 1998). Consequently, the criteria for household weath assessment are difffrent between men and women. Thus depite the relative high value of cattle in

the region, results of the present study showed that women sometimes rank cattle low because they have no decion on the cattle.

By application of the conventional approaches, the standard mechanisms used to value different products are as follows: The standard mechanism for valuing timber production is through inventory to get timber quantities and market analysis to get timber prices. In the present study, timber products quantities were obtained using questionnaire and checklist and crosschecked by interviews with key stakeholders. Prices for timber products were obtained through market analysis and checklist. Standard units for timber quantities are cubic meters but in the present study timber products quantities were measured in pieces and later converted to cubic metres. Prices were expressed in Tanzania Shilling.

The standard mechanism for valuing non-timber forest products such as grazing, fodder, wild foodstuffs, thatch material, medicinal plants and bush meat is through secondary information on household usage per day/week/month/year and local market analysis to obtain prices. In the present study, quantities of NTFPs were obtained using questionnaire and checklists with specific questions on quantities collected per year, month, week or day. Prices for these products were obtained from market surveys and from checklist with key stakeholders.

Effects of Ngitili restoration on water flows are related to some important effects and uses including drinking water for humans and livestock, irrigation and fishing. In calculating the values of water, the standard mechanism involves quantification of the effects of Ngitili restoration on the water flows by determination of the rise in the water table. This is measured by assessment of the depth households have to dig before they find water. Study results show that in the advent of Ngitili water is now easily found after shallow digging. The value of water was also obtained from the quantity of water used for drinking by humans and livestock in the household and cost involved in accessing the water. Biodiversity values were measured through flora and fauna inventory and market analysis of prices.

Table 3.32. Standard mechanisms for valuing different products from Ngitili in Shinyanga Region.

Ngitili product	Standard mechanism of valuation	Standard unit of measure	Locally used unit of measure
Timber production	Inventory and market analysis	Cubic meter	Number pieces Running meter
Pole production	Inventory and market analysis	Running meter	Number of pieces Ox and donkey carts
Fuel wood	Secondary information household usage per annum	Head load	Ox and donkey cart Head load
Withies	Secondary information household usage per annum	Bundle	Bundle
Honey	Secondary information household usage per annum	Litre	Bucket, plastic container, bottles
Bush meat	Secondary information household usage per annum	Kg	Number of pieces
Thatch grass	Secondary information household usage per annum	Bundle	Bundles
Mushroom	Secondary information household usage per annum	Kg	Local metal bowl (Ngere)
Wild vegetables	Secondary information household usage per annum	Kg	Local metal bowl (Ngere)
Wild fruit	Secondary information household usage per annum	Kg	Heap
Edible insects	Secondary information household usage per annum	Kg	Local bowl (Ngere)
Herbal medicine	Secondary information household usage per annum	Kg	Handful, spoonful, bottle lid, pieces, bottles
Water	Secondary information household usage per annum	Litre	Plastic buckets
Biodiversity	Flora and fauna inventory market analysis	Units count	Not Applicable
Ecotourism	Visitations count and cost infrastructure replacement	Visitors count	Visitor's count
Option value	Secondary information	Money units	Not applicable

3.2.9 Assessment of the marketing constraints, prospects and opportunities for benefits from Ngitili

The values of products in form of goods and services from Ngitili are a function of prevailing market conditions in Shinyanga region. In the 2000/01 National Household Budget Survey, the region is rated as one of the four regions in the country that are poorer than average. The mean monthly expenditure per capita in the region is Tsh. 8,000. This is below the national average of Tsh. 8500 (Household Budget Survey, 2002). This low level of expenditure per capita could be an indication of limited market potential in the region especially in the rural areas where Ngitili are a critical land use of high value to households both socially and economically. Broadly, the region is endowed with resources and conditions that influence the marketing environment of the

region. The marketing opportunities, prospects and constraints are a function of the region's conditions and its resource endowment which include: (a) Positive endowments: (i) High level of awareness on environmental conservation and benefits from Ngitili, (ii) Well established traditional institutions (Sungusungu, Dagashida, Elders Councils), (iii) Organized groups dealing with small-scale processing industries (e.g. processing indigenous fruits), (iv) Political will or support for development initiatives, (v) Large population of humans and livestock, (vi) Arable land, (vii) Large and small scale mining industry, (viii) Railway and all-weather road infrastructure, (ix) Expanding towns, (x) Forest reserves in districts in the western part of the region, (xi) Development programmes dealing with land and natural resources, and (xii) Growing of cotton as a cash crop (b) Negative endowments: (i) Harsh environment due to drought and semi-arid condition across a large proportion of the region, (ii) Fragile ecosystem, (iii) Historical high level of land and forest degradation, (iv) Relatively undeveloped infrastructure especially in the rural areas, (v) Illiteracy among a huge population segment in the region, (vi) Presence of a number of cultural and traditional barriers among people, (vii) Limited diversification of the region's economy, (viii) Stiff competition with neighbouring regions, (ix) Widespread income poverty among the majority of people, (x) Food insecurity, (xi) Limited access to modern health services, and (xii) Bureaucracy due to the centralized issuance of logging permits in own Ngitili. Table 3.33 presents the marketing opportunities, constraints and prospects for Shinyanga Region as assessed in the study area.

Table 3.33: Summary of marketing opportunities, constraints, prospects in Shinyanga Region

Marketing aspects	DISTRICTS						
	SHY (U)	SHY (R)	MASWA	MEATU	BARIADI	BUKOMBE	KAHAMA
Opportunity (H)	▪ Easy access to market ▪ Variety of customers ▪ Sale of grazing rights ▪ Institutions guiding the use of communal Ngitili ▪ Occassional farm labourers	▪ Freedom on land management decisions. ▪ Increased income sources ▪ Vegetable gardens ▪ Training by World Vision	▪ Diversification of products from Ngitili ▪ Fodder supports input to agriculture as it ensures supply of feed to oxen plough	▪ People are aware of environment conservation ▪ Near to market ▪ Support from government ▪ Well-managed communal Ngitili ▪ Arrangements to use of communal Ngitili	▪ Authority on grazing land ▪ Availability of fuelwood around homesteads ▪ Selling firewood ▪ Milk for HH consumption - enhanced family health ▪ Increased number of cattle	▪ Close to town ▪ Expanding brick burning business and house construction	▪ Forest reserves around ▪ Institutions supporting Ngitili ▪ Training by HASHI ▪ Access to market ▪ Game – bushmeat
Opportunity (NH)	▪ Access to markets ▪ Vegetable gardening ▪ By-laws to safeguard Ngitili use	▪ Adjacent to Forest Reserve ▪ Ease accessibility by railway ▪ Game – bushmeat	▪ Exchange of Ngitili products for farm labour	▪ Large land area		▪ Access to land is "first come first saved" ▪ Few cattle keepers	▪Neighbouring mining centre ▪Access to open woodlands ▪Acceptable local herbalists
Constraints (H)	▪Traditional free grazing ▪ Land shortage, ▪ Food shortage, ▪ Customers needs not predictable.	▪ Traditional free grazing ▪ Drought. ▪ Decreased Ngitili size due increase in family (clan) hence land division ▪ Destructive animals ▪ No participatory planning ▪ Unwise use of communal property	▪ Decrease in the size of Ngitili ▪ Free grazing ▪ Fires ▪ Ngitili ownership biased to men ▪ Food shortage	▪ Drought ▪ Sabotage (destructive tree cutting & fire) Centralized issuance of logging permits in own Ngitili	▪ Traditional free grazing ▪ Land shortage	Few cattle keepers to buy grass for fodder Hatred between the perceived haves and the have not.. Incease in population may impair Ngitili extent. Conversion of Ngitili to farms. Few trees of high potential value.	▪Refugees ▪Lack environmental committees ▪Encroachment including theft of thatch grass ▪Destructive animals ▪No by-laws ▪ Herbalist get medicinal for free
Constraints (NH)	▪ Inadequate supply of fodder, ▪ Un-proper use of communal Ngitili ▪ Encroachment	▪ Dislike by villagers to have forest-bush around the village ▪ Lack adherence to village rules	▪ Drought ▪ Uncontrolled free grazing ▪ Decrease in the size of Ngitili ▪ Ngitili ownership - biased to men	▪ Large herds of cattle ▪ Drought and adverse environment conditions ▪Big families, polygamy ▪ High reliance on local beliefs jeopardise family improvements	▪ Encroaches ▪ Land shortage	▪Lack of awareness on Ngitili ▪ Uncontrolled grazing ▪ Lack of market for abundant thatch grass	▪ No environment committee ▪ Free grazing ▪Population increase, reduces land size
Prospects (H)	▪Increased market opportunities with expansion of town	▪ Increased savings from Ngitili – enhanced future investments ▪ Rise on tree Seeds requests - increased conservation	▪ Intensification of Ngitili management Ensured supply of fodder ▪ Increase in number of individual Ngitili ▪ Increased in come	▪ Intensification of Ngitili management ▪ Nutritional & health improvement among family members ▪ Ensured supply of fodder	▪ Future Market for pasture/ fodder ▪ Money to buy more land ▪ Institutions governing management	Sustainance established Ngitiili	▪ Tree Planting spirit among villagers ▪Availability of timber trees from Ngitili

			▪ Food - Security y Reduced fatigue	▪ Improved Housing ▪ Reduced monetary contributions to village Increased awareness			
Prospects (NH)	▪Saving from sale of cattle, vegetables – Improved housing ▪Increase in number of individual Ngitilis ▪Support to children's' education	Increased awareness on owning Ngitili	▪ Ngitili can be used as a collateral		▪ Availability of land for hire ▪ Government support conservation issues	Rising aware ness on Ngitili	▪Consciousness on land ownership – Ngitili ▪Expansion for agrofore-stry activities

Where: H = HASHI areas of concentration
         NH = Areas outside HASHI concentration

3.3 Social-cultural and institutional aspects related to woodland restoration

3.3.1 Local meanings and practice of Ngitili restoration and management

From this study it was clear that the Ngitili concept as a terminology and a practice that has been part of the lives of people in Shinyanga for a very long time (Mlenge, 2002) still survives2. In many areas, the traditional meaning of Ngitili as a fodder bank or wood reserve is still being maintained although mixed within a system that also responds to the multiple needs and changing socio-economic circumstances that people currently live in. In this regard, people's understanding of Ngitili and the meanings given to the concept extend beyond Ngitili as simply the means through which people get their needs of fodder and wood products, to encompass the need to maintain people's diversified livelihood needs. In other words, its reference to a geographical space under a specific natural resource management regime has made more sense to those individuals and communities who have been able to use Ngitili in maintaining their multiple sources of sustenance, that include social esteem, income generation, solution for labour shortage, including other socio-cultural needs for their households and beyond.

Ngitili is also understood as a long-term investment, ideally not supposed to depreciate in terms of quality or size. Yet since it provides space for balancing immediate household needs with such investments, Ngitili is also understood as a safety net such as hiring out in return of a cash income, or reserve land for expansion of crop cultivation when need arises. This means that, its original high value notwithstanding, for some people the capacity to

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[2] It is important to note here that the term Ngitili is in some communities referred to as *'mpaga'* (lit: boundary) indicating an area demarcated for specific uses, while wood lands are referred to as *'pori'*. The meaning however, of a natural resource bank and its systematic management programmes is more or less common throughout the region.

maintain ownership of Ngitili is a question demands much more than appreciating its meaning.

3.3.1.1 Changing perceptions with socio-economic reality

What is also interesting is the way in which local people have managed to 'modernise' their relationships with outsiders on the use of Ngitili for their own benefit. A classic example was found in Seseko whereby grazing rights are from time to time (and particularly during the dry season) temporarily sold to what the local community called 'investors'. This system that has been integrated into the traditional ifogong'ho3 credit system has enabled the community to realise many benefits. Some of these include source of funds for financing some of the village projects, while individuals have had access to expanded opportunities for credit (Box 1).

Box 1:Ngitili as an investment: Seseko village

The (temporary) sale of grazing rights to people from outside the village is currentlyone of Seseko's most lucrative investments.   Those granted temporary access for   grazing are called 'wawekezaji' (investors). The first step requires such an investor to present his case to the Hamlet chairperson and the intention to buy grazing rights. If the idea is accepted, the investors are directed to meet the
 Ngitili chairperson who in turn, presents the issue to the Hamlet Ngitili committee to discuss the matter, including the size of the herd and the investors' background. The second step involves seeking for community consensus that is made through a community meeting. This meeting has the final say in
either accepting or denying to provide grazing rights to 'foreignors'.   If the   request is accepted, the investor is supposed to pay TShs. 120,000.00 for every herd of 100 cows that graze in the Ngitili. The money may be paid in two instalments, each of TShs 60,000.00 within a period of six months. The maximum herd size that an investor is allowed to bring into the Ngitili is 200 cows. The village government gets 50% of the money earned from sales of grazing rights at hamlet level. Procedures for such investments are rigid and have to be adhered to avoid conflict. For example in year 2003, people from Mwajiginya village brought 300 cows into one of Seseko's hamlet Ngitili without permission from the respective owners. They were arrested by Sungusungu and asked to pay TShs 360,000.00 if they wanted their animals to continue grazing in the area. They disagreed with the amount by saying they could afford to pay TShs 10,000.00 only, an idea which was rejected and they were ordered to get out of the village.

3.3.1.2 Differences according to ecological zones

The ecological differences in the study area that are mainly associated with the rainfall distribution pattern, and therefore vegetation performance and productive potential of the land also influence people's perceptions on the meaning of Ngitili since they have an implication on the nature of the products that people in a particular area demand more highly. For the people in the eastern zone that encompasses Meatu, Maswa, Bariadi, Shinyanga Municipal and Shinyanga rural district, the demand for fodder, both to feed large livestock populations and for sale is high. This is because the area receives lesser amount of rainfall, but has high livestock population, and therefore the assured supply of fodder becomes very important. For people in the western zone, that include communities in Kahama and Bukombe districts, Ngitili makes more sense according to its potential to

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[3] *Ifogong'ho* refers to a traditional system of savings and credit from which people can be given financial assistance or request for loans payable with an interest that is determined according to the need.

provide wood products such as timber, charcoal production and supply of firewood for both domestic and small-scale industries such as brick-making.

In addition to the fact that people's demands for Ngitili products are normally high, as was experienced in this study, the degree of their involvement in the process of Ngitili restoration, and the nature and type of beneficiaries of the process are also significant aspects indicating people's needs and commitments to the process.

3.3.1.3. Intervention, restoration and ownership

Local people's well-deserved appreciation of Ngitili as described above does acknowledge the efforts of Government on Ngitili restoration to the state that they are found today. Government led sensitization campaigns and the institution of structures and rules regarding natural resource management (such as rules preventing indiscriminate cutting of trees) have complemented (but definitely do not belittle) indigenously driven desires to have protected areas for livestock production that occurred long before the current independence Government was in place. According to oral historical sources, the desire to conserve natural woodlands in Shinyanga goes a long way back to the times before colonialism. Later, political changes and institutional transformations affected local people's traditional systems for maintaining Ngitili, and the health of the environment. The practice was then later given impetus after Independence when the government gave directives on tree conservation and afforestation in the region. A Focus Group discussion in Ngaganulwa village (Shinyanga Rural District) summarized its own experiences on restoration (Box 2):

Box 2:Ngitili management … historical processes in Ngaganulwa Village (Shinyanga Rural District)

In the past, the sub-chief, Mwanangwa was the ruler over the land of a Hamlet (Gunguli). This land was given by the chief (Mtemi) after paying a due of 5 cattle. Mwanangwa was quite powerful and he could send away or invite into the community anybody on his own accord. Following a request by livestock keepers, who were experiencing shortages in fodder, the Mwanangwa began distributing areas specifically for grazing, during the dry season, demarcating them in paddocks, and letting out one for use when fodder in one was depleted. This usually happened between February/March, and August/September in each year. If a member of the community went against these regulations he was publicly canned. This system allowed natural regeneration and plenty of fodder that benefited all livestock keepers in the Gunguli even as livestock and human populations grew. But come independence in 1961, Mwanangwa's seat and powers over the land became abolished.
Around 1967 the Government established the post of Balozi (Ten Cell Leader), but who in reality had little social influence. We were happy for the abolishment of the post of Mwanangwa because of the mis-use of power, prohibiting people to raise maize, eat ugali from maize meal,and frequent canning of wrong-doers in the Gunguli. After independence, punishment by public canning was abolished. Another development was the placement of land as public property. This resulted into free grazing but also with the same mismanagement that was experienced before the establishment of Ngitili under Mwanangwa. Traditional systems became dishonoured.
The Balozi's influence became diminished after the establishment of Ujamaa villages in 1975. The Village Government commanded all authority, but management of the Village Ngitili weakened even firther. Placing land under public property regimes caused local people to loose their privately or individually owned land resources, and therefore also individually owned Ngitili, although communal or village level Ngitili continued to exist albeit in very weak states. The result was a serious degradation of the environment, until HASHI stimulated interest into maintaining Ngitili more effectively.

Many villages had gone through the same experiences. Since the 1970s a series of efforts were directed towards environmental conservation aiming at addressing the serious degradation. Among the earliest interventions that people recall was the directive issued by the then Shinyaga Regional Commissioner that prohibited uncontrolled tree felling in the region. Oral sources during the study mentioned Mr Mustapha Songambele and his predecessor, Mr Marko Mabawa who promoted tree planting in the region in the early 1970s. Many people were aware of these campaigns directive although admit that they had not been effectively adhered to.

Many communities recall the period between 1984 to 1986 when concerted efforts to make Shinyanga green for the purposes of land and environmental conservation were effected and made possible through HASHI. HASHI's intervention has therefore been a catalyst in the restoration process (Kileo et al, 1995). Following the intervention by HASHI, various types of Ngitili were established, some of them being developed according to the traditional systems of fodder/woodland reserves, while other Ngitili being established by institutions such as schools, religious denominations or women's groups (Seseko village, Shinyanga urban). In Mwambegwa village (Meatu District) individuals started their own Ngitili after being encouraged by HASHI/s successes in demonstration plots for restoration in their area.

3.3.1.4 Types and ownership categories of Ngitili at village level

HASHI's programmes of restoration and conservation of Ngitili did not erode traditional patterns of ownership, although in the process introduced new and more modern ways of ownership that introduced more broad-based systems of access and beneficiaries. The study out there was no uniform pattern in the types of Ngitili and in the systems of ownership of these Ngitili between communities. At a general level, however, it was observed that, at least each community had communal and individually owned Ngitili, the use of different terms such as mpaga, or pori notwithstanding.

Communal ownership – Ngitili under communal ownership are common in most villages. Such Ngitili may be established according to Hamlet membership as Village *Ngitili*. There are two types of communal Ngitili, those that are established by demarcating an area within no-man's land, and those formed by conjoining several individual plots and subjecting the area to common rules and regulations for grazing and grass cutting seasons. These types of *Ngitili* not only perpetuate the concept of sharing of resources but also a common responsibility of resource management. Since many communities are increasingly experiencing land shortage, communal management was seen by most as the best alternative towards livelihood security. This is because it controlled the fragmentation of land among individuals and at the same time, ensured access to fodder and grass for other livelihood needs.

Individual ownership – Many households also have privately owned Ngitili, usually managed by the individual household, and handed down through generations. These households maintain the right of access to Ngitili and normally consent when neighbours or other people request grazing rights. Collection of fuel wood or cutting trees usually involves a cash payment. Although declared as the most effective system of natural resource management, individually owned Ngitili were found to be the most threatened system of ownership, usually subjected to fragmentation because of increasing land shortage, or being purchased by the more well-off households.   It was also seen that

protection of such Ngitili from encroachment was not always successful since it demanded individual efforts rather than community efforts because local leaders find themselves more obliged to protect community resources, but needed to be coaxed to protect individual property.

Group ownership: Group-owned Ngitili is practiced in a variety of ways. These include groups formed under blood or clan/kin relationships (Seseko village); friendship (Ngaganulwa village) or other forms of common interest groups such as women's groups. The most common types are established on clan basis. One such clan in Nyashimba village (Maswa District) manages a 200 acre area of Ngitili. The clan's objective is to control the fragmentation of land and therefore, secure their access to fodder and wood products throughout the year. Such ownership is usually quite powerful as long as individual desires are controlled, and the Head of the clan is able to respond to the needs of each member. Being based on kin relationships rather than local government regulations, people tend to adhere to these quite respectfully.

The mixed-sex group in Ngaganulwa village (Shinyanga rural) has Ngitili of 150 acres in size, and was formed out of a common interest to protect each other's areas from encroachment. The idea to form a united Ngitili arose after experiencing threats from other villagers who saw these people's move to form individual Ngitili as excluding them from accessing fodder on the free range system Women's group Ngitili were in most cases encouraged by HASHI processes, and these usually comprise of planted tree plots.

Institutional ownership: In almost every community, institutions such as the school and religious organizations (the church) have established their own Ngitili, most with exotic species that provide tree products such as timber, charcoal and poles for house contruction.

3.3.1.5 Ownership and tenure rights

3.3.1.5.1 Choice of areas

Throughout the region, it was established that the choice of areas for restoration of Ngitili did not follow a uniform pattern, even in those communities in which HASHI has had collaborative projects for woodland restoration and management. In some places Ngitili were established in a strategic response to fodder shortages resulting from extension of cropping land to rangelands to suffice the demand of the increasing human population as was the case with Nyashimba village, Maswa District.

In general therefore several factors have influenced people's choice of areas to develop as Ngitili. These include:
- individual resource endowment
- communal outlooks based on tradition
- local administration including development projects

Representation by Local leaders such as Baraza la Wazee and Village Government Leaders ensured that the choice of communal Ngitili was appreciated across community members. However, it was observed that in some cases, despite the 'communal' nature of some Ngitili, the process of its establishment such as choice of area to establish the Ngitili was

done arbitralily by Village governments, or by a few representatives and other people made to accept for the common good, as the following example of a man in Chembeli village illustrates:.

> I know that *Ngitili* are called mpaga. Mpaga is allocated arbitralily by community members through marking out an area for grazing and for getting grass for thatching. My 4 acre shamba is within the hamlet *Ngitili*. I cannot refuse because the decision to mark out this area is done communally by community members. Every one with a piece of land within the demarcated area is compelled to agree to Hamlet decisions (Chembeli village, Shinyanga Rural District, 28/07/04).

Ngitili have also been demarcated in order to protect national development interests. Sometimes such initiatives are done by imposition with less sensitivity on its 'supposed' immediate beneficiaries. One such experience is found in Mwashegeshi village, in Maswa district where a Ngitili was formed by the District Government Authorities in order to protect the main water source, a dam, that served the town and several other communities with piped water. It was claimed that the District Council was responsible in identification of the location for the Ngitili, while respective District officals sensitized and mobilized local people for their participation in protecting water sources. As part of the process, exotic trees were intercropped with indigenous ones, and the villagers were encouraged to maintain the area. This arrangement, whatever its benefits was however, not sensitive to villagers in this case as Box 3 below explains.

Box 3:   Serving … to protect

The water source in the Ngitili near Mwashegeshi village serves water by pipe to Maswa town and several other villages in the district. Ironically, Mwashegeshi village, the nearest community does not have piped water although one of their roles is to protect the Ngitili from destruction.

In compensation for protection of the *Ngitili*, and therefore the dam, Mwashegeshi people have been allowed to fetch water using buckets. Other activities such as cultivation and livestock activities were strictly restricted in and around the dam and *Ngitili*. Through an arrangement between villagers and the District Water Authorities, the latter employed Ngitili security guards but on the agreement that all fines charged to encroachers should be given to the villagers. No consultation with village authorities was done on the employment of the security guards, but the village government was expected to be their overseer. Not surprisingly the security guards did not adhere to the original arrangement of submitting the money they often collected from encroachers (loggers and cattle grazers) to the village, and this has led to conflict between the guards, the Village authorities and District officials. Currently, the Ngitili has been handled over to the village government.

Other options have been more successful. In many cases, especially where an organizational hierarchy for natural resource management is already in place, establishment of village or communal Ngitili has been done through an open system of decision-making through the Village Assembly. The Village Assembly is a meeting that summons community members and is the ultimate decision-making body at grassroots level in Tanzania. From the experiences of some of the villages, the Village Assembly made decisions on the location and area to be demarcated for Ngitili as well as instituting of the rules that apply to its management. This was the process followed in Ngaganulwa village (Shinyanga rural). In this particular case, the Village Assembly used its powers to confiscate an area from a villager who misused his successful efforts to restore vegetation in an area that was once 'no-man's-land' in the village as the following Box 4 illustrates.

Box 4: Decision-making at village level

According to village accounts, one villager was able to restore a once down-trodden and sparcely vegetated area into a rich woodland that came to enable him earn an income from fuel wood sales. Being a clever person he was later able to convince people that he was protecting the area on behalf of the Division's Forest Officer to avoid any confrontation. Women in the village were later attracted to the area for its fuel wood potentials and were often tempted to cut fuel wood without informing the person. But he used this opportunity to harass them and demand for sexual favours, on the pretext that without giving in to him he would report them to the Forest Oficer where they would be formally charged. Women reported him to the village's Sungusungu whom after consultations with the Forest Officer, decided to take the area from him as a punishment (Ngaganulwa, 31/10/04)

The choice of having an individual Ngitili is somehow different. An individual chooses an area for Ngitili usually determined by individual economic capacity or in relation to one's land holding. In many cases, the option to use the land available to raise crops becomes more pressing than setting some land aside for Ngitili. Crops such as cotton, maize, groundnuts, potatoes, lentils and green peas serve as both food and cash crops and therefore secure familres from food insecurity. The capacity to purchase land has enabled several people to establish Ngitili and have other space left for other purposes such as cultivation. For those with large land holdings, it has been customary to set aside areas for Ngitili within their farmland. These areas are then handed down through generations through inheritance or claiming and winning back clan lands that became deserted after Villagisation in 1974.

Awareness raising and sensitization by project or Government officials also influenced some people to take up the idea of establishing Ngitili. In Busindi village (Kahama District), many of the individual Ngitili were established through the influence of the Village Government Chairperson, who after attending a seminar on environmental management conducted by HASHI were able to encourage people to establish their own Ngitili. Many people took up the idea and selected areas of their land according to their fodder production potential. In Mwamunemha village (Baradi District) on the other hand, although people selected areas of their liking, it was actually a response to the District Commissioner's order which required villagers to embark on Ngitili management as a way of getting basic forest products and services.

Therefore, establishment of individual Ngitili has entailed considerable freedom of choice for areas depending the resources or opportunities at the persons' disposal. The experience of a couple of families in Bulega village (Bukombe) illustrates this in Box 5 below.

Box 5: First come, first served basis.

In Bulega village, the only two families that own Ngitili in areas called mapori, had been able to get these areas because their families were among the first settlers in the area in 1993, that is, when the land was still virgin miombo woodland forest and land pressure was low. There were no specific criteria used for choosing an area to be pori. As long as the farmer feels that cropping area was enough, then the rest of the land is left as woodland. The family forest areas are considered as reserves for future expansion of cropping land as the family size increases.

3.3.1.5.2 Choice of species

The choice for species to protect and regenerate in the Ngitili also depended on several factors. In many places restored Ngitili were based on natural regeneration, envisaged that the area does have species to satisfy livelihood demands. The most preferred species that people mentioned for the whole woodland restoration programme included the following:

- *mgongwa*, protected because of its use in making farming implements (yoke for ploughs)
- *mgembe* was preferred because it is hard, and thus cannot be easily attacked by ants. It is used for house construction and is said to last for 20 years.
- *migu, mivinje, migunga, mpilipili, manula, mambiso* (for wood)
- *misungwi, mitundwa, sungwi, mifuru and mikoma* (for fruits)
- *mitundu and misama* are preferred becase of making bee hives
- *Msisi (Ukwaju)* – preferred for its fruits that are added to porridge, but also because of the traditional belief that cutting a *msisi* brings misfortune (Businda village, Bukombe District).

People also manage plots of trees with species provided by HASHI from time to time on its periodic community based reforestation/afforestation programmes. The project distributed both indigenous and exotic seedlings throughout the region (Arnesen, 1977). Therefore, most of what people planted was influenced by what HASHI could make available.

Enrichment planting by seedlings provided by HASHI is also common in the villages receiving HASHI support. Agro-forestry within Ngitili was also promoted by HASHI, including techniques on improved beekeeping. In Mwambegwa village (Meatu District) agroforestry practices including on-farm conservation of indigenous trees species was widely introduced and farmers confirmed during the study that they are still adopting the new technologies. They were adviced to leave and nurture at least fifteen trees per acre during land preparation. The choice of species in these cases was done selectively to suit these purposes. In Ngaganulwa village (Shinyanga Rural District) the Ward Forest extension also provided knowledge and seedlings for species such as Lucina, Albizia, Mihale, Migu and Pawpaw seedlings.

3.3.1.5.3. Land tenure and broad ownership regimes

Ideally, it is regarded that people should enjoy the freedom to dispose off, exchange or sell Ngitili rights without being asked by anybody. Individuals understand that they have the right to do so. For example, selling Ngitili to any buyer and the buyer is free to make any changes in the area as one wishes – such as – cutting down all trees and starting crop cultivation, or getting fuel wood for brick making without being taken to task by anybody. A person in Chambala village said;

> If a person has his own trees and needs to sell them for his own benefit, I do not think he will prohibited to do so … he will seek a permit from the Kamati ya Mazingira and inform the Village Government and Ward Development Committee … as long as he follows all procedures (Chabala village, Meatu District).

The freedom to dispose of land with Ngitili harvesting of Ngitili products can however be exercised without much restraint in individually run Ngitili that are located in areas that are not co-joined with other people's areas. This freedom is, however, not the case with one wanting to break off from communally held Ngitili reserve, ie where the Ngitili is made up of a number of co-joined plots but under systematized grazing programmes according to seasons. This is because of the insecurity that community members place on haphazard land fragmentation– which to them weakens community solidarity and control over natural resources management.

However, there have been cases where individuals have demanded for and have been given the right to individually manage Ngitili irrespective of their location within communally controlled areas. One experience involves a demand by an elderly woman who wanted to use her portion to meet her food security requirements, that was supported by the District government as Box 6 below illustrates.

Box 6:Individual management rights in special cases

An 85 year old frail woman who lives in Seseko village (Shinyanga urban) with her grandchildren, owned a 4 acre plot located within the Village *Ngitili*. Early in 2003, she requested the Village Government to allow her manage individually her portion of the area so that she can get an income from selling fodder individually. The Village Government discussed the issue but failed to reach a consensus, and denied her request. Then the lady decided to present her case to the Shinyanga Urban District Commisioner.

On receiving the request, the DC adviced the Division Secretary to look into the matter, who in turn requested the Village government to review the issue again. After another session, the Village Government decided to cut the portion as she requested, and she was given 2 acres out of her area. During the dry season in 2003, she lent grazing rights to one investor who paid her a sack of maize. In 2004, the lady has granted grazing access to one of the rich men in Seseko in exchange of 2 sacks of maize.

The lady is appreciative of this system because since being granted individual rights to manage a portion of the Ngitili, she has stopped asking the Village Government to support her with food and other needs (Seseko, Shinyanga Urban)

This example, however isolated, illustrates to us the demand that people have for private control of resources. A man in Iwelyangula Ward, also in Shinyanga Urban, made similar demands, although for other reasons, claiming that the communally managed Ngitili was being abused, to the extent that there wasn't enough fodder to feed the people's livestock. Mzee L demanded that his oxen were getting thinner, and that he wanted to control the area himself. He said,

> I have my independently managed Ngitili located within the area that is for the communal Ngitili. I do not permit people to graze in my area. When I find someone I chase him and his livestock away. Nobody has refused to leave when I do so. My colleagues laugh at me calling me foolish and they mock me calling me CUF, but I am CCM[4]. But they are used to graze without discipline. Now my cattle are well-fed and healthy.

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[4] CUF stands for Civic United Front, one of the main opposition political parties in Tanzania, and CCM stands for Chama cha Mapinduzi, the ruling Party at present. Being referred to as CUF implies a person who is in opposition to general community consensus. Pulling out of communal management was this person's second attempt for independence. The Hamlet's leadership mentioned that a year ago, Mr L

3.3.1.5.4 Household Asset accumulation and wealth creation

There are also many experiences of households being able to overcome poverty completely by channelling resources realised from Ngitili management into other businesses. One of the most successful experiences is illustrated in Box 7 below.

