	UNESCO MAB Programme	

Sheka Forest Biosphere Reserve

Nomination Form

UNESCO-MAB National Committee

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Maps: All maps used in this nomination form were prepared for the purpose of this application by Mr. Fite Getaneh, with geospatial data inputs of MELCA-Ethiopia Sheka Branch.

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Table of Content

List of Figures

PART I: SUMMARY

1. PROPOSED NAME OF THE BIOSPHERE RESERVE:

Sheka Forest Biosphere Reserve

2. COUNTRY:

Ethiopia

3. FULFILLMENT OF THE THREE FUNCTIONS OF BIOSPHERE RESERVES

3.1 "Conservation - contribute to the conservation of landscapes, ecosystems, species and genetic variation"

The proposed Sheka Forest Biosphere Reserve is located in the Sheka Zone of the Southern Nations, Nationalities and Peoples (SNNP) Regional State. It covers a total area of 238,750 ha of forest, bamboo thickets, wetlands, agricultural land, rural settlements and towns. It covers a unique biogeographic unit extending from cold and very wet highlands bordering Illubabor zone of Oromia regional state and Kafa zone to hot lowland areas bordering Gambella regional state and the Bench-Maji zone. The whole area is very diverse, with contrasting landscape elements, habitats and cultural practices. The following are the major nature conservation features of the area:

Aforomontane forest vegetation: The Afromontane forest vegetation has long been considered as one of the most threatened eco-region in the world (White 1983). Ethiopia has the biggest land surface falling within the Afromontane region. The forest in Sheka is part of the southwest highlands forests of Ethiopia important for conservation of the Afromontane forest vegetation types, especially the Afromontane Rainforest and alpine bamboo thickets. Some of the characteristic plant species of the forest include *Aningeria adolfi-friederici, Albizia gummifera, A. schimperiana, A. grandibracteata, Blighia unijugata, Cassipourea malosana, Celtis africana, Croton macrostachyus, Ekebergia capensis, Euphorbia ampliphylla, Ficus sur, F. ovata, F. thonningii, Hallea rubrostipulata, Ilex mitis,*

Macaranga capensis, Olea capensis ssp. *welwitschii, Polyscias fulva, Schefflera abyssinica, Prunus africana, Sapium ellipticum,* and *Syzygium guineense* ssp. *afromontanum*. A discontinuous lower canopy of small trees (less than 10 m high) includes *Allophylus abyssinicus, Apodytes dimidiata, Bersama abyssinica, Brucea antidysentrica, Calpurnia aurea, Canthium oligocarpum, Chionanthus mildbraedii, Clausena anisata, Cyathea manniana, Deinbollia kilimandscharica, Dracaena afromontana, D. fragrans, D. steudneri, Ehretia cymosa, Ensete ventricosa, Erythrina brucei, Galiniera saxifraga*, *Lepidotrichilia volkensii, Lobelia giberroa, Millettia ferruginea, Nuxia congesta, Oncoba routledgei, Oxyanthus speciosus* ssp. *stenocarpus*, *Phoenix reclinata, Pittosporum viridiflorum 'ripicola', Psychotria orophila, Ritchiea albertsii, Rothmannia urcelliformis, Solanecio gigas, Solanecio mannii, Teclea nobilis, Trema orientalis, Turraea holstii,* and *Vepris dainellii.* Lianas are common, and about 25 species have been recorded. Epiphytes are also numerous, and include ferns, lycopods, orchids, *Peperomia spp.,* ***Canarina abyssinica*** and ***Scadoxus nutans.*** The ground cover is very rich in herbs in areas where light is sufficient (Friis 1992).

Figure 1. Two endemic epiphytes: *Scadox nutans* and *Canarina abyssinica*

Conservation of biodiversity: The area is rich in plant and animal species. The area is rich in plant and animal species. There are over 300 higher plants, 50 mammals, 200 birds, and 20 amphibian species, occurring in all habitat types within the proposed biosphere reserve. There also many endemic species, at least 55 plants, and 10 birds. Altogether, there are over 65 endemic species of plants and birds. There are also over 38 threatened species (IUCN Red list) in the area, which include 5 bird, 3 mammals and 30

plant species. The number of threatened species is likely to be higher when the status of other species is determined.

Deep-rooted culture of nature conservation: The people of Shaka have deep-rooted culture of conserving species, ecosystems and pristine natural habitats. In a recent eco-mapping exercise by the community and MELCA-Ethiopia, around 209 sacred sites, 67 waterfalls, 74 mineral water springs, 13 historical sites, 17 cultural huts, 37 historical caves, 417 community kobo forests and 8 burial places were recorded (Appendix 3). All these are considered as community conserved areas. Ecologically fragile areas like wetlands, lakes, rivers and steep slope areas are culturally protected from human disturbance. Forests and other natural landscapes have special cultural values among the people. Large intact forest landscapes at lower altitude along the Baro River are Kobo[1] forests for honey production. Besides, they have culturally protected for malaria control. The local communities believe that deforestation of these forests and settlement leads to malaria outbreak. Forests on steep slopes and hills in human-dominated areas, buffer areas of rivers and wetlands are also protected as sacred forests called *Gudo* (Zewdie 2007). In Shekacho culture and belief system, steep slopes, water bodies and wetlands should not be 'naked' and always be covered by forests or buffer areas of forest. Such areas are also places for worship. Each clan has its own gudo, and the clan leader conducts prayer in gudos. Wetlands by themselves also have cultural values, and are called Ceeco, with use and management sanctions. Highland areas above 2300 m asl are mostly covered by highland bamboo and wetlands with characteristic humid forest vegetation.

Watershed of regional and global importance: These forests play an important role in protection of watersheds that have local and international significance in the Nile and Omo-Ghibe/Lake Turkana Basins, conservation of biodiversity, flood and erosion control, and carbon-sequestration to mitigate the effects of climate change. It is the source of major rivers like Baro and Akobo rivers, the main tributaries of the White Nile, Gojeb, the main tributary of Omo from the southwestern highlands of Ethiopia.

Conservation of crop plant genetic resources: Sheka is an important gene pool for Ensete (*Ensete ventricosum,* sometines called 'false banana'), Arabica coffee (*Coffea*

[1] Kobo –refers to customary forest tenure system of where individuals own, inherit and primarily manage for traditional beekeeping (Wakjira and Gole, 2007)

arabica), and other plant species important as food, agricultural and forestry purposes. The agricultural landscape surrounding the forest area is mainly under perennial crops like Ensete and coffee, and is important for the conservation of cultivated landraces of ensete (*Ensete ventricosum*), coffee (*Coffea arabica*), anchote (*Coccinia abyssinica*), Oromo-Dinch (*Plectranthus edulis*), *Dioscorea* spp., Cabbage (*Brassica oleracea*, *B. nigra*) and other crops.