Box 7: From a simple livestock keeper to a prominent businessman

A villager in Mbiti village explained how he had been able to raise and sell cattle fattened in his *Ngitili*. In 1986, he was able to sell some of the cattle and bought a Fiat tractor for Tshs 400,000/-. He has also been able to convert part of his Ngitili area to plant cotton and maize, whose proceeds gave him initial capital to invest in other businesses. He became a cattle trader. Later in 1991 he cultivated cotton again and got 80,000 tons of cotton, but unfortunately low cotton prices made him realise significant losses that forced him to sell the tractor and to stop cotton farming. From the cattle trade and sales of his tractor he has been able to build a modern guest house in Mwanza City called Ndama Guest House (Mbiti village, Bariadi District, 13/08-04)

Restored Ngitili was also credited for supporting children's education in an indirect way as Mzee Jim of Seseko village (Shinyanga Urban District) explained. Mzee Jim sees a close relationship between having a well-managed Ngitili and his success in educating his children up to Higher Learning Institutions. His daughter has completed her education at the University of Dar es Salaam, and is now working in Dar es Salaam. His son is in Form One in Moshi Secondary School. Mzee Jim said,

> "I have not gone to school at all … therefore, I work hard to educate my children .. my Ngitili assists me, … I fatten my cattle there and therefore they fetch a good price when I sell them. Then I use the money to educate my children" (Seseko village, Shinyanga Urban 21/07/2004).

Employment creation: Individuals have also been able to get jobs from restored Ngitili because of the increased availability of wood products. The types of employment generated by Ngitili include carpentry, charcoal making, fuel wood sales andcutting grass for thatching. Many of the youth have found employment in trades such as carpentry or selling fuel wood, especially in current circumstances where land for cultivation is getting scarcer for the majority. Some women also engage in charcoal making, traditionally a men's activity.

3.3.1.5.5 Transcending basic needs level

At the same time, restored *Ngitili* have enabled some households to escape the drudgery of laborious tasks in order to buy food and other basic needs. A woman in Ngaganulwa village who has for long worked as a casual labourer in other people's farms and used to collect fuel wood for sale, explained that since establishing a *Ngitili* near my homestead, I do not do casual work any more like the people in the low income category. I now sell fodder to people with livestock and get money for my up keep (Ngaganulwa, Shinyanga rural).

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had requested for permission to sell this plot of land to a person residing in Shinyanga town, a request that was turned down by the whole community that feared the repercussions of bringing in new -comers in what was refereed to as communal property belonging to local people.

In many communities, several people gave accounts of having been able to accumulate livestock by letting out their Ngitili for grazing to people with many heads of cattle, getting more milk for sale and for consumption from healthy cattle fed on a well-kept Ngitili; being able to pay school fees; and constructing better housing.

An old man in Mwambegwa village (Meatu District) said: "My Ngitili was established in the early 1990s after witnessing successes by HASHI. Since its establishment, my household has benefited so much. I previously did not have cattle, now I have 20 heads of cattle, 10 of which I got through bridewealth aidn for my daughters. From the money I earn through my Ngitili, I can now employ labourers for weeding my shamba therefore reducing the drudgery on my family".

3.3.1.5.6 Beneficiaries of Ngitili restoration

In order to establish the beneficiaries of Ngitili restoration, it was also important to identify what forms of access are available for whom and for which type of Ngitili. It was also important to identify who benefits more than others from the Ngitili process.

From the study area it was observed that ownership and tenure rights give people the right of access albeit according to the rules and regulations guiding such access. For example, certain kinds of communal management of Ngitili allow the whole commune freedom to access resources in the Ngitili area without restraint. This is a system carried over from traditional ways of maintaining Ngitili as evident in Mlenge (2002).

There are several success stories directly related to the Ngitili restoration efforts such as that of Jim. Jim of Seseko village (Shinyanga urban) sees a close relationship between having a well-managed Ngitili and his success in educating his children up to Higher Learning Institutions. His daughter has completed University education and is now working in Dar es Salaam. His son is in Form One in Moshi Secondary School. Jim said "I have not gone to school at all therefore I work hard to educate my children... my Ngitili assists me, … I fatten my cattle there and therefore they fetch a good price when I sell them. Then I use the money to educate my children" (Seseko, 21/07/2004).

Other benefits include community solidarity, expressed in terms of protecting boundaries of common resources.

3.3.1.5.7 Community Solidarity

One of the most important common benefits from Ngitili is the common desire by community members to maintain common access resources. In many ways, increasing land shortage areas of Ngitili for common access. As expressed in Chambala village (Meatu) "these days we have built friendship between livestock owners and those who do not have livestock but own Ngitili. We do not fight over grazing grounds because we have accepted that everybody should be able to access Ngitili. We therefore see the Ngitili issue as benefitial to us since it has reduced disputes over grazing lands" (Chambala, 03/08/2004)

Yet, although there are definitely common benefits across people of different socioeconomic and sociocultural status in the communities, there is a difference between and within the members of each group in terms of the nature and opportunity to benefit

from Ngitili restoration and management. The most obvious differences can be traced by gender, and socio-economic differentiation.

3.3.1.5.8 Gender and Ngitili restoration and management

Ownership in terms of gender indicate that most of the ownership patterns and access to Ngitili and its related resources have evolved from rigid patriarchal influences of the Wasukuma, the dominant ethnic group in the region. According to this system, women in many cases do not have control over land or key household resources (Shinyanga, 1998). However, in several communities it was expressed that women have more freedom these days in not only having access to Ngitili products but also owning Ngitili. Although in most cases spoken with an additional 'if the man consents' attitude, some women in Mbiti village (Bariadi district) said that women can control Ngitili with her children 'if the husband passes away', and she can even participate in planting trees in the household's Ngitili which she will have the freedom to harvest later.

A women's group in Mwamunemha village (Meatu District) contended that a woman usually handles her late husband's Ngitili for her children until the eldest son is able to take formal charge. In the the meantime, the woman will have ultimate decisions on the use of Ngitili resources. This is not the case always since land=grabbing by a deceased man's relatives also happens, as was explaind by a woman in Businda village (Bukombe District) whose In-laws took the land she had since she did not have male children and sold part of the land while the rest was given to her late husband's nephews. The right to dispose the Ngitili is also not the womans' in most communities. Women therefore can have access to Ngitili through the following ways:
- Ownership from inheritance of husband's estate, although normally, male heirs would be given preference in ownership of areas, to which their mothers and sisters may have access rights.
- Own purchase – this system is becoming common but has depended on economic capacities
- Given by father – not common cases, but increasingly, fathers are seeing the value of giving daughters ownership of land, contrary to customary expectations.

Married women in all socio-economic categories seem to be the most disadvantaged in terms of control of Ngitili. Normally, they also do not have the final decision making on harvesting resources from Ngitili. But there are possibilities of joint management by husband and wife/wives. In the view of a man of Mbiti village (Bariadi District), this system of joint management of Ngitili usually takes place in the form of the women being asked or putting forward their demands of Ngitili resources to the husband. Petty demands do not involve much consultation - such as fuel wood that does not need cutting down trees. In most study villages it was established that women control the collection of fuel wood and vegetables and a married woman can consent on other people doing the same in her husband's Ngitili. For a married woman who wanted to make charcoal or needed timber, however, she had to get her husband's consent. He said,

> I can consult with the family especially my wife when in need of harvesting Ngitili products, or if my wife has a need she requests me. But the overall power rests on the man. Every football match has to have a referee, and the referee is the man (Mbiti village, Bariadi District, 13/08/04).

Women in most of the study villages seem to agree that gender differences in Ngitili ownership related resources are inevitable, as one of them said, "since the land is owned by

men, the wife cannot decide to harvest certain products without the man's consent. Even areas for cultivation are allocated by the man!"

Gender differences in access to Ngitili are also reflected by the division of labour as well as how men and women make differential demands to Ngitili resources. In most villages, it was established that men's primary need for Ngitili was timber, fodder for livestock and land as capital. Women wanted fuel wood, fruits, vegetables, fodder and grass for thatching. Women can have access to these products from communal or household Ngitili, but the rigid division of labour requires them to rely on the services of men for some of the products. A woman in Businda village (Kahama District) who acknowledged that they are now accessible to abundant supply of grass for thatching commented, however, that "cutting grass is a man's responsibility. This is tradition. If a woman is seen cutting grass for thatching, people may find her strange" (Busindi village, Kahama District). Therefore, most women, especially those in single headed families are compelled to buy grass for thatching from men who trade in this product. Women also get good fuel wood from the left over branches of trees when timber is being produced.

3.3.1.5.9 Differential uses and control over products

The tendency for benefiting in different ways is increasingly becoming common, particularly because of different needs of Ngitili products. Men, it was established, normally benefit from added timber harvests, which women do not have control over. But women gain from easier availability of fuel wood. For example, women are usually able to collect tree branches when timber is being produced. Gender divisions also remain rigid in the division of labour, making some individuals unable to benefit from the added opportunity of getting adequate fodder or adequate supply of grass for thatching. A woman in Businda village (Kahama) acknowledged that they now have access to abundant supply of grass for thatching. However she commented that "cutting grass is a man's responsibility. This is the tradition. If a woman is seen cutting grass for thatching, people will find her strange" (Businda, Kahama)

3.3.1.5.10. Socio -economic differentiation and benefits from Ngitili

Socio-economic differences between households have some implication on the degree to which a particular household may benefit from restored Ngitili. Major aspects that determine difference include landholding sizes that either allow or restrict a household to demarcate areas for Ngitili, be able to rent or give temporary grazing rights to other people, or benefit from Ngitili products. Although the Tanzania Household Budget Survey (2002) indicates that Shinyanga Region has the highest landholding average in the country, as is illustrated in Table 3.3.3 below, what was established in the study is that actually there is a wide range of difference in landholdings in the Region. The range may be from 0 to 300 acres in individual holdings.

Table 3.33:   Mean area of land owned in Shinyanga compared to neighbouring Regions

Description	Tabora	Shinyanga	Mwanza	Tanzania average
Mean area of land owned across all rural household (acres)	6.8	14.1	6.8	5.3
Percentage of rural households owning any land for farming or pastoralism	96%	90%	90%	89%
Mean area of land owned by rural households that own any land (acres)	7.1	15.6	7.6	6.0

Source: Tanzania Household Budget Survey (2002), Table C:26.

In the Focus Group Discussions many villages estimated about 30%-40% of their households as having between 0 – 1 or 2 acres of land[5]. This group include the destitute such as the elderly, or widows. Box 8 illustrates Mwashegeshi village representatives estimates on socio-economic groupings.

Box 8: Mwashegeshi's population in different socio-economic categories (by household)

i) High Income Category (15%)
        -own 10-200 heads of cattle
        -have more than 10 acres of land
        -food secure throughout the year
        -employed (government)
        -never work as labourers
	(iii) Low Income Category (55%)
	        -No cattle
	        -about 2 acres of land
	        -about 5 goats/sheep
	        -food insecurity
	        -usually work as labourers for food

(ii) Mid-Income Category (25%)
        -own between 1-9 heads of cattle
        -have abourt 2 acres of land
        -have just enough food. No stores
        -never work as labourers
	(iv)Destitute (5%)
	        -the elderly, disabled
	        -food insecure
	        -poor dwellings
	        -cannot work

Ownership of land is therefore not so common as statistics based on aggregates may illustrate. However, individual ownership of *Ngitili* – even having a one-acre sized *Ngitili* has enabled some people to earn more cash or increase their livestock herd. The result is thus more income for those with bigger portions of land. Resourceless people, who do not have individual *Ngitili*, neither the resources to buy land for one, settle with what they can get from communal Ngitili. A woman in Mwamnemha village, (Bariadi District) from the poor household category explained (Box 9):

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[5] One of our respondents explained that "some people do not have Ngitili because they do not have land, others do not have the capability to purchase land, while others own land located in poor areas that cannot be ideal for grazing – poor vegetation eg those located in rocky areas. People live this way not because of deliberate measures by the village but it has just happened according to the way in which opportunities are availed to each individual differently" (Chambala village, Meatu District).

Box 9: Access through cash, or favours.

I do not have direct access to a Ngitili, neither do I have the money to purchase land so that I could be able to establish one. I do not even have cattle that I could use as capital. People with Ngitili in this village are the rich who have capital and a lot of cash to enable them to do so. I therefore purchase some of the needs that I want from other Ngitili. If I want to purchase grass for thatching I have to pay TShs 200 per bundle. If I want land for cultivation I have to rent a piece for TShs 12,000 per acre. I am sometimes given these products free of charge, but this is very rare. I also buy insecticides when I need to cultivate cotton. (Mwamunemha, Bariadi District)

For a household in the well-off category, the experience is usually quite different as explained before.

There is an increasing tendency of some of the well-off people buying land from less economically endowed households, and therefore, extending the imbalance in land holdings and ownership of *Ngitili* in future. In Mbiti village (Bariadi District) for example, the sale of land usually takes place in the form of exchange whereby people with large herds of cattle but small individual grazing land thrive to buy land from farmers with sizeable but agriculturally unproductive areas for cultivation. The best times for land sales are during prolonged dry spells, when many households suffer from food insecurity, and some of them become compelled to sell pieces of their land to ward off hunger.

The freedom to accumulate land among the less endowed people is minimal since they normally use their land carefully, trying to balance the existing resources with their current production and consumption patterns. Most land is therefore, allowed for cultivation, especially for paddy and cotton. Less acreage is left for fodder, in most cases, on fallow land, not for *Ngitili*. The temptation to sell land off as a safety net is therefore high in some cases (Mbiti village, Bariadi District).

In addition to these benefits accruing to the individual or individual households, *Ngitili* restoration has also generated communally appreciated processes. These include the desire to hold on to common resources, and a general appreciation of improved environmental resources and value.

Restoration and management of Ngitili have benefited people in many ways. Many households speak of improved livelihoods through added incomes; an increasingly reliable access including availability of wood products; increased capacity to handle other household needs such as children's education, health etc. These benefits have to a large extent reached people of all socio-economic categories, albeit in different ways. One person summarised these benefits saying:

> Benefitting from Ngitili is not a straightforward thing – many factors are responsible especially for a family that breaks the poverty line into a situation of well-being. For example, some families benefit from healthy cattle because of good supply of fodder, other households benefit from beekeeping in a well-kept *Ngitili*, while other people have been able to acquire cattle through the sale of grazing rights to livestock keepers. In addition, some people have been able to start brick-making businesses after their *Ngitili* had matured and therefore provided enough fuel wood for the purpose (SHinyanga, 14/08/04).

There are significant benefits at community level. For example, under Mwambegwa village's rules (Meatu District), a person is charged a mchenya (fine) of TShs 10,000 or 5 heads of cattle if he feeds his cattle without permit into another person's Ngitili. This fine is one bag of cement for ever 5 heads of cattle if the offence is on the village or hamlet Ngitili. Usually 50% or sometimes 1/3rd of the total amount is submitted to the hamlet's treasurer for community businesses such as financing development projects.

For the year 2004, the village earned TShs 265,000/- from mchenya collections including those from selling grazing rights to outsiders temporarily. The village was therefore able to contribute TShs 30,000/- for the Uhuru torch (mwenge), and to purchase 15 lorry (tipper) trips of gravel for construction of the Primary Schools' toilets. The District Council provided them with the tipper free of charge. While such benefits have been people's immediate incentives for management, other aspects that may have pushed them into managing Ngitili include the opportunity of reducing vulnerability to impoverishment for people of different social statuses in communities of Shinyanga. With regard to changing socio-economic conditions in the country, and people's increased vulnerability to impoverishing shocks and processes such as declining crop prices or frequent droughts, Ngitili have offered to many families an increased capacity to maintain their livelihood choices, opportunity for diversification, income generation and, generally, as a safety net in times of crises.

These opportunities have been made possible by upholding most of the traditional systems of access to Ngitili resources. One of them is giving people access to Ngitili resources, albeit in accordance to certain regulations as documented by Mlenge et al, (2002). Even those without Ngitili benefit to some extent. A woman in the low-income category in Chambala village (Meatu District) explained how she was able to survive through other people's Ngitili (Box 10);

Box 10: Surviving ….

She does not have an individually controlled Ngitili because she does not have resources to buy land. With increasing scarcity of land, even a small piece of land may be worth up to 10 heads of cattle. Therefore she can only protect a few bushes around her homestead that serve as protection for her chicken from eagles. Her father has a small *Ngitili* and therefore it is not likely that he may offer her a piece, "neither does he want to help me with cultivation, although he has oxen. He says I have to be independent"

It is also not easy to get oxen from friends' husbands for ploughing my field since I do not have an equally worth asset to reciprocate [as has been explained above]. She therefore participates in communal weeding which is performed by hand and rotates to the fields of those who weed together. In this case she said"I do get people to help me because I can reciprocate by working in their fields too. When they work on my field I give them porridge, ugali and green vegetables, while in some of my colleagues' homes, a goat is usually slaughetered for the occasion".

But she collects fuel wood, vegetables, sticks for the house and grass for thatching from the Ngitili of neighbours which she is given free of charge. Only when she needs poles for house construction which she has to pay TShs 500/- per tree or TShs 300/- for a piece of wood. "I am also usually permitted to collect 3 bundles of fuel wood from some neighbours, some of which I sell @TShs 200 a bundle at the market in Bukundi. Therefore although I do not see a chance for having *Ngitili* of my own, I get a small income which I may use to purchase food or clothing. I also work with my neighbour whose economic status is similar to mine. We often prepare farms for planting, earning TShs 3000/- between the two of us. It takes us 5 days to prepare on hectar

3.3.1.5.11 Incentives for management

The incentives that people have for management include their ability to maintain their livelihood choices, opportunity for diversification, income generation and generally as a safety net in times of crises.

Access without ownership: Assured access to products of communally managed Ngitili is the most immediate incentive to manage Ngitili among community members. This is because by virtue of being a member of a particular community, people can pursue their livelihood choices – for example, livestock keeping and exploitation of forest products such as timber and fuelwood consumption. Communal Ngitili have made it possible for single women in poor households in Shinyanga urban to keep livestock successfully as the following example in Box 11 illustrates.

Box 11: Access to Ngitili resources without control.

Anne of Ilagala hamlet at Seseko village (Shinyanga urban) is a widow with a land holding of five acres. She has a small house (*tembe*) and one improved heifer obtained through a programme run by the Roman Catholic charitable organisation, CARITAS in Shinyanga. The heifer was acquired as a loan on condition that she had to meet a down payment of TShs 18,000.00 charged to everyone who gets that support. She got money for the down payment from rice sales that she had saved.

Anne does not have a Ngitili, neither did she attach much value to her Hamlet Ngitili because, according to her, she did not have to, since she got all her household requirements such as fuel wood and charcoal from her late husband's farm. Before she got her heifer, she was not very keen in watching over the hamlet *Ngitili*. The trees in her husband's farm are now finished. But she has free access to the communally owned hamlet *Ngitili* where she is currently getting fodder for her animal. Like the others who are keeping improved heifer breeds, Anne is also practicing zero grazing; thus she has to fetch fodder for her heifer. Looking at these benefits she is now playing a more active role in guarding the *Ngitili*. She is indeed benefiting from the communal N gitili now (Seseko village, Shinyanga Urban 21/07/04).

3.3.1.5.12 Changes over time

In some ways, people acknowledge that the benefits of Ngitili have been changing over time. People were able to recall initial experiences in benefits at around 5-7 years since the establishment of Ngitili, that is, when Ngitili products could be harvested for household income generation. At this stage, Ngitili as a resource, and not only for subsistence living began to be realised. Ngitili as a resource is however realised more by individuals owning private reserves, where the rules for resource exploitation can be controlled better, and individual gain is more meaningful.

However, apart from the increased access to and availability of fodder and tree products needed for household sustenance, almost all communities mentioned a sharp increase in wildlife, previously depleted or disappeared after the degradation of the natural environment.

3.3.1.5.13 Increase in wildlife populations

People mentioned an increase in the population of hyena, rabbits, deer and wild duck compared to the case about 10 years ago. The increased numbers of these animals has however brought both positive and negative impacts. On the positive side, people mentioned that they get meat from wildlife. Small size animals like deer, hare, wild pig, dikdik, birds and hyena are seen in increasing numbers within Ngitili. Conversely, the

communities are experiencing difficulties especially in areas where some animals are causing destruction of crops and killing livestock (goats, sheep and cattle.).

A well-off farmer/businessman of Mbiti village in Bariadi district said " *Majirani zangu wananichukia kwa kuwa wanyama kutoka kwenye Ngitili yangu wanaharibu mashamba yao. Pia fisi wanakamata na kula mifugo*". (lit . neighbours hate me because my Ngitili harbours wild animals that destroy crops and kill their livestock (Mbiti, Bariadi).

Respondents of Nyashimba village in Maswa district singled out hyena as a nuisance animal in the area by saying, "in August 2004, hyena killed 11 goats of one family just in a single day. A farmer from Mwambegwa village had the same concern about the impact of wild animals particularly the hyena

3.3.1.5.14 Extension of traditional credit systems

Giving temporary grazing rights to outside people in return for a cash payment have boosted the traditional credit institution called *ifogong'ho*. The *ifogong'ho*, is an institution common to all communities in Shinyanga, and has been used to give credit and assistance to people in need. With regard to the improved Ngitili in Seseko village, (Shinyanga Urban District) that attracted many livestock keepers from outside, the village was able to get a lot of money in payment. Part of this money is placed under the ifogong'ho institution and administered by the Ngitili Committee. With increased capacity to lend, Seseko village's ifogong'ho was made accessible to many people who were in need of cash. Rules for borrowing from the ifogong'ho credit institution allow every community member access, and demand that a borrower pays back his/her dues in time, otherwise the interest charged is multiplied. No interest is charged for a person who needs money to meet funeral costs, a small interest is charged for the sick, and maximum interest is charged for those who borrow for business purposes.

3.3.1.5.15 Seasonality and safety net functions

Restored Ngitili has also cushioned people during times of crises in many ways. Reminiscing of the last couple of years that Shinyanga had an unusually long dry spell, a man from Chambala village commented that they were able to survive from selling Ngitili products to other less advantaged communities or households. He said,

> Many of us sold fodder and bought food from the proceeds. In that respect we have named *Ngitili* Mkapa or Mkombozi. And when you see that the grass has flourished, you realise that it is like a tree you planted now bearing fruit"(Chambala village, Meatu District, 03/08/04).

The seasonal availability of some Ngitili products also provide certain types of vegetables and fruits that become useful when there is shortage of other kinds of food. Women mentioned that they collect mushrooms during the rainy season, when other vegetables are not in season. Grass for thatching on the other hand provides some men an income during the dry season since the product is collected only during this season. Yet, although there are definitely common benefits across people of different socio-economic and socio-cultural status in the communities, there is a definite difference between and within the members of each group in terms of the nature and opportunity to benefit from Ngitili restoration and management. The most obvious differences can be traced by gender, and socio-economic differentiation.

3.3.1.5.16 Household food security

In some communities, access to Ngitili has made it possible for vulnerable households to cushion themselves from food insecurity in a number of ways. These households include those of the elderly, widows and asset-less households (cattle being regarded as the most important asset in this regard). Well-kept Ngitili usually provided various species of green vegetables during the rainy season that people collect freely. In addition, since many such households do no have the capacity to prepare their own fields for cultivation due to lack of oxen, some communities may assist cattle-less households (traditionally regarded as the poorest households) in ploughing their fields. In Mwambegwa village (Meatu District) households without cattle usually permit grazing in their Ngitili in exchange for the services of oxen for ploughing their fields during the cultivation season.

The drought of 2003 also led many vulnerable households to desperation, but ngtili resources were used to ease the hunger. An old man in Mwambegwa village (Meatu District) explained that when he requested for assistance from the Village Government he was given permission to collect 4 bundles of fuel wood and 3 poles for house contruction from the village Ngitili that he sold and was able to buy food. He later received assistance from World Vission Tanzania and did not disturb the Village government again.

Seseko Hamlet's Chairperson (Seseko village) explained that the hamlet has a system that allows households without cattle to have their fields ploughed upon request. This task is usually performed in exchange of the household feeding workers who will perform this task. Such reciprocal relationships have their roots in Sukuma traditions whereby disadvantaged households are usually assisted in times of need. In Ngaganulwa village (Meatu District) an elderly woman who survives from making pots said that neighbours usually pity her and offer her oxen free of charge during cultivation season. But the prevalence of a money economy has eroded the meanings of such traditions, and reciprocity is no longer favoured. In order to cushion such households from further impoverishment, the tradition has been adopted by the Seseko Hamlet Ngitili Committee to serve the same purposes. Another way through which such households reciprocated such assistance was to be in the forefront in attending to other activities such as planting or weeding in other people's fields. On the occasion that an able-bodied person did not participate in such communal activities he or she was charged a fine of TShs 1000/-, or a fine of TShs 500/- for late attendance to the task. These regulations were upheld by the Ngitili leadership
(Box 12)

Box 12: Individual management rights for special cases

An 85 year old frail woman who lives in Seseko village (Shinyanga urban) with her grandchildren, owned a 4 acre plot located within the Village Ngitili. Early in 2003, she requested the Village Government to allow her to manage individually her portion of the area so that she can get an income from selling fodder individually. The Village Government discussed the issue but failed to reach a consensus, and denied her request. The lady then decided to present her case to the Shinyanga urban District Commisioner.

On receiving this request, the DC adviced the Division Secretary to look into the matter, who in turn requested the Village government to review the issue again. After another session, the Village Government decided to cut the portion as she requested, and she was given 2 acres out of her area. During the dry season in 2003, she lent grazing rights to one investor who paid her a sack of maize. In 2004, the lady has granted grazing access to one of the rich men in Seseko in exchange of 2 sacks of maize.

The lady is appreciative of this system because since being granted individual rights to manage a portion of the Ngitili, she has stopped asking the Village Government to support her with food and other needs

For this lady, her choice of Ngitili was realised through a struggle, indicating that local structures of governance have in a way some say in the individual choices people may place on Ngitili management.

3.3.1.5.17 Community Solidarity

One of the most important benefits from Ngitili restoration and management is the common desire by community members to maintain common access resources. In many ways, increasing land shortage has minimized the availability for areas of common access Ngitili, just as much as it has threatened individual land holdings, especially because of inevitable fragmentation due to population increases. This threat has compelled many communities to appreciate the relevance of communal Ngitili because it is through them that many households get their needs for fodder, thatching grass, fuel wood and other products. Therefore many people openly declared that they willingly guard their Ngitili and even elderly members mentioned that they inform local authorities when they see encroachers grazing cattle in their communal Ngitili. Managing the Ngitili needs cooperation and community solidarity even between the haves and have-nots. A member of Chambala village said,

> these days we have built friendship between livestock owners and those who do not
> have livestock but own Ngitili. We also do not fight over grazing grounds because we
> have accepted that everybody should be able to access Ngitili. Therefore we see the
> communal Ngitili as benefitial to us since it has reduced disputes over grazing lands
> (Chambalavillage, Meatu District, 03/08/2004)

Apart from the increased availability of wood products, Ngitili restoration has also had 'multiplier effects', such as stimulating the increase in wildlife populations in the area. In the study villages of Bariadi district, people mentioned an increase in the population of hyena, rabbits, gazelles, wild pig, birds and wild duck compared to what was the case 10 years ago. Their increased availability has however had both negative and positive aspects. It is much easier for people to get meat proteins from wildlife to supplement their diet.

Unfortunatley, the increase in hyena has had a negative impact on livelihoods in the District. Despite his well-earned income from Ngitili, a well-off farmer/businessman of Mbiti village in Bariadi district said that his Ngitili is becoming a nuisance to neighbours

and other villagers. He complained that "My neighbours hate me nowadays because my Ngitili is harbouring a lot of animals that destroy their crops. The hyena, in particular, is also killing people's livestock" (Mbiti, Bariadi District).

Maswa District residents reiterated this complaint against increased population of hyena. Explaining that restored Ngitili has increased the population of hyena and its associated nuisances. According to a resident of Nyashimba village in Maswa district, "in August 2004, hyena killed 11 goats of one family in just a single day".   A farmer from Mwambegwa village in the same district also had the same concern.

3.3.1.5.18 Cultural values associated with restored woodlands

People's appreciation of an improved environment was also quite obvious. To some of them, such as traditional healers, an improved natural resource base enhanced their already favourable social status in the local community, while to others it was the attractive aesthetics developing from restored environment that was appreciated.

3.3.1.5.19 Increased aesthetic value

People appreciate the environmental beauty gradually being revived through restored woodlands. An old man in Ngaganulwa village said, "it is important that people maintain their Ngitili since they improve one's sight of the environment – *kukua kwa mazingira kumependezesha macho* (Ngaganulwa village, Shinyanga Urban District, 27/07/04). Mwambegwa villagers in Meatu District commented that "the area where our village *Ngitili* is located was once bare land, an area where we used to have traditional (*ngoma*) dances. It is now very different"

3.3.1.5.20 Spiritual values

It is also customary for local people to perform certain rituals in respect of traditional rulers (Watemi), particularly when they need rains or individual pursuits. These rituals are performed at the grave yards of these Watemi. These grave yards are usually within dense forest – pori - that had developed through natural regeneration. This is so because when a Mtemi dies, he is usually buried in an open area that becomes reserved as sacred. In the process natural vegetation grows around the graves. Nobody is allowed to cut trees in the site for the belief that the culprit will witness strange happenings such as lion, leopard or snakes in the area. Even honey collection is not allowed. Such pori can be found at Hungizwa-kanegere and Bulangwa in Bokombe District, in Masabe area in Kahama District … and the pori called Lyanda lya Baloha that is in Kahama District Lyamba lya Baloha' is a 3950 hectre woodlot, estimated to be the largest in Shinyanga. Measures and regulations to encourage natural regeneration has built up this practice.

3.3.1.5.21 Medicinal

Restored woodlands have also improved availability of medicines and herbs. This has meant that Traditional Healers and Medicine men/women can get more medicines for treatment; an aspect that has siginificantly raised their social status. In communities of Shinyanga where traditional healing takes a siginificant proportion of local people's health-seeking behaviour, and not only because of the lack of money, the increasing availability of local herbs, shots, tree barks and leaves has indeed been a boost in this regard. This is in

addition to the fact that people in the low income category also benefit from the cheaper availability of herbs for those ailments that they can administer on their own.

In many communities, it was established that local Traditional healers do not always own a privately managed Ngitili. A Businda village resident said,

> Traditional Healers and Medicine men/women usually do not have their own Ngitili or pori that would suffice them with their needs for herbs and other kinds of medicine. Most of those in Bukombe go to Maswa Game reserve or to Iramba District in Singida Region for that purpose. The indiscriminate felling of indigenous trees had affected their trade very much, and this is because most of the species needed for healing became depleted – such as *mhimula* … that is used a luck portion for people aspiring to be public figures such as politicians.

However, many of the healers are satisfied for being able to access the herbs and trees available within the community – this implies being able to collect them from anybody's Ngitili. According to a healer in Seseko village, their needs for herbs and other kinds of medicine are normally huge and they are usually 'guided by revelations' on where to get them. This is usually within their immediate neighbourhood, but as this healer explained, it is normally not always possible to get the right herbs in just one area.

But this tendency has made some of them unpopular, making some Ngitili owners disgruntled on the self-styled freedom that these healers have in collecting or digging for herbs in other people's property as expressed by a woman from Wendele who said:
> Traditional healers are intruders; they do not seek for permission from us to collect herbs from people's Ngitili. Worse is that when they uproot a tree or plant – they do not cover it again with soil, causing environmental degeradation (Wendele village, Kahama District)

Local people are now becoming highly aware of their roles in protecting their areas, irrespective of the common understanding that healers can 'dig anywhere for the common good'. One of the healers in Iwelyangula community explained how he was apprehended by villagers in a neighbouring community for digging part of the roots of a tree to which he was 'directed' by the spirits. It was established that some of the disgruntlements were due to the fact that these healers get their permits directly from the District Cultural Officers without consultation of local people.

3.3.2 Institutional aspects related to restoration and management of woodlands

This section makes an assessment of current institutional arrangements related to Ngitili restoration and management in Shinyanga. It builds upon the discussion above on their significance in terms of upholding the tradition of natural resource management in the region. Increasing land shortage and declining pastures for common access were among the major reasons that encouraged many of the communities in Shinyanga Region to re-institute the Ngitili system, albeit with some modifications as introduced by HASHI. What is also interesting is the apparent over-lap in responsibilities between traditional institutions and modern systems of governance responsible for Ngitili management. This over-lap has actually served to strengthen management rules and regulations, as people usually adhere to the ideals of both, tradition and modern ways of managing resources.

3.3.2.1 Current institutional arrangements for Ngitili management

In almost all villages, it was observed that there is a rich mixture of traditional and modern institutions in managing Ngitili. Although each community has its own institutional arrangements, these institutions normally work together albeit with different powers as the experience in Wendele village (Kahama District) illustrated below in Box 13 indicates.

Box 13: Different arrangements for different ownership

Wendele village in Kahama District has Ngitili managed at hamlet level and individually owned reserves including some under the Primary school. Management patterns of these Ngitili are different. Individual *Ngitili* are managed by their respective owners, school *Ngitili* by the school committee and the hamlet one is communally managed but under the guidance of the Hamlet leadership. The Village government however has overall influence on all of these structutres since they all fall under its administrative jurisdiction, although it has not laid down any rules governing Ngitili management. The Baraza la Wazee is the one that has instituted regulations regarding access to Ngitili, such as instituting fines called *mchenya* on any violator. However, Baraza la Wazee does not involve itself with individual *Ngitili*. Therefore individual owners have to take full responsibility of their management.

In cases where an individual Ngitili has been violated, it is the responsibility of the owner to take the matter to the Hamlet leadership, which in consultation with the Baraza la Wazee agree to the kind of charges the offender should be accountable to.

Mlenge (2002) has documented the central role played by traditional Sukuma institutions – especially the Dagashida, in regulating access and control of natural resources in the area. The Dagashida, however, despite its prominence in documented literature was in this study observed as existing and functioning only in Bariadi District. Erosion of the strength of Dagashida in other areas may have been due to the more modern nature of establishment of some of the villages, such as those formed under Ujamaa villagisation, that brought together people of different socio-cultural backgrounds. In such villages, the strength of tradition was based on a mixed combination of integrating cultures with modern approaches to management.

Within this regard, Ngitili management in most of the villages are organised under the Baraza la Wazee (Elder's Council), Serikali ya Kijiji (Village Government), Kamati ya Ngitili (Ngitili Committee) and the Sungusungu6, each of which was in one way or the other directly responsible for Ngitili management. Figure 3.3 below illustrates the hierarchy and relationships that exist between these institutions in those communities where they both exist. In the relationship, the Village government remains the key institution, making public decisions on Ngitili management, although Baraza la Wazee still commands great respect among community members, and to which the Village Government usually seeks for consultations on how such decisions should be met. Figure 3.7 below illustrates the hierarchy of these institutions in terms of Ngitili management. Figure 3.7 also illustrates an ideal situation that envisages a smooth integration between traditional institutions with modern ones in maintaining the Ngitili restoration process.
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6 Sungusungu is the name of a traditional security institution formed by the youth in a Sukuma community. It has its own structures of command like any army or police force. Powers and mandate of this guard has survived for generations and is currently acknowledged as a *bona fide* security institution by the government.
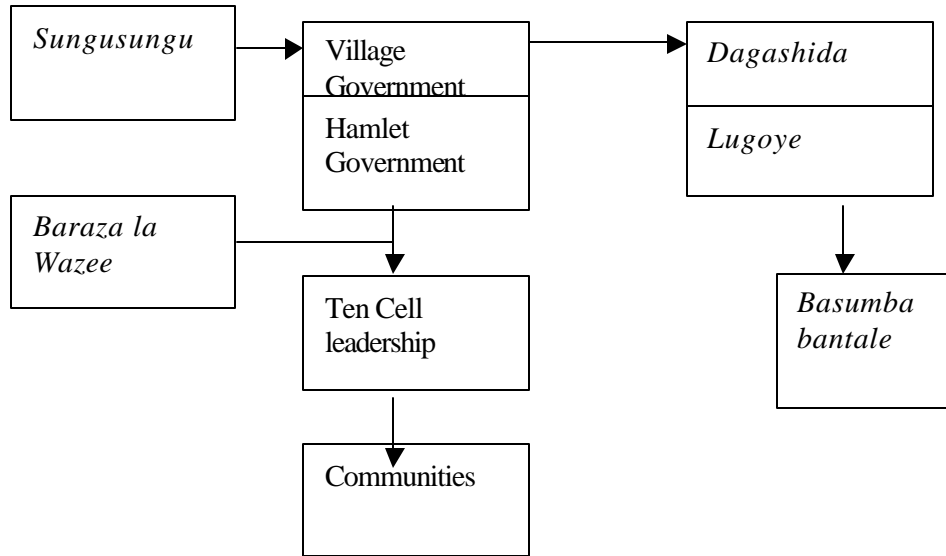
Figure 3.7: Institutions responsible for Ngitili management in communities illustratingintegration between traditional and modern management bodies

This arrangement as depicted in Figure 3.7 is not common to all villages, but it illustrates the harmonious integration of activities between traditional institutions with modern ones. This harmony has also been made possible by finding the same functionaries serving different institutions in the community. For example, some Sungusungu are also Hamlet leaders or members of the Village Government. Therefore, it is usually the case that decisions will be upheld. A brief description of the roles of each is provided in the subsequent section (3.3.2.2).

3.3.2.2 Traditional/indigenous institutions

3.3.2.2.1 The Dagashida

The Dagashida which was referred to by villages within Bariadi district is an annual village assembly of all male members in a community irrespective of age. Opportunity to voice concerns in this assembly is allocated according to age, where members are allowed to speak, beginning with the youngest members, and going up the age hierarchy ending with the eldest male members of the community. The Dagashida is led by a [wise] old man, Nyangogo, who is chosen among Village community elders.

Oral accounts establish that traditional roles of Dagashida had been mobilising and overseeing cultural events, such as organising local dances (ngoma ya lilida). It also operated as an institution for arbitration for disputes between individuals. These roles have now been adopted to respond to the modern needs of Ngitili management such as participating in making decisions on Ngitili demarcation, enforcing rules regarding access and as an arbitration forum for disputes about Ngitili.

3.3.2.2.2 *Wasumba Batale*

Basumba Batale comprise of a group of middle-aged men whose responsibilities include apprehending wrong doers. Most of the communities in the study area have such a traditional force, except a few whose formation brought as members people of different cultural backgrounds, as was the case with Seseko village in Shinyanga Urban District. This heterogeneity did not foster the perpetuation of some of the practices for Ngitili management.

3.3.2.2.3 *Baraza la Wazee* (Elders' Council)

The Baraza la Wazee operates as a mediator between traditional and formal institutions. This Baraza is also called upon to advice formal institutions such as the local Ten Cell leadership and Hamlet leadership. In some cases, they act independently making decisions that need not to be endorsed by any other body but are usually accepted and adhered to. For example, in Wendele village (Kahama District), where the council is represented in Hamlet leadership, the Baraza may influence ways in which it believes Ngitili could be rightfully managed.

3.3.2.2.4 Sungusungu

Sungusungu is a traditional guard, an exclusive men's group responsible for the security of communities and their properties. While occasionally accused of taking the law too far, its mandate includes protecting community property and taking (disciplinary) action in case of an offence (such as theft). One of the issues entrusted to Sungusungu is mobilising for and leading in controlling wild fires whereby a kalulu (call) would be heralded summoning all people to attend to the incident.

Sungusungu have also been entrusted to ensure that encroachment by 'outsiders' on Ngitili is contained. Usually it is the Sungusungu who monitor and oversee that the rules and regulations for use of Ngitili are upheld by local people and outsiders, a responsibility that was found to be common in all of the study villages (IUCN, 2002).

3.3.2.3. Modern/Government Institutions

Formal institutions, most of which fall within the framework of the Local Government Structure, include the Village Government, Hamlet leadership and *Kamati ya mazingira* (Environment Management Committee). Establishment of these bodies is mandatory according to Local government legislations (Table 3.34).

3.3.2.3.1 Environmental Committees (*Kamati za Mazingira*)

Kamati ya Mazingira is an institution whose formation was established by a Ministerial Directive in the 1990's to give responsibility to local communities for protection of their local environment7. Every village in the country is encouraged to have a Kamati ya Mazingira, but practically it hasn't been the case, even in Shinyanga Region, where one would expect their prevalence in their area due to HASHI's significant impact on

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[7] This was a directive by the Ministry of Natural Resources and Tourism that intended to promote local participation and responsibility in environmental management.

environmental conservation and promoting the establishment of these committees. Those villages that have a Kamati ya Mazingira, draw their representation from each hamlet in the village, a certain percentage of female representatives and key persons who may have influence in environmental management. Through this system it is expected that local ownership and responsibility in environmental management will be achieved.

However, Kamati ya Mazingira have not been established in every village. Mwashegeshi village (Maswa District) and Mbiti village (Bariadi District) which are HASHI supported villages, for example do not have such institutions. What would have been their roles are therefore conducted by the Village Government's Committee for Safety and Security and Dagashida. The same was evident in the non-HASHI villages of Busindi (Kahama District); Iwelyangula (Shinyanga urban), Chembeli and Nyashimba (Maswa District) who used the same systems to resolve Ngitili management related conflicts.

What was evident however was that in some of those communities where both institutions existed, subtle conflicts existed between the Kamati ya Mazingira and other institutions – especially fuelled by over-lapping mandates or ill-defined roles. This seemed to be a result of the 'forced' establishment of the Kamati in these communities, irrespective of the prevalence of traditional systems and which unfortunately received HASHI sympathy more directly. In one of the study villages, the role of the Kamati was mentioned with some hostility, especially because of it taking over parallel roles to traditional institutions – in this case, Baraza la Wazee and Sungusungu. Such negative attitudes towards formal institutions are not isolated in Shinyanga such as was the case for dissolving of Mwendakulima Village Environmental Committee (Kahama district). In this village, the responsibilities of the Committee had to be replaced by one of the Village government's official committees, the Economic Services Committee. This was a result of local dissatisfaction over an imposed body in their administrative system.

3.3.2.3.2 The Village Government

The Village Government is currently the key Local government institution responsible for local governance. The Village Government also has the ultimate mandate to establish and institute local By-laws and to take to task any person charged with violating these By-laws. Although there is much respect on traditional institutions of management, in some cases, the Village government leaders, especially the Village Executive Officer, are called to intervene, especially when disputes between individuals could not been solved through other means. In those cases where village powers are insufficient to control an offence, the Village government is usually responsible to take the case further, such as by appealing to higher Government authorities in seeking for justice for its community. In one incidence, Mwambegwa village of Meatu District lodged a complaint to the Ward Development Committee (WDC) about encroachment on its Ngitili by livestock keepers from nearby villages (31/07/04). What ensured was a follow-up by the WDC and warning to the other villages on such encroachment.

Table 3.34 Existing institutions at local level: Village environmental committees, Hamlet Ngitili committees and hamlet baraza councils in both the HASHI and non-HASHI villages.

District	Village	Village environmental committee	Hamlet Ngitili committee	Hamlet elders cou	Remarks
Shinyanga Manispality	Seseko (HASHI)	-	Exist and is very effective	-	
-do-	Ilwelyangulu (non-HASHI)	-	-	-Hamlet elders involved in conflict manegement	All village elders are responsible in conflict management
Shinyanga rural	Ngaganulwa (HASHI)	Exist and effective	-	-	
-do-	Chembeli (non-HASHI)	-	-	Exist effective	Elders decide on Ngitili management
Bariadi	Mbiti (HASHI)	-	-	-	Have dagashida
-do-	Mwamnemha (non-HASHI)	Exist and effective	-	-	Supervise tree planting
Kahama	Wendele (HASHI)	Exist but not effective fro 2003.	-	Exist and very effective	-
-do-	Busindi (non-HASHI)	-	-	-	
Meatu	Mwambegwa (HASHI)	Exist and effective	-	-	Enforce rules and regulations
-do-	Chambala (non-HASHI)	Exist but not active	-	-	-
-do-	Mwashegeshi (HASHI)	Peace and security committee	-	Hamlet chairman and elders council	Balozi is also involved in resolving Ngitili conflicts
Maswa	Nyashimba (non-HASHI)	Peace and security committee	-	Hamlet chairman and elders council	Balozi is also involved in resolving Ngitili conflicts
Bukombe	Busindi	Exist and effective	-	-	
-do-	Bulega (HASHI)	-	-	-	-

Hamlet Leadership: This is one of the arms of the Village Government administrative system, the lowest body in the hierarchy but closest to people in terms of communication and mobilisation. Hamlet Leadership is usually the most effective in management of community resources especially because most people tend to sympathise with this system especially when it has meaning to their livelihoods. Ngitili under Hamlet leadership were in several comunities in this study found to be the most well-kept as the following example illustrates.

Box 13:   Seseko Namlet's Ngitili Management Committee

Seseko Hamlet's Ngitili management committee was formed in 2003 and democratically elected through hamlet meetings. Despite the democracy demonstrated in the process of instituting the committee, women in leadership positions had to be greatly coaxe d.

Reasons for establishment of the Hamlet Ngitili included the lack of equity among community members in sharing resources (mainly fodder) in the village, and reducing pressure on the village Ngitili. The committee deals with day to day management of Ngitili and handling of conflicts. Any trasspasser is fined mchenya by the committee. It is also the committee's responsibility to close the ngiliti when the time is ripe, and to plan and allocate grazing paddocks to ensure its members access to fodder in a systematic way. lans (*paddocks*). This committee also makes final decisions on when and in what manner grazing rights to 'outsiders' could be given.

By-laws: Irrespective of this range of structures concerned in one way or the other with Ngitili management, what is coomon is that they both abide to the same rules and principles regarding Ngitili. Many villages have also established local by-laws that cater for Ngitili uses and management whose provisions are upheld by each structure.

Iwelyangula community (Shinyanga Urban District), similar to most of the others in the study area, has formally instituted By-laws to protect its Ngitili. One of them states that anybody caught mis-using the area is fined TShs 10,000/- if the person is an outsider, or one goat of it is a local person. These By-laws had been officially approved by the Ward Development Committee in the year 2000.

3.3.2.3.3 Enforcement of rules and regulations

Existence of the range of institutions notwithstanding, the enforcement of rules and regulations guiding Ngitili management begin at the individual level. At this level, the individual is responsible for protecting an individually owned Ngitili, chasing away encroachers, or giving access to neighbours or other people (on request). Some of the By-laws that have been approved by the respective District Councils are provided in Table 3.4 below.

Table 3.4:   Some By-laws on Ngitili management in elected villages.

	Village	Activity	Explanation	Measures
1	Nyashimba	Grazing livestock in another persons' farm, Ngitili or the village Ngitili (HASHI)	Every individual is requested to graze one's livestock in the approves areas. It it prohibited for anybody to feed livestock in the school area, in the village Ngitili (HASHI) or in an individuals' Ngitili	Anybody proved guilty of contravening this regulation will have to compensate the destroyed crops and pay a TSH 5000/- fine
2	Mwashegeshi	To cut a tree without permit in the village Ngitili (HASHI), to establish a farm; grazing cattle in the Ngitili;	Fine of TShs 20,000/- for each offence
		to start a fire	Taken to court
		To cut a tree without permit in the village Ngitili (HASHI), to establish a farm; grazing cattle in the Ngitili; to cut grass without permit	Fine of TShs 5-10,000/- depemdig for each offence
		to start a fire	Fine of 20,000/- or taken to court
3.	Mwambegwa, Meatu District	Grazing cattle in village Ngitili	Fined a bag of cement for every 5 heads of cattle.
	Bulega,	Starting a fire	Fine of TShs 5000/- or taken to court

In the view of a Villager in Chambala (Meatu District), the current political era under Mkapa is regarded as 'utawala wa sheria' (lit: rule of law) and therefore all regulations regarding environmental management have to adhere to formally instituted laws. This understanding was evident in most communities illustrated by their attempts to institute By-

laws regarding Ngitili management or environmental protection in general. The person said,

> *In the past there wasn't any system of seeking arbitration when somebody offends you. If a person catches somebody who has trespassed into his Ngitili, a fight usually ensues and they may exchange blows. This system has now declined resulting from leadership of the current government under President Mkapa that insists on the rule of law (Chambala village, Meatu District, 03/08/2004).*

Commenting on the advantages of individual management, one of the respondents said "one has more freedom in managing individual Ngitili than participating in the management of a common Ngitili, because interests and commitments to it's management may clash", to the extent that it may affect the rules for use of the Ngitili. Only in the case of practices that are out of control such as for hard core encroachers where an individual may appeal to the Hamlet or Village authorities. People complained that despite the powers that traditional institutions have locally, formal institutions are more sympathetic to individual demands than the response they usually get from traditional ones.

At the communal level, things are different and regulations for Ngitili management are enforced by Sungusungu who report to the Baraza la Wazee. This body, working in collaboration with Hamlet leadership, usually institute sanctions accordingly to people who go contrary to Ngitili rules. This common approach to Ngitili management has not however, meant that enforcement of rules is most effective where you have communal Ngitili. What was established was that even communaly managed Ngitili can sometimes be subjected to abuse or mismanagement despite the common support for their establishment given in most cases.

One advantage of adhering to communal principles for preserving woodlands was the possibility to extend such control even to other woodlands that were maintained for other purposes such as rituals and related customary practices. This was usually not the case with government established forest reserves. For example, there was evidence of an almost complete breakdown of forest or tree management principles where institutional incoherence was the case. The study team found out rampant abuse of the Lushimba government forest reserve located near Bulega village in Bukombe District. In this village, the only well-kept Ngitili belong to two households that had demarcated part of their land for woodland conservation purposes. Established on the western border of Lushimba forest reserve, these two households had been able to accumulate large tracts of land for cultivation and for preservation. Their Ngitili have controlled rules of access – especially for tree felling or cultivation. Otherwise grazing rights are open to the community. The government reserve, on the other hand, is frequently abused and there is widespread harvesting of forest products in the area. This was because of absence of strong village leadership in the area that would have otherwise commanded other institutions to assist in management of the area.

3.3.2.3.4 Synergies, collaboration and conflict

There are significant differences among the villages regarding ways in which these institutions harmonise their roles, and the degree to which community members adhere to or respect the powers of these institutions. In many cases communities have been able to

integrate or carry over the functions of traditional institutions within modern systems of natural resorce governance. In other places, the two remain separate but work in harmony, as Seseko village's experience illustrates below (Box 14):

Box 14: Working together

In Seseko village, the relationship between the various institutions responsible for Ngitili management does not reveal any open competition; instead, there are all indications of bodies complementing each other in their responsibilitis. For example, in the case of of access to hamlet *Ngitili*, each Hamlet Chairperson [who is under the local Village government structure] endorses the permission for [*wawekezaji*] investors to use the Hamlet Ngitili. The Chair also observes that security of both the community and investors is maintained in the process by involving Baraza la Wazee and Sungusungu [which are traditional institutions] in decision making and security. The village government gets 50% of money earned from sales of grazing rights at hamlet level Arbitration of conflicts arising from Ngitili mismanagement involves both Baraza la Wazee and Hamlet leadership.

The same is the case with Iwelyangula village, also in Shinyanga Urban District, whereby the Hamlet government consults the Baraza la Wazee on most matters concerning the village. The Hamlet Government also recognizes the existing hierarchies established by tradition in running its affairs. Thus they work closely with the Sungusungu and Basumba Batale on such issues.

This experience is different in other villages, usually associated to the processes of establishment of formal institutions as briefly discussed above. When the villagization programme was introduced in 1970s, village governments took the lead in Ngitili management. Most of the private or household owned Ngitili collapsed because of the notion of ujamaa, where private property was abolished and communal systems overrode relationships to natural resources. Ardhi ni mali ya umma (lit: land is common property became a popular adage. Land re-allocation led to loss of individual household Ngitili and croplands, and private Ngitili became banned by the government in favour of communal Ngitili. In the process, traditional systems of individual Ngitili management gradually eroded. By 1976, individual Ngitili were completely eroded in some villages such as in Mwashegeshi village (Maswa district). Some communities, however, kept on their systems of managing communal Ngitili, allowing traditional institutions to work with formal local government structures in the process.

Yet, in some villages, the influence of Government on traditional systems of governance was so strong that even individuals refused to be subjected to traditional sanctions. Mwambegwa village leaders (in Meatu District) recalled the famous case of one of the Mwambilija (a local leader) in the village who oversaw the sustainable utilization of a Ngitili in one of the village's hamlet – Budakama, and was once subjected to the court of law after demanding a goat from a trespasser as a fine. The trespasser complained that the Mwambilija did not have the right to charge him using traditional laws and therefore took him to court. The Mwambilija was in turn fined a goat for not adhering to formal procedures in containing wrongdoers. After this incidence he never charged a trespasser on the Ngitili again (Mwambegwa village, Meatu district). But currently, many villagers are increasingly falling back to traditions, and particularly their respect to Baraza la Wazee. The systems that prevail therefore comprise of different arrangements at different levels of management.

3.3.2.3.5 Institutional conflict and conflict resolution mechanisms

When the villagization programme was introduced in 1970s, village governments took the lead in Ngitili management. Most of the private/household Ngitili collapsed because of the ujamaa notion (A*rdhi ni mali ya umma*) - that is, land is common property. Land re-allocation led to loss of household Ngitili and croplands. Private Ngitili were banned by the government in favour of communal Ngitili and gradually the traditional procedures for Ngitili management were abandoned. By 1976 individual Ngitili were completely eroded in some villages such as in Mwashegeshi village (Maswa).

The influence of government on local governance was so strong that even individuals refused to be subjected to traditional systems of sanction. Mwambegwa village leaders recalled the famous case of the Mwambilija of Mwambegwa village (Mwambegwa, Meatu), it is recalled that the Mwambilija who oversaw the sustainable utilization of a Ngitili in one of the village's hamlet – Budakama, was once subjected to the court of law after charging a trespasser a goat. The tresspasser complained that the Mwambilija did not have the right to charge him using traditional laws and therefore took him to court. The Mwambilija was in turn fined a goat. He never charged a tresspasser on the Ngitili again (Mwambegwa, Meatu). Yet, in many cases people are increasingly falling back to traditions, and particularly their respect to the Council of Elders.

3.3.2.3.6 Institutional challenges

There are considerable synergies between institutions responsible for Ngitili management in HASHI villages, and in many of the non-HASHI villages. Yet there was evidence of an almost complete breakdown of forest or tree management principles where institutional incoherence was the case. The Bulega village experience is one of such cases where only a couple of households actually maintained land for woodland conservation purposes. Established on the western border of the Lushimba Forest Reserve, these two households were able to accumulate large tracts of land for cultivation purposes and for reservation. These are the only two areas currently subject to individual rules of access – especially for tree felling or cultivation. Otherwise grazing rights are open to the community. The lack of Government presence in the village has added to the freedom of using the abundant forest products in the reserve and within the village.

3.3.2.3.7 Formalization of rules and regulations

In the view of a Villager in Chambala, the current political era under Mkapa is regarded as *utawala wa sheria* (lit: rule of law) and therefore all regulations regarding environmental management had to be backed by formally instituted laws. This understanding was evident in most communities illustrated by every villages attempt to institute By-laws regarding Ngitili amanagement or environmental protection in general.

> *Siku za nyuma kulikuwa hakuna utaratibu wa kupelekana kwa waamuzi. Akipatikana mtu amechungia Ngitili ya mwezake bila ridhaa ya mwenyewe mapigano yalifanyika. Tabia hii ya kupigana iliisha wakati utawala wa Mkapa ulipoanza 1995 ambapo sheria ilianza kuchukua mkondo wake (Chambala,*

03/08/2004) (Lit: In the past tradition required everboy to avoid taking anybody who had committed an offence to a hearing. Quarrels and fighting were frequent when one individual trespassed into another person's Ngitili. Such behaviour involving quarrels has declined as a consequence of the present day Government of President Mkapa revitalization of the rule of law).

People can therefore be subjected to formal legal institutions. Some of the By-laws provide for fines.

3.3.3 Socio-cultural and institutional challenges to restoration and management

Despite the strengths that an elaborate institutional framework has brought into Ngitili management, other factors threaten the sustainability of Ngitili restoration and management. Key among these factors that threaten the erosion of the natural resource base and hence Ngitili, include, population growth rate vis-à-vis available land holdings, land scarcity, and weakneses in conflict resolution mechanisms.

3.3.3.1 Population growth

Shinyanga is currently experiencing a rapid population growth. This growth has meant increased needs and pressure on scarce resources including Ngitili. One of its implications is the demand to redistribute land resources especially to family members when they have to start independent lives. Sons, in particular would demand land for agriculture, which sometimes is acquired through clearing of already established Ngitili, thus threatening its sustainability. Expressing such an inevitable situation, one father in Bulega village said, "pori langu la ekari kumi linakodolewa macho na vijana wangu wanne ambao karibuni wataoa na watajitegemea" (lit: my 10 acre woodlot is being eyed by my sons who are soon to get married and be independent – Bulega village, Bukombe District 24/08/2001), implying that he will have to redistribute what is available and therefore end up with less acreage under his control.

Land redistribution in some communities has increased the possibility of the quantity of Ngitili increasing year after year, but whose average sizes is smaller and therefore difficult to manage as a Ngitili.

3.3.3.2 Land scarcity

Fragmentation and increasing land scarcity, particularly for households in the low income category was seen to be the biggest challenge to Ngitili restoration and management. In cases where a household ends up having pieces of land distributed in different areas in the village, it was possible for one to identify one of the pieces for Ngitili, but in practice, this fragmentation complicates the establishment of Ngitili because of management challenges. The experience of a resident of Mwamunemha village (Bariadi District) illustrates this challenge (Box 15).

Box 16: Fragmentation and increasing land scarcity

Mr. Lameck of Mwamunemha village in Bariadi district has five pieces of land that amount to 23 acres. He has however not been able to establish Ngitili on the grounds that, his land is made up of spicies located in different places that are surrounded by crop fields belonging to other people. This is a result of inheriting plots in different places and purchasing some in different areas in the village. Unless an agreement is made on how to harmonise the different uses of land with the owners of land plots that are close to his, managing a Ngitili that would occasionally allow grazing near somebody-else's farmland is usually dangerous.

3.3.3.3 Impact of urbanization

There is also pressure coming from urban expansion. In such cases, Ngitili that have been established close to urban centres are under pressure resulting from high demand of woodland products such as charcoal and fuel wood for household consumption and for small industry such as brick making. There is a thriving brick making industry in Businda village, Bukombe District (Box 16).

Box 16: Urban demands and threats to restoration and management

In one of NAFRACs planning meeting held in October 2004 in Shinyanga, a former Meatu HASHI District manager, Mr. Pastory Mwesiga explained that, one of the biggest threats to *Ngitili* restoration and management in Meatu was the increasing tendency of local people to meet urban demands for charcoal and fuel wood. This practice has significantly multiplied the rate of harvesting trees for charcoal production and brick making, and therefore a continuing threat to conservation of natural woodlands..

Other villages in the region are also pressurized to supply mining settlements in the region with fuel wood from Ngitili. Although this practice enables them to earn an income, the threat to Ngitili remains the same. Interviews with HASHI staff indicated similar concerns.

3.3.4.4 Inappropriate production practices

Despite measures to sensitize people on the hazards of using environmentally insensitive production practices, such as the 'slash and burn cultivation' or using smoke in collecting honey, frequent bush fires have threatened many woodland reserves in the region. Wild fires, either caused by charcoal makers, traditional hunting, honey collectors and by people clearing land, have been serious threats to Ngitili management. For example, in year 2002, about ten out of 200 acres of Mr. Masele Kidai's Ngitili of Nyashimba village in Maswa district were destroyed by such run-away fires. Similarly, the honey harvesting period in Mwamunemha village (Bariadi District) is usually rampant with runaway fires.

In Wendele village (Kahama District) people complained of making ropes for house construction. An aggrieved person said "people take off the bark of young trees in order to make rope. The ropes are for house contruction. But this practice threatens the growth of these trees and people cut the barks even in other people's Ngitili without consent"

3.3.3.5 Livestock populations versus land holdings

Increasing livestock populations are pressing too much demand on available grazing land to the extent that encroachment is becoming increasingly common. Conflict related to such encroachment is, therefore, common and was reported in every village. The following example illustrates the extent of conflict in some villages (Box 17).

3.3.3.6 Change of management objectives

The freedom that one has in deciding on the use of individual land is also a threat to maintenance of Ngitili, especially when a person decides to change land use to cater for a need that is seen as more beneficial – such as house construction or clearing land for cultivation.

This was established in some villages whereby due to poverty or as a result of the recent drought in Tanzania, some people had been forced to sell part of their Ngitili to meet family needs especially food security. In Busindi village (Kahama District) in the year 2002, many households became forced to sell fuel wood and charcoal to Kakola mining settlement also in the district in order to buy food during the drought period. This led to significant cutting of trees in preserved woodlands. The rate of cutting decreased the following seasons when crop production improved.

In those areas where people sell land, some of the land was sold at very low prices to the extent that many households cannot make a come back later and buy land to compensate for their loss of family assets in previous experiences.

3.3.3.7 Institutional weaknesses.

Institutional shortcomings have also threatened Ngitili in some of the villages. One of the key factors under this concern is weaknesses in local capacities to influence the law in their favour. For example, in cases where local communities are in conflict with communities that command greater political clout, it is usually the former that is disadvantaged. A serious conflict over encroachment was experienced by Iwelyangula community in Shinyanga Urban District where the communities' Sungusungu came to the brink of a war in order to protect their Ngitili area that was being destroyed by uncontrolled cattle grazing. Unfortunately the Ward authorities did not respond in their favour, as the following account by Iwelyangula's Chairperson in Box 18 below illustrates.

Box 18:   Lack of political influence – Iwelyangula villagers against Shinyanga town cattle keepers

this time would have otherwise been spent in doing other income generation activities.

The encroachment has also reduced the availability of fodder for oxen that are normally grazed in the area in preparation of the following cultivation period, one of the local people's main livelihood activities.

The villager's realise that the encroachment may be because they do not have a formalised land use plan, and being just in the vicinity of the town, they can be victimized by land grabbers. Some time ago, the leaders of Shinyanga Region's Livestock Keepers Cooperative (SHILICO) submitted a plan that indicated their need to take much of Iwelyangula's land in order to establish a modern ranch. Noting the deceit underlying the plan, Iwelyangula's local people demanded in turn that land allocation should first take into consideration all of the village's residents including their children, and propsed that the rest of the land (if any) can then be taken by the cooperative. SHILICO's leadrs have not come back since.

Lack of common rules and regulations governing even individual or privately owned Ngitili is also a constraint, because some people tend to abuse principles of conservation in their own woodlands due to their freedom to do so. For example, some farmers of Busindi village in Kahama District reported rampant felling of trees in some of the private or household based Ngitili mainly because they were not subjected to a restraint instituted by law or local government. This freedom, or lack of concern on individual Ngitili especially by traditional institutions such as Baraza la Wazee is a threat to sustainability of Ngitili that some villagers identified.

4. CONCLUSIONS AND RECOMMENDATIONS:

4.1 Conclusions

The main conclusions from the study are as follows:

Despite some variations in species composition between the districts, two major vegetation types are easily distinguished. These are bushland (*Acacia, Dalbergia*, and *Combretum* bushlands) in Shinyanga Urban, Meatu, Bariadi and Maswa districts (eastern side of the region); and regrowth miombo woodland in Kahama, Shinyanga Rural and Bukombe districts (western side of the region). Generally the regowth miombo vegetation had higher stocking, basal area, volume production, and tree species diversity compared to the bushland. The dominant tree species in terms of volume per ha in the surveyed Ngitili are: *Acacia tortilis, Acacia tanganyikensis, Acacia senegal, Acacia mellifera, Acacia kirkii, Acacia seyal* var. fistula, *Acacia drepanolobium, Acacia sieberiana*, and *Acacia polyacantha*. Other non-Acacia species are: *Commiphora africana, Dalbergia melanoxylon, Combretum zeyheri, Cordia sinensis, Pterocarpus angolensis, Diplorhynchus condylocarpon* and *Albizia harveyi*. Regenerants are generally few and are dominated by *Dichrostachys cinerea* and *Omorcapum trichocarpum*, which are indicators of degraded areas. Grass and herb cover is also generally low and is dominated by grass species, which are indicators of degraded sites. Individual Ngitili are well defined and of better quality in terms of wood stocking and tree species diversity compared to communal Ngitili.

Stocking in terms of volume per hectare and tree species biodiversity reveal no significant difference between HASHI and Non-HASHI supported villages. Ngitili have restored the hitherto degraded landscape of Shinyanga region particularly in Shinyanga Rural, Maswa and Meatu districts. There are not clear indication that the restoration is sustainable and worries linger on when it is observed that both human and livestock populations are rapidly increasing with a surging demand for biodiversity resources from the recovering land scape. A considerable variety of animal species have emerged or re-emerged in the restored woodlands as a consequence of the habitat provided by Ngitili. There are greater chances of finding animals in communal than individual Ngitili because the latter are more intensively used and are in most cases smaller than the former. Despite the growing number of animals as a consequence of Ngitili, tourism potential is still low. Damage caused by animals from Ngitili is substantial sometimes compromising the value of benefits from Ngitili. Besides providing habitat for animals, Ngitili has opened doors for breeding ground of some seasonal bird species.

The values of economic contribution of goods and services from Ngitili to household and village economies in Shinyanga Region are significantly high. The values of these economic benefits are higher for Kahama and Bukombe Districts relative to the other districts in Shinyanga Region due to relatively higher stock of trees influenced by better climate. The flora inventory carried out in sampled Ngitili in these districts confirmed this situation. The values for Bariadi district are also high due to the higher level of Ngitili awareness brought by political campaigns. The retrospective cost benefit analysis carried out at 10 percent discount rate using value of benefits from the time before woodlands restoration and the present situation shows a positive present value for the entire Shinyanga Region. The utilization of benefits from Ngitili to improve people's livelihoods has a multiplier effect generated through improvement of security for social services and improvement of sustainable land use management through increased capacity of household to purchase farm inputs for farm production. The value of benefits from Ngitili per person in Shinyanga Region is estimated at TSh. 14,046 (USD 14.0). This is higher than the national average consumption per person of Tsh. 8,500 (USD 8.5) per month in the rural areas of Tanzania. The impact of the HASHI project in Shinyanga Region has been positive. The values of economic contribution of goods and services from Ngitili disaggregated between households in HASHI areas of concentration and households outside HASHI areas of concentration showed that in five out of seven districts of Shinyanga region (71%), higher values were realized from HASHI areas of concentration than from areas outside HASHI concentration. The high level of awareness in these areas and the HASHI support in various forms can explain this situation.