Figure 2. Typical farmland and homegarden in the highland parts of Sheka

Farmlands and homegardens: The agricultural land consists of mainly smallholder farms with diverse crops and homegardens. Most crops are traditional landraces. The croplands, homegardens, the managed forests and the natural forests, altogether form a characteristic cultural landscape in the region, depicting domestication stages and evidences of agricultural evolution.

Most forest areas, highland bamboo, sacred forests, wetlands and lakes fall within the boundaries of Masha-Anderacha national forest priority areas (NFPAs) (formerly parts of Mocha Forest, Gebre-Dima Forest, Sele-Anderacha Forest, Godere Forest and Yeki Forest). Since mid 1990s, the regional government of the SNNP sub-divided the forest areas into smaller blocks for ease of management. Most parts of the land cover in the proposed biosphere reserve are also part of the Eastern Afromontane Biodiversity Hotspot, which is one of the 34 globally important, and yet threatened areas for biodiversity conservation.

3.2 "Development - foster economic and human development which is socio-culturally and ecologically sustainable".

The proposed biosphere reserve area has distinctive culture and pattern of human activity. Large part of the area is highland, inhabited by the Shekacho people. The Shekacho people practice ecologically sustainable resources management practices. The Shekacho people earn most of their cash income from honey and spices produced in dense forest. The traditional beekeeping is highly associated with forests/trees. Log hives are put on branches of big trees in natural forests. Spices like korerima are also produced under the canopies of natural forests. The forests of the area have economic, ecological and cultural/spiritual functions among the Shekacho people, which ensured preservation of large forest areas for centuries. The traditional agricultural practice is also ecologically sustainable, while fulfilling the social and economic needs of the local population. Ensete is a perennial crop produced as the main source of staple food in extended homegarden systems. Cereals are produced only on small farm plots, using a fallow system, where farmland rests for 1-2 years after 4-5 years of cultivation. All farmlands and fallows are fenced to restrict movement of livestock in order to reduce land degradation. There is also a growing trend of coffee production by the highlanders, by planting coffee in degraded forest areas. Since coffee is shade-loving crop, enrichment planting of trees is also

conducted, thereby contributing to ecological sustainability through rehabilitation degraded forest areas.

The area is also suitable for various fruits, vegetables and spices production. There is a growing trend of producing vegetables like cabbage, onions, and potatoes for local consumption and major markets in Teppi and Mettu. Fruits like Avocado and Mango are also produced. Some farmers have also started producing tea as out-growers for a Tea Estate in Masha area. The forest management for non-timber forest products (NTFP) production and agricultural practices in transitional areas are sustainable practices, which can be strengthened with the establishment of biosphere reserves.

In lowland areas around Teppi, there is a mixed culture of the native people like Sheko, Shekacho and Mejengir, and that of recent settlers from northern and central Ethiopia like the Amhara, Oromo and Tigray people. Coffee is the major source of cash income in Teppi area, and perhaps the whole Yeki woreda. Large state coffee plantation is also found in the area. Agricultural practice in the area is predominantly cereal-based. The major food crops in the area are maize and sorghum, though Ensete is also produced in areas dominated by the native inhabitants. Teppi is also known for spices production like cardamom, turmeric and chilli pepper. Mango, banana, papaya and sugar cane are also produced for local consumption as well as market.

Local products with a potential for sustainable production and possibilities of being labelled as unique brands from the area are:

- Honey- wild/forest honey
- Bamboo and bamboo products
- Spices- Korerima, cardamom, turmeric, chilli pepper, long black pepper
- Ensete- fiber/starch for industrial application
- Coffee
- Fruits- avocado, mango, banana

The area also has a good potential for eco-tourism, with its diverse natural and cultural landscape, tropical forest, crater lakes, waterfalls and cultural festivals.

Figure 3. Shesheko waterfall in Masha woreda

3.3 "Logistic support - support for demonstration projects, environmental education and training, research and monitoring related to local, regional, national and global issues of conservation and sustainable development".

The proposed biosphere reserve has a great potential as a demonstration site for environmental education and the link between culture and biodiversity or cultural biodiversity. MELCA-Ethiopia is implementing an environmental education program called SEGNI (Social Empowerment through Group Nature Interaction). The overall objective of MELCA-Ethiopia's SEGNI program is to create connect the youth in schools with culture, nature and self by way of intergenerational learning with the intention of creating, in the youth, a sense of responsibility for the conservation of their cultural and ecological resources. The program create a platform of interaction between the youth and elders, by staying in wilderness for 5 days, and where the youth experience nature and culture as well as related environment and natural resource conservation mechanisms from elders to connect with themselves. UNESCO has selected the SEGNI program of MELCA-Ethiopia as one of the few good practices worldwide for successful education and learning

initiatives that articulate strong links between cultural, socio-economic and environmental aspects of sustainability. SEGNI is highlighted as a case in good practices compiles in "Linking Culture, Education and Sustainability: Good Practices and Experiences from Around the World". Several awareness raising trainings for community members, leaders, experts and local authorities were also conducted as part of environmental education for adults. The area has a great potential to serve as biological field station for the newly established universities in the area, especially for Mizan-Teppi University, located in the proposed biosphere reserve, and Metu University located at 60 km away in Illubabor zone of Oromia state.

Due to its relative distance and poor access, there was little research in the area. Over the past few decades, however, it has attracted researchers from different aspects. Botanists have been frequently collecting and describing species from the area since 1970s (Friis et al. 1982). There is a growing research interest and activity over the last decade. Some of the recent research works in the area include:

- Studies on NTFPs production, processing and marketing by Ethio-wetlands (Tadesse and Ararsa 2004, Dereje and Tadesse 2007)
- A multi-disciplinary research on forest cover changes, biodiversity, culture, institutional and legal frameworks by MELCA-Ethiopia (Masresha 2007, Tadesse and Masresha, 2007)
- Various research works by graduate students from Addis Ababa University, and Civil Service College
- Agricultural research on major crops, coffee and spices by Jimma and Teppi Agricultural Research Centers. Teppi is the national center of excellence for research on spices, and is located within the proposed biosphere reserve

Monitoring of changes in forest cover, forest conditions, biodiversity and culture is important for sustainability. MELCA-Ethiopia, in collaboration with government agencies and other stakeholders initiated monitoring activities. The initial GIS and remote-sensing assisted forest cover change and associated changes in culture and biodiversity was conducted by MELCA-Ethiopia and published in a book entitled "Forests of Sheka: Multidisciplinary case studies on impacts of landuse/land cover changes, southwest Ethiopia" (Bedru 2007, Tadesse 2007, Zewde 2007, Melese and Mohammud 2007, Aseffa 2007). MELCA-Ethiopia has also introduced participatory eco-mapping and 3D mapping exercises as tools to monitor changes in the area. Eco-cultural mapping was conducted in

all districts of Sheka in 2008 and 2009. The mapping process was carried out by MELCA-Ethiopia staff members and invited experts, led by local community leaders who were selected based on their age, knowledge, and gender. During the mapping process, various areas were located and mapped, including 209 sacred sites, 67 waterfalls, 74 mineral water springs, 13 historical sites, 17 cultural huts, 37 historical caves, 417 community kobo forests and 8 burial places. Different maps depicting these futures, and distribution wild animals were produced (see Appendix 3, Figure 4).