The value of the contribution of benefits from individual Ngitili is higher than from the communal Ngitili because households showed a higher propensity for consumption of goods and services from their own individual than communal Ngitili. The reason is that individual Ngitili are amenable to less regulation relative to communal ones. Furthermore, communal Ngitili are sometimes closed down in order to either enhance natural regeneration or as a way to defer benefits to meet future household or vilage contingencies.
Across Shinyanga region the value of benefits from Ngitili assessed for individual products vary across districts. Products used for construction of houses, charcoal and wild foods have higher value relative to other products from Ngitili in Kahama and Bukombe districts due to abundance of wood relative to other districts. Similarly wood works have higher value in these districts than in others. The values of other products are influenced by factors of locality but they seem to be comparable across the region.

Most Ngitili in their present form were established after HASHI was launched in 1986. The size of Ngitili is the function of land scarcity in Shinyanga (Urban) and Shinyanga (Rural) districts; ease of access to natural forests in Kahama and Bukombe districts and huge livestock populations in Meatu, Maswa and Bariadi districts. Values of benefits from Ngitili are to a large extent influenced by many factors such as age of Ngitili, size of Ngitili, stock of flora and fauna, education level of the owner, household size and gender. These factors are highly correlated but individually affect value of benefits from Ngitili. Statistical analysis through multiple regression analysis showed that the factors that significantly affect the value of benefits from Ngitili at 5 percent level of significance, assuming comparable stock levels are: age and size of the Ngitili. Assessment of the improved economic well being at the household and village level shows that the value of benefits from Ngitili has increased possibilities for diversification of household livelihood strategies by improvement of security of social services, enabling households to hire in labour, engage in local petty business, pay different fees, increase nutrition levels, improve diet, health and housing condition. Values from timber and non-timber products have been used for construction of classrooms, healthcare centres and village offices. Wild foodstuffs from Ngitili constitute an important ingredient of household diet. Herbal medicine is critical in treating some diseases locally believed to be curable only by herbal medicine. Ngitili has significantly contributed to improvement of health services (USD 8.90 per household per year). Easy access to thatch grass has improved local housing condition. Raised water table and dry season springs have improved water availability. On the negative side, vermin in form of wild animals has caused considerable damage to crops while some carnivores mainly hyenas have frequently killed livestock.

Assessment of contribution benefits from Ngitili as a result of reduced effort for collecting forest products shows that household labour demand has to a considerable extent been reduced and the saved labour is deployed in other social and economic endeavours. The monetary value per household per day for the reduced effort in collecting various Ngitili products in Shinyanga Region was found to be: USD 0.70 for firewood collection, USD 0.50 for collecting poles, USD 0.80 for collecting fodder, USD 0.55 for thatch materials collection, USD 0.30 for collecting withies, USD 0.30 and USD 0.34 for domestic and livestock use water respectively. One outcome is adoption by males of roles traditionally perceived as female roles hence promotion of gender balance and reduction of female workload. Other positive outcomes are improvement in child-care and children school attendance including payment of school fees and other school-related contributions (USD 22.90 per household per year). Assessment by broad groups of species of the direct values to the household and village economies shows that the high direct values from Ngitili come from fuel wood, fodder or livestock forage, timber products, woodcraft and medicinal use. Fuel wood use which is non-specie s specific, is met from the largest broad group of species. The low direct values from Ngitili come from wild foodstuffs (e.g. bush meat, fruits, vegetables), thatch grass, fencing material, shade and shelter. Fencing which needs durable prime species is met from the smallest broad group of species. The high direct value broad groups of species deserve emphasis to maximize value of benefits from Ngitili. Establishment of a standard mechanism for valuing different products is a matter that requires further study to adapt existing methods or establish a different mechanism. However, for the purpose of this study valuing of timber and non-timber products was effected through a pragmatic approach that applied a combination of methods to captured as close as possible, the actual value of each product. A combination of methods used are: inventory; market analysis; secondary information on usage per year, month, week or day; expert evaluation and recording of quantities consumed at household level. Market

opportunities identified in Shinyanga Region include: access to local markets and customers; diverse variety of tradable products from Ngitili; free training by HASHI and World Vision; high level of awareness on natural forest conservation; freedom to make land management decisions.

Market constraints include: traditional free grazing; land scarcity; highly degraded land and forests, widespread illiteracy and poverty; harsh and dry weather condition; destructive animals, fire and sabotage; unwise and irresponsible use of communal resources; gender imbalance in land and tree tenure and ownership; lack of or narrow market for some products; conversion of Ngitili to farms; free exploitation of Ngitili by local herbalists, and ineffectual village environmental committees. Market prospects include: growing market opportunities due to expansion of towns and infrastructure; increasing diversity and value of Ngitili products; intensification of Ngitili management; increasing awareness on natural forest conservation; establishment and registration of more Ngitili, improvement and diversification of people's livelihoods and rise in incomes. Generally, Ngitili restoration has indeed multiple benefits as far as people's livelihood security is concerned, and has raised the standards of living of people within a range of social statuses. Innovative people who have been able to circulate income from Ngitili into other production processes or children's education have been among the highest beneficiaries. The challenge therefore becomes how to make these gains sustainable by minimising the erosion of the natural resource base by the several arising challenges.

Generally, Ngitili restoration has indeed had multiple benefits as far as people's livelihood security is concerned. To a great extent Ngitili has enabled many households to raise their standards of living of people irrespective of social status. Innovative people who have been able to circulate income from Ngitili into other production processes or into children's education have been among the highest beneficiaries. Other benefits include an appreciation on the improved natural environment and aesthetic value. Comments such as "this place was full of dust with only one tree in the middle of the village" illustrate that people have appreciated the value of restored woodlands. There is also a strong indication that these benefits are changing over time as people can now have access to previously depleted products such as wildlife, and therefore opening opportunities for recreation or income from tourism or hunting. There is also a strong sense of ownership in the process of restoration and management of Ngitili. For example, community members have been involved, or at least informed on the selection of species for restoration – the choice being more personal in individually owned Ngitili. For communal Ngitili such involvement has been mostly conducted through representation by the institutional mechanisms available to people.

Local ownership of the process is exemplified by the commitment found in some of the villages towards maintaining Ngitili. The collaboration between institutions related to Ngitili management indicates a strong local context in pursuing Ngitili restoration and management, although there is a heavy reliance on traditional institutions for enforcement of the related rules and regulations. This situation could be so because these traditional bodies, such as the council of elders cut across all hierarchies established by government and can sympathise with people of many categories in their communities. Therefore, the

prevailing institutional frameworks have enabled local people to pursue their demands for holding on to resources and be their primary beneficiaries.

The challenge therefore becomes how to make these gains sustainable by minimising vulnerability of the socio-economically disadvantaged community members, who sometimes cannot avoid letting go off their pieces of Ngitili in exchange of their survival, and, the erosion of the natural resource base by several arising challenges. A major challenge is containing fragmentation of communally managed land into smaller individual holdings that become vulnerable to exploitation or being bought of by other people. Instead of experiencing widening socio-economic differentiation, vulnerable households have to be supported using the same old practices of cushioning them through support, and minimising the degrees to which they have to sell of their land with Ngitili. Another challenge is by strengthening and instituting the rights of local people to hold on to their land. This is possible is every community is enabled to have its own land use plan, and therefore have the clout to make demands when the need arises.

4.2 Recommendations

The following measures at different levels society and administration are recommended:

Strict observation of by-laws is necessary to ensure that Ngitili are properly managed (intensification of management for both individual and communal Ngitili). In dense Ngitili, appropriate tree management regimes (cutting frequency and pruning intensity) to promote fodder production should be studied. Further studies are still needed on seasonality of biodiversity and on insects and other smaller animals in the study area. Application of satellite imagery and other remote-sensed data is still needed to track changes in the study area over time. The sustainability of Ngitili restoration and management is dependent on addressing several socio-cultural and institutional aspects that threaten the erosion of the natural resource base and hence Ngitili. Key among these are population growth rate vis-à-vis available land holdings, land scarcity and weakneses in conflict resolution mechanisms. The sustainability of Ngitili restoration therefore rests on the nature of the institutions currently entrusted with the management responsibility, and the degree to which they can keep on winning community trust in this mission. An important aspect here is enabling people to hold on to land resources so that they could maintain Ngitili and enjoy its products. The benefits of woodland restoration (Ngitili) through natural regeneration in Shinyanga Region are obvious. There is need to scale up this approach by dissemination to other places with similar or related problems.

Capture and use of lessons of experience from development initiatives other than those with which HASHI have worked in Shinyanga Region. Diversification of market for products from Ngitili through small-scale processing to diversify and add value to products from Ngitili. Investment in local Ngitili-related economic ventures by active involvement in enterprise development leading to improvement and enhancement of skills in business management. Wise use of both individual and communal Ngitili by instituting financial instruments that result in equitable sharing of the costs and benefits of damage of Ngitili by fire or unauthorized deliberate human action. Promotion of safety net functions of Ngitili for coping with household and village contingencies. Improvement of traditional uses of Ngitili while promoting non-traditional uses of Ngitili. Promotion of household's access to markets locally and beyond by timely provision of relevant market information in order to maximize benefits from Ngitili. Documentation, repackaging and dissemination for use by

local people, of relevant Ngitili-related innovative research achievements. Removal of barriers to Ngitili establishment, development and management. These include perverse legal incentives such as punitive laws and regulations; and centralized issuance of logging permits presently needed for one to harvest protected tree species in own Ngitili. Promoting management and use of high value broad groups of species. Promotion of benefits from Ngitili with maximum multiplier effect. Capitalization on existing local and formal institutions to promote Ngitili. Carrying out further research on mechanisms for valuing products whose valuation is still unclear with conventional methods especially for non-market goods and services. Carrying out research in adding value to products from Ngitili and other forest resources.

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ANNEXES:

ANNEX 1: TERMS OF REFERENCE FOR THE STUDY

Ngitili – Contributing To Improving Livelihoods and Enhancing Environmental Security in Shinyanga, Tanzania

Terms of Reference For A Study On The Social, Economic And Environmental Impacts Of Forest Landscape Restoration In Shinyanga Region, Tanzania

(Ngitili Socio-Econ&BD Study-final.doc; draft 4/12/03; EB)

## 1.	Introduction

Shinyanga Region is situated in North Western part of Tanzania at about latitude 2º – 5º South and Longitude 31º -35º East.   The region covers about 50,781 km of which 43,722 km is arable land and 7 042.2 km^2 are official forest reserves. The region is characterized by detached hills, great craggy masses of sharply angled rocks, "Mbuga" plains which are flat and undulating, and covered with low sparse vegetation.   The altitude varies between 10000m and 1500m above sea level.   Climatically, the region falls under the semi-arid zone of the country with mean annual rainfall ranging from 600 mm in the east to 1200 mm in the west.   The region is divided into 7 administrative districts, and occupied by the agro-pastoral Sukuma people.   According to the 2002 census, it has a human population of 2,805,580 which average growth rate of 2.9% per year, and a population density of about 35/km^2.

The people practice agro-pastoralism, and the average land area per household is 3 ha. Over 90% of the region's population live in the rural areas and practice substance farming. However crops yields are low due to increasing soil infertility, yet very few people   apply animal manure in spite of its abundance. Cotton and tobacco are the main cash crops while sorghum and maize are the staple crops.   In addition, such crops as paddy rice, sweet potatoes, cassava, beans, finger millets and groundnuts are cultivated.   Livestock keeping is very important for the people.

The   Hifadhi Ardhi Shinyanga (HASHI) programme was established in 1986 to address severe land degradation problems in Shinyanga Region.   This study will therefore explore the impact of project activities so as to document best natural resources management practices, and learn lessons for other parts of Tanzania with similar conditions, In addition, the study will assess how forest and land restoration have improved the livelihoods of the people and contributed to poverty reduction.

## 2.	Goal, Hypothesis and Objectives

While it is clear that very large areas of Miombo and Acacia woodland have been restored on individual farmer's land and on communal lands in Shinyanga, it is less clear as to the real and tangible benefits these   restored woodlands have provided, in terms of household

economies and strategies. A range of important goods and services have been identified, but these are not yet quantified in terms of their economic contribution, or how they reduce household labour four instance. Equity considerations have not been analysed as to how having such forests reduces the length of time women have to spend collecting tree products for example.

Such household and village level analysis is required in order to demonstrative the importance of forest restoration and tree based natural resources to the economies of local people, and as a strong case study to demonstrate the importance of environmental goods and services in terms of poverty reduction strategies at a national level. This will provide a strong robust and empirical case study for Tanzania (and other countries), at an important time which Tanzania is starting to mainstream the environment in national economic and development planning , and ensuring that the environment is responsibly integrated in the PRSP process. This will also be a demonstration of one way by which Tanzania is contributing to the Millennium Development Goals and to the outcomes of WSSD.

The assessment will test two hypotheses, namely that

1.   Community based woodland restoration has contributed significantly to the socio-economic and ecological values of Shinyanga Region; and
2.   Traditional institutions are very important in the promotion of sustainable woodland management in Shinyanga Region.

This detailed assessment has the following has the following major objectives of carrying out.

1.   A detailed and statistically robust analysis of the contribution of the restored woodlands to household and village economies;
2.   An analysis off the impact of such restoration on household labour budgets, and equity; and
3.   An analysis of the biodiversity that has been restored.

The following board activities will be undertaken
1.   A rapid appraisal of the restoration effort to define in detail the parameters of the detailed assessment;
2.   Implementation of the detailed assessment by a team with economic, social and biodiversity skills (See section 3 for the details);
3.   Presentation of the assessment of a high level meeting in Dar es Salaam; and
4.   Publication of the findings by the Forestry and Bee-Keeping Division of the Ministry Natural Resource and the Eastern African Regional Office of IUCN

This assessment will be implemented by a team of independent consultants. Emphasis will be placed on gathering high quality information which is robust and statistically strong, rather than on trying to survey too many villages and households in the region. The study will be managed by the Forestry and Bee-Keeping Department of the Ministry and Natural Resources and Tourism, and IUCN-EARO through a small steering group. If funding permits this study will try and obtain satellite imagery for certain selected areas and villages in the study area, and tract changes through time (ideally from before 1986 to the present).

Indeed it might be possible to take some aerial photography similar to what was taken in the later 1980's.

3.   Detailed Terms of Reference

3.1   *General and Biodiversity*
1.   Carry out an assessment of Ngitili in a random (statistically) and stratified (by district and age) sample in Shinyanga region;
2.   Assess the scale and extent of Ngitili (individual, group, village) within villages in terms of their numbers and size;
3.   What woody species have been actively restored and why (and establish% composition and frequency of occurrence)?
4.   What other flora have re-established (scale, % cover);
5.   What fauna have re-established in the Ngitili (scale, %);
6.   Which species (whether tree or non-tree based) are people (farmers, men, women, children, others) using and not using – for what purpose;
7.   What uses did people think they would use their Ngitili for, and now what are the actual uses? And
8.   Overall assessment from a biodiversity perspective of the restored Ngitili for, and now what are the actual uses? And based natural

3.2.   *Economics*

1.   Assessment of the overall economic   contribution of Ngitili at both the household and village levels, and the implication of this on sustainable land use management. This may require a smaller sample to enable a more detailed economic survey to be carried out;
2.   Assessment, by broad groups of species, of the direct values to the household and village economies. These broad groups would include, but not be limited to timber based products, medicinals, foods and fruits, and livestock forage;
3.   Assessment of the contribution of Ngitili as a result of reduced effort to collect certain products, for instance fuelwood?
4.   Assessment of the increased and improved economic well being at the family level in terms of nutrition (quality of diet), health (use of medicinals, children), improved housing and seasonal use of Ngitili products (safety net functions, products used in dry and drought time, and to meet contingencies) through a combination of structured interviews and short surveys to gain more quantified data. Data should be desegregated by gender as well within the household;
5.   In selected (randomly) site carry out a retrospective cost-benefit analysis from the time before their Ngitili and the present situation. This will also involve the use of the literature, and baselines from before when HASHI started in 1986.
6.   Establish, if possible, a standard mechanism for valuing the different products (per Kg, per area, per bundle, per handful etc.) so that the data fits well with the objectives of the study;
7.   All the values should be based on Tanzania shillings (current value), and should also be expressed in US $; and
8.   An assessment of the marketing constraints, prospects and opportunities.

3.3.   *Social and Cultural*

1. Assess who are the beneficiaries from the Ngitili restoration, and why? – This should be carried out with reference to the different social grouping at the village level, and by gender
2. Are some groups benefiting more than others? And are some groups being marginalized – why?;
3. What important cultural attributes (for example aesthetic, spiritual values) are being restored, and why are they important to the people?
4. To what extent has the choice of areas to restore, the species etc. been made by the people and the villages, rather than by outsiders?
5. How are the Ngitili being managed, by whom and why? With respect to for example, species levels, seasonality and safety net functions. Who makes the decisions about management?
6. Where do people obtain their advice from with respect to their Ngitili management?
7. Do mechanisms exist for the effective management of conflict and disputes? And
8. It is likely that a certain amount of pre-inquiry (literature, rapid appraisal etc.) will be required to enable to assessment questions to be fine tuned and made practical. Such pre-inquiry will be based on PRA approaches, and this may, indicatively, result in a few key indicators which could then collected in more formal village/household survey approaches.

3.4. Institutional
1. What are the institutional arrangements (both official and customary or local) in place for Ngitili management? Are they successful and if so why.
2. To what extent have these institutions evolved from older more traditional institutions?
3. What are the rules, and regulations that such institutions have put in place for the improved management of Ngitili?
4. Who implements and enforces such rules and regulations?
5. Are their different institutional arrangements at different levels, e.g. individual, groups village?
6. Is there synergy or competition between traditional and government institutions at the village level with respect to Ngitili, and if this has happened why?
7. Do the people have access to improve technology? And if so are the improved technologies available and put to good use?
9. With respect to land tenure issues, assess what the broad ownership regimes area and how they impact on Ngitili restoration and management (for example Ngitili rights saleable, rentable and can they be inherited, and whether there are specific rights to specific Nigitili resources (for example plant or tree products)?
10. What have been the impacts of institutional (official, customary) changes in Tanzania on the whole process of Ngitili restoration?
11. It is likely that a certain amount of pre-inquiry (literature, rapid appraisal etc.) will be required to enable to assessment questions to be fine tuned and made practical.

4. Broad Methodology

There are 833 villages in Shinyanga region in 6 districts (so approx 160 villages per district). It will neither be possible or appropriate to survey every village and every Ngitili. So random stratified sampling is suggested to select the villages to be studied in more detail. HASHI staff will have compiled a district register of all the villages in each district with whom, HASHI has worked with (and it will be known since which year), and those

which HASHI has not worked with. The sample will be stratified by district since there are many differences both within and between districts, where for instance Kahama district has a much richer existing forest cover, and Shinyanga rural district is close to the regional capital of Shinyanga. Within each district two further strata will be used, namely villages with which HASHI has worked with and those where HASHI has not worked with.

For example if Meatu district has a total of 160 villages and HASHI has worked with 100 villages over the life of the programme to date. Then a 5% random sample will be take from those 100 villages over the life of the programme to date. Then a 5% random sample will be taken from those 100 villages with whom HASHI has worked with (i.e 5 villages), and a similar sample from those where HASHI has not worked (3 villages). Then within each of the randomly selected villages any communal village Ngitili will be assessed (these are not likely to be many, and may amount to less than 5). When it comes to individual household Ngitili, again it will neither be practical nor desirablle to sample all the Ngitili at the village level (though the study will find out how many people have Ngitili). All those households with an Ngitili will put their names on a pieces of paper which will then be put in a hat and between 5% and 10% of the Ngitili will be sampled (this is based on the general assumption that each village comprises of about 300 household so the sample of Ngitili to be survey will be between 15 and 30 household Ngitili. This will then allow the study team can measure are survey careful and with high quality, rather than trying to over work and measure, for example, all the Ngitili in the village.

The actual numbers of villages will be guided by the overall funding available, and the amount of time required per village to carry out the assessment. Where possible more villages will be sampled so as to assess a wider range situations. The withing each village an assessment should be made of all the different types of Ngitili (Village, Group and Individual/Family).

The following broad approaches are suggested for actually carrying out the work:

1.   The HASHI programme will have sough approval from the Government officials for the study to be carried out. The study team would meet briefly with the various district official to ensure their support and approval.
2.   The study team and HASHI will agree on what an Ngitili includes and does not include, and identify, if appropriate different types of Ngitili
3.   Assess from records to see what socio-economic and biodiversity type baselines exist from before 1985. Such a baseline could then be used to explore causal linkages and trends between restoration and livelihood status.
4.   It is suggested that a historical time line be developed over the Ngitili phenomenon, which will include all the more recent development interventions;
5.   At the village level introductory and preparatory meetings will be held to introduce the study, its objectives and potential outputs. This can be used as the basis for pre-inquiry (using PRA approaches) to help in the identification of some key indicators;
6.   A village participatory assessment would be held (one for men and one for women) so as to gain an overall understanding. Such an assessment would use participatory tools, for example wealth ranking to assess how Ngitili are benefiting people in the village, and see if certain groups are benefiting more than others
7.   Compile a development chronology for the village, to find out when other livelihood improvement related interventions were implemented in the village (health, water, agriculture etc.)

8. It will be very important to ensure that consistent information is collected. For instance if there is more than one data collection (field) team, it will be vital that information is collected in a uniform manner. Therefore the study team will need to develop a protocol that describes everything in terms of data collection and study approaches. This will provide a basis for the training of the field data collection team, so that there is uniformity in data collection. This would then require some cross checking during the field work. With a more formal survey instrument this is less important (as it is much easier to measure the areas and numbers of trees). For example it is very important that an area or number of trees means the same thing in different places, than it is to be certain that a focus group was conducted in a comparable way;

9. It will be important to design the data management protocols and methods before the actual collection of the data. This will ensure that data is collected for all the aspects called for in the study, and will make for easier analysis of the data sets. It is likely that most of the numerical type data will be easily analysable using Excel.

10. See if any causal links can be made between Ngitili use and improvement with improved school attendance (and investment), improved health, and improved housing

11 Use of in depth structured interviews (men, women, different interest groups)

12. Interviews with village leadership and appropriate Government staff

13. While the focus of the study will be on the randomly selected villages, other villages and farms will be assessed on an ad hoc and in a rapid manner (for example when the team is travelling from one selected village to the next, they may stop off at a village on the way).

The study team will be contracted by the Ministry on Natural Resources, though it will report to a steering committee comprised of two representatives each from IUCN and from the MNR. This steering committee will be the key focus for the study team to interact with MNR and IUCN, as well as the basis for the approval of work-plans, release of funding and so forth.

The Team leader will take on lead responsibility fore the study. He/she will report to the Study Steering Committee who will take overall responsibility for the study on behalf of MNR and IUCN . While MNR will contract the senior consultant directly it is expected that the team leader will sub-contract the field staff and provide the accommodation and other allowances as required. This will be accounted for in the normal manner.

ANNEX 2: ITINERARY FOR PILOT STUDY

Date	Activity	Time	Place	Responsible
18/07/2004	Arrival	4:00 P.M	Shinyanga	All Task Force Members, Team Leader
19/07/2004	Task Force Sections to discuss their instruments	8:00 - 9:00 A.M	NAFRAC	Task Force Sections' Members
	Harmonization of working instruments	9:00 - 10:00 A.M	NAFRAC	Task Force Sections, Team Leader
	Courtesy calls	10:30AM – 12:00 Noon	Regional /DistrictOffice	All Task Force Members, Team Leader, RAS, DC, DED
	Briefing on NAFRAC activities	12:00 Noon –1:00 PM	NAFRAC	NAFRAC officials
	LUNCH	1:00 PM – 2:00 PM	NAFRAC	ALL
	Planning for pilot study and main study	3:00 PM – 5:00 PM	NAFRAC	Task Force Sections' Leaders, Team Leader
20/07/2004	Pilot study (data collection)	8.00 AM – 9.00 PM	Seseko	All Taskforce members
21/07/2004	Pilot study (data collection)	8.00 AM – 8.30 PM	Seseko	All Taskforce members
22/07/2004	Pilot study (data collection)	9.00 AM - 6.00 PM	Iwelyangula	All Taskforce members
23/07/2004	Pilot study (data collection)	8.30 AM – 4.00 PM	Iwelyangula	All Taskforce members
24/07/2004	Preparation of Pilot Study Report and itinerary for main data collection	9.00 AM – 10.30 PM	NAFRAC	All Taskforce members
25/07/2004	Planning main data collection Traveling back to DAR	2.00 PM	SHY - DAR	Team leader & Sections' leaders

ANNEX 3: PILOT STUDY REPORT

1.0   BACKGROUND INFORMATION

The Ministry of Natural Resources and Tourism-MNRT (through its Forestry and Beekeeping Division-FBD) and the International Union for Conservation of Nature (IUCN) have commissioned a Taskforce to undertake a study on the social, economic and environmental impacts of forest landscape restoration in Shinyanga region, Tanzania. The study is scheduled to take place from 12th July 2004 to 12th January 2005.

According to the Task force's work plan, the pilot study was scheduled to take place for one week from 19th – 24th July 2004 and to that effect, all the team members traveled to Shinyanga on 18th July 2004.

The Task force met on the 19th July 2004 at NAFRAC in Shinyanga to discuss and harmonize the working instruments, paid courtesy calls to the relevant offices, and got a briefing on NAFRAC activities. The meeting was also used to plan logistical matters and to prepare the itinerary for the pilot study.

NAFRAC provided the Taskforce with district and village registers for Shinyanga region that were used to randomly select villages for the pilot study. The villages selected for the pilot study were Seseko and Iwelyangula in Seseko and Kitangili Wards respectively. These villages are located in Shinyanga Urban district. The itinerary for the pilot study is attached to this report as Appendix 1.

  On Saturday 24th July 2004, the Taskforce convened a meeting to discuss lessons learnt, establish the way forward and prepare an itinerary for the main data collection phase of the study (Appendix 2). The pilot study report was prepared during this meeting. This pilot study report is not a requirement in the Terms of Reference but has been prepared as a result of the suggestion by Edmund Barrow who is a member of the Steering Group as well as a representative of the donor (IUCN). The instruments to be used for main data collection are presented as Appendix 4.

2.0 STUDY METHODOLOGY, HOW TESTED, PROBLEMS ENCOUNTERED AND HOW SOLVED

The results of the pilot study show that methodologies for all components/sections of the study are appropriate and working in keeping with the study objectives. At its conclusion, this study, among other things, will complement other related studies on Ngitili already undertaken in Shinyanga region; it will also provide baseline information on biodiversity from Ngitili and will also establish a benchmark for biodiversity aspects from Ngitili in the region. However, some matters emerged from the pilot study with a direct bearing on the performance of the study instruments. These are as follows:

(x)   The term Ngitili is understood differently by communities in different areas, consequently the methodology used to collect data has to reflect the Ngitili context adopted by HASHI.

(xi)   Long protocols extended by the Village Government to visitors in the village are perceived by villagers as an important and inevitable activity hence interfering with the work plan of the Taskforce.

(xii)   Some data types require a combination of methods to capture. This aspect has been incorporated in the methodology.

(xiii)   In some areas, individual Ngitili are difficult to find while village or group Ngitili are many and large. In consequence, the procedure for sampling needs to be reviewed to cater for this reality.

(xiv)   Seasonality of biodiversity (flora and fauna) and its impact on livelihood may to a large extent, not be covered due to the timing of the study.

(xv)   There are some overlaps in the information being collected by different sections of the Taskforce. Such overlaps have been reconciled to avoid duplication of effort and to increase efficiency.

(xvi)   Application of satellite imagery and other remote sensed data would have been an added advantage to study vegetation cover change over the years. However, it appears to be infeasible given the prevailing situation.

Other matters related to the instruments to be used in this study are described in the sections 2.1, 2.2, and 2.3 of this report.

2.1 Social and Institutions aspects of the study

The Social/Cultural and Institutional components of the study employed partly PRA techniques and in-depth studies to collect information related to Ngitili restoration and people's livelihoods. From this pilot study, it was established that the limited time and resources would not allow the Team to include one aspect proposed in the TOR, that is, to conduct a formal household survey. It is however expected that the nature of the multi-method approach as adopted by the whole Study Team will be able to capture pertinent social and cultural issues that are needed for the study. In addition, the Case study technique is expected to capture important and necessary details required for the study. On the Institutional aspects, all issues contained in TOR were addressed without any changes during the pilot study.

The key outputs obtained from the pilot study included information on the social and cultural implications of Ngitili restoration and people's livelihoods at communal and individual levels; Resource maps illustrating people's ideas about Ngitili; and, Institutional analyses examining the changing nature and importance of Ngitili management and sustainability.

Among the key problems encountered included the limited time that did not permit enough time for exhaustive triangulation of information. However, it is expected that time-efficient but exhaustive Focus Group Discussions, case studies and observation will be able to collect quality data.

2.2 Biodiversity component of the study

The methodology was tested by collecting data in a pilot study and found to be appropriately working. The TOR require that individual Ngitili be sampled at 5% sampling intensity while all village and group Ngitilis be totally enumerated.

Pilot survey experience and information show that some village and group Ngitili are many and large in some villages, thus the assessment of all of them is not practical given the resources and time at our disposal. Therefore, 5% sampling intensity was also applied to

this category of Ngitili. Table 1 indicates the villages covered during pilot study, types and number of each Ngitili category and sample plots.

Table 1:Number of sample plots in village/sub-village and individual Ngitili

Village Name	No. of village/ sub-village Ngitili	No. of Individual Ngitili	No. of sample plots for village Ngitili	No. of plots for individual Ngitili
Seseko	4	0	7	0
Iwelyangula	0	3	0	3

Furthermore the pilot study has also shown that Fauna Biodiversity has a good amount of data some of which need to be collected using relatively sophisticated methods which take time to accomplish. Moreover, the time allocated for this section has to be shared between two senior taskforce members. This implies that the allocated time for data analysis and report writing (10 days for analysis of both flora and fauna and other 10 days for writing both flora and fauna) with respect to the biodiversity section is inadequate and needs to be reviewed.

2.3 Economic component of the study

The pilot exercise was conducted by using a combination of methods which include structured questionnaire, interviews, field observation, market survey as well as individual and group focused discussions. The structured questionnaire was administered in each of the sample villages. A village register in each village was used to determine sample households using a 5% sampling intensity. In Seseko village with 312 total households, 15 households were surveyed whereas 5 households were surveyed in Iwelyangula village which has a total of 100 households.

Different user groups in the village and key persons were interviewed. These include village elders, influential people in the village, herbalists, pottery makers, wild fruit and vegetable gatherers, herders, local petty traders, people who are involved in charcoal production, and local artisans - carpentry and wood crafting among others.

Hard data of quantities on goods and services from Ngitili as well as costs related to Ngitili were collected through a combination of market survey, field observation and taking measurements complemented by interviews. The role of Ngitili on social welfare and poverty reduction was also assessed.

The problems encountered include the following:
- Definition of "Ngitili" - it is understood differently by most respondents as compared to HASHI's definition.
- Most respondents do not have references of their incomes - absence of records.
- Due to lack of direct relationships between daily households' expenditure/income and to Ngitili, it was rather hard for the respondents to give recall-data on household income and expenditure.
- Slow understanding of some questions when semi- illiterate or illiterate respondents are encountered.
- Household heads for some selected households being not present.
- It takes time to convince respondents to give data on their incomes.

- Lack of measurements, it is sometimes difficult to get conversions of products from Ngitili into monetary terms.

The following are some of the solutions to the problems encountered:

- Review and improvement of the questionnaire to accommodate changes to reflect the reality on the ground.
- Prolonged discussions with respondents so as to harmonise the process e.g. to define Ngitili into different context as understood by respondents.
- Measurement and quantification of quantities of products consumed for subsistence in the household
- Use of proxy values and surrogate prices for non-market goods and services
- Market survey on the "market day" for goods and services marketed only occasionally.
- Inviting both husband and wife to interviews in sample households in order to get correct information on matters influenced by gender roles and/or sex

3.0 POSSIBLE SCENARIOS FOR FIELDWORK
3.1. Scenario 1: Abiding by the Terms of Reference (TOR)

In accordance with the TOR, the number of randomly selected villages is indicated in Table 2.The names of selected villages for each District is annexed to this report as
 Appendix 3.

Table 2: Number of Villages selected for the study.

District	Total No Villages	HASHI-Supported Villages		Villages not supported HASHI	
		Total No. villages	5%	Total No. villages	5%
Shinyanga (U)	30	19	1	11	1
Shinyanga (R) & Kishapu	204	102	5	102	5
Maswa	78	51	3	27	1
Bariadi	124	72	4	52	3
Kahama	204	149	7	55	3
Bukombe	52	5	1	47	2
Meatu	71	34	2	37	2
TOTAL	**763**	**432**	**23**	**331**	**17**

In light of Table 2, the total sample size for the study is 40 villages (23+17). The pilot study was conducted in two of these villages. Thus, the main field work will be undertaken in 38 villages.