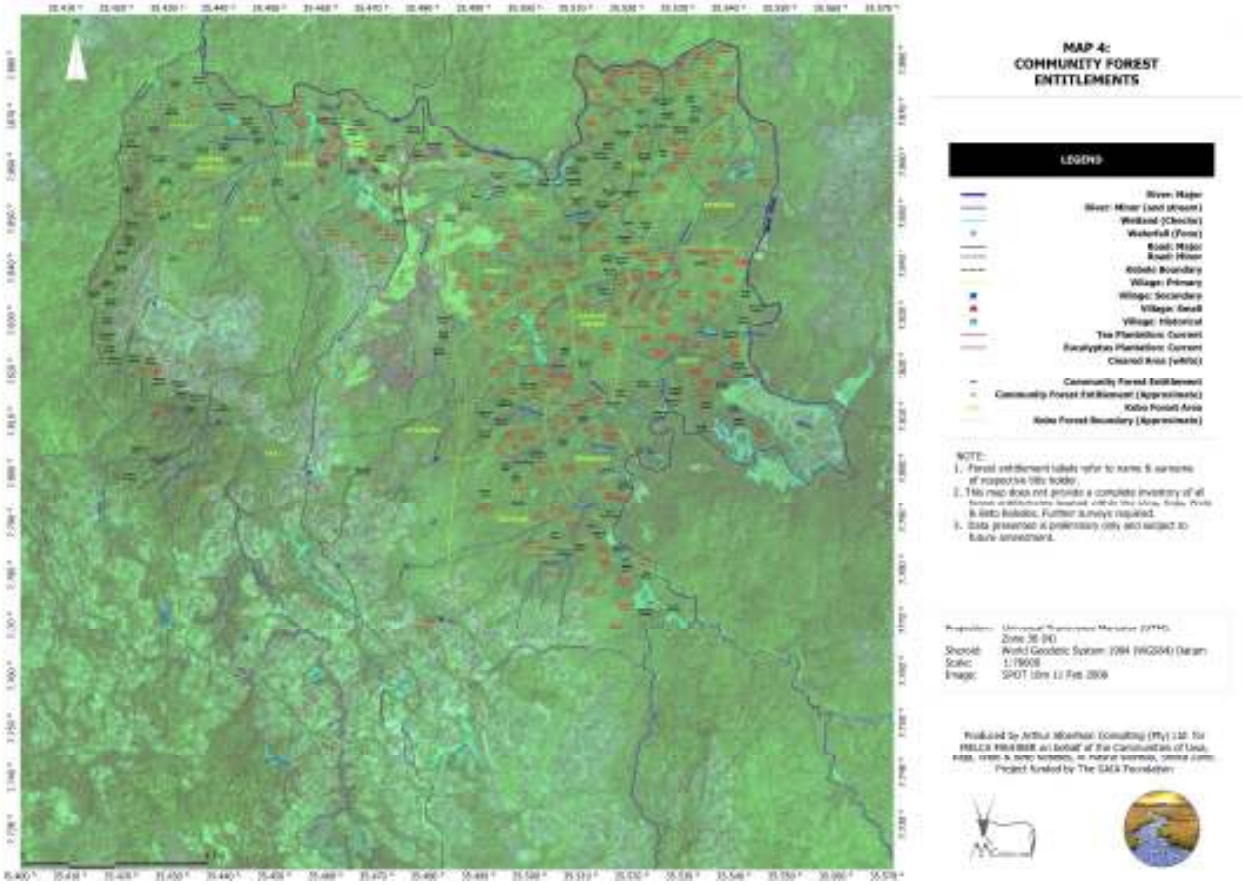


Figure 4. Eco-cultural map of Masha woreda

In 2010, MELCA-Ethiopia organized participatory 3D mapping of Masha woreda. Building on these baseline information and further studies, land use management plan of Masha woreda was prepared in 2010. The management plan serves as a baseline for monitoring of changes, and provides mitigation measures for sustainability. Establishment of the proposed Sheka Forest Biosphere Reserve extends such management plan to the rest of Sheka, with appropriate monitoring plans and mitigation measures in cases of deviation.

4. CRITERIA FOR DESIGNATION AS A BIOSPHERE RESERVE

4.1. "Encompass a mosaic of ecological systems representative of major biogeographic regions, including a gradation of human intervention"

The proposed biosphere reserve is part of the Afromontane region. This region occurs across Africa from the north in Sudan to the south in the Cape region of South Africa, from east in Djibouti to the west in Cameroon. Over 50% of the Afromontane region with elevations above 1500 m occurs in Ethiopia. Most of these areas in Ethiopia have lost their original habitat types. The Sheka forest is among the few remnant representative areas with original habitat types, and is of high significance for conservation of biodiversity in such eco-region at national, regional and continental level. The natural habitats are also quite diverse, including wetlands, bamboo thickets, Afromontane rainforest, transitional rainforest and wooded grasslands. The cultural landscape is characterized by distinctive agricultural practices of traditional multi-storey agroforestry, with perennial crops and extended homegardens. Perennial crops based agriculture dominates in Masha and Anderacha woredas, which provides good ground cover throughout the year and contribute to soil and water conservation. The lowland areas around Teppi are densely populated, with a relatively more transformed landscapes dominated by annual crops and coffee agroforestry.

Water and wetlands are important features of the area. Highland wetlands are the sources of major rivers flowing into river basins of regional and international importance. The drainage network links the Nile and the Omo-Ghibe basin and has a major influence on land use, settlement and ecology in the region. Small lakes and extensive wetlands feed the tributaries of Baro, Akobo and Gojeb rivers.

The Sheka forest is under a forest management practice with clear gradation of human intervention: dense **kobo forest** managed for honey production and environmental protection, sacred forests managed for spiritual purposes of the different clans, buffer vegetations on steep slopes, wetlands and water bodies for their ecosystem services, semi-forest coffee production systems, and degraded forest areas near settlement areas that are used as grazing lands. Outside the forest, the land is covered by a mosaic of different land-use types and with different management intensities for crop production, livestock grazing, and settlement. This designation of landscape components matches

perfectly with the biosphere reserve concept and offers a unique opportunity for sustainable development and conservation in a traditional human-transformed landscape within Ethiopia.

4.2 "Be of significance for biological diversity conservation"

The proposed biosphere reserve has an exceptionally high level of biodiversity. The forest vegetation is rich in plant species. Most tree species in the area are endemic to the Afromontane eco-region. It is among the few remaining pristine habitats of the Afromontane eco-region in Africa, with unique assemblage of flora and fauna. There are many Ethiopian endemics, of which some are range-restricted to the southwestern highlands, e.g, *Dombeya kefaensis, Scadox nutans* and *Phyllanthus limmuensis* (Appendix 6). It also harbors Afrotropical highland biome (HB) bird assemblage. There are 32 species of the total 48 HB bird species occurring in Ethiopia, and is part of the Metu-Gore-Teppi important bird area (EWNHS 1996).

The area is the center of origin and diversity for Enste (*Ensete ventricosum*) or often called false banana, a staple food crop growing in most parts of southern and southwestern Ethiopia. Ensete is perennial and drought tolerant, playing an important role in food security. It is also the secondary center of diversity for many food crops and spices.

The unique land use practices of Sheka are the most outstanding features of the area. In Sheka, there is a traditional forest tenure system called Kobo. Kobo forests are individually owned and managed for honey production and environmental protection. Ownership of kobo is through inheritance. Forests and trees have special places in Shekacho culture, and recognized for ecosystem services. Wetlands and water bodies are always surrounded by a buffer zone of forest in order protect them from degradation. Wetlands without buffer are considered a “naked”. It is also strictly forbidden to graze livestock in wetlands to avoid compaction. Instead, they use cut-and-carry system of feeding livestock during the dry season. Similarly, steep slopes and hills in human-dominated landscapes are kept under forest cover in order to avoid severe erosion and landslide. These cultural practices are in agreement with sound scientific recommendation for sustainability. Establishment of biosphere reserve in the area and networking with other national and regional biosphere reserves has a multiplier effect through sharing good practices of nature conservation and sustainable development.

Because of the importance of forests for the livelihood of the people and their cultural practices, the area still maintains an extensive forest cover and, therefore, of high biodiversity. For instance, the south-western part of Ethiopia as a whole has lost over 60% of its forest cover over the last 30 years (Tadesse et al. 2002). Average forest cover of Ethiopia is around 3%, and that of southwest around 18%. The Sheka zone maintained close to 50% forest cover, well above the national as well as southwest highlands' average.

4.3 "Provide an opportunity to explore and demonstrate approaches to sustainable development on a regional scale"

There is deep-rooted culture of sustainable natural resources management in the area. It is also endowed with abundant water resources, high rainfall throughout the year and existence several rivers and perennial streams. The area has high potential for production of organic products like honey, coffee, tea and spices like korerima, cardamom, long black pepper, turmeric and ginger, and fruits like avocado, papaya, mango and banana.

There is quite large resource of bamboo in the study area. The bamboo forest in Sheka zone covers about 18,652 ha. The average annual increment of unmanaged bamboo forest of Ethiopia is estimated to be 8.5-10 tones oven-dry matter per ha (LUSO Consult 1997). It is possible to safely harvest 1/3 of the total stock, i.e., 3 tones/ha every year on sustainable basis (Kassahun 1999). Hence, there is a potential to harvest 56,000 tones of oven-dry weight bamboo every year from the area. The resource can be used to develop small-scale industry/ enterprises for the local community to produce processed bamboo products of high quality, curved and laminated furniture. Bamboo can be processed in different ways (Liese 1985): curving to produce furniture, peeled to produce plywood (plybamboo) sheets. Plybamboo is used for furniture, boxes, doors, flooring in buildings and railway cars, for cement formwork, for windmill blades, as underlay for concrete sleepers and for many ornamental purposes. Several products are derived from chemical processing of bamboo. Dry distillation of bamboo yields charcoal, tar and vinegar. Bamboo fibers are also suitable as raw materials for pulp production. They are more slender than wood-fibers, which contribute to the desired smoothness and flexibility. Most bamboo stands have dried after flowering recently. This is a natural phenomenon for bamboo. Regeneration and assumption of the original status of bamboo stand may take several years

Most people in the area depend on forest resources for their livelihood. Hence, most forests are managed for honey and spices production. Honey and spices production is compatible with sustainable forest management and biodiversity conservation goals. Forest honey from the area is gaining popularity on local and international market over the past 5 years. Producers are organized into cooperatives and limited companies, and began playing an important role in honey and spices supply to exporters. There is also an increasing trend of using modern and transitional beehives, which does not require hanging hives on trees. Modern beehives have multiple benefits: increase yield, improve quality and create equal opportunities for both men and women to produce honey. Besides, individuals who do not have kobo forest can also benefit from beekeeping, since ownership of trees and forests is not necessary. The figure below depicts a mode woman farmer with her beehives in homegarden near a forest margin.

Figure 5. Transitional and modern beehives in homegardens of a woman farmer in Masha

Figure 6. Example of organized business entities in the area

Some community members that were dependent on the sale of fuel wood are also shifting their way of life. Through homegarden project promoted by MELCA-Ethiopia, many have started production of vegetables, ensete, fruits and cereal crops.

4.4 "Have an appropriate size to serve the three functions of biosphere reserves"

The area demarcated as the proposed Sheka Forest Biosphere Reserve is mainly a forested and agricultural landscape. Undisturbed natural forests are mainly found along Baro river and its tributaries in Masha, upland areas in Anderacha and some parts of Yeki. Forest areas are managed for honey and spices production in most parts, and for coffee production in Yeki.

The proposed biosphere reserve has a total area of 238,750ha. The core area represents intact undisturbed natural forests along altitudinal gradients from well over 2600 meter to 1300 m. The core area is 55,255ha, and hence covers areas large enough to conserve biodiversity, representative ecosystem of the Afromontane vegetation in the area and provide ecosystem services for the local and regional watershed. Extensive buffer zones surround the core areas, covering 76,395 ha of cultural or sacred forests, managed forests spices, coffee and honey production, and bamboo thickets. The transition area occupies

107,100 ha and contains some degraded forests, cropland, grazing-land, grassland, wetlands as well as urban and rural settlement areas. This zone is where most the human population in the biosphere reserve resides, and is therefore under intensive human use. This will provide an appropriate context for land-use related problem identification and participatory solution formulation.