Results of the Pilot Study have shown that the appropriate working rate is 2 days per one village. The traveling time between Districts has been established to be 6 days (1 week) in total.

At a rate of 3 villages/week (as established by the pilot study results), a total of 13 weeks is required to successfully accomplish the fieldwork (i.e. 38 villages/3 villages per week).

There are 14 Sundays in which fieldwork will not be carried out (= 2 weeks). These will be used for data entry.

In light of the above situation, it is deduced that the total number of weeks required to accomplish the fieldwork is 16 weeks. The remaining time (of the original five weeks time allocated) after pilot study is only four (4) weeks.

In view of the above scenario, the extra time required is 12 weeks (84 days) whose cost implication is as elucidated in Table 3.

Table 3: Additional Cost implication if Scenario 1 is to be adopted.

Item	Description	Cost (in USD)
1.Additional working allow for field staff	84 days x 100 USD/day/staff x 6 staff	50,400
2. DSA for field staff	84 days x 30 USD/day/staff x 6 staff	15,120
3.Local assistants	84 days x 20 USD/day/person x 2 persons	3,360
Total		**68,880**

The above-indicated additional cost does not however, include administration costs and additional supervision cost for senior Taskforce members and Team Leader. The above-mentioned cost is an addition to the present budget.

Advantages of the scenario:
- It is relatively statistically robust method and fully addresses the TOR
- It allows coverage of social, institutional, economic and biodiversity aspects in the whole Region.
- Using this approach all categories in the districts (i.e. areas with or without HASHI concentration) can be fully covered.

Disadvantages:

- It is costly in terms of time and financial resources.
- Covering 40 villages may not necessary add more value compared to coverage of relatively fewer villages.

3.2. Scenario 2: Purposeful Sampling – Covering all Districts by taking two villages from each District (one from HASHI-Supported villages and another one from villages not supporte d by HASHI).

Under this scenario, it is envisaged that two villages will be randomly sampled. Five percent within-village sampling will (as indicated in the TOR) be used to select households for structured interview.

If this scenario is adopted, a total of 14 villages will be sampled in all districts. But two villages have already been covered during the pilot study. Therefore, main data collection/fieldwork will be conducted in 12 villages. Therefore under this sampling scenario, a total of 4 weeks (ie. 12 villages and 3 villages per week) plus traveling time between districts (6 days), and Sundays (4 days) will be required.

This sampling technique will therefore require an extra/additional time of 10 days whose cost implication is depicted in Table 4.

Table 4: Additional Cost implication if Scenario 2 is to be adopted.

Item	Description	Cost (in USD)
1.Additional working allowance field staff	10 days x 100 USD/day/staff x 6 staff	6,000
2. DSA for field staff	10 days x 30 USD/day/staff x 6 staff	1,800
3.Local assistants allowance	10 days x 20 USD/day/person x 2 persons	400
Total		**8,200**

Advantages of the scenario:
- It allows coverage of social, institutional, economic and biodiversity aspects in the whole Region.
- Budget increase is modest compared to the first scenario.
- Data/information gathered will fulfill the provided TOR.
- Having results by districts would complement many previous studies which have unfortunately not covered all districts.
- If this scenario is adopted, a 5% sampling intensity stipulated in the TOR will be used to assess selected villages.

Disadvantages:

- It cannot fully capture the intra-district variation due to low sample size.
- Coverage will be less than the proposed one in TOR.

3.3. Scenario 3: Stratification by Ecological Zones (same budget maintained)

Under this scenario, the region will be ecologically stratified into two main strata namely:
- Sub-humid ecological zone (Bukombe & Kahama districts).
- Semi-arid ecological zone (Shinyanga Urban, Shinyanga Rural, Kishapu, Bariadi, Meatu and Maswa districts).

Using this approach, six (6) villages will be sampled from each stratum, making a total of 12 villages in the study area. Nonetheless, since two villages have already been covered during the pilot survey, the actual data collection will make use of 10 villages.

Advantages of the approach:

- There is no additional cost implication.

Disadvantages:

- Allocation of districts into the respective zones might have some subjectivity due to possible overlaps of zones.
- Inter- and intra-district variation in the study area cannot be properly captured.
- Presentation of results by district to demonstrate the impact of Ngitili will not be possible.
- Seasonality of biodiversity (flora and fauna) and its impact on livelihood may, to a large extent, not be covered.

3.4. Scenario 4: Reducing Sampling Intensity (from 5% to 1.5%)

The Task force proposes a reduction of sampling intensity from 5% (as indicated in the TOR) to 1.5 % to cope with the budget and time. The number of villages to be sampled in each District if this approach is adopted, is shown in Table 5.

Table 5: Number of sample villages if Sampling Intensity is reduced to 1.5%

District	Total No Villages	HASHI-Supported Villages		Villages not supported HASHI	
		Total No. villages	1.5%	Total No. villages	1.5%
Shinyanga (R) & Kishapu	204	102	2	102	2
Maswa	78	51	1	27	0
Bariadi	124	72	1	52	1
Kahama	204	149	2	55	1
Bukombe	52	5	0	47	1
Meatu	71	34	1	37	1
TOTAL	**763**	**432**	**7**	**331**	**6**

In light of Table 5, the total sample size for the study is 13 villages (7+6).

The extra time required under this scenario is 10 days and its cost implication is as indicated in Table 4.

Advantages of the approach:

- Additional cost implication is modest.
- The sampling scenario will enable collection of baseline biodiversity information for the entire region and establish a benchmark for biodiversity aspects in the restored woodlands in Shinyanga region.

Disadvantages:

- Sampling intensity (i.e. 1.5%) has been arbitrarily selected.
- Using this approach some categories in the districts (i.e. areas with or without HASHI concentration) will not be covered.

2.0 RECOMMENDATIONS BY THE TASKFORCE

In light of all the above scenarios, the Taskforce is recommending the second scenario (i.e. purposeful sampling) for the present study. The Taskforce is requesting the MNRT and IUCN to promptly make a decision on this matter in order to facilitate smooth progress of the field work. This recommended scenario is in keeping with the TOR (p.2) which stipulate that:
" Emphasis will be placed on gathering high quality information which is robust and statistically strong, rather than on trying to survey too many villages and households in the region".

The TOR further stipulate that *" The sample will be stratified by districts since there are many differences both within and between districts…. Within each district two further strata will be used, namely villages with which HASHI has worked with and those where HASHI has not worked with".*

ANNNEX 4: ITINERARY FOR THE MAIN DETAILED ASSESSMENT OF NGITILI

(BASED ON SCENARIO No. 2 WHERE TWO VILLAGES WERE SAMPLED FROM EACH DISTRICT, ONE VILLAGE FROM HASHI CONCENTRATION AREA AND ONE FROM THE REMAINING AREA)

DAY	DATE	VILLAGE NAME/ACTIVITY	DISTRICT
Monday	26/7/04	Ngaganula (HASHI)	Shinyanga rural
Tuesday	27/7/04	"	"
Wednesday	28/7/04	Chambeli (non- HASHI)	"
Thursday	29/7/04	"	"
Friday	30/7/04	Travel to Meatu	Meatu
Saturday	31/7/04	Mwambegwa (HASHI)	"
Sunday	1//8/04	Data entry	"
Monday	2/8/04	Mwambegwa	"
Tuesday	3/8/04	Chambala (non-HASHI)	"
Wednesday	4/8/04	"	"
Thursday	5/8/04	Travel Maswa	Maswa
Friday	6/8/04	Mwashegeshi (HASHI)	"
Saturday	7/8/04	"	"
Sunday	8/8/04	Data entry	"
Monday	9/8/04	Nyashimba (non-HASHI)	"
Tuesday	10/8/04	"	"
Wednesday	11/8/04	Travel to Bariadi	Bariadi
Thursday	12/8/04	Mbiti (HASHI)	"
Friday	13/8/04	"	"
Saturday	14/8/04	Mwamunenha (non-HASHI)	"
Sunday	15/8/04	Data entry	"
Monday	16/8/04	Mwamunenha	"
Tuesday	17/8/04	Travel to Kahama	Kahama
Wednesday	18/8/04	Wendele (HASHI)	"
Thursday	19/8/04	"	"
Friday	20/8/04	Mazimba A (non-HASHI)	"
Saturday	21/8/04	"	"
Sunday	22/8/04	Data entry	"
Monday	23/8/04	Travel to Bukombe	Bukombe
Tuesday	24/8/04	Nampalahala (HASHI)	"
Wednesday	25/8/04	"	"
Thursday	26/8/04	Ihulike (non-HASHI)	"
Friday	27/8/04	Ihulike (non-HASHI)	"
Saturday	28/8/04	Travel to Shinyanga	Shinyanga
Sunday	29/8/04	Travel to respective stations	

ANNEX 5a: FLORA INVENTORY PLOT FIELD FORM

Date:………………Recorder:………………Village:……………Sub-village:………..…..
Ward:..…………….Division:…………… District:……………..Ngitili type……………..…
Date of established……. Area……………..General condition………………………………
Plot No: ………………… Stratum:………………… Vegetation type:……………………

CODE	LOCAL NAME	DBH (cm)	Height (m)

Code	Local Name	Ns	Dbh (cm	Code	Local Name	Ns	Dbh (cm

Herbs, Grasses and Regenerants

Code	Local Name	% cover	Code	Local Name	% cover

ANNEX 5b: METHODOLOGY FOR FAUNA BIODIVERSITY DATA (INVERTEBRATES AND VERTEBRATES)

There are several methods that can be used to collect biodiversity (fauna) data. Sample sizes and sampling intensities influence the data analysis and the subsequent results. In this study, due to limitations of resources and time, the listed methods will not provide results on species population but can will give pointer results on species list, relative abundance, species richness, species diversity and similarity indices.

The methods do not delve into the background theories but are customised into field survey procedures. The selection of these methods was influenced by a one-week pilot study conducted in two villages in Shinyanga Urban District. The timing of the pilot study, which was conducted in the peak of the dry season, was not suitable for collecting data on invertebrates like butterflies, insects, frogs which would otherwise be abundant in the wet season. The listed methods will only be used for vertebrates and specifically small mammals and birds.

Methods and procedures

1. Local knowledge survey

One or two guides from the local community will accompany the survey team where the survey will take place. They identify birds and mammals in their local language or Kiswahili. Before the exercise starts the survey leader will brief the guides on the purpose of the survey and its benefits to the community. He/she will ask the guides the following questions which when answered will generate a species list.

   a. What wild animals have disappeared?
   b. What wild animals have emerged after the establishment of Ngitili?
   c. What is the age of the guide (respondent)?

2. Transect survey (Observations)

Transects will be set at intervals of 100m apart and the length of each transect will depend on the area of the Ngitili. The survey group will walk along a transect, following a pre-determined compass bearing. On each transect, careful observations and sighting of mammals will be recorded. Also presence of individual mammal species will be inferred through sighted indices like dung, foot prints, claw marks, animal parts etc.) During the transect traverse the survey team will also record dung and nests that will be sighted along and within the transect sighting range.

3. Searching
On each transect that is determined in method 1 above, the survey team will demarcate a 15m-radius sample plot after every 100m distance. At this plot the team will search and record number of sighted dung and nests according to species. The team should pay attention on tall trees where small and poorly constructed nests like those of African mourning dove or Namaqua dove, which can be easily missed. Ground nests are hard to find but they should be searched.

4. Calls
On each sample plot marked in method 2 above, the survey team will stand for five minutes, listen and record bird and mammal calls according to species.

5. Trapping

Twenty medium Sherman traps (23cmx9.5cmx8cm) will be on a transect line at 20m intervals. A mixture of peanut butter and maize flour can be used as bait. All traps are checked twice a day at dawn and dusk. Traps in exposed areas will be closed during the day as they may be exposed to high temperatures thus jeopardizing the welfare of the animals. Trapped mammals will be identified, recorded, marked and released in the wild.

6. Mist netting

Points are established at 200m interval along a transect line. Mist netting of birds is done by putting nets around different habitat types in the selected areas. Nets are opened at dawn on the following day and closed at dusk and moved the next day to a new habitat type. Nets are checked every after one-hour interval while they are open and birds are released soon after they have been identified. Trapped birds are recorded according to species and numbers.

7. Social and economic survey

The Social and economic survey teams will collect through interviews, on behalf of the biodiversity team, the following information

- e. What wild animals and birds than are commonly found in the Ngitili?
- f. What wild animals and birds that are considered to have disappeared and those that have emerged after the establishment of the Ngitili ?
- g. What wild animals and birds destroy crops, or prey on livestock etc?
- h. Values of wild animals?

Field identification procedures

The survey team should always carry the following field guide books; African Mammals (Jonathan Kingdon) and Birds of Southern Africa (Ian Sinclair et. Al.) and a pair of binoculars. The local guide will, in most cases, provide species names in a local language. The survey team will show him coloured illustrations from the guide book and will be asked to identify the bird or mammal that matches with the local name.

DATA ANALYSIS

The following parameters will be established from the data obtained from the different surveys.

1. Relative abundance

This is the average number of individuals per sampling unit;

$$\bar{x} = \frac{\sum_{i=1}^{n} x_i}{n}$$

where: x_i = the number of individuals in sampling unit i and n = the number of sampling units (Anon, 1998)

2. Species richness

It is the average number of species per unit sampling unit:

$$\bar{y} = \frac{\sum_{i=1}^{n} y_i}{n}$$

where: y_i = the number of species in sampling unit i and n = the number of sampling units. (Anon, 1998)

3. Total species list

Total species list is compiled for each of the sub habitat and the relative abundance is calculated therefrom.

4. Similarity indices

This is calculated for different sub habitats. Similarity index is used to compare two communities differing in the number of species they possess, e.g. one with x number of species and the other with y number of species, and with z species occurring in both communities.
The index of similarity is given by;
 Si=2z/x+y

Where

Si = similarity index

Z = Species occurring in both communities

X = Number of species in community A

Y = Number of species in community B

Using the above relation, similarities between different sub-habitats will be obtained.

5. Species diversity

Relative Family Diversity = <u>Number of species in family x   X 100</u>

Total number of all species

A Shannon-wiener index of diversity, H', (Shannon-wiener, 1949) can also be calculated for animals at each sub habitat. The formula for calculating the diversity is:

$$s$$

H' = - å pi log pi

i=1

s= Number of species

p*i*= The proportion of the total number of individuals represented by the ith species

In this study species richness will be given by the total number of species occurring in an area and local diversity/alpha diversity i.e. number of species weighted by their relative abundances, usually expressed as the Shannon-Wiener function, will be used, also, Simpson index of diversity and This is because species diversity considers both the species richness and evenness.
Shannon Index (H) is used to quantify species diversity for comparison. H is given by,

$$H = -\sum_{i=1}^{s} (Pi)(\log_2 Pi)$$

Where;
H= Shannon index,
S= Number of species,
Log_2= Natural log,
Pi=Proportion of individuals of the total sample belonging to the ith species.

Simpson index of diversity (D) is given by:

$$D = 1 - \sum_{i=1}^{s} (Pi)^2$$

where;
    D = Simpson's index of diversity.
    Pi = Proportion of individuals of species I in the community.

Ngitili Biodiversity Survey

Transect counts, Form No. …………………

Surveyor:			Date:			Ngitili: Ownership:			Area (ha):	
Hamlet:			Village:		Ward:		Division:		District:	
Vegetation: Dominant species:					Human Activities:					
Season:			Weather:		Cloud cover:			Temperature:		
Transect length (m):				Start time:			End time:			
Other observations:										

S/No.	Time	Distance (m)	Species		No. Sighted	Nests		Dung		Species call	Additional Observations
						Species	No. Sighted	Species	No. Sighted		

Ngitili Biodiversity Survey

Catch records, Form No………………

Surveyor:		Date:	Ngitili:	Area (ha)
			Ownership:	

Hamlet:	Village:	Ward:	Division:	District:

Vegetation: Dominant species		Human disturbance:		

Season:	Weather:	Cloud Cover	Temperature	

Other observations:						

Trap no	Trap type (& bait)	Species	No. trap	Species description	Topography	Other

ANNEX 6: DATA COLLECTION INSTRUMENTS FOR THE ECONOMICS SECTION

8a: Individual household qestionnaire

A. IDENTIFICATION VARIABLES

Item	Name/Number
1. Name of interviewer	
2. Date of interview	
3. Name of respondent	
4. Questionnaire number	
5. Village name (HASHI/NON-HASHI)	
6. Ward	
7. Division	
8. District	

B. HOUSEHOLD CHARACTERISTICS

9. Total size of the household…………….

10. Head of the Household ....

11. Number of children ....

12. Provide the following information for the respondent

Gender	Age	Marital st	Education level	Main occupation

Code: Gender   1=Male, 2 =Female
    Marital status   1= Married, 2 = Single, 3 = Widowed, 4= Divorced
    Main occupation   1 =No occupation, 2= Farmer, 3 =Others (specify)
    Education level   Number of years in school

C. GENERAL INFORMATION ABOUT NGITILI

13 (a).Do you own any Ngitili?………………..

  (b) What is the size of your Ngitili?……...

  (c) When was your Ngitili established and by who?……………………

  (d) What species of Trees and Fauna which are found in your Ngitili?……………..

  (e) Which of the species in (d) were not available before Ngitili establishment?…………….

  (f) Explain how do you manage your Ngitili………………………

  (g) When was your Ngitili registered?……………………………..

  (h) What products/goods and services do you obtain from your Ngitili?……………..

  (i) How many village Ngitilis are present in your village?…………Specify area (ha)……

  (j) How often do you access the village Ngitili and under what conditions?……………

  (k) Explain difference between individual Ngitili and village Ngitili?………………..

D. HOUSEHOLD INCOME FROM NGITIRI PRODUCTS

14.Give quantity/ price of Wood Products collected from Ngitiris collected last year

Product	Potential use (amount collected per mouth)	Actual use (amount collected per mouth)	Unit	Unit Price (Tsh) dry season . wet season	
Timber					
Firewood					
Poles					
Withes					
Others (specify)………..					

15. Give quantity/ price of Non-Wood Products collected from Ngitili collected last year

Product	Potential (amount coll per week/ mouth	Actual use (amount collected per mouth week)	Unit	Unit Price (Tshs) dry season wet season	
Water					
Honey					
Wild meat					
Edible insects					
Mushroom					
Indigenous Fruits					
Medicine					
Withes					
Stimulants					
Thatching material					
Fodder					
Wild vegetables					
Litter for nursery soil					
Mat making materials					
Minerals					

16. Indicate income from Livestock last year

Type of livestock	Number sold	Unit Price (TAS)
Cattle		
Goat		
Sheep		
Chicken		
Duck		
Donkey		
Pig		
Others		

17. Give the amount of income obtained last year from other sources

	Amount (unit)	Price per un	Total income
Agricultural crops			
Milk			
Honey			
Fruits			
Vegetables			
Firewood			
Medicines			
Local brew			
Casual labour			
Formal employment			
Remittances			
Business e.g teah restaurant, cooking shop, a milling ma buying and selling v products			
Others (specify)……..			

F. TIME SAVING FOR COLLECTING VARIOUS FOREST PRODUCTS FROM NGITILI

18. Indicate time spent for collecting various products before and after Ngitiris have been established

Type of g service	Who collec	Approx. Hour Time spent	Approx. Hours/ Time spent to collec same products w there was no Ngitili	How is the saved utilised in other econo activities?
Timber				
Poles				
Withies				
Firewood				
Medicines				

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Indigenous fruits/spices/ Nuts			
Mushrooms			
Edible insects			
Honey			
Thatching materials			
Mat making mater			
Wild animals			
Fodder			
Water for dom use			
Water for lives use			

G. USES OF DIFFERENT TREE/WOODY SPECIES

19. Mention various tree / woody species found in the Ngitili and their economic use. Give remarks.

Tree/ wood species	Parts used	Economic use	Remarks (availability other areas than Ngitili)

H. MARKETING CONSTRAINTS, PROSPECTS AND OPPORTUNITIES

20. Do you have accessible market for goods/services from Ngitili?…………………..

21. What do you perceive as problems associated with marketing of goods/services from Ngitili?………………………………………………………………………… ………………………………………………………………

22. In your opinion, what do you think so far has or would improve the marketing situation for the above goods /services?
    1) …………………………………………………………………………..
    2) …………………………………………………………………………

I. COST-BENEFIT DATA

23.What are the costs of Ngitili establishments?………………………….

24. What are the costs of maintaining Ngitili?……………………………

25. What are benefits accrued from Ngitili?………………………………

26. How do Ngitili improve school attendance?…………………………………………

27.   How do Ngitiris improve Health?……………………………………………………

28.   How   do   Ngitili improve Housing ?……………………………………………………

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8b: Check list for village leaders

A. IDENTIFICATION VARIABLES

Item	Name/Number
1. Name of interviewer 2. Date of interview	
3. Name of respondent	
4. Questionnaire number	
5. Village name	
6.Human population in the village	
7.Number of Village Ngitili	
8.Number of House hold Ngitili	
6. Ward	
7. Division	
8. District	

B. OTHER VARIABLES

1. List goods /products obtained from the Ngitili in order of importance and specify the quantity and price year (on average).

Product/ good	Quantity per year	Price

2. Quantify the following services that your village gets from the Ngitili

Service	Quantity per day applicable)	Price per unit (Tshs/unit)	If you can not give price what is WTP the service
Water Climate amelioration			
Soil erosion Control			
Scenic beauty			
Others (specify)………………………..			

3. How much revenue was collected from Ngitili related activities in the village last year?

Ngitiri Activity	Revenue collected (Tshs.)
Ecotourism	
Confiscated products	
User fees (including research fees)	
Sales of products from Ngitili (if any)	
Others	

4. How much does the Ngitili contribute to the economy of the household?………………………………………………………………………………… ……………………………………………………………………………… Indicate number of livestock in the village where they graze.

Type of Livestock	Number of Livestock	Where they graze
Cattle		
Goats		
Sheep		
Donkeys		
Others (specify)…………………..		

5. To what extent have animals (game) from Ngitili destroyed the farms in the village?

Type of Game	Crops destroyed	Area destroyed (acr	Estimated damage cost

6. How much are people willing to pay to maintain Ngitili in the vicinity of the village?……………………………………………………………………………… …………………………………………………………………..

7. What are the deliberate efforts and strategies of the village leadership to maintain and promote both village and individual Ngitili?…………………………………………

9.0 COST-BENEFIT DATA

9.1 What are the costs of Ngitili establishments?………………………….

9.2 What are the costs of maintaining Ngitili?…………………………

9.3 What are benefits accrued from Ngitili?……………………………

8c: Checklist for district forest officers/regional forest officers

A.   IDENTIFICATION VARIABLES

Item	Name/Number
1. Name of interviewer	
2. Date of interview	
3. Name of respondent	
4. Questionnaire number	
5. District	

B. OTHER VARIABLES

1. (a) List the villages, sub-villages and population in each village and sub-village around the Ngitili

Village/sub-village	Population size

(b) In each village / sub-village indicate where trees and other forest resources   are obtained.

Village / sub-village	Source of wood and other forest products

2. Estimate the revenue and other benefits obtained from ecotourism in Ngitili.

3.0 Explain the extent of trade in forest products and / or services from the Ngitiris by specifying quantity and price for each product and/or service.

Product/service traded	Quantity/ year	Price

5. In what ways have your district strived to create markets for non-marketed and /or non-paid Ngitili benefits?

6. What is the average yields per ha in Ngitili?

7 Give sustainable levels of harvesting (allowable cut) in Ngitili.

…8. Give actual area of Ngitili in hectares.

8. How much does the Ngitiris contribute to the economy of the household, village   and district?

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9. If for various reasons Ngitiris disappeared, what would be the effect on the following: products/services

Product/services	Effects	Monetary implications
Food security		
Health services		
Clean water		
Safe shelter		
Clean air		
Fuelwood		
Traditional medicine		
Cultural practices		
Natural disasters		
Employment		
Income		
Farm inputs		

8d: Checklist for key persons in the village

A. IDENTIFICATION VARIABLES

Item	Name/Number
1. Name of interviewer	
2. Date of interview	
3. Name of respondent	
4. Questionnaire number	
5 Respondent's main activity	
6.District	

B. OTHER VARIABLES

B.1 Information from beekeepers, local herbalists, charcoal makers, loggers, carvers, local traders and woodfuel gatherers; on the use of various species , quantities collected and their respective monetary values *(Both spontaneous exchange & interviews in villages will be applied)*

Key person	Species used	Parts used	Quantity harvested/ month/week/d	Source: (Ngitiri/other sources)	Frequen per week	Estimated value/price
Beekeeper						
Local herbalist						
Charcoal makers						
Loggers						
Carverers						
Local traders						
Woodfuel gatherers						
Fruits gatherers						

B.2 Information from village elders on the use of different species, their sources and values

;Purpose	Species used	Parts used	Source (Ng others)	Frequency/week/m	Unit Price applicable)
Fuelwood					
Food					
Fruits					
Fodder					
Building poles					
Local medicine					
Shade					
Soil erosion control					
Green manure					
Honey					
Other (specify)…………					

8e: Guidelines for collecting market- related data:

1. Market survey on the existing products in the market (sellers/producers)

Product	Source (Ngitili/ others	Price	Monthly/weekly volume

2. Information on market information from consumers (buyers)

Product	Source (Ngitili/ other	Price/cost	Monthly/weekly vo bought

3. Information from consumers (buyers) on the price of different products. What is their feeling on the supply of the products in question?……………………
………………………………………………………………………………

4. Enumerate Ngitiri products which are used by households but not sold in the market

Non-market product	Its substitute	Substitute's price

8f: Checklist for project (hashi/nacraf) officials

A. IDENTIFICATION VARIABLES

Item	Name/Number
1. Name of interviewer	
2. Date of interview	
3. Name of respondent	
4. Questionnaire number	

B. OTHER VARIABLES
1. What is your role and Mandate in the establishment and management of Ngitili?

2. What support (material/financial) is provided to Ngitiri owners?

3. What are the goods/services that stakeholders get from Ngitili?

4. Estimate annual extraction of various Ngitili products and their unit prices.

Product	Quantity harv annually	Frequency/week/month Unit Price

5. What do you perceive as problems associated with accessibility, utilization and management of Ngitili?

………………………………………………………………………………………………

………………………………………………………………………………

6. What do you suggest as appropriate techniques for sustainable Ngitili management?

7. Briefly explain how the economic benefits accrued from Ngitili contribute to welfare?

8. What do you consider to be problems brought by existence of Ngitili

(quantify on annual basis if possible)

Problem	Amount/quantity/extent	Unit cost

8g: Household survey guide (checklist)

Name of interviewer…………………………………Date of interview……………….

1. Personal data

Name of head of household……………………………..Sex………………………

Age………………………………Marital status……………..Education……………

Village………………Ward………………Division…………………District……….

Size of family: Males…………..Females……………

Worked with HASHI: Yes………….No……………….

2. What are the main economic activities of the household? …………………….

3. Information about Ngitili

(a) Size of the Ngitili………………………………………………………………

(b) When was it established and by who?……………………………………...

(c) Explain the management of your Ngitili(s)…………………………………………

(d) When you established your Ngitili, what use did you envisage and what is the current use?…………………………………………………………………………………..

(e) What species: tree, non-tree, fauna are found in your Ngitili?………………………

(f)Indicate the **use/non use** of trees and non- tree species from the Ngitili by farmers, men, women, children etc (use Table 1)

Tree species used by:	Type of use
Farmers:	
Men	
Women	
Children	
Others: specify	
Tree species not used	**Reasons for non-use**

Non-Tree species used by:	Type of use
Farmers:	
Men	
Women	
Children	
Others: specify	
Non-Tree species not used	**Reasons for non-use**

8h: Village survey guide (checklist)

Name of interviewer…………………………………Date of interview……………….

1. Identification variables

Name of Village………………………………...………………………………………….

Ward…………………………………Division…………………District……………….....

Communal Ngitili established with HASHI support: Yes………….No……………….

2. What are the main economic activities in the village?………………………..

3. Information about Ngitili

(a) No. and Size of communal Ngitili…………………………………………………

(b) When were they established and by who?…………………………………………

(c) Explain the management of the communal Ngitili in the village………………

(d) When the village established Ngitili, what use did the village envisage and what is the current use?…………………………………………………………………………

(e) What species: tree, non-tree, fauna are found in the communal Ngitili?……………

(f)Indicate the **use/non use** of trees and non- tree species from the Ngitili by farmers, men, women, children etc (use Table 1)

Tree species used by:	Type of use
Farmers:	
Men	
Women	
Children	
Others: specify	
Tree species not used	**Reasons for non-use**

Non-Tree species used by:	Type of use
Farmers:	
Men	
Women	
Children	
Others: specify	
Non-Tree species not used	**Reasons for non-use**

ANNEX7: DATA COLLECTION INSTRUMENTS FOR SOCIAL-CULTURAL AND INSTITUTIONAL ASPECTS

Social/Cultural and institutional aspects of Ngitili restoration

Research questions
1.0   Social and Cultural Issues
1.1   Participation and management (VG rep discussions)

1. Identify types and categories of Ngitili at village – including Resource map
2. Briefly describe intervention processes for Ngitili restoration
3. How were the areas for restoration chosen
4. Who was involved in the identification of Ngitili for restoration
5. How are Ngitili managed?
6. Identify and describe the roles of people/categories of people currently involved in Ngitili restoration
7. Are these roles different from what it used to be before? Explain?
8. Why are these [particular] people into management? Who chose them? How were they selected?
9. Who makes decisions on management? Are there any hierarchies in management of these Ngitili? Explain.
10. What techniques for management are used? How do the people manage these resources? By whom and why?
11. Who can access what from which type of Ngitili? Any differences in access?
12. What incentives do people have for management? Any specific measure – eg with respect to species levels, seasonality, safety net functions
13. What are the added impacts from Ngitili restoration – ie apart from tree products, fodder and grazing – eg wildlife (therefore meat or insecurity?); tourism? Sport hunting or poaching? Or areas where thieves hide?)
14. Are there any conflicts experienced in management processes? (ref. to different livelihood activities, different needs, different powers)
15. What mechanisms exist for resolution of conflicts or disputes arising out of management processes?
16. Can Ngitili be associated to socio-economic differentiation in the village? How?
17. Is the number of Ngitili increasing or decreasing over time? Why?
18. What are the major challenges that the village encounters in Ngitili management? What are the kinds of solutions already tried? Successes, Limitations? – (probe on weather, population growth, decreasing size of acreage
19. Has Ngitili restoration made a difference to community-based NRM and farming systems in the area (eg diverting or concentration in certain activities eg tree planting to Ngitili restoration, cotton farming to bee-keeping,

2.0 Household Use/Management patterns, benefits and changing livelihoods (Key informants, Case studies)
1. What are the current uses of your Ngitili?. Identify each category of uses
2. Who uses what from the Ngitili, who can access what from the Ngitili.
(Since you do not own a private Ngitili, can you access one?)
3. What determines these patterns of uses?
4. To what extent have these uses changed over time? How? Why?

5. What incentives do you have for management? Initial expectations? And actual achievements?
(Why don't you own a Ngitili?)Was this a deliberate exclusion?
6. What activities complement incentives for Ngitili management? Does the household have any other activities that reduce or increase pressure on Ngitili resources? How?
7. Describe the benefits (impacts, or added value) accrued from Ngitili restoration
8. Have these benefits changed over time?, explain
9. What difference has it made to the household? To whom? (women, men, children/youth, elderly) In what way (income, time, health)?
10. What other household level changes can be associated to Ngitili restoration? The youth (employment); gender (closing or widening traditional gendered spaces?)
11. Can Ngitili be employed as an asset in times of crises? (eg bank, as a social safety net for the destitute; providing immediate cash needs?)
To what extent can benefits from Ngitili be related to seasonality? Eg dry season food source etc??
12. How does the household define food security? To what extent does the Ngitili influence household food security status
13. What challenges currently exist with respect to maintaining Ngitili restoration?, explain – (probe on population growth, expanding household sizes and therefore decreasing size of acreage per head, wildlife, income based needs v/s restoration requirements)

3.0   Institutional analysis (FGD with purposively selected people)

1. What rules and regulations guided Ngitili management in the past?
2. Who was responsible for designing and enforcing these rules/regulations
3. If Village started before Independence, did Uhuru make a difference? How?
4. Identify policies in Tanzania that have had an impact on the process of Ngitili restoration? What have been the impacts of policies and policy changes in this respect on the whole process of Ngitili restoration. For example, what other processes influenced Ngitili management after Uhuru (eg Ujamaa vijijini, communal ownership of Ngitili v/s private ownership of assets).
5. Uhuru wa kuuza na kununua bidhaa (what impact did it have to Ngitili restoration)
6. 1986 and the establishment of HASHI – did it change anything in terms of Ngitili management? How? What new components were introduced? What difference did it make to people and people's rights to Ngitili management
7. Mipango Shirikishi mnaifahamu? Ilianza lini hapa kijijini, ilisaidia nini? (ref to 1988-89 – New methodologies and training to Staff juu ya Ushirikishwaji jamii (kuanzisha bustani, Ngitili za binafsi)
8. What new systems have been introduced to cater for Ngitili management, that have an implication on people's livelihoods.
9. What have been the impacts of institutional (official, customary) changes in Tanzania on the whole process of Ngitili restoration? Probe on the Establishment of Kamati za Mazingira, influence of HASHI.
10. What forms of institutions currently responsible for Ngitili management exist (both official and customary, and local) – Describe those mechanisms defining property/ownership rights, tenure, capacity to use (technologies), policy issues.
11. How were they instituted/formed?
12. Are there different arrangements at different levels? – individual, group, village
13. To what extent have these institutions evolved from older or more traditional institutions?
14. What are the rules, and regulations that such institutions have put in place for the

improved management of Ngitili?