Table 1. Size distribution of the different management zones

Districts	Core		Buffer		Transition	
	Ha	%	Ha	%	Ha	%
Masha	12,708.65	23	29,030.1	38	35343	33
Anderacha	32,600.45	59	41,253.3	54	27846	26
Yeki	9,945.9	18	6,111.6	8	43911	41
Total	***55,255***		***76,395***		***107,100***	***238,750***
Proportion	**23.14**		**32.00**		**44.86**	

4.5 Through appropriate zonation:

"(a) a legally constituted core area or areas devoted to long term protection, according to the conservation objectives of the biosphere reserve, and of sufficient size to meet these objectives" ?

The core areas of the Sheka Forest Biosphere Reserve are devoted to the long-term protection of natural forests as part of the National Forest Priority Areas, which are under two legally binding regulations:

- the Federal Democratic Republic of Ethiopia's Forest Conservation, Development and Utilization Proclamation No. 94/1994, which was revised and replaced with the Forest Development, Conservation and Utilization Proclamation 542/2007, and
- the Southern Nations, Nationalities and Peoples (SNNP) regional state Forest Proclamation No. 77/2004.

In order to strengthen its legal protection, the core area is currently gazetted by a new "Regulation for the Establishment of the Sheka Forest Biosphere Reserve". In the near future, the regulation shall be approved by the Council of SNNP National Regional Government.

Currently the Sheka Zone Department of Agriculture and respective woredas administer the core areas of the proposed biosphere reserve. The Environmental Protection and Land

Administration Desk of the Department is the regulatory organ for land and environment, including the core area. The Sheka Zone Administration oversees all aspects of land administration and development in the zone.

The core area has five contingent compartments, covering 55,255 ha, which provides sufficient surface area to attain the conservation objectives. The main objectives of the core area are conservation of the natural habitats of the Afromontane eco-region, *in-situ* conservation of flora and fauna, especially rare and threatened species, conservation of cultural forest landscape and protection of important watersheds of trans-boundary rivers. Hence, the core areas have been delineated based on biophysical criteria such as patterns of forest, current land uses or disturbance levels, distances from roads, boundaries and settlements as well as social criteria like traditional use rights of local community members.

"(b) a buffer zone or zones clearly identified and surrounding or contiguous to the core area or areas, where only activities compatible with the conservation objectives can take place..."

The buffer zone in the proposed biosphere reserve is also part of the Masha-Anderacha National Forest Priority Area, protected by both federal and regional government forest proclamations (Federal Forest Development, Conservation and Utilization Proclamation 542/2007; SNNP Forest Proclamation No. 77/2004). It includes managed forests, disturbed and secondary forests, bamboo thickets and lowland wooded grassland. The forests in the buffer zone have multiple functions: spiritual, economic and ecological functions. Most are part of sacred forests, which are protected by the community and used for religious ceremonies and cultural festivals. Economically, the forests are used for honey, spices and coffee production, as well as extraction other NTFP and local construction materials. Cutting trees for timber is strictly forbidden by the federal and regional government forest proclamations, which also apply in the core area. The buffer zone encompasses the core areas and covers 76,395 ha, mainly representing individual and communally managed forests.

Through community forest management programs (SLM), development workers are promoting sustainable and equitable use of forest resources in the buffer zone expansion. Marketing strategies for honey, spices and coffee produced in the buffer zone are also being developed, along with quality improvement through introduction of improved production and processing technologies.

"(c) an outer transition area where sustainable resource management practices are promoted and developed"

The transition area contains cropland, grazing land, grassland, some isolated sacred forests and wetlands as well as urban and rural settlement areas. It is the place of residence for most human populations in the proposed biosphere reserve. Most income for the livelihood of the population of the area comes from the transition area. Around 200,000 people live in the transition areas, including urban and rural settlements. Out of this close to 135,000 live in Yeki woreda, which is densely populated as compared to 40,000 and 25,000 inhabitants in Masha and Anderacha woredas.

The agricultural landscape of the transition zone includes perennial crops like ensete, vegetable and extended home gardens of spices in Masha and Anderacha and cereal crops, large-scale coffee plantations, and smallholder coffee farms in Yeki woreda. Large-scale coffee and tea plantations are also emerging in Anderacha and Masha woredas. Even though the area has abundant resources, which can support the local livelihood from products like coffee, honey and spices, there is lack of improved production and processing technologies to meet high quality standards required by the market in order to attract high prices.

In the next five years, it is planned to transform traditional honey production using transitional and modern beehives, introduce wet-processing plant and standard storage facilities for coffee, domesticate economically valuable spices, expand production of introduced spices into existing production system by the government and NGOs to most communities within the transition area of the biosphere reserve.

In five years, the government plans to double agricultural production, including honey, spices, coffee and food crops production. Doubling production can be achieved, by introducing modern beehives for honey production, and improving the management of existing coffee stands as well as extending the coffee growing area in disturbed or degraded forest area. It is expected that over 50% of coffee, 75% of honey and spices from the area can be certified and marketed on niche markets, through cooperative unions and private partners within five years. In ten years, most honey and coffee produced by smallholders in the area will be certified and sold with premium price at local and international market.

4.6 "Organizational arrangements should be provided for the involvement and participation of a suitable range of inter alia public authorities, local communities and private interests in the design and the carrying out of the functions of a biosphere reserve."

Strong traditional institutions governing forest and other natural resources management existed in the area for centuries. Currently, there are also strong government organizations dealing with rural development, environmental protection and sustainable uses of biodiversity. The Desks of Agricultural Development, and Environmental Protection and Land Administration of the Rural Development Office are primarily responsible to promote, monitor and regulate sustainable use of natural resources and conservation of biodiversity in the area. The zonal and woreda administrations are responsible to oversee the overall development and conservation activities through designated office.

Since 2004, different NGOs have also joined the local community and government agencies in order to promote sustainable development and conservation of biodiversity in the area. Ethio-Wetlands and Natural Resources Association (EWNRA) has been implementing research and development projects on sustainable production and marketing of NTFPs since 2004. MELCA-Ethiopia has also been implementing different projects on impacts of forest cover changes on biodiversity and culture, community empowerment (environmental advocacy, eco-cultural mapping, strengthening traditional institutions), policy work and law enforcement (training workshops for experts and local leaders), capacity building and economic development activities (environmental education, home garden development, and youth entrepreneurship and business management trainings) since 2005.

In 2005, impacts of different development interventions on forest, biodiversity and culture were assessed by a multi-disciplinary research team (Tadesse 2005) and the work was later published as a book (Masresha 2007). This was followed by participatory eco-cultural mapping in 2008 and 2009, and 3D mapping and land use management plan of Masha woreda in 2010 (Tadesse et al 2011). During these mapping and management planning exercises, it became clear that the existing natural resources management and development activities match the UNESCO biosphere reserve concept. It was also noted that increase in population and expansion of investments are posing pressure on sustainable resources management in the long term. Hence, the people of Sheka and

local government initiated the Sheka Forest Biosphere Reserve nomination process in 2010. The initiative was motivated by the success of similar nominations of Kafa and Yayu biosphere reserves. Participants of Yayu Coffee Forest Biosphere Reserve inauguration workshop from UNESCO, Germany and AfriMAB members have briefly visited Sheka forest in October 2010.

The local authorities, in collaboration with MELCA-Ethiopia also formed technical committee that leads the nomination process and conducted several stakeholders consultation at zone, worda and kebele administration levels since the end of 2010. MELCA-Ethiopia has also commission experts that assist in biosphere reserve areas zoning, compilation of the nomination process and writing up of the nomination form in 2011, with financial support from Norwegian Peoples Aid (NPA).

The technical committee at different levels is called Sheka Forest Biosphere Reserve Management Unit (MU). The MU, at zone level, is composed of the Sheka Zone Administration, Sheka Zone Trade and Industry Zone, Sheka Zone Department of Agriculture, Sheka Zone Finance and Economic Development Department, Sheka Zone Justice Department, Sheka Zone Development Association, and MELCA-Ethiopia.

Management units were also formed at the three woredas (Masha, Anderacha and Yeki) and all kebeles (kebele is the lowest formal administrative unit in Ethiopia) in order to guarantee the equitable representation of local community representatives and their participation in decision-making processes regarding the biosphere reserve. At community level, MU members include elders and community leaders. The MELCA-Ethiopia is serving as facilitator the MU at all levels, with financial supports for some activities.

The Zonal MU meets every month, and also plays a leadership role in organizing consultation meetings and discussions with community members. Since the composition of the MU includes local authorities and relevant government offices, the Zonal MU makes it easier to communicate to the community as well as to higher government officials.

Private sector organizations in the area like Teppi Coffee Plantation Enterprise, Gemadro Coffee Plantation (Ethio-Agri-CEFT), East African Tea Estate, traders, hotel owners and cooperatives shall also be consulted and invited to play their role in sustainable development, production and marketing of local products.

4.7 Mechanisms for implementation

Does the proposed biosphere reserve have:

"(a) mechanisms to manage human use and activities in the buffer zone or zones" ?

The buffer zones are part of the Masha Anderacha National Forest Priority Area. The forests and bamboo thickets in the area are used for various purposes. The forest provides ecosystem services like protection of watershed, hilly areas, wetlands and rivers from degradation. Most are also managed for NTFPs production like honey, spices and coffee. Besides, some forests are sacred sites and used for religious and cultural festivals. The bamboo thickets are sources of construction materials for houses, fences and beehives. Some forests are by the local community. Management and use of the forests are regulated by the 2007 Forest Proclamation of the Federal Democratic Republic of Ethiopia and the SNNP Forest Proclamation of 2004.

Besides, the management plans of the biosphere reserve will be applied in the buffer zone to regulate human use activities, monitor changes (See Appendix 5) and take mitigation measures. These management plans have been discussed with the management units (MU) at all levels; are approved and will be applied in accordance with the legal framework of the existing proclamations.

"(b) a management plan or policy for the area as a biosphere reserve"?

Management plans of Masha Woreda have been prepared and discussed with local authorities, experts and the communities. The MU members and MELCA-Ethiopia have much effort throughout 2011 to introduce, discuss and explain the idea of a biosphere reserve to the communities of the proposed biosphere reserve. The management plan prepared for land use in Masha woreda and endorsed in early 2010 is being up-scaled to the other two woredas in the spirit of biosphere reserve management. The overall management plan of the whole biosphere is under preparation by the MU at Zonal level, and will be enriched further with community discussion. After the establishment process of the proposed biosphere reserve is completed, the guidelines will be revised and improved through practices and lessons learned from research and implementation.

"(c) **a designated authority or mechanism to implement this policy or plan" ?**

Currently, the MU serves as a platform for coordination and operations of all biosphere reserve related activities, such as information dissemination, community consultation, research and planning. Its work is being supported by MELCA-Ethiopia. The biosphere reserve coordination office will be opened in Masha town, the zone administration capital,

with sub offices in Gecha and Teppi towns for Anderacha and Yeki woredas. This coordination office will facilitate the coordination of stakeholders and all activities in the biosphere reserve and report them to the public, thereby ensuring that the three functions of a biosphere reserve are fulfilled.

On the other hand, the Southern Nations, nationalities and peoples region (SNNPR) under Bureau Agriculture (BoA), Natural Resources and Environmental Protection Authority, and Departments of Agriculture and Offices at Sheka Zone and Woreda administration have responsibilities to regulate, monitor and evaluate the activities of the different participants, in order to make sure that all are in-line with management plan of the Sheka Forest Biosphere Reserve. The MU, at all levels, will also continue to play an advisory role as members of **biosphere reserve board**.

The BoA and agencies under it like under Bureau Agriculture (BoA), Natural Resources and Environmental Protection Authority, and respective departments and offices at zone and woreda level are primarily responsible for the implementation of biosphere reserve. The BoA aims to create a market-led modern agricultural system and a society that is free from poverty. Furthermore, it strives to promote, conserve, develop and use the natural environment in a sustainable manner; build the capacity of disaster prevention and preparedness; and to empower women and youth in development. The BoA also implements national policies mainly on environment, biodiversity and agriculture. The bureau also enacts and implements regulations, directives and legislations pertinent to social, environmental and economic development. Hence, it is the designated authority to lead and coordinate the implementation of Sheka Forest Biosphere Reserve.

Other stakeholders important for the implemetation include the Department of Trade and Insustry which promotes private sector investment, the Department of Finance and Economic Development which supports in development planning, finance and capacity building, the Department of Culture and Tourism which promotes tourism opportunities and investments in the sector.

√	□	□
Yes	No	Planned

(d) Programmes for research, monitoring, education and training"?