15. Who implements or enforces such rules and regulations?

16. Which is the most important institution in Ngitili management currently? How? Why ?

17. Is there synergy or competition between traditional and government institutions at village level with respect to Ngitili and if this has happened why? Are there any synergies or competition between the various levels of Ngitili management? (ie village/communal/private)

18. With respect to land tenure issues, assess what the broad ownership regimes are and how they impact on Ngitili restoration and management (eg are Ngitili rights saleable, rentable or can they be inherited, - are there specific rights to specific Ngitili resources (eg plant or tree products, for what needs (eg beekeeping, fuel wood, medicine)

19. What technologies have people had access to in using and improving Ngitili resources? (Probe on agro-forestry, enrichment planting, improved stoves, modern beehives) Do people have continued access to these improved technologies? And if so are these technologies put to good use? Have these technologies made a difference towards Ngitili restoration?

20. Any challenges – population growth?, the move towards individualism?

Summary of the data collection process for the social-cultural and institutions section of the study

No.	Technique	Category	Objectives
1	FGD	Village representatives	To establish village basic overview or information related to Ngitili restoration, types and number of Ngitili, responsibilities, challenges
	FGD	Village representatives	Mapping key natural resources and Ngitili at the village
2	Timeline	Key informants -elders -traditional leaders -women	To learn about changes in institutional arrangements responsible for Ngitili management over time
3.	Institutional analysis	Selected key informants	To establish relationships and importance of institutions related to Ngitili management and people's livelihoods
	Case studies	Purposively selected households (successful, not-so-successful, non-Ngitili hh) Key informants (local people, officials, heads of institutions, social categories)	To explore individual involvement and assessment of benefits from Ngitili restoration To examine livelihood changes, and challenges due to Ngitili restoration programme

Socio-cultural and Institutional aspects of Ngitili restoration and management

District	Village	Method	Number individuals groups		Gender	Selection details
Shy (urban)	1. Seseko	Semi-structured interviews (key informant)	1		2 Male 1female	-Head of Hamlet Ngitili -VEO -woman who claimed her Ngitili
		Case studies histories)	4		2 Males 2 Females	-widow -rich man -poor household -able bodied single woman
		FGD	2			-Village representatives -Ngitili managers
		Basic vi information	Location (rural about 25 kms from centre) Hamlets 4 (Ilugala, Nhobola, Seseko) Total pop, No. of Ngitili, (individually owned, communally owned) Any unique feature			
		Limitations shortcomings	Overlaps in data collected hence need for multiple methods			
	2. Iwelyangula	Semi-structured interviews	-		-	-
		Case studies histories)	4		2 Females 2 Males	-Elderly single female household and destitute -Able bodied household headed by woman - A male head of household with Ngitili and of a middle class economy
		FGD	2			-Economic group (pottery, gardeners) -Traditional healer -Representative of school committe -Livestock keepers and ordinary farmers
		Basic village information	-It has 1 communally owned Ngitili mainly for fodder production and rotational farming (paddy and vegetable gardens) -It is a sub-urban street of Shinyanga municipality -It has 1 household Ngitili -It is itself a hamlet -Non HASHI supported area			
		Limitations shortcomings	-Too long protocol but unavoidable			
Bariadi	3. Mbiti	Semi-structured interviews	1	1		-A male head of household with enormou benefits from Ngitili

		Case studies histories)	5	4 Males 1 Females	-A female head of household from poor category -A male head of household from middle category stepping from lower class. -Elderly poor couple
		FGD	2	12 Male 2 Female	-VG representatives -Traditional healers -Women and Youth economic and user groups reps. -Users of Ngitili products (charcoal, thatch grass, firewood) and beekeepers -Crafts makers (pottery) -Ngitili owners -Influential people
		Basic information	v		-Traditional village that underwent villagelization in 1974. -It has 728 households out of which 6 HH have Ngitili -Population is 2737 -Has 1024 households -Has 12 hamlets -HASHI focus area
		Limitations shortcomings			-Difficult in getting a balanced representation by gender per each class -Difficult in disaggregating benefits and impacts of Ngitili by the respondents.
Bariadi	4. Mwamneml	Semi-structured interviews	-	-	-Information was collected through other means.
		Case studies histories)	4	3 Males 1 Females	-A male head of household from poor category. -Widow female headed household middle class category -A male head of household from ri category also relating to Ngitili owners -A male head of household from middle class category stepping from lower category, also relating to Ngitili owners.

		FGD	2 groups	11 Males 6 Females	-Village government representa-tives -Influential people -Traditional healers -Sungusungu -Women economic groups (agriculture, pottery and water users) -Representative of religious institutions -Environmental committee members
		Basic information	vi	-Traditional village transformed to ujamaa village in 1974. -Has population of 1507 people -The number of households is 263 -Number of households with Ngitili is 18 -The number of hamlets is 4 (Mwakija, Kidula, Mwamnemha, Mwikumulo) -Very far from district headquarter about 80 km; sharing boarder with Magu district. -Non HASHI focus area		
		Limitations shortcomings	-Lack of strict rules to govern Ngitili management, thus it was difficult to establish as to how much someone has benefited from his own or somebody's Ngitili. -Poor accessibility to the village coupled with remoteness. -Poor delivery of information to the respondents regarding the meeting time. As such the evening group turned up in the morning and they had to wait for the morning session to be completed.		
Maswa	5. Mwasheges	Semi-structured interviews	-	-	-
		Case studies histories)	4	3 Males 1 Female	-Elderly male head of household from poor category -Rich category male head of household who makes use of his own Ngitili and helps others with Ngitili. -A dynamic young person with different view of Ngitili management. -Single family female headed household

		FGD	2	14 Males 3 Females	-Representatives of village government -Religious denominations representatives -Representatives of economic groups (brick makers, water users and carpenters) -Influential people
		Basic information vi	-Village population is 2861, females 1485 and males 1376 -The number of household is 469 -The village started in 1974; having spit from Mwadila village -HASHI focused area -There are 6 individual Ngitili and 1 school Ngitili -Ngitili types (fodder Ngitili and fodder with trees) -It has 3 hamlets namely, Ilambamakono, Mwamanonga, Chungambuli.			
	6. Nyashimba	Limitations shortcomings	-Poor attendance of women in discussions		
		Semi-structured interviews	-	-	-
		Case studies histories)	4	3 Males 1 Female	-A landless young man earning his livelihood through products from others Ngitili (thatch grass, poles, charcoal and firewood) -A rich female headed household -A male head of household managing a big clan Ngitili and exchanging cow with fodder. -A male head of household whose family livelihoods depend on sales of Ngitili products.
		FGD	2	13 Males 2 Females	-Village government representative -Economic groups (carpenters, pot and brick makers) -Representatives of religious denominations
		Basic information vi	-The village population is 3382 people, males 1619 and 1763 females. -The number of households is 507 -The number of households with Ngitili is 4 -The village has 2 hamlets (Suluji and Salida). -Non HASHI focus area			

		Limitations shortcomings	-Poor representation and passiveness of women. -Some of the participants were suspicious and failed to out adequate information (refers to previous bad relations had with district authority with legitimacy of the village).		
Meatu	7. Mwambegwa	Semi-structured interviews	1	1 male	-A rich household head known to have overcome poverty through use of Ngitili
		Case studies (life histories)	3	2 females 1 male	-A middle category female head of household stepping from lower class by making use of Ngitili -A poor category male head of household surviving from Ngitili -A widow female headed household but rich
		FGD	2	2 females 11 males	-Village government representatives -Influential people -Representatives of traditional institutions (sungusungu) -Primary school teachers -Prominent farmers -Traditional healers -Environmental committee members
		Basic village information	-The village started 1974 -It has 10 hamlets (Mabambasi, Imalakoi, Ushirika, Budakama, Buhangija, Bulyanaga, Kisesa, Malugala, Mwilati and Bulyashimba). -There are 2 village government and 17 household Ngitili -Village population is 4683, males 2198 and females 2491 -The village has environmental committee -There are 676 households Ngitili types: with planted trees (HASHI zetu), with indigenous trees also called HASHI zetu -HASHI focus area.		
		Limitations shortcomings	-A vast village with many hamlets constraining movement from one place to another; limiting time for discussion.		
	8. Chambala	Semi-structured interviews	-	-	-
		Case studies histories)	4	3 males 1 female	-A rich man with big Ngitili but does not suffice his need due to big herd of cattle -A male head of household of a poor category -A poor widower with no Ngitili depending on others cattle for milk and also Ngitili for grazing.

		FGD	2	1 female 21 males	-Village government representative -Primary school teachers -Influential people -Traditional healers -Traditional institutions (sungusungu).
		Basic information	vi	-Non HASHI focus area -It has 124 households -It has 114 individuals Ngitili -The village population is 1350, males 621 and females 729 -The village started in 1992 -It is the driest part of the district, flat land with very scattered shrubs and trees. -It experiences whirlwind frequently especially in dry season -It is far from the district headquarters (Mwanhuzi) about 60km. -There is a presence of big herds of cattle -It has 4 hamlets namely, Magonali, Bupunja, Kisesa and Wime		
		Limitations shortcomings	-Poor representation of women -The second day for data collection coincided with the open air marketof Bukundi; compelling us to go there to find alternative respondents from the same village.		
Shy Rura	9. Ngaganulwa	Semi-structured interviews	-	-	-
		Case studies histories)	4	3 males 1 female	-Representative of the group owned Ngitili -Traditional healers -Destitute female headed household -A rich man head of household with cattle
		FGD	2	19 males 2 females	-Environmental committee members -Village government representa-tives -Traditional healer -Influential people -Traditional institutions (sungusungu) -Representative of water user groups

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		Basic village information	-Located about 30 km from Shinyanga Municipality along the Nzega road. -Situated at the foot of rocky hills -It is a traditional village transformed into ujamaa village in 1974 -It has 467 households -The village population is 1275, male 919 and females 1076 -There is 1 village Ngitili and a 16 member group (men, women and youths) Ngitili. -HASHI focus area -It has 4 sub-villages namely, Malaba, Sapaki, Kashenda and Ngaganulwa		
		Limitations shortcomings	-Poor leadership and uncooperative VEO hampered ti access to necessary village and respondents information		
	10. Chembeli	Semi-struc tured interviews	-	-	-
		Case studies histories)	4	2 females 2 males	-Elderly poor woman, single headed household -Female headed household of a middle category -A poor category widower head of household -A rich category male headed household
		FGD	2	3 females 15 males	-Village government representative -Primary school teacher -Economic groups (masonry) -Village health worker -Influential people
		Basic vi information	-The village has 7 hamlets namely Buniga, Butima, Isunga, Nhumbo, Inyanga, Nzanza, Chembeli -It has 297 households -The human population is 1927, females 1001 and males 926 -Households with Ngitili are 5 -There are 7 hamlet Ngitili -The village is about 55 km from the district headquarter. -Non HASHI area		
		Limitations shortcomings	-Language constraints hampered interview process deflecting the meaning of the information as well as consuming.		
Kahama	11. Wendele	Semi-structured interviews	-	-	-

		Case studies histories)	4	1 female 3 males	-A male head of household from a poor category without Ngitili -A male head of household from a rich category with Ngitili and livestock -A male head of household from rich category with Ngitili and gardening activities -Widow female head of household from rich category with Ngitili, also practices traditional healing
		FGD	2	4 Females 15 Males	-Village government representative -Influential people (with Ngitili) -Representatives of religious denominations -Economic groups (beekeepers, carpenters, prominent farmers) -Primary school teacher -Ngitili owners
		Basic vi information	-It has 640 households -Village population is 3650, males 1650 and female 1700 -There are 2 hamlet Ngitilis -There is 1 school Ngitili and 13 household Ngitili -It was a traditional village (Igunguli), registered in 1976. -It borders Mkweni central government forest reserve -It is located along Isaka Rusumo tarmac road 20km from district headquarter -HASHI concentration area. -It has 10 hamlets (Mpeneji, Mwendakulima, Kayenze, Wendele chini, Majengo mapya, Wendele mlimani, Witaja and Ulyankulu).			
		Limitations shortcomings	-People were suspicious in providing information due to antagonistic relations they have with district forest officials as a result of charcoal and timber production from the forest reserve.			
Kahama	12. Busindi	Semi-structured interviews	-	-	-
		Case studies histories)	4	1 Female 3 Males	-Widow, female headed household with degraded wood land -A male head of household from a poor category without Ngitili -Traditional healer from a poor category -Male head of household from poor category with Ngitili.

		FGD	2	5 Females 16 Males	-Village government representatives -A member of school committee -traditional healers -Economic groups (firewood sellers -A primary school teacher
		Basic vi information	-Started in 1975 -It has 180 households, 13 households have Ngitili -It has population of 952, females 457 and males 495 -It is close to the Bulyanhulu gold mine -Has sites for small scale gold processing -Far remote, about 80km from Kahama town. -Non HASHI concentration area.			
		Limitations shortcomings	-People had very high expectation hoping that the study group would bring some assistance, thus some people influenced participants to nominate them into poor category while in fact they are fairly well off.			
Bukomb	13.Businda	Semistructured interviews	-	-	-
		Case studies histories)	4	1 Female 3 Males	-A destitute, single female household -A male head of household from middle category without Ngitili -A male head of household from ric category with a big Ngitili and cattle. -A male head of household from a rich category with Ngitili.
		FGD	2	5 Females 23 Males	-Village government representative -Village environmental committee members -Traditional institutions (sungusungu) -Traditional healers -Ten cell leaders (balozi)
		Basic village information	-It has human population of 2160 -It has 415 households It has 14 households Ngitili and 1 school Ngitili -It started in 1999 -HASHI focus area -It is close to the district headquarter about 7km. -It is located along Isaka Rusumo highway -It has 4 hamlets (Iloganzala, Shikalibuga, Businda and Msindikwa).			
		Limitations shortcomings	-Time limitation as a result of failure to get people from the sampled village (Nampalahala)			
Bukomb	14. Bulega	Semi-structured interviews	-	-	-

		Case studies histories)	2	2 Females	-A poor single landless woman with a small plot for a house. -A middle category woman whose husband is a teacher and she is doing business
		FGD	2	2 Females 9 Males	-Village government representatives -Traditional institutions (sungusungu) -Village health attendant -Ten cell leaders (balozi) -Traditional healers

| | | Basic information | vi | -Has human population of 8904, males 3802 and female 4102
-It has 700 households
-The village has 6 hamlets namely Lwamkongwa D, Bulega A, Bulega B (Shilabela), Bulega C, Mweli Magharibi Mweli Mashariki and Bulega centre.
-There are 2 household Ngitili
-It borders Lushimba central government forest reserve
-It was established in 1993
-It has big scattered trees on cropping land, an indication of deforestation that took place in this area.
-It is far from the district headquarter about 40km.
-It is Non-HASHI area |
| | | Limitations shortcomings | | -Time limitation as a result of failure to get people from the priority sample village (Ihulike) |

ANNEX 8: SPECIES CHECKLIST FOR NGITILI IN SHINYANGA REGION

Spp Code	Botanical Name	Life form
1	*Acacia tortilis*	T
2	*Acacia brevispica*	SS
3	*Acacia drepanolobium*	ST
4	*Acacia gerrardii*	T
5	*Acacia hockii*	T
6	*Acacia kirkii*	ST
7	*Acacia mellifera*	T
10	*Acacia nilotica subsp.indica*	T
11	*Acacia nilotica subp. Subalata*	T
12	*Acacia nubica*	ST
13	*Acacia polyacantha*	T
14	*Acacia robusta*	T
15	*Acacia Senegal*	T
16	*Acacia seyal var. fistula*	ST,T
17	*Acacia ?sieberiana*	T
19	*Acacia tanganyikensis*	T
20	*Acacia tortilis*	T
21	*Adansonia digitata*	T
22	*Afzelia quanzensis*	T
23	*Albizia amara*	T
24	*Albizia anthelmintica*	T
25	*Albizia harveyi*	T
26	*Albizia petersiana*	T
27	*Albizia tanganyikensis*	T
28	*Albizia versicolor*	T
29	*Albizia petersiana*	T
30	*Anisotes dumosus*	S
31	*Annona senegalensis*	S,ST
32	*Antidesma venosum*	S,ST
33	*Balanites aegyptiaca*	T
34	*Boscia mossambicensis*	S,ST
35	*Brachystegia spiciformis*	T
36	*Brachystergia boehmii*	T
37	*Bridelia cathartica*	S,T
38	*Bridelia duvigneoudii*	S,ST
39	*Burkea africana*	T
40	*Burttia prunoides*	S
41	*Cadaba farinose*	S,ST
42	*Canthium burtii*	S,ST
43	*Capparis tomentosa*	CL
44	*Calotropis procera*	S,ST
45	*Cassipourea mollis*	T
46	*Catunaregum spinosa*	ST
47	*Combretum adenogonium*	T
48	*Combretum collinum*	T
49	*Combretum hereroense*	ST,T
50	*Combretum longispicatum*	CS

51	*Combretum molle*	T
52	*Combretum obovatum*	
53	*Combretum psidioides*	T
54	*Combretum zeyheri*	T
56	*Commiphora africana*	T
57	*Commiphora caerulea*	T
58	*Commiphora edulis*	T
59	*Commiphora mollis*	T
60	*Commiphora mossambicensis*	T
61	*Commiphora sp1*	T
62	*Cordia monoica*	S
63	*Cordia sinensis*	S,ST
64	*Crossopteryx febrifuga*	
66	*Croton menyarthii*	S
67	*Dalbergia arbutifolia*	S,ST
68	*Dalbergia boehmii*	T
69	*Dalbergia melanoxylon*	T
70	*Dalbergia nitidula*	ST
71	*Dalbergia stuhlmanii*	
72	*Dichnostachys cinerea*	S,ST
73	*Diospyros fischeri*	S,ST
74	*Diplorhynchus condylocarpon*	T
77	*Elaeodendron schlechteranum*	T
78	*Entada abyssinica*	T
79	*Euphorbia grantii*	SS
80	*Euphorbia nyikae*	T
81	*Feretia apodanthera*	ST
82	*Ficus sur*	T
83	*Flacourtia indica*	ST
84	*Friesodielsia obovata*	S
85	*Garcinia buchananii*	ST
86	*Gardenia ternifolia*	S,ST
88	*Grewia fallax*	ST
89	*Grewia mollis*	ST
90	*Grewia platyclada*	S
91	*Grewia similes*	ST
92	*Harrisonia abhysinica*	S,ST
93	*Hexalobus monopetalus var obovatus*	ST
94	*Holarhena pubescens*	S,ST
95	*Hymenocardia acida*	ST
96	*Hymenodictyon floribundum*	ST
97	*Hymenodictyon parvifolium*	ST
98	*Indigofera swaziensis*	S
99	*Julbernardia globiflora*	T
100	*Kigelia africana*	T
101	*Lannea fulva*	ST
102	*Lannea humilis*	ST
103	*Lannea schimperi*	T
104	*Lannea schweinfurthii*	T
105	*Lonchocarpus bussei*	T
106	*Maerua parvifolia*	S,T
107	*Maerua triphylla*	S
108	*Magnistipula butayeyi var greenwayii*	T

109	*Manilkara mochisia*	T
110	*Margaritaria discoidea*	S,ST
111	*Markhamia obtusifolia*	T
112	*Markhamia puberula*	ST
113	*Mayternus senegalensis*	S,ST
114	*Multidentia crassa*	S,ST
116	*Mystroxylon aethiopicum*	T
117	*Ochna holstii*	ST
118	*Ormocapum trichocarpum*	S.ST
119	*Parinari curatellifolia*	
120	*Parvetta schumaniana*	S
121	*Pavetta gardeniifolia*	S
122	*Pericopsis angolensis*	T
123	*Phyllanthus engleri*	T
124	*Phyllanthus reticulates*	CS
125	*Pseudolachnostylis maprounefolia*	T
126	*Psydrax livida*	ST
127	*Pterocarpus angolensis*	T
128	*Pterocarpus tinctorius*	T
129	*Rhus natalensis*	S,ST
130	*Rothmania engleriana*	ST
131	*Salvadora persica*	CS
132	*Schrebera trichoclada*	ST
133	*Sclerocarya birrea subsp. Multifoliolata*	T
134	*Senna singueana*	S,ST
135	*Sterculia mhosya*	ST
136	*Strophanthus eminii*	CS
137	*Strychnos cocculoides*	T
138	*Strychnos innocua*	T
139	*Strychnos potatorum*	T
140	*Strychnos pungens*	T
141	*Strychnos spinosa*	T
142	*Syzigium guineense*	T
143	*Terminalia mollis*	T
144	*Terminalia sericea*	T
145	*Terminalia stuhlmanii*	T
146	*Tricalysia ruandensis*	ST
147	*Vepris glomerata*	T
148	*Vernonia exsertiflora*	S,ST
149	*Vitex doniana*	T
150	*Vitex mombassae*	T
151	*Xeroderris stuhlmannii*	T
152	*Ximenia caffra*	S,ST
153	*Xylopia antunesii*	T
154	*Zanha africana*	T
155	*Zanthoxylum chalybeum*	T
156	*Ziziphus mucronata*	T
157	*Vitex payos*	T
158	*Ehretia amoena*	S
159	*Croton dichogamus*	S
160	*Delonix elata*	T
161	*Opilia amantacea*	CS

Key to life form

C	Climber
CS	Climbing shrub
S	Shrub
St	Small tree
T	Tree
SS	Scandent shrub

ANNEX 9: REGENERATING TREE SPECIES IN NGITILI IN SHINYANGA REGION

Species	Sph
Dichrostachys cinerea	233
Ormocarpum trichocarpum	101
Maerua parvifolia	71
Commiphora africana	71
Margartaria discoidea	51
Acacia drepanolobium	46
Catunaregum spinosa	36
Combretum molle	30
Mayternus senegalensis	30
Combretum zeyheri	30
Dalbergia melanoxylon	25
Acacia tortilis	20
Combretum longispicatum	20
Lannea humilis	20
Acacia hockii	20
Julbernardia globiflora	20
Brachystergia boehmii	20
Acacia nilotica ssp. subalata	15
Harrisonia abyssinica	15
Acacia polyacantha	15
Vepris glomerata	15
Brachystegia spiciformis	15
Crossopteryx febrifuga	15
Terminalia sericea	15
Combretum adenogonium	15
Multidentia crassa	10
Rothmania engleriana	10
Combretum obovata	10
Pavetta schumaniana	10
Balanites aegyptiaca	10
Salvadora persica	10
Acacia seyal var. fistula	10
Croton menyharthii	10
Albizia harveyi	10
Phyllanthus reticulatus	10
Senna singueana	10
Diplorynchus condylocarpon	10
Opilia amantacea	10
Zanthoxylum chalybeum	10
Ximenia caffra	10
Friesodielsia obovata	10
Strychnos pungens	10
Acacia gerradii	5

A.brevispica	5
A. tanganyikensis	5
A. nilotica	5
Acacia senegal	5
A. mellifera	5
Annona senegalensis	5
Calotropis procera	5
Capparis tomentosa	5
Cassipourea mollis	5
Diospyros fischeri	5
Elaeodendron schlechterianum	5
Flacourtia indica	5
Gardenia ternifolia	5
Grewia fallax	5
Grewia mollis	5
Hexsalobus monopetalus var. obovatum	5
Hymenocardia acida	5
Kigelia africana	5
Lycium sp.	5
Lonchocarpus bussei	5
Markhamia obtusifolia	5
Ochna holstii	5
Psydrax livida	5
Phyllanthus engleri	5
Pterocarpus tinctorius	5
Rhus natalensis	5
Strychnos cocculoides	5
Strophanthus eminii	5
Vitex doniana	5
Vitex mombassae	5
Ziziphus mucronata	5
Total	**1294**

ANNEX 10: BIRDS OF SHINYANGA REGION

	Kiswahili name	Common name	Species name		Family name
1	Hondohondo	African grey hornl	A.	*tockus natutus*	bucerotidae
2	Chechele kijivu	Ashy flycatcher	B.	*muscicapa caerulescens*	muscicapidae
3	Kipanga marungi	African harrier hav	C.	*polyboroides typus*	accipitridae
4	Bwerendadomobuluu	African firefinch	D.	*logonosticta rubricata*	estrildidae
5	Kiluwiluwi majumba	African pied wagt:	E.	*mocronyx aguimp*	motacillidae
6	Njiri machomeupe	African qualifinch	F.	*ortygospiza atricollis*	estrildidae
7	Kwarara mweupe	African sacred ibis	G.	*threskiornis aethiopica*	threskiornithidae
8	Kuyu jichonjano	African mo dove	H.	*streptopelia decipeens*	columbidae
9	Tai kipanga	African hawk eagle	I.	*hieraaetus spilogaster*	accipitridae
10	Bata mtoni	African finfoot	J.	*podica senegalensis*	heliornithidae
11	Chechele mwekundu	African pa flycatcher	K.	*terpsihpone viridis*	monarchidae
12	Njiwa mweusi	African olive pige	L.	*columba arquatrix*	columbidae
13	Korongo domowazi	African open- stork	M.	*anastomus lamelligerus*	scopidae
14	Mozo kwapanyeupe	Anteater chat	N.	*myrmecocichla aethiops*	turdidae
15		Bronze backed bir	O.		
16	Kikuche kichwacheusi	Black cro tchagra	P.	*tchagra senegala*	malaconotidae
17	Mwewedomojeusi	Black kite	Q.	*milvus migrans*	accipitridae
18	Neli kilima	Bronze sunbird	R.	*nectarinia kilimensis*	nectariniidae
19	Mnaana,Tokeeo	Buffy pipit	S.	*anthus vaalensis*	motacillidae
20	Pungu	Bateleur	T.	*terathropius ecaudatus*	accipitridae
21	Chiku mweusi	Black cuckoo shril	U.	*campephaga flava*	campephagidae
22	Njiri buluu*	Blue waxbill	V.	*uraeginthus angolensis*	estrildidae
23	Korongo majoka	Black headed hero	W.	*ardea melanocephala*	ardeidae
24	Tai kifuacheusi	Black chested eagle	X.	*circaetus pectoralis*	accipitridae
25	Mbayuwayu mweusi	Black roug swallow	Y.	*psalidoprocne holomelas*	hirundinidae
26	Kinega shavubuluu	Blue cheeked eater	Z.	*merops persicus*	meropidae
27	Mbayuwayu buluu	Blue swallow	AA.	*hirundo atrocaerulea*	hirundinidae
28	Kasuku kichwakahawia	Brown headed pa	BB.	*poicephalus cryptoxanthus*	psittacidae
29	Bwerenda kahawia	Brown firefinch	CC.	*lagonosticta rufopicta*	estrildidae
30	Chigi madoa	Bronze mannikin	DD.	*lonchura cucullata*	estrildidae
31	Kuzi tumbojeusi	Black bellied starl	EE.	*lamprotornis corruscus*	turnidae
32	Gawa bawabulu	Bronze w courser	FF.	*rhinoptilus chalcopterus*	glareolidae
33	Chozi uzuri	Beautful sunbird	GG.	*nectarinia pulchella*	*nectariniidae*
34	????	Black firefinch	HH.	*lagonosticta rara*	estrildidae
35	Njiri buluu*	Blue cheeked blue	II.	*uraeginthus angolensis*	estrildidae
36	Nguya*	Black headed wea	JJ.	*ploceus cucullatus*	ploceidae
37	Mozo	Common stonecha	*saxicola torquata*		turdidae
38	Kwera kiparachekundu	Cardinal quelea	KK.	*quelea cardinalis*	ploceidae

39	Kwera mwekundu	Chestnut br Weaver	**LL.**	**ploceus rubigonosus**	**ploceidae**
40	Yangeyange	Cattle egret	**MM.**	**bubulcus ibis**	**ardeidae**
41	Kwale mdogo	Coqui francolin	**NN.**	**francolinus coqui**	**phasianidae**
42	Chigi,Njiri	Cordon blue			**estrildidae**
43	Mozo kichwacheusi	Cliff chat	**OO.**	**thamnolaea cinnamomeiventris**	**turdidae**
44	Sasol	Cape grassbird	**PP.**	**sphenoeacus afer**	**sylviidae**
45	Kwale kishungi	Crested francolin	**QQ.**	**francolinus sephaena**	**phasianidae**
46	Kololo	Crested guineafov	**RR.**	**guttera pucherani**	**phasianidae**
47		Common greater			
48	Z uwakulu ushungimweu	Crested barbet	**SS.**	**trachyphonus vaillantii**	**lybiidae(capitonida**
49	Kigon'gota Kiparachekun	Cardinal woodpec	**TT.**	**campethera fuscescens**	**picedae**
50	Tetere,pugi,njiaw,nk	Dove			**columbidae**
51	Kwera msitu	Dark backed weaver	**UU.**	**ploceus bi color**	**ploceidae**
52	Chole ulaya	European roller	**VV.**	**coracias garrulous**	**coraciidae**
53	Njiwa kisogo-rangishaba	Eastern bronze pigeon	**WW.**	**columba delegorguei**	**columbidae**
54	Sasol	Forest canary	**XX.**	**serinus scotops**	**fringillidae**
55	Mlamba mkiapanda	Fork tailed drongo	**YY.**	**dicrurus adsimilis**	**dicruridae**
56	Sasol	Fiscal flycatcher	**ZZ.**	**sigelus silens**	**platysteiridae**
57	Kwale, kereng'ende nk	Francolin			**phasianidae**
58	Kwarumanjano	Fisher's lovebird	**AAA.**	**agapornis fischeri**	**psittacidae**
59	Gegemela domojekundu	Green woodhoop	**BBB.**	**pheoniculus purpureus**	**phoeniculidae**
60	Korobindo kichwakijivu	Grey headed weaver	**CCC.**	**pseudonigrita arnauli**	**ploceidae**
61	Chozi kichwakijivu	Grey headed sunb	**DDD.**	**anthreptes frasseri**	**nectariniidae**
62	Korongo kisiwa	Grey heron	**EEE.**	**ardea cinerea**	**ardeidae**
63	Korobindo kaya(jolowe)	Grey headed spar	**FFF.**	**passer griseus**	**passeridae**
64	Njiri bawakijani	Green winged pyt	**GGG.**	**pytilia melba**	**estrildidae**
65	Chiku mweupe	Grey cuckoo-shrik	**HHH.**	**coracina caesia**	**campephagidae**
66	Mdogo	Golden weaver	**III.**	**ploceus subaureus**	**ploceidae**
67	Fundichuma	Hamerkop	**JJJ.**	**scopus umbretta**	**scopidae**
68	Collin	Handsome Franco	**KKK.**	**francolinus nobilis**	**phasianidae**
69	Ndoero kipipi	Kittlitz's plover	**LLL.**	**charadrius pecuarius**	**charadriidae**
70	Chozi macheo	Kenya violet b sunbird	**MMM.**	**anthrepte orientalis**	**nectariniidae**
71	Kukuziwa mdogo	Lesser moorhen	**NNN.**	**gallinula angulata**	rallidae
72	Korongo pwani(dandala)	Little egret	**OOO.**	**egretta garzetta**	**ardeidae**
73	Chozi mgongo kijani	Little purple b sunbird	**PPP.**	**nectarinia bifasciata**	**nectariniidae**
74	Tai ushungi	Long crested eagle	**QQQ.**	**lophaetus occipitalis**	**accipitridae**
75	Sasol	Lemon br canary	**RRR.**	**serinus cutrinipectus**	**fringillidae**
76	Chambombe miombo	Miombo grey tit	**SSS.**	**parus griseiventris**	**paridae**
77	Kichi kishungibuluu	Malachite kingfish	**TTT.**	**alcedo cristata**	**alcedinidae**
78	Chigi mkuu	Magpie mannikin	**UUU.**	**lonchura fringilloides**	**estrildidae**
79	Mozo miombo	Miombo rock thru	**VVV.**	**monticola angolensis**	**turdidae**
80	Sasol?	Monotous lark	*mirafra…?*		**alaudidae**
81	Kuzi machonjano	Miombo blue starling	**WWW.**	**lumprotornis chalybaeus**	**sturnidae**
82	Pugi kombamwiko	Namaqua dove	**XXX.**	**oena capensis**	**columbidae**
83	Sasol	Nothern m weaver	**YYY.**	**ploceus taeniopterus**	**ploceidae**
84	Mbarawaji	Nightjar			**caprimulgidae**
85	Chozi kijanikijivu	Olive bellied sunb	**ZZZ.**	**nectarinia chloropygia**	**nectariniidae**

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86	Sasol	Orange breasted sunbird	*AAAA.*	*anthobaphes violacea?*	**nectariniidae**
87	Kunguru mweupe	Pied crow	*corvus albus*		**corvidae**
88	Mzese mweupe(fumbwe	Pin tailed whydah	*BBBB.*	*vidua macroura*	**viduidae**
89	Pondagundi	Purple heron	*CCCC.*	*ardea purpurea*	**ardeidae**
90	Chechele mweupe	Pallied flycatcher	*bradornis microrhynchus*		**muscicapidae**
91	Mnaana mgongomweupe	Plain backed pipit	*DDDD.*	*anthus leucophrys*	**motacillidae**
92	Kurumbiza, Kuruwiji	Robin chat			**turdidae**
93	Shoro mito	River warbler	*EEEE.*	*locustella fluviatilis*	**sylviidae**
94	Mlali domojekundu	Retz's red helmet-shrike	*FFFF.*	*prionops plumatus*	**prionopidae**
95	Kwelea kwelea	Red billed quelea	*GGGG.*	*quelea quelea*	**ploceidae**
96	Yombeyombe mwekundu	Red headed weave	*HHHH.*	*anaplectes rubriceps*	**ploceidae**
97	Tetere mdogo	Ring necked dove	*IIII.*	*streptolia capicola*	**columbidae**
98	Kipozamataza bawajekur	Red winged lark	*JJJJ.*	*mirafra hypermetra*	**alaudidae**
99	Bwerenda domojekundu	Red billed firefinch	*logonosticta senegala*		**estrildidae**
100	Njiri buluu shavujekundu	Red cheeked cc blue	*KKKK.*	*uraeginthus bengalus*	**estrildidae**
101	Kibubutu usomwekundu	Red faced crombec	*LLLL.*	*sylvietta whytii*	**sylviidae**
102	Kurumbiza mwekundu	Red capped chat	*MMMM.*	*cossypha natalensis*	**turdidae**
103		Red winged bush			
104	Kiruwiri domokifundo	Red knobbed coot	*NNNN.*	*fulica cristata*	**rallidae**
105	Sasoln?	Rockrunner (achaetops)	*OOOO.*	*achaetops pycnopygius*	**sylviidae**
106	Tai mbuga	Steppe eagle	*PPPP.*	*aquila nipalensis*	**accipitridae**
107	Kwale kiparachekundu	Southern (Vite masked weaver	*QQQQ.*	*ploceus velatus*	**ploceidae**
108	Kiongozi koomabaka	Scaly thr honeyguide	*RRRR.*	*indicator variegates*	**indicatoridae**
109	Sasol?	Swainson's spurfc	*SSSS.*	*pternistes swainsonii*	**phasianidae**
110	Njiwa madoa	Speckled pigeon	*TTTT.*	*columba guinea*	**columbidae**
111	Nguya*	Social weaver	*UUUU.*	*ploceus cucullatus*	**ploceidae**
112	Tambarazi	Spotted creeper	*VVVV.*	*salpornis spilonota*	**certhiidae**
113	Korobindo mchirizimwe	Sparrow weaver	*WWWW.*	*plocepasser mahali*	**passeridae**
114		Sululi			
115	Mpasuambegu michilizi	Streaky headed eater	*XXXX.*	*serinus gularis*	**fringillidae**
116	Chozi gunda	Scarlet c sunbird	*YYYY.*	*nectarinia senegalensis*	**nectariniidae**
117		Southern crowned starling			**sturnidae**
118	Kichwacheupe	Southern crowned-shrike	*ZZZZ.*	*eurocephalus rueppelli*	**prionopidae**
119	Pasa michilizi	Speckled mousebi	*AAAAA.*	*colius striatus*	**coliidae**
120	Kurumbiza miluzi	Spotted mc warbler(thrush)	*BBBBB.*	*cichladusa guttata*	**turdidae**
121	Mlamba misitu	Square tailed drong	*CCCCC.*	*dicrurus ludwigii*	**dicruridae**
122	Bundi machonjano	Spotted eagle owl	*bubo africanus*		**strigidae**
123	Kwera domojembamba	Slender billed wea	*DDDDD.*	*ploceus pelzeln*	**ploceidae**
124	Sasol	Southern p sunbird	*EEEEE.*	*anthreptes platurus*	**nectarinidae**
125	Karani(Ndege kilemba)	Secretarybird	*FFFFF.*	*sagittarius serpentarius*	**sagittariidae**
126	Pugi kikombe(kituku pori	Tambourine dove	*GGGGG.*	*turtur tympanistria*	**columbidae**
127	Shoro bawakahawia	Tawny flanked pr	*HHHHH.*	*prinia subflava*	**syl viidae**

128	Kitongo domojekundu	Village indigobird	*IIIII.*	*vidua chalybeata*	**viduidae**
129	Nguya*	Village weaver	*JJJJJ.*	*ploceus cucullatus*	**ploceidae**
130	Sasol	Violet eared waxbi	*KKKKK.*	*granatina grnatina*	**estrildidae**
131	Kuzi mgongozambarau	Violet b starling	*LLLLL.*	*cinnyricinclus leucogaster*	**sturnidae**
132	Kunguru shingonyeupe	White necked rave	*MMMMM.*	*corvus albicollis*	**corvidae**
133	Kiruwiji tumbojeupe	White breasted ale	*NNNNN.*	*alethe fuelleborni*	**turdidae**
134	Shoro mbuga	Willow warbler	*OOOOO.*	*phylloscopus trochilus*	**sylviidae**
135	Kurumbiza kiunochekund	White browed robin chat	*cercotrichs leucophrys*		**turdidae**
136	Kuzi kijivucheupe	Wattle starling	*PPPPP.*	*creatophora cineria*	**sturnidae**
137		Grey browned cra			
138	Dudumizi	White browed cou	*QQQQQ.*	*centropus superciliosus*	**centropidae**
139	Kidenenda mkuu	Winding cisticola	*RRRRR.*	*cisticala galactotes*	**sylviidae**
140	Korobindo kichwacheupe	White headed b weaver	*SSSSS.*	*dinemellia dinemeli*	**passeridae**
141		Yellow eyed flycatcher	*TTTTT.*	*melaenornis ardesiacus*	**muscicapidae**
142	Chiriku usonjano	Yellow fr canary	*serinus mozambicus*		**fringillidae**
143	Sholwe(shore)	Yellow vented bul	*UUUUU.*	*ptcnonotus barbatus*	**pycnonotidae**

ANNEX 11a: BIRDS OF MASWA DISTRICT, SHINYANGA REGION.

	Kiswahili name	**Common name**	**Species name**		**Family name**
1	Kunguru shingonyeupe	White necked raven	**VVVVV.**	**CORVUS ALBICOLLIS**	**Corvidae**
2	Bundi machonjano	Steppe eagle	**WWWWW.**	**BUBO AFRICANUS**	**Strigidae**
3	Mdogo	Golden weaver	**XXXXX.**	**PLOCEUS SUBAUREUS**	**Ploceidae**
4	Korongo kisiwa	Grey heron	**YYYYY.**	**ARDEA CINEREA**	**Ardeidae**
5	Korongo domowazi	African open-billed stork	**ZZZZZ.**	**ANASTOMUS LAMELLIGERUS**	**Scopidae**
6	Kwarara mweupe	African scared ibis	**AAAAAA.**	**THRESKIORNIS AETHIOPICA**	**Threskiornithidae**
7	Shoro bawakahawia	Tawny flanked prinia	**BBBBBB.**	**PRINIA SUBFLAVA**	**Sylviidae**
8	Kiruwiri domokifundo	Red knobbed coot	**CCCCCC.**	**FULICA CRISTAT**	**Rallidae**
9	Kwale kiparachekundu	Southern masked weaver	**DDDDDD.**	**PLOCEUS VELATU**	**Ploceidae**
10	Domomundu mweusi	Common scimitarbill	**EEEEEE.**	**PHEONICULUS CYANOMELAS**	**Phoeniculidae**
11	Kurumbiza kiuno chekun	White browed scrub chat	*Cercotrichs leucophrys*		**Turdidae**
12	Kurumbiza,Kuruwiji	Robin chat			**Turnidae**
13	Njiwa kishingo rangishaba	Eastern bronze pigeon	**FFFFFF.**	**COLUMBA DELEGORGUEI**	**Columbidae**
14	Kiongozi koomabaka	Scaly throated Honeyguid	**GGGGGG.**	**INDICATOR VARIEGATES**	**Indicatoridae**
15	Pungi kombamwiko	Namaqua dove	**HHHHHH.**	**OENA CAPENSIS**	**Columbidae**
16	Kitongo domojekundu	Village indigobird	**IIIIII.**	**VIDUA CHALYBEA**	**Viduidae**
17	Pasa usomwekundu	Red faced mousebird	**JJJJJJ.**	**UROCOLIUS INDIC**	**Collidae**
18	Njiwa mweusi	African olive pigeon	**KKKKKK.**	**TERPSIHPONE VIRIDIS**	**Monarchidae**
19	Sasol	Forest canary	**LLLLLL.**	**S ERINUS SCOTOF**	**Fringillidae**
20	Kwera msitu	Dark backed forest weave	Ploceus bicolour		**Ploceidae**
21	Sasol	Monotous lark	Mirafra…?		**Alaudidae**
22	Njiri bawakijani	Green winged pytilia	**MMMMMM.**	**PYTILIA MELBA**	**Estrildidae**

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23	Sasol	Swainson's spurfowl	**NNNNNN. PTERNISTES SWAINSONII**	**Phasianidae**
24	Kukuziwa mdogo	Lesser moorhen	**OOOOOO. GALLINULA ANGULATA**	**Rallidae**
25	Bata mtoni	African pin foot	**PPPPPP. PODICA S ENEGALENSIS**	**Heliornithidae**
26	Fundi chuma	Hamerkop	**QQQQQQ. SCOPUS UMBRET**	**Scopidae**
27		Common greaters		
28	Mwewe domojeusi/njan	Black kite	**RRRRRR. MILVUS MIGRNS**	**Accipitridae**
29	Korongo pwani (dandala)	Little egret	**SSSSSS. EGRETTA GARZETTA**	**Ardeidae**
30	Sasol	Rockrunner	**TTTTTT. ACHAETOPS PYCNOPYGIUS**	**Sylviidae**
31	Njiwa madoa doa	Speckled pigeon	**UUUUUU. COLUMBA GUINE**	**Columbidae**
32	Mnaana mgongo mweup	Plain backed pipit	**VVVVVV. ANTHUS LEUCOPHRYS**	**Motacillidae**
33	Neli kilima	Bronze sunbird	**WWWWWW. NECTARINIA KILIMENSIS**	**Nectariniidae**
34	Sasol	Orange breasted sunbird	**XXXXXX. ANTHOBAPHES VIOLACEA?**	**Nectariniidae**
35	Chiku mweupe	Grey cuckoo shrike	**YYYYYY. CORACINA CAESI**	**Campephagidae**
36	Shoro mweupe	River warbler	**ZZZZZZ. LOCUSTELLA FLUVIATILIS**	**Sylviidae**
37	Mnaana Tokeeo	Buffy pipit	**ANTHUS VAALENSIS**	**Motacillidae**
38	Nguya	Social weaver	**AAAAAAA. PLOCEUS CUCULLATUS**	**Ploceidae**
39	Tambarazi	Spotted creeper	**BBBBBBB. SALPORNIS SPILONOTA**	**Certhiidae**
40	Korombindo mi mweupe	Sparrow weaver	**CCCCCCC. PLOCEPASSER MAHALI**	**Passeridae**
41	Sasol	Cape grassbird	**DDDDDDD. SPHENOEACUS A**	**Sylviidae**
42	Mlamba mkiapanda	Fork tailed drongo	**EEEEEEE. DICRURUS ADSIMILIS**	**Dicruridae**
43	Pungu	Bateleur	**FFFFFFF. TERATHROPIUS ECAUDATUS**	**Accipitridae**
44	Chiku mweusi	Black cuckoos shrike	**GGGGGGG. CAMPEPHAGA FLAVA**	**Campephagidae**
45		Sululi		
46	Kiruwiji tumbo jeupe	White chested alethe	**HHHHHHH. ALETHE FUELLEBORNI**	**Turdidae**
47	Njiri buluu	Blue waxbill	**IIIIIII. URAEGINTHUS ANGOLENSIS**	**Estrildidae**
48	Hondohondo	African grey hornbill	Tockus natutus	
49	Kololo	Crested guinefowl	**JJJJJJJ. GUTTERA PUCHERANI**	**Phasianidae**
50	Kwale kishungi	Crested francolin	**KKKKKKK. FRANCOLINUS S EPHAENA**	**Phasianidae**
51	Mlali domojekundu	Retzs's red billed shrike	**LLLLLLL. PRIONOPS PLUMATUS**	**Prionopidae**
52		Helmet shrike		**Prionopidae**
53	Kwelea kwelea	Red billed quelea quelea	**MMMMMMM. QUELEA QUELEA**	**Ploceidae**

ANNEX 11 b: BIRDS - KAHAMA DISTRICT, SHINYANGA REGION.

	Kiswahili name	Common name	Species name	Family
1	Kuzi macho njano	Miombo blue-eared starli	NNNNNNN. LUMPROTORNIS CHALYBAEUS	Sturnidae
2	Pugi kikombe kitupu (por	Tambourine dove	OOOOOOO. TURTUR TYMPANISTRIA	Columbidae
3		Francolin		Phasianidae
4	K orongo majoka	Black headed heron	PPPPPPP. ARDEA MELANOCEPHALA	Ardeidae
5	Sasol	Fiscal flycatcher	QQQQQQQ. SIGELUS SILENS	Platysteiridae
6	Mozo kichwa cheusi	Cliff-chat	RRRRRRR. THAMNOLAEA CINNAMOMEIVENTRIS	Turdidae
7	Mpasuambegu michilizi	Streaky headed seed-eater	SSSSSSS. SERINUS GULARIS	Fringillidae
8	Tai kifuacheusi	Black chested snake eagle	TTTTTTT. CIRCAETUS PECTORALIS	Accipitridae
9	Mlamba mkiapanda	Fork tailed drongo	UUUUUUU. DICRURUS ADSIMIL	Dicruridae
10	Tetele mdogo	Ring necked dove	VVVVVVV. STREPTOLIA CAPICOLA	Columbidae
11		Black saw-wing swallow	WWWWWWW. PSALIDOPR NE HOLOMELAS	Hirundinidae
12	Kiluwiluwi majumba	African pied wagtail	XXXXXXX. MOCRONYX AGUIM	Motacillidae
13	Mwewe domojeusi/njano	Black kite	YYYYYYY. MILVUS MIGRNS	Accipitridae
14	Hondohondo	African grey hornbill	ZZZZZZZ. TOCKUS NATUTUS	Bucerotidae
15	Chozi gunda	Scarlet chested sunbird	AAAAAAAA. NECTARINIA SENEGALENSIS	Nectariniidae
16	Kuzi mgongo zambarau	Violet backed starling	BBBBBBBB. CINNYRICINCLUS LEUCOGASTER	Sturnidae
17	Shoro mbuga	Willow warbler	CCCCCCCC. PHYLLOSCOPUS TROCHILUS	Sylviidae
18	Kikuche kichwacheusi	Black crowned tchagra	DDDDDDDD. TCHAGRA SENEGAI	Malaconotidae
19	Kurumbiza kiuno chekund	White browed scrub chat	Cercotrichs leucophrys	Turdidae
20	Kinega shavubulu	Blue cheeked bee eater	EEEEEEEE. MEROPS PERSICUS	Meropidae
21	Mbayuwayu buluu	Blue swallow	FFFFFFFF. HIRUNDO ATROCAERULEA	Hirundinidae
22	Kuzi kijivucheupe	Wattled starling	GGGGGGGG. CREATOPHORA CINERIA	Sturnidae
23		Southern white cro starling		
24	Chigi, Njiri	Cordon blue		Estrildidae
25	Njiwa madoa doa	Speckled pigeon	HHHHHHHH. COLUMBA GUINEA	Columbidae
26	Pasa michilizi	Speckled mousebird	IIIIIIII. CO LIUS STRIATUS	Coliidae
27		White crowned ?		
28	Sholwe, shore	Yellow vented bulbul	JJJJJJJJ. PTCNONOTUS BARBATUS	Pycnonotidae
29	Mozo miombo	Miombo rock thrush	KKKKKKKK. MONTICOLA ANGOLENSIS	Turdidae
30	Chechele mwekundu	African paradise flycatche	LLLLLLLL. TERPSIHPONE VIRII	Monarchidae
31	Kungulu mweupe	Pied crow	Corvus albus	Corvidae
32	Kasuku kichewa kahawia	Brown headed parrot	MMMMMMMM. POICEPHALU CRYPTOXANTHUS	Psittacidae
33	Korongo kisiwa	African grey heron	NNNNNNNN. ARDEA CINEREA	Ardeidae
34	Kwarara mweupe	African sacred ibis	OOOOOOOO. THRESKIORNIS AETHIOPICA	Threskiornithidae
35	Njiri buluu	Blue waxbill	PPPPPPPP. URAEGINTHUS ANGOLENSIS	Estrildidae

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36		Southern white crowned shrike		
37	Kiluwiluwi majumba	African pied wagtail	**QQQQQQQQ. MOCRONYX AGUIM**	**Motacillidae**
38	Pugi kombamwiko	Namaqua dove	**RRRRRRRR. OENA CAPENSIS**	**Columbidae**
39	Bwerenda kahawia	Brown firefinch	**SSSSSSSS. LAGONOSTICTA RUFOPICTA**	**Estrildidae**
40	Korobindo kahawia	Great sparrow	*Passer motitensis(rufocinctus)*	**Passeridae**
41	Chigi madoa	Bronze mannikin	**TTTTTTTT. LONCHURA CUCULLATA**	**Estrildidae**
42	Sasol	Red headed finch	**UUUUUUUU. AMADINA ERYTHROCEPHALA**	**Estrildidae**
43	Kurumbiza kiuno chekundu	White browed scrub chat	*Cercotrichs leucophrys*	**Turdidae**
44	Sasol	Violet eared waxbill	**VVVVVVVV. GRANATINA GRNATINA**	**Estrildidae**
45	Njiri macho meupe	African qualifinch	**WWWWWWWW. ORTYGOSPI ATRICOLLIS**	**Estrildidae**
46	Mzese mweupe (fumbwe	Pin tailed whydah	**XXXXXXXX. VIDUA MACROURA**	**Viduidae**
47	Chigi mkuu	Magpie mannikin	**YYYYYYYY. LONCHURA FRINGILLOIDES**	**Estrildidae**
48	Nguya*	Spotted backed weaver	**ZZZZZZZZ. PLOCEUS CUCULLATUS**	**Ploceidae**
49		Green winged pytilia	**AAAAAAAAA. PYTILIA MELBA**	**Estrildidae**
50	Kuy u jichonjano	African morning dove	**BBBBBBBBB. STREPTOPELIA CAPICOLA**	**Columbidae**

ANNEX 11c: BIRDS - BARIADI DISTRICT, SHINYANGA REGION.

	Kiswahili name	Common name	Species name	Family	Number sighted
1	Fumvu (so kanturi)	Loughing dove	Streptopelia senegalensis	**Columbidae**	8
2	Mlali domojekund	Retz's red billed helmet shrike	**CCCCCCCCC. PRIONOPS PLUMATUS**	**Prionopidae**	12
3	Kuzi tumbo jeusi	Black bellied starling	**DDDDDDDDD. LAMPROTORNIS CORRUSO**	**Turnidae**	2
4	Njiri buluu	Blue waxbill	**EEEEEEEEE. URAEGINTHUS ANGOLENS**	**Estrildidae**	26
5	Dodumizi	White browed coucal	**FFFFFFFFF. CENTROPUS SUPERCILIOSU**	**Centropidae**	13
6	Mbarawaji	Nightjar		**Caprimulgidae**	15
7	Ndoero kipipi	Kittlitz's plover	**GGGGGGGGG. CHARADRIUS PECUARIUS**	**Charadriidae**	6
8	Fundichuma	Hamerkop	**HHHHHHHHH. SCOPUS UMBRETT**	**Scopidae**	8
9		Red winged bush			2
10	Kiluwiluw i majun	African pied wagtail	**IIIIIIIII. MOCRONYX AGUIMP**	**Motacillidae**	3
11	Gawa bawabuluu	Bronze winged courser	**JJJJJJJJJ. RHINOPTILUS CHALCOPTERUS**	**Glareolidae**	2
12	Pasa michilizi	Speckled mousebird	**KKKKKKKKK. COLIUS STRIATUS**	**Coliidae**	4
13	Kitwitwi Mgongomabaka	Ruff	**LLLLLLLLL. PHILOMACHUS PUGNAX**	**Scolopacidae**	2
14	Chiriku usomanjar	Yellow fronted canary	Serinus *mozambicus*	**Fringillidae**	9
15	Mnaana nyasa	Woodland pipit	Anthus nyassae	**Motacillidae**	3
16	Kwale mdogo	Coqui francolin	**MMMMMMMMM. FRANCOLINUS COC**	**Phasianidae**	2
17	Yangeyange	Cattle egret	**NNNNNNNNN. BUBULCUS IBIS**	**Ardeidae**	1
18	Korongo kisiwa	Grey heron	Ardea cinerea	**Ardeidae**	4
19	Kiluwiluwi majun	African pied wagtail	Mocronyx aguimp	**Motacillidae**	2
20	Kurumbiza mwekundu	Red capped robin chat	Cossypha natalensis		5
21	Mozo kwapajeup	Anteater chat	**OOOOOOOOO. MYRMECOCICHLA AETHIOPS**	**Turdidae**	5
22	Pondagundi	Purple heron	**PPPPPPPPP. ARDEA PURPUREA**	**Ardeidae**	2
23	Tetele mdogo	Ring naped dove	**QQQQQQQQQ. STREPTOLIA CAPICOLA**	**Columbidae**	6
24		Bronze backed bird ?			4
25	Chozi macheo	Kenya violet backed	**RRRRRRRRR. ANTHREPTE ORIENTALIS**	**Nectariniidae**	4
26	Kibubutu usomwekundu	Red faced crombec (sylvietta)	**SSSSSSSSS. SYLVIETTA WHYTII**	**Sylviidae**	3
27	Kwera kiparachekundu	Cardinal quelea quelea	**TTTTTTTTT. QUELEA CARDINALIS**	**Ploceidae**	8
28	Chozi kichwakijiv	Grey sunbird	**UUUUUUUUU. ANTHREPTES FRASSERI**	**Nectariniidae**	9
29	Sasol	Northern masked weaver	**VVVVVVVVV. PLOCEUS TAENIOPTERUS**	**Ploceidae**	5
30	Sasol	Lemon breasted canary	**WWWWWWWWW. S ERINUS CUTRINIPECTUS**	**Fringillidae**	5
31	Njiri shavujekundu	Red cheeked cordon blue	**XXXXXXXXX. URAEGINTHUS BENGALUS**	**Estrildidae**	5
32	Kidenenda mkuu	Winding cisticola	**YYYYYYYYY. CISTICALA GALACTOTES**	**Sylviidae**	1
33	Mlamba misitu	Square tailed drongo	**ZZZZZZZZZ. DICRURUS LUDWIGII**	**Dicruridae**	1
34	Bwerenda domojekundu	Red billed firefinch	*Logonosticta senegala*	**Estrildidae**	7
35	Korombindo kichwakijivu	Grey headed social weaver	**AAAAAAAAA. PSEUDONIGRITA ARNAULI**	**Ploceidae**	7
36	Chigi madoadoa	Bronze mannikin	**BBBBBBBBB.LONCHURA CUCULLATA**	**Estrildidae**	2
37	Kurumbiza miruz	Spotted morning warbler	**CCCCCCCCC. CICHLADUSA GUTTATA**	**Turdidae**	1
38	Kichi kishingo bul	Malachite kingfisher	**DDDDDDDDD. ALCEDO CRISTATA**	**Alcedinidae**	1
39	Dudumizi	White browned coucal	**EEEEEEEEE. CENTROPUS SUPERCILIOSU**	**Centropidae**	3

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40	Kwarumanjano	Fisher's lovebird	**FFFFFFFFFF. AGAPORNIS FISCHERI**	**Psittacidae**	1
41	Kipozamataza bawajekundu	Red winged lark	**GGGGGGGGGG. MIRAFRA HYPERMETRA**	**Alaudidae**	1
42	Sasol	Northern masked weaver	**HHHHHHHHHH. PLOCEUS TAENIOPTERUS**	**Ploceidae**	2
43	Chozi uzuri	Beautful sunbird	**IIIIIIIIII. NECTARINIA PULCHELLA**	**Nectariniidae**	1

ANNEX 11d: BIRDS - MEATU DISTRICT, SHINYANGA REGION.

1	Kuyu jichonjano	African morning dove	**JJJJJJJJJJ. ST TOPELIA CAPICOLA**	**Columbidae**	10
2	Bwerenda domobuluu	African firefinch	**KKKKKKKKKK. OGONOST A RUBRICAT**	**Estrildidae**	9
3	Kwera domojembamba	Slender billed weaver	**LLLLLLLLLL. PL EUS PELZEI**	**Ploceidae**	1
4	Korombindo kichy cheupe	White headed buffalo weaver	**MMMMMMMMM INEMELLIA DINEMELI**	**Passeridae**	1
5	Tetele mdogo	Ring necked dove	**NNNNNNNNNN. TREPTOLI CAPICOLA**	**Columbidae**	1
6	Collin	Handsome francolin	**OOOOOOOOOO. RANCOLII NOBILIS**	**Phasianidae**	4
7	Fumvu (tongoro kanturi)	Loughing dove	Streptopelia senegalens	**Columbidae**	1
8	Bund imachonjand	Spotted eagle owl	**PPPPPPPPPP. BU AFRICANU**	**Strigidae**	1
9	Nguya	Black headed weaver	**QQQQQQQQQQ. LOCEUS CUCULLA'**	**Ploceidae**	4
10		Yellow eyed black flycatcher	**RRRRRRRRRR. ELAENORI ARDESIAC**	**Muscicapidae**	1
11	Kinega shavubuluu	Blue cheeked cordon bl	**SSSSSSSSSS. ME PS PERSIC**	**Meropidae**	8
12	Chozi mgongokijai	Little purple banded sunbird	**TTTTTTTTTT. NE ARINIA BIFASCIA'**	**Nectariniidae**	2
13	Neli bawadhahabu	Golden winged sunbird	**UUUUUUUUUU. ECTARINI REICHENG**	**Nectariniidae**	1
14	Chozi tumbokijan	Olive bellied sunbird	**VVVVVVVVVV. ECTARINI CHLOROP A**	**Nectariniidae**	1
15		Black bellied firefinch	**WWWWWWWWW AGONOST A RARA**	**Estrildidae**	2
16	Kwera mwekundu	Chestnut breasted wea	**XXXXXXXXXX. LOCEUS RUBIGON S**	**Ploceidae**	1
17	Pasa michirizi	Speckled mousebird	**YYYYYYYYYY. OLIUS STRIATUS**	**Coliidae**	1

18	Pugi kombamwiko	Namaque dove	**ZZZZZZZZZZ. OE CAPENSIS**	**Columbidae**	1
19	Chechele mweupe	Pallied Flycatcher	**AAAAAAAAAA. RADORNI MICRORH CHUS**	**Muscicapidae**	1
20	Mozo	Common stonechat	*Saxicola torquata*	**Turdidae**	1
21	Collin	Southern pygmy sunbi	**BBBBBBBBBBB. NTHREPTI PLATURUS**	**Nectariniidae**	3

ANNEX 11e: BIRDS - BUKOMBE DISTRICT, SHINYANGA REGION.

1	Kiswahili name	Common name	Species name	Family name	Number sighted
2	Neli kilima	Bronze sunbird	CCCCCCCCCCC. ECTARINIA KILIMENSIS	**Nectariniidae**	30
3	Njiri buluu	Blue waxbill	DDDDDDDDDDD. URAEGINTHUS ANGOLENS IS	**Estrildidae**	1
4	Tetele,pugi	Dove		**Columbidae**	49
5	Zuwakulu ushungimweusi	Crested barbet	EEEEEEEEEEE. TRACHYPHONUS VAILLANTII	**Lybiidae (Capitonidae)**	4
6	Gegemela domojekundu	Green wood hoopoe	FFFFFFFFFFF. PHEONICULUS PURPUREUS	**Phoeniculidae**	7
7	Kipanga marungi	African harrier hawk	GGGGGGGGGGG. POLYBOROIDES TYPUS	**Accipitridae**	3
8	Yombeyombe mwekundu	Red headed weaver	HHHHHHHHHHH. ANAPLECTES RUBRICEPS	**Ploceidae**	12
9	Mlamba mkiapanda	Fork tailed drongo	IIIIIIIIIII. DICRURUS ADSIMILIS	**Dicruridae**	6
10	Chole ulaya	European roller	JJJJJJJJJJJ. CORACIAS GARRULUS	**Coraciidae**	1
11	Mbarawaji	Nightjar		**Caprimulgidae**	1
12	Karani(ndege Kiremba)	Secretarybird	KKKKKKKKKKK. SAGITTARIUS SERPENTARIUS	**Sagittariidae**	4
13	Tai ushungi	Long crested eagle	LLLLLLLLLLL. LOPHAETUS OCCIPITALIS	**Accipitridae**	2
14	Tai kipanga	African hawk eagle	MMMMMMMMMMM. HIERAAETUS SPILOGASTER	**Accipitridae**	2
15	Nyuya	Village weaver	NNNNNNNNNNN. PLOCEUS CUCULLATUS	**Ploceidae**	4
16	Chechele kijivu	Ashy flycatcher	OOOOOOOOOOO. MUSCICAPA CAERULESCENS	**Muscicapidae**	6
17	Kigon'gota kiparachekundu	Cardinal – woodpecker	PPPPPPPPPPP. CAMPETHERA FUSCESCENS	**Picedae**	2
18	Chambombe miombo	Miombo grey tit	QQQQQQQQQQQ. PARUS GRISEIVENTRIS	**Paridae**	8

ANNEX 11f: BIRDS DISAPPEARED AND BIRDS EMERGED IN MASWA DISTRICT, SHINYANGA REGION.

	SPECIES DISAPPERED	SPECIES EMERGED
1.	Secretarybird	Red faced bird
2.	Growed crane	African olive pigeon
3.	Helmeted guineafowl	Forest canary
4.	Secretarybird	Dark backed forest weaver
5.	Grey heron	Monotous lark
6.	Grey southern crowned crane	Green winged pytilia
7.	Kori Bustard	Swainsin spurfow
8.	Common quail	Lesser Moorhen
9.	Grey heron	African finfoot
10.	Grey southern crowned crane	Hamerkop scaups
11.	Kori bustard	Common greaters
12.	African wood owl	Little egret
13.	Dundo?	Marabou stork
14.	White necked raven	Hamerkop
15.	Crested guineafowl	Spur winged goose
16.	Bateleur	Red billed teal
17.	Secretarybird	White naped raven
18.	Helmeted guineafowl	Bateleur
19.		Red faced
20.		African green pigeon
21.		Forest canary
22.		Dark forest weaver
23.		Monotous lark
24.		Green winged pytilia
25.		Namaqua dove

ANNEX 11g: BIRDS DISAPPEARED AND BIRDS EMERGED IN MEATU DISTRICT, SHINYANGA REGION.

S/N	SPECIES DISAPPEARED	EMERGED
1.	Kori bustard	Yellow eyed black flycatcher
2.	Ostrich	Secretarybird
3.	Marabou stork	Kori bustard
4.	Bateleur	Black headed weaver
5.	Secretarybird	Spewed moyo bird
6.	Grey crowned crane	Blck headed weaver
7.	Black headed weaver	Black headed oriole
8.	Yellow eyed black flycatcher	Loughing dove
9.	Speckled mousebird	African morning dove
10.	Common ostrich	African ground hornbill
11.	White backed vulture	Pied crow
12.	Helmeted guineafowl	Purple roller
13.	Secretarybird	Brown snake eagle
14.	Kori bustard	Bronzy sunbird
15.	Common ostrich	Speckled mousebird
16.	White backed vulture	Fisher's lovebird
17.	Helmeted guineafowl	Afriac wood owl
18.	Kori bustard	Square tailed drongo
19.		Secretarybird
20.		Blue cheeked cordon blue
21.		Sooty boubou
22.		Usambiro barbet
23.		Black headed weaver
24.		Fisher'slovebird
25.		White headed buffalo weaver
26.		Handsome francolin

ANNEX 11h: BIRDS DISAPPEARED AND BIRDS EMERGED IN BARIADI DISTRICT, SHINYANGA REGION.