Research

The Teppi Agricultural Research Center (TARI) is permanent national center with excellence in spices. The center is conducting research on domestication and propagation of various local spices like Korerima, Long Black Pepper. TARI is also conducting adaptation trials and variety selection of coffee, fruit trees and introduced spices like cardamom, turmeric, and vanilla. Different research organizations like MELCA-Ethiopia and EWNRA are conducting applied research on sustainable natural resources management and conservation of biodiversity. The Ethiopia Institute of Biodiversity has permanent research plots on highland bamboo. Different Ethiopian and foreign universities are also engaged in various research activities on the forest, culture and ecosystems of the area. The newly established new Mizan-Teppi and Metu universities are also expected to launch research in the proposed biosphere reserve. The MU shall approach these universities and other potential partners for collaboration

Monitoring

Baseline information based on satellite image analysis has been established. MELCA-Ethiopia has developed participatory mapping methodologies with the community. Community members and experts have produced a participatory map for Masha Woreda. Eco-mapping and 3D mapping trainings were also given to community members, to build their capacity to monitor changes in forest and land use condition. Further trainings shall be conducted on management plan of the different biosphere reserve zones and indicators for monitoring. Selected community members shall be trained as para-ecologists to conduct monitoring and identify mitigation measures. MELCA-Ethiopia shall continue support the implementations of the plan and monitoring of the biosphere reserve. Research organizations and universities shall also be invited to provide technical support on monitoring and development of tools for monitoring.

Education and training

MELCA-Ethiopia has launched Environmental Education activities called SEGNI. The program focuses on inter-generational knowledge transfer and promotion of exiting traditional good practices from elders to the young generation. MELCA-ETHIOPIA also organises various training on policies and laws, natural resources management, sustainable agricultural development practices, beekeeping, entrepreneurship and business management.

5. ENDORSEMENTS

5.1 Signed by the authority/authorities in charge of the management of the core area(s):

Institution: Sheka Zone Administration

Full name : Alemu Achomo Dunisho

Title : V/chief Administrator

Signature

Date:

Alemu Achomo Dunisho

Institution: Sheka Zone Department of Agriculture

Full name : Adamsegged W/Yohannes

Title : For Department Head

Signature

Date:

V/Chief Administrator and Head Justice Department

Institution: Masha Woreda Administration

Full name : TASSAHUN KETEMA SHENO

Title : CHIEF ADMINISTOR

Signature

Date: 02/08/2011

Kassahun Ketema Sheno

Chief Administrator

Institution: Masha Woreda Office of Agriculture

Full name : AGEZEGN MAMO DILAMO

Title : HED OF OFFICE

Signature

Date: 02/08/2011

Agezegn Mamo Dilamo

Institution: Anderacha Woreda Administration

Full name : NOH KOCHITO MECHERASHA

Title : CHIEF ADMINISTOR

Signature

Date: 02/08/2011

Noh Kochito Mecheresha

Chief Administrative

Institution: Anderacha Woreda Office of Agriculture

Full name : AYELE AGELO ACHOMO

Title : Head of office

Signature

Date: 02/08/2011

Institution: Yeki Woreda Administration

Full name : Bizuayehu Tokon Gey

Title : Head of office

Signature

Date: 02/08/2011

Institution: Yeki Woreda Office of Agriculture

Full name : Kifle Adasho Atilo

Title : Head of office

Signature

Date: 02/08/2011.

5.2 Signed by the authority/authorities in charge of the management of the buffer zone(s):

All institutions listed under 5.1 above.

5.3 Signed as appropriate by the National (or State or Provincial) administration responsible for the management of the core area(s) and the buffer zone:

Institution: Southern Nations, Nationalities and Peoples (SNNP) National Regional Government

Full name :

Title :

Signature

Date:

Federal Democratic Republic of Ethiopia – Sheka Forest Biosphere Reserve Nomination Form-Sept. 2011

29

Institution: SNNP Bureau of Agriculture

Full name : _____

Title : _____

Signature _____

Date: _____

5.4 Signed by the authority/authorities, elected local government recognized authority or spokesperson representative of the communities located in the transition area.

Institution: Sheka Zone Council

Full name : Merid Mamo Sharew

Title : Council Speaker

Signature _____

Date: 17/02/11

Institution: Masha Woreda Council

Full name : Tarekegn Alemu Merga

Title : Council speeker

Signature _____

Date: 02/02/2011

Institution: Anderacha Woreda Council

Full name : Shadend Gaid Gawed

Title : council Speaker

Signature _____

Date: 02/02/11

Institution: Yeki Woreda Council

Full name : Melaku Bizuneh Shawo

Title : Council Speaker

Signature _____

Date: 02/08/11

30

5.5 Signed on behalf of the MAB National Committee or focal point:

Institution: UNESCO MAB National Committee of Ethiopia

Full name: _____

Title: _____

Signature _____

Date: _____

Federal Democratic Republic of Ethiopia – Sheka Forest Biosphere Reserve Nomination Form-Sept. 2011

PART II: DESCRIPTION

6. LOCATION (LATITUDE AND LONGITUDE):

The central point : $35^{O}24'12.71"$ E and $7^{O}33'50.11"$ N.

The external limits: $35^{O}5'48"$-$35^{O}44'11"$ E and $7^{O}6'24"$-$7^{O}53'14"$ N