S/N	SPECIES DISAPPEARED	EMERGED
1.	Common ostrich	Ring necked dove
2.	Secretarybird	Loughing dove
3.	Loughing dove	Malachate kingfisher
4.	Three banded courser	Cattle egreat
5.	Spotted creeper	Grey heron
6.	Anteater chat	Hamerkop
7.	Whiet browed coucal	Shikra
8.	Nightjar	Coqui franconlin
9.	African citril	Kittlitz's plover
10.	Secretarybird	Ruff
11.	Hamerkop	Fisher's lovebird
12.	Coqui francalin	White browed coucal
13.	Ostrich	Nightjar
14.	Loughing dove	Speckled mousebird
15.	Ostrich	African pied wagtail
16.	Grey crowned crane	Anteater chat
17.	Bronze winged courser	Red winged lark
18.	Secretarybird	Anteater chat
19.	Common ostrich	Loughing dove
20.	Secretarybird	Red capped robin chat
21.		Bronze backed bird
22.		Bronze winged courser
23.		African pied wagtail
24.		White browed coucal
25.		Blue waxbill
26.		Grey heron
27.		Cattle egret
28.		Hamerkop
29.		Coqui francolin
30.		Wood pipit
31.		Nightjar
32.		Yellow fronted canary
33.		Ruff
34.		Speckled mouesbird
35.		Loughing dove
36.		Purple heron
37.		Blue waxbill
38.		Red capped robin chat
39.		Yellow fronted canary
40.		Nightjar
41.		Hamerkop
42.		Ring necked dove
43.		Bronze backedbird
44.		White browed coucal
45.		Blue quil
46.		Wood pipit
47.		Bronze sunbird
48.		Spotted creeper
49.		African pied wagtail
50.		Scaly feathered finch
51.		Red backed seruli ?
52.		Winding cisticola

53.		Yellow fronted canary
54.		Red faced crombec
55.		Kenya violet backed
56.		Cardinal quelea
57.		Grey headed sunbird
58.		Northern masked canary
59.		Red cheeked cordon blue
60.		Lemon breasted canary
61.		Pied avocet
62.		Square tailed drongo
63.		Grey headed social weaver
64.		Red billed firefinch
65.		Bronze mannikin
66.		Spotted morning warbler
67.		Smithis plover
68.		Black bellied starling
69.		Red winged bush

ANNEX 11i: BIRDS DISAPPEARED AND BIRDS EMERGED IN KAHAMA DISTRICT, SHINYANGA REGION.

S/N	SPECIES DISAPPEARED	EMERGED
1.	Fisher's lovebird	Ring necked dove
2.	Secretarybird	Fork tailed drogo
3.	Helmeted guineafowl	Blue cheeked cordon blue
4.	Quails sp	African pied wagtail
5.	Woodpecker	Tambourine dove
6.	Honeyguide	Sacred ibis
7.	Roller	Nightjar
8.	Coucal	Pied crow
9.	Cuckoo	African wagtail
10.	Grey crowed crane	Nightjar
11.	Ostrich	Cordon blue
12.	Secretarybird	Marabou
13.	Fisher's lovebird	Pied crow
14.	Woodpecker	Oxpecker
15.	Roller	White naped raven
16.	Coucal	Pudson ?
17.	Cuckoo	White naped raven
18.	Honey guide	Streaky headed seed eater
19.	Wood pecker	Tambourine dove
20.		Francolin
21.		Black headed heron
22.		African pied wagtail
23.		Marabou stork

ANNEX 12a: **MAMMALS IN MEATU DISTRICT, SHINYANGA REGION.**

1	Kiswahili name	Common name	Species name	Family name	Number sighted
2	Sungura	Cape hare	**RRRRRRRRRRR. EPUS CAPENSIS**	**Leporidae**	4
3	Suguya,Digidigi	Kirk's dikdik	**SSSSSSSSSSS. MA QUA KIRK**	**Bovidae**	7
4	Nguchiro	Banded mongoose	Mungos mungo	**Herpestidae**	5
5	Bweha nyekundu	Black backed jackal	**TTTTTTTTTTT. ANIS MESOMEL**	**Canidae**	4
6	Fungo	African civet	**UUUUUUUUUUU. IVETTICT CIVETTA**	**Vevirridae**	2
7		Straw coloured fruit ba	**VVVVVVVVVVV. IDOLON HELVUM**	**Pteropodidae, Megachiroptera**	3
8		Meadow rat	**WWWWWWWWW YLOMYS(SPECIES)**	**Muridae**	2
9	Fisi,nyangao	Spotted hyaena	**XXXXXXXXXXX. RUCUTA CRUCUTA**	**Hyaenidae**	1
10	Muhanga	Aardvark	*Orycteropus afer*	**Orycteropodidae**	1
11	Bweha nyekundu	Black backed jackal	**YYYYYYYYYYY. ANIS MESOMEL**	**Canidae**	1

ANNEX 12b: MAMMALS DISAPPEARED AND MAMMALS EMERGED IN MEATU DISTRICT, SHINYANGA REGION.

S/N	SPECIES DISAPPERED	EMERGED
1.	Kirk dirdik	Common warthog
2.	Common warthog	Eland
3.	Eland	Kirk dik dik
4.	Thomson's gazell	Black backed jackal
5.	Cape hare	Honeybadger
6.	Aardavark	Cape hare
7.	Spotted hyaena	Kirk dik dik
8.	Black backed jackal	Black backed jackal
9.	Honeybadger	Cape hare
10.	Crested porcepine	Straw coloured fruit bat
11.	Black rhino	African civet
12.	Wildebeest	Spotted hyaena
13.	Common zebra	Crested porcupine
14.	Masai giraffe	Honey badger
15.	Lion	Dik dik
16.	Leopard	Cape hare
17.	Olive baboon	Staim buck?
18.	African elephant	Black footed cat
19.	Buffalo	Straw coloured bat
20.	Giraffe	Spotted hyaena
21.	Zebra	Aardvark
22.	Impala	
23.	Leopard	
24.	Lion	
25.	Baboon	
26.	Wildebeest	
27.	Thomson's gazell	
28.	Kirk dik dik	
29.	Cape hare	
30.	Honey badger	
31.	Black backed jackal	
32.	Buffalo	
33.	Giraffe	
34.	Zebra	
35.	Thomson's gazell	
36.	Kirk dik dik	
37.	Wildebeest	
38.	Leopard	
39.	Lion	
40.	Black backed jackal	
41.	Cape hare	
42.	Crested porcupine	
43.	Honey badger	
44.	Black footed cat	
45.	Spotted hyaena	
46.	Aardvark	
47.	Roan antelope	
48.	Impala	
49.	Gerenuk	
50.	African buffalo	
51.	Chacma baboon	

ANNEX 12c: MAMMALS DISAPPEARED AND MAMMALS EMERGED IN BARIADI DISTRICT, SHINYANGA REGION.

S/N	SPECIES DISAPPEARED	EMERGED
14.	Elephants	Cape hare
15.	Lions	Dik dik
16.	Zebras	Aardvark
17.	Common giraffe	Spotted hyaena
18.	Buffalos	Crested porcupine
19.	Red black kite ?	Yellow winged bat
20.	Leopard	Mongoose
21.	Warthog	African civet
22.	Thomson's gazell	Common hare
23.	Black backed jackal	Lesser mongoose
24.	Impala	Dikdik
25.	Dikdik	Cape hare
26.	Bushbuck	Dikdik
27.	Elephant	Aardvark
28.	Lion	Spotted hyaena
29.	Zebra	Crested porcupine
30.	Giraffe	Yellow winged bat
31.	Buffalo	Mongoose
32.	Reedbuck	African civet
33.	Leopard	
34.	Warthog	
35.	Thomson's gazzell	
36.	Black backed jackal	

ANNEX 12d: MAMMALS DISAPPEARED AND MAMMALS EMERGED IN KAHAMA DISTRICT, SHINYANGA REGION.

S/N	DISAPPEARED	EMERGED
37.	Eland	Spotted hyaena
38.	Bushbuck	Striped hyaena
39.	Lesser kudu	Mongoose
40.	**Leopard**	Buck
41.	Bushbaby	Dikdik
42.	Honeybadger	Dikdik
43.	Elephant	Mongoose
44.	Baboon	Spotted hyaena
45.	African elephant	Striped hyaena
46.	Giraffe	Spotted hyaena
47.	Baboon	Striped hyaena
48.	Lion	Hedgohog
49.	Great kudu	Bushpig
50.	Honey badger	Mongoose
51.	Lesser kudu	Spotted hyaena
52.	Porcupine	Velvet monkey
53.	Leopard	
54.	Golden jackal	
55.	Pangolins	
56.	Aardvark	
57.	Galago -bushbaby	

ANNEX 13a: Present values of the economic contribution to household economies of different products from Ngitili in Shinyanga (Urban) district, Shinyanga Region.

District/ Product	Shinyanga (U)											
	Value per household				Value per village				Values per district			
	Current value		Present value		Current value		Present value		Current value		Present value	
	Tsh.	USD	Tsh.	USD	Tsh	USD	Tsh	USD	Tsh	USD	Tsh	USD
Timber	2043.36	2.04336	20433.6	20.4336	1757289.6	1757.2896	17572896	17572.896	38660371.2	38660.3712	386603712	386603.712
Fuelwood	7846.502	7.846502	78465.02	78.46502	6747991.72	6747.9917	67479917	67479.917	148455817.8	148455.8178	1484558178	1484558.178
Poles	2077.416	2.077416	20774.16	20.77416	1786577.76	1786.5778	17865778	17865.778	39304710.72	39304.71072	393047107.2	393047.1072
Withies	2247.696	2.247696	22476.96	22.47696	1933018.56	1933.0186	19330186	19330.186	42526408.32	42526.40832	425264083.2	425264.0832
Water	3480.523	3.480523	34805.23	34.80523	2993249.78	2993.2498	29932498	29932.498	65851495.16	65851.49516	658514951.6	658514.9516
Honey	3269.376	3.269376	32693.76	32.69376	2811663.36	2811.6634	28116634	28116.634	61856593.92	61856.59392	618565939.2	618565.9392
Wild animals	3269.376	3.269376	32693.76	32.69376	2811663.36	2811.6634	28116634	28116.634	61856593.92	61856.59392	618565939.2	618565.9392
Edible insects	340.56	0.34056	3405.6	3.4056	292881.6	292.8816	2928816	2928.816	6443395.2	6443.3952	64433952	64433.952
Medicinal plants	1089.792	1.089792	10897.92	10.89792	937221.12	937.22112	9372211.2	9372.2112	20618864.64	20618.86464	206188646.4	206188.6464
Mushroom	6215.22	6.21522	62152.2	62.1522	5345089.2	5345.0892	53450892	53450.892	117591962.4	117591.9624	1175919624	1175919.624
Thatching materials	3065.04	3.06504	30650.4	30.6504	2635934.4	2635.9344	26359344	26359.344	57990556.8	57990.5568	579905568	579905.568
Fodder	6130.08	6.13008	61300.8	61.3008	5271868.8	5271.8688	52718688	52718.688	115981113.6	115981.1136	1159811136	1159811.136
Wild vegetables	3269.376	3.269376	32693.76	32.69376	2811663.36	2811.6634	28116634	28116.634	61856593.92	61856.59392	618565939.2	618565.9392
Charcoal	98081.28	98.08128	980812.8	980.8128	84349900.8	84349.901	843499008	843499.01	1855697818	1855697.818	18556978180	18556978.18
Pottery	19854.65	19.85465	198546.5	198.5465	17074999	17074.999	170749990	170749.99	375649978	375649.978	3756499780	3756499.78
Carvings	1471.219	1.471219	14712.19	14.71219	1265248.34	1265.2483	12652483	12652.483	27835463.48	27835.46348	278354634.8	278354.6348
Carpentry												
Materials for mats												
Fruits												

ANNEX 13b: Present values of the economic contribution to household economies of different products from Ngitili in Shinyanga (Rural) district, Shinyanga Region.

District/ Product	Shinyanga （R）											
	Value per household				Value per village				Values per district			
	Current value		Present value		Current value		Present value		Current value		Present value	
	Tsh.	USD	Tsh.	USD	Tsh	USD	Tsh	USD	Tsh	USD	Tsh	USD
Timber	7,349	7.348954	73489.54	73	39398.56	39.39856	393985.6	394	8234298.371	8234.298371	82342983.71	82,343
Fuelwood	153	0.1531032	1531.032	2	2836696	2836.696	28366960	28,367	592869515	592869.515	5928695150	5,928,695
Poles	1,225	1.224826	12248.26	12	59097.84	59.09784	590978.4	591	12351447.56	12351.44756	123514475.6	123,514
Withies	6,124	6.124128	61241.28	61	472782.8	472.7828	4727828	4,728	98811612.72	98811.61272	988116127.2	988,116
Water	2,526	2.526203	25262.03	25	2363913	2363.913	23639130	23,639	494057902.3	494057.9023	4940579023	4,940,579
Honey	1,633	1.633101	16331.01	16	975114.4	975.1144	9751144	9,751	203798900.8	203798.9008	2037989008	2,037,989
Wild animals	612.4128	0.6124128	6124.128	6	630377	630.377	6303770	6,304	131748790.1	131748.7901	1317487901	1,317,488
Edible insects	1946.962	1.946962	19469.62	19	236391.3	236.3913	2363913	2,364	49405790.23	49405.79023	494057902.3	494,058
Medicinal plants	612.4128	0.6124128	6124.128	6	751527.3	751.5273	7515273	7,515	157069212.4	157069.2124	1570692124	1,570,692
Mushroom	459.3096	0.4593096	4593.096	5	236391.3	236.3913	2363913	2,364	49405790.23	49405.79023	494057902.3	494,058
Thaching materials	6966.196	6.966196	69661.96	70	177293.5	177.2935	1772935	1,773	37054342.67	37054.34267	370543426.7	370,543
Fodder	76.5516	0.0765516	765.516	1	2688952	2688.952	26889520	26,890	561990896.1	561990.8961	5619908961	5,619,909
Wild vegetables	0	0	0	0	29548.92	29.54892	295489.2	295	6175723.778	6175.723778	61757237.78	61,757
Charcoal	0	0	0	0	0	0	0	0	0	0	0	0
Pottery	0	0	0	0	0	0	0	0	0	0	0	0
Carvings	0	0	0	0	0	0	0	0	0	0	0	0
Carpentry	122,789	122.7888	1227888	1,228	47396477	47396.477	473964770	473,965	9905863651	9905863.651	99058636510	99,058,637
Materials for mats												
Fruits												
TOTAL												

ANNEX 13c: Present values of the economic contribution to household economies of different products from Ngitili in Meatu district, Shinyanga Region.

District/ Product	Meatu											
	Value per household				Value per village				Values per district			
	Current value		Present value		Current value		Present value		Current value		Present value	
	Tsh.	USD	Tsh.	USD	Tsh	USD	Tsh	USD	Tsh	USD	Tsh	USD
Timber	21,202	21.20152	212015.2	212	8480608	8480.608	84806080	84,806	610603776	610603.776	6106037760	6,106,038
Fuelwood	83,808	83.80836	838083.6	838	33523344	33523.344	335233440	335,233	2413680768	2413680.768	24136807680	24,136,808
Poles	12,627	12.62738	126273.8	126	5050952	5050.952	50509520	50,510	363668544	363668.544	3636685440	3,636,685
Withies	1,871	1.870722	18707.22	19	748288.8	748.2888	7482888	7,483	53876793.6	53876.7936	538767936	538,768
Water	1,366	1.365627	13656.27	14	546250.8	546.2508	5462508	5,463	39330057.6	39330.0576	393300576	393,301
Honey	1,372	1.371863	13718.63	14	548745.2	548.7452	5487452	5,487	39509654.4	39509.6544	395096544	395,097
Wild animals	94	0.09353612	935.3612	1	37414.448	37.414448	374144.48	374	2693840.256	2693.840256	26938402.56	26,938
Edible insects	74.82889	0.07482889	748.2889	1	29931.556	29.931556	299315.56	299	2155072.032	2155.072032	21550720.32	21,551
Medicinal plants	112243.3	112.2433	1122433	1,122	44897320	44897.32	448973200	448,973	3232607040	3232607.04	32326070400	32,326,070
Mushroom	187.0722	0.1870722	1870.722	2	74828.88	74.82888	748288.8	748	5387679.36	5387.67936	53876793.6	53,877
Thatching materials	1558.935	1.558935	15589.35	16	623574	623.574	6235740	6,236	44897328	44897.328	448973280	448,973
Fodder	26190.11	26.19011	261901.1	262	10476044	10476.044	104760440	104,760	754275168	754275.168	7542751680	7,542,752
Wild vegetables	4489.734	4.489734	44897.34	45	1795893.6	1795.8936	17958936	17,959	129304339.2	129304.3392	1293043392	1,293,043
Charcoal	4,490	4.489734	44897.34	45	1795893.6	1795.8936	17958936	17,959	129304339.2	129304.3392	1293043392	1,293,043
Pottery	13,469	13.4692	134692	135	5387680	5387.68	53876800	53,877	387912960	387912.96	3879129600	3,879,130
Carvings	0	0	0	0	0	0	0	0	0	0	0	0
Carpentry	200,541	200.5414	2005414	2,005	80216560	80216.56	802165600	802,166	5775592320	5775592.32	57755923200	57,755,923
Materials for mats	3,118	3.117871	31178.71	31	1,247,148	1247.1484	12471484	12,471	89794684.8	89794.6848	897946848	897,947
Fruits	4,490	4.489734	44897.34	45	1,795,894	1795.8936	17958936	17,959	129304339.2	129304.3392	1293043392	1,293,043

ANNEX 13d: Present values of the economic contribution to household economies of different products from Ngitili in Bariadi district, Shinyanga Region.

District/ Product	Bariadi											
	Value per household				Value per village				Values per district			
	Current value		Present value		Current value		Present value		Current value		Present value	
	Tsh.	USD	Tsh.	USD	Tsh	USD	Tsh	USD	Tsh	USD	Tsh	USD
Timber	48,159	48.15938	481593.8	482	31014640.72	31014.64072	310146407.2	310,146	3845815449	3845815.449	38458154490	38,458,154
Fuelwood	114,269	114.2691	1142691	1,143	73589300.4	73589.3004	735893004	735,893	9125073250	9125073.25	91250732500	91,250,733
Poles	4,378	4.378126	43781.26	44	2819513.144	2819.513144	28195131.44	28,195	349619629.9	349619.6299	3496196299	3,496,196
Withies	365	0.3648438	3648.438	4	234959.4072	234.9594072	2349594.072	2,350	29134966.49	29134.96649	291349664.9	291,350
Water	26,269	26.26875	262687.5	263	16917075	16917.075	169170750	169,171	2097717300	2097717.3	20977173000	20,977,173
Honey	730	0.7296876	7296.876	7	469918.8144	469.9188144	4699188.144	4,699	58269932.99	58269.93299	582699329.9	582,699
Wild animals	73	0.07296876	729.6876	1	46991.88144	46.99188144	469918.8144	470	5826993.299	5826.993299	58269932.99	58,270
Edible insects	0	0	0	0	0	0	0	0	0	0	0	0
Medicinal plants	204312.5	204.3125	2043125	2,043	131577250	131577.25	1315772500	1,315,773	16315579000	16315579	1.63156E+11	163,155,790
Mushroom	0	0	0	0	0	0	0	0	0	0	0	0
Thatching materials	3648.438	3.648438	36484.38	36	2349594.072	2349.594072	23495940.72	23,496	291349664.9	291349.6649	2913496649	2,913,497
Fodder	437.8126	0.4378126	4378.126	4	281951.3144	281.9513144	2819513.144	2,820	34961962.99	34961.96299	349619629.9	349,620
Wild vegetables	3064.688	3.064688	30646.88	31	1973659.072	1973.659072	19736590.72	19,737	244733724.9	244733.7249	2447337249	2,447,337
Charcoal	236,419	236.4188	2364188	2,364	152253707.2	152253.7072	1522537072	1,522,537	18879459693	18879459.69	1.88795E+11	188,794,597
Pottery	18,169	18.16922	181692.2	182	11700977.68	11700.97768	117009776.8	117,010	1450921232	1450921.232	14509212320	14,509,212
Carvings	230,494	230.4937	2304937	2,305	148437942.8	148437.9428	1484379428	1,484,379	18406304907	18406304.91	1.84063E+11	184,063,049
Carpentry	0	0	0	0	0	0	0	0	0	0	0	0
Materials for mats	0	0	0	0	0	0	0	0	0	0	0	0
Fruits	9,734	9.734033	97340.33	97	6,268,717	6268.717252	62687172.52	62,687	777320939.2	777320.9392	7773209392	7,773,209

ANNEX 13e: Present values of the economic contribution to household economies of different products from Ngitili in Maswa district, Shinyanga Region.

District/ Product	Maswa											
	Value per household				Value per village				Values per district			
	Current value		Present value		Current value		Present value		Current value		Present value	
	Tsh.	USD	Tsh.	USD	Tsh	USD	Tsh	USD	Tsh	USD	Tsh	USD
Timber	1788.684	1.788684	17886.84	18	872877.792	872.877792	8728777.92	8,729	67,211,590	67211.58998	672115899.8	672,116
Fuelwood	105830.5	105.8305	1058305	1,058	51645284	51645.284	516452840	516,453	3,976,686,868	3976686.868	39766868680	39,766,869
Poles	1490.57	1.49057	14905.7	15	727398.16	727.39816	7273981.6	7,274	56,009,658	56009.65832	560096583.2	560,097
Withies	1341.513	1.341513	13415.13	13	654658.344	654.658344	6546583.44	6,547	50,408,692	50408.69249	504086924.9	504,087
Water	13601.45	13.60145	136014.5	136	6637507.6	6637.5076	66375076	66,375	511,088,085	511088.0852	5110880852	5,110,881
Honey	372.6425	0.3726425	3726.425	4	181849.54	181.84954	1818495.4	1,818	14,002,415	14002.41458	140024145.8	140,024
Wild animals	7154.736	7.154736	71547.36	72	3491511.168	3491.511168	34915111.68	34,915	268,846,360	268846.3599	2688463599	2,688,464
Edible insects	834.7192	0.8347192	8347.192	8	407342.9696	407.3429696	4073429.696	4,073	31365408.66	31365.40866	313654086.6	313,654
Medicinal plants	111792.8	111.7928	1117928	1,118	54554886.4	54554.8864	545548864	545,549	4200726253	4200726.253	42007262530	42,007,263
Mushroom	0	0	0	0	0	0	0	0	0	0	0	0
Thatching materials	1490.57	1.49057	14905.7	15	727398.16	727.39816	7273981.6	7,274	56009658.32	56009.65832	560096583.2	560,097
Fodder	10061.35	10.06135	100613.5	101	4909938.8	4909.9388	49099388	49,099	378065287.6	378065.2876	3780652876	3,780,653
Wild vegetables	1490.57	1.49057	14905.7	15	727398.16	727.39816	7273981.6	7,274	56009658.32	56009.65832	560096583.2	560,097
Charcoal	23252.89	23.25289	232528.9	233	11347410.32	11347.41032	113474103.2	113,474	873,750,595	873750.5946	8737505946	8,737,506
Pottery	2794.819	2.794819	27948.19	28	1363871.672	1363.871672	13638716.72	13,639	105,018,119	105018.1187	1050181187	1,050,181
Carvings	0	0	0	0	0	0	0	0	0	0	0	0
Carpentry	219039.3	219.0393 0	2190393 0	2,190 0	106891178.4 0	106891.1784 0	1068911784 0	1,068,912 0	8,230,620,737 0	8230620.737 0	82306207370 0	82,306,207 0
Materials for mats												
Fruits		0	0	0	245140456	245140.456	2451404560	2,451,405	18,875,815,112	18875815.11	1.88758E+11	188,758,151

ANNEX 13f: Present values of the economic contribution to household economies of different products from Ngitili in Kahama district, Shinyanga Region.

District/ Product	Kahama											
	Value per household				Value per village				Values per district			
	Current value		Present value		Current value		Present value		Current value		Present value	
	Tsh.	USD	Tsh.	USD	Tsh	USD	Tsh	USD	Tsh	USD	Tsh	USD
Timber	31828.29	31.82829	318282.9	318	13049598.9	13049.5989	130495989	130,496	2,805,663,764	2805663.764	28056637640	28,056,638
Fuelwood	10185.05	10.18505	101850.5	102	4175870.5	4175.8705	41758705	41,759	897,812,158	897812.1575	8978121575	8,978,122
Poles	3315.447	3.315447	33154.47	33	1359333.27	1359.33327	13593332.7	13,593	292,256,653	292256.6531	2922566531	2,922,567
Withies	596.7805	0.5967805	5967.805	6	244680.005	244.680005	2446800.05	2,447	52,606,201	52606.20108	526062010.8	526,062
Water	48405.53	48.40553	484055.3	484	19846267.3	19846.2673	198462673	198,463	4,266,947,470	4266947.47	42669474700	42,669,475
Honey	102115.80	102.11580	10211580	1,0210	41867478 0	41867.478 0	418674780 0	418,675 0	9,001,507,770 0	9001507.77 0	90015077700 0	90,015,078 0
Wild animals												
Edible insects	1591.415	1.591415	15914.15	16	652480.15	652.48015	6524801.5	6,525	140283232.3	140283.2323	1402832323	1,402,832
Medicinal plants	63656.59	63.65659	636565.9	637	26099201.9	26099.2019	260992019	260,992	5611328409	5611328.409	56113284090	56,113,284
Mushroom	1989.268	1.989268	19892.68	20	815599.88	815.59988	8155998.8	8,156	175353974.2	175353.9742	1753539742	1,753,540
Thatching materials	5304.716	5.304716	53047.16	53	2174933.56	2174.93356	21749335.6	21,749	467610715.4	467610.7154	4676107154	4,676,107
Fodder	84875.45	84.87545	848754.5	849	34798934.5	34798.9345	347989345	347,989	7481770918	7481770.918	74817709180	74,817,709
Wild vegetables	4177.464	4.177464	41774.64	42	1712760.24	1712.76024	17127602.4	17,128	368243451.6	368243.4516	3682434516	3,682,435
Charcoal	254626.3	254.6263	2546263	2,546	104396783	104396.783	1043967830	1,043,968	22,445,308,345	22445308.35	2.24453E+11	224,453,083
Pottery	0	0	0	0	0	0	0	0	0	0	0	0
Carvings	0	0	0	0	0	0	0	0	0	0	0	0
Carpentry	107022.6	107.0226	1070226	1,070	43879266	43879.266	438792660	438,793	9,434,042,190	9434042.19	94340421900	94,340,422
Materials for mats	0	0	0	0	0	0	0	0	0	0	0	0
Fruits	265.2358	0.2652358	2652.358	3	108746.678	108.746678	1087466.78	1,087	23,380,536	23380.53577	233805357.7	233,805

ANNEX 13g: Present values of the economic contribution to household economies of different products from Ngitili in Bukombe district, Shinyanga Region.

District/ Product	Bukombe District											
	Value per household				Value per village				Values per district			
	Current value		Present value		Current value		Present value		Current value		Present value	
	Tsh.	USD	Tsh.	USD	Tsh	USD	Tsh	USD	Tsh	USD	Tsh	USD
Timber	71741.66	71.74166	717416.6	717	42184096.08	42184.09608	421840960.8	421,841	5,399,564,298	5399564.298	53995642980	53,995,643
Fuel wood	13092.85	13.09285	130928.5	131	7698595.8	7698.5958	76985958	76,986	985,420,262	985420.2624	9854202624	9,854,203
Poles	2869.666	2.869666	28696.66	29	1687363.608	1687.363608	16873636.08	16,874	215,982,542	215982.5418	2159825418	2,159,825
Withies	8967.707	8.967707	89677.07	90	5273011.716	5273.011716	52730117.16	52,730	674,945,500	674945.4996	6749454996	6,749,455
Water	34041.42	34.04142	340414.2	340	20016354.96	20016.35496	200163549.6	200,164	2,562,093,435	2562093.435	25620934350	25,620,934
Honey	2391.389	2.391389	23913.89	24	1406136.732	1406.136732	14061367.32	14,061	179,985,502	179985.5017	1799855017	1,799,855
Wild animals	717.4166	0.7174166	7174.166	7	421840.9608	421.8409608	4218409.608	4,218	53,995,643	53995.64298	539956429.8	539,956
Edible insects	478.2777	0.4782777	4782.777	5	281227.2876	281.2272876	2812272.876	2,812	35997092.81	35997.09281	359970928.1	359,971
Mushroom	2869.666	2.869666	28696.66	29	1687363.608	1687.363608	16873636.08	16,874	215982541.8	215982.5418	2159825418	2,159,825
Medicinal plants	10761.25	10.76125	107612.5	108	6327615	6327.615	63276150	63,276	809934720	809934.72	8099347200	8,099,347
Thatching materials	2152.25	2.15225	21522.5	22	1265523	1265.523	12655230	12,655	161986944	161986.944	1619869440	1,619,869
Fodder	1147.867	1.147867	11478.67	11	674945.796	674.945796	6749457.96	6,749	86393061.89	86393.06189	863930618.9	863,931
Vegetable	2152.25	2.15225	21522.5	22	1265523	1265.523	12655230	12,655	161986944	161986.944	1619869440	1,619,869
Fruits	2869.666	2.869666	28696.66	29	1687363.608	1687.363608	16873636.08	16,874	215,982,542	215982.5418	2159825418	2,159,825
Carpentry	1021601	1021.601	10216010	10,216	600701388	600701.388	6007013880	6,007,014	76,889,777,66	76889777.66	7.68898E+11	768,897,777
Pottery	12913.5	12.9135	129135	129	7593138	7593.138	75931380	75,931	971,921,664	971921.664	9719216640	9,719,217

ANNEX 14: Present values of direct values by groups of species from Ngitili to the houisehold and village economies by district in Shinyanga Region.

	SHINYANGA (U)				SHINYANGA (R)				MEATU			
	Current value		Present value		Current value		Present value		Current value		Present value	
Economic use	Tsh.	USD	Tsh.	USD	Tsh	USD	Tsh	USD	Tsh	USD	Tsh	USD
Medicinal	1,089	1.089	10890	11	1,946	1.946	19460	19	112,243	112.243	1122430	1,122
Nutritional (vegetable)	3,269	3.269	32690	33	76	0.076	760	1	8,978	8.978	89780	90
Fuel wood	7,846	7.846	78460	78	7,348	7.348	73480	73	83,808	83.808	838080	838
Timber & woodcraft	6,367	6.367	63670	64	1,479	1.479	14790	15		0	0	0
Fodder	6,130	6.13	61300	61	6,966	6.966	69660	70	26,190	26.19	261900	262
Fencing	-	0	0	0		0	0	0	-	0	0	0
Bush meat	3,269	3.269	32690	33	1,633	1.633	16330	16	93	0.093	930	1
Thatch grass	3,065	3.065	30650	31	469	0.469	4690	5	1,558	1.558	15580	16
Shade, shelter	-	0	0	0	-	0	0	0	-	0	0	0

ANNEX 14 (continued): Present values of direct values by groups of species from Ngitili to the houisehold and village economies by district in Shinyanga Region.

| Economic use | MASWA | | | | BARIADI | | | | KAHAMA | | | |
| | Current value | | Present value | | Current value | | Present value | | Current value | | Present value | |
	Tsh.	USD	Tsh.	USD	Tsh	USD	Tsh	USD	Tsh	USD	Tsh	USD
Medicinal	111,792	111.792	1117920	1,118	204,312	204.312	2043120	2,043	63,656	63.656	636560	637
Nutritional(fruits& vegetable)	1,490	1.49	14900	15	12798	12.798	127980	128	4,442	4.442	44420	44
Fuel wood	105,830	105.83	1058300	1,058	114,269	114.269	1142690	1,143	10,185	10.185	101850	102
Timber & woodcraft	4,619	4.619	46190	46	52,901	52.901	529010	529	35,739	35.739	357390	357
Fodder	10,061	10.061	100610	101	437	0.437	4370	4	84,875	84.875	848750	849
Fencing	-	0	0	0	-	0	0	0	-	0	0	0
Bush meat	7,154	7.154	71540	72	73	0.073	730	1		0	0	0
Thatch grass	1,490	1.49	14900	15	3,648	3.648	36480	36	5,304	5.304	53040	53
Shade, shelter	-	0	0	0	-	0	0	0	-	0	0	0

ANNEX 14 (continued): Present values of direct values by groups of species from Ngitili to the houisehold and village economies by district in Shinyanga Region.

| Economic use | MASWA | | | |
| | Current value | | Present value | |
	Tsh.	USD	Tsh.	USD
Medicinal	10,761	10.761	107610	108
Nutritional (f vegetable)	5,021	5.021	50210	50
Fuel wood	13,092	13.092	130920	131
Timber & woodc	83,577	83.577	835770	836
Fodder	1,147	1.147	11470	11
Fencing	-	0	0	0
Bush meat	717	0.717	7170	7
Thatch grass	2,152	2.152	21520	22
Shade, shelter	-	0	0	0