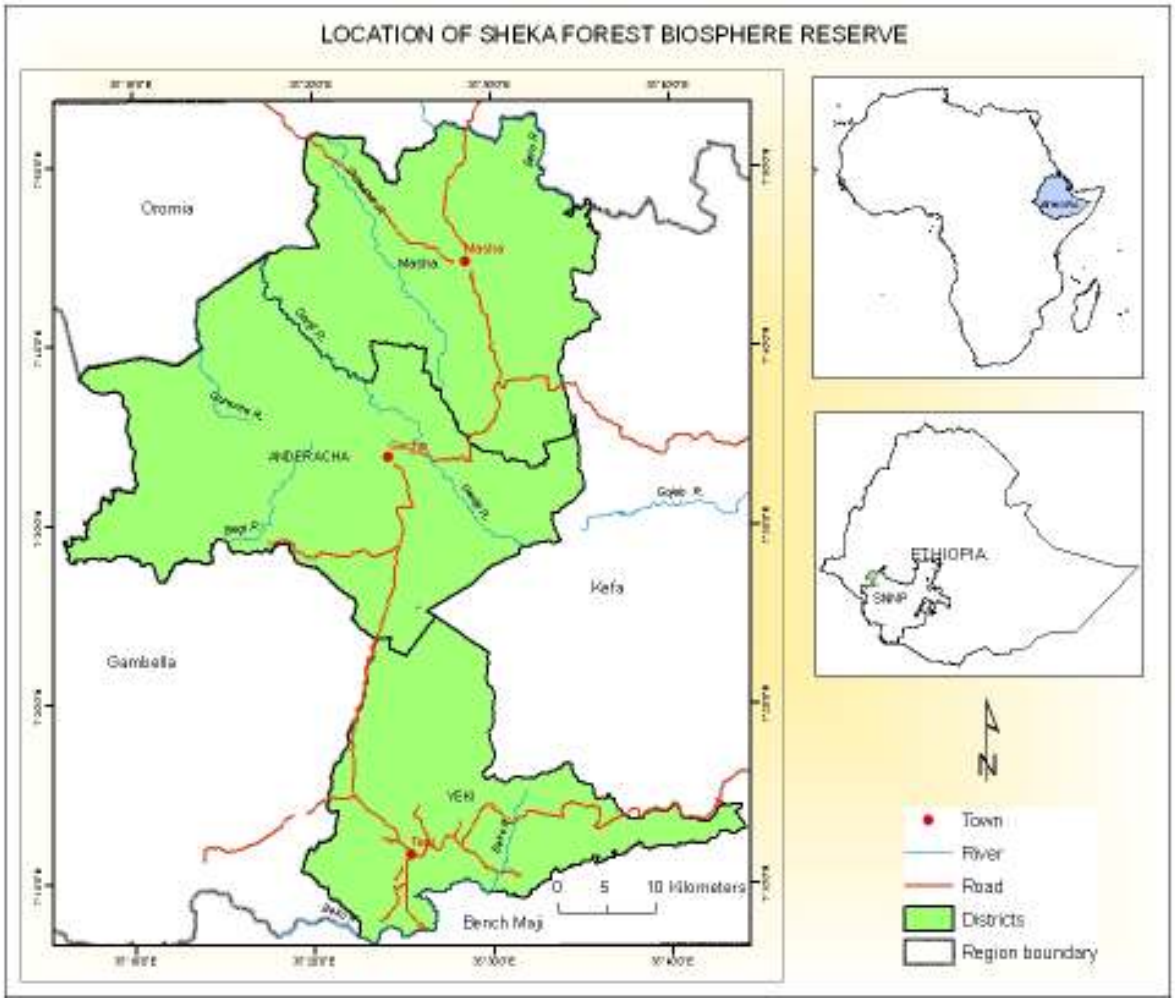


Figure7. Location of the Sheka forest Biosphere Reserve

7. AREA (see map):

Total: 238,750 (ha)

7.1 Size of terrestrial Core Area(s):

55,255 ha;

7.2 Size of terrestrial Buffer Zone(s):

76,395 ha;

7.3 Approx. size of terrestrial Transition Area(s) (if applicable):

107,100 ha;

7.4 Brief rationale of this zonation (in terms of the various roles of biosphere reserves) as it appears on the zonation map. In the cases where a different type of zonation is also in force at the national level, please indicate how it can coexists with the requirements of the biosphere reserve zonation system:

Zonation of the proposed biosphere reserve was determined based on current and planned future land uses, traditional ecological knowledge and recent research and monitoring works. There were efforts to map distribution of natural resources over the past 6 years, including analysis of forest cover changes, eco-cultural maps and 3D participatpry maps. Based on these activities, a pilot general land use management plan for Masha woreda was prepared in 2010. In this plan, UNESCO biosphere reserve was considered as one ofption for sustainable use and conservation of biodiversity in the area (Tadesse et al., 2011).

The forest is a National Forest Priority Area (EFAP 1994), mainly for conservation of biodiversity and watershed protection. The natural vegetation in the area is predominantly Afromontane Rainforest, along with bamboo thickets and wetland grasslands at higher altitudes. There is also savannah grassland at the western parts of Masha and Anderacha weredas. The area is rich in highland and forest bird species, mammals like colobus monkey and Anubis baboon, and other wild animals. Apart from the flora and fauna, there are several rivers with the associated riverine habitats, waterfalls, caves, mineral water and several cultural sites.

Description of the zones

Core area: The core areas are composed of intact natural high forest, cultural forests (kobo), sacred forests, wetlands, and bamboo thickets. As the core zone is devoted to long term protection, its location and boundaries are also determined in such a way that minimises human disturbance and hence ensure sustainability. This was approached by maintaining appropriate distances from settlement areas, cultivated areas, roads and

towns that are thought to trigger anthropogenic pressure. In fact, the majority of the current remaining natural high forest occurs at distinct altitudinal range, mainly on the higher altitudes. Therefore, the majority of the core areas are at higher altitudes.

Buffer zone: the buffer zone includes cultural forests, bamboo thickets, managed forests for NTFPs production including coffee, honey and spices, wetlands, wetlands, riverine habitats and the like. Though the buffer zone serves as a shield for the core zone, it should simultaneously render economic use on a sustainable basis and in agreement with the conservation objective of the Biosphere Reserve. Asefa (2007) has estimated the value of the forest in economic terms. He estimated that direct use value of the natural forest for house construction, furniture, utensils, farm implements and for fencing purposes was estimated to be Birr 89 per ha per annum, while the value of non-timber forest products from the forest was estimated to vary from about Birr 1,192 per hectare, based on current extraction level, to Birr 8,142 per hectare under exploitation of the potential of the natural forest with zero management. Among the non-timber forest products he considered are honey, forest coffee, spices, bamboo, fuel wood and charcoal, and others such as palm and wild fruits. But honey is the main source of cash for most of the rural households. He has also estimated that, on average, the sampled households generate 44% of their income from forest and forest products. This indicated that there is high dependence on forest resource by the community for livelihood purpose. Hence, sufficient size of the forest that the community can utilize for livelihood purpose should remain in the buffer zone. In accordance with that, the zonnation scheme tried to allow the buffer zone to compose parts of the forest that can be exploited for such purposes. The majority of the buffer zone areas are at lower altitude where coffee performs well and within accessible distances from settlement areas and roads that can allow the community to utilize the direct use values and collect non-timber forest products.

The trabsition area represents an area of the biosphere reserve where sustainable development is promoted for the improvement of the livelihoods of the local community. The transition area in the proposed biosphere reserve includes agricultural land, grazing land, settlement areas, coffee and tree plantation, small-holder coffee plantations and some semi-forest coffee production areas. These areas are under intensive human use and therefore demand the promotion of sustainable resource use, which is the major

objective to be attained in the transition zone. The agricultural lands are dominated by perennial crops like Ensete in Masha and Anderacha, and annual crops in Yeki. The perception of the local community living next to the forest is taken into account during zonation. Apart from this, thorough discussions have been undertaken with local farmers, clan leaders, chairmen of the kebeles (local government body), and district administration.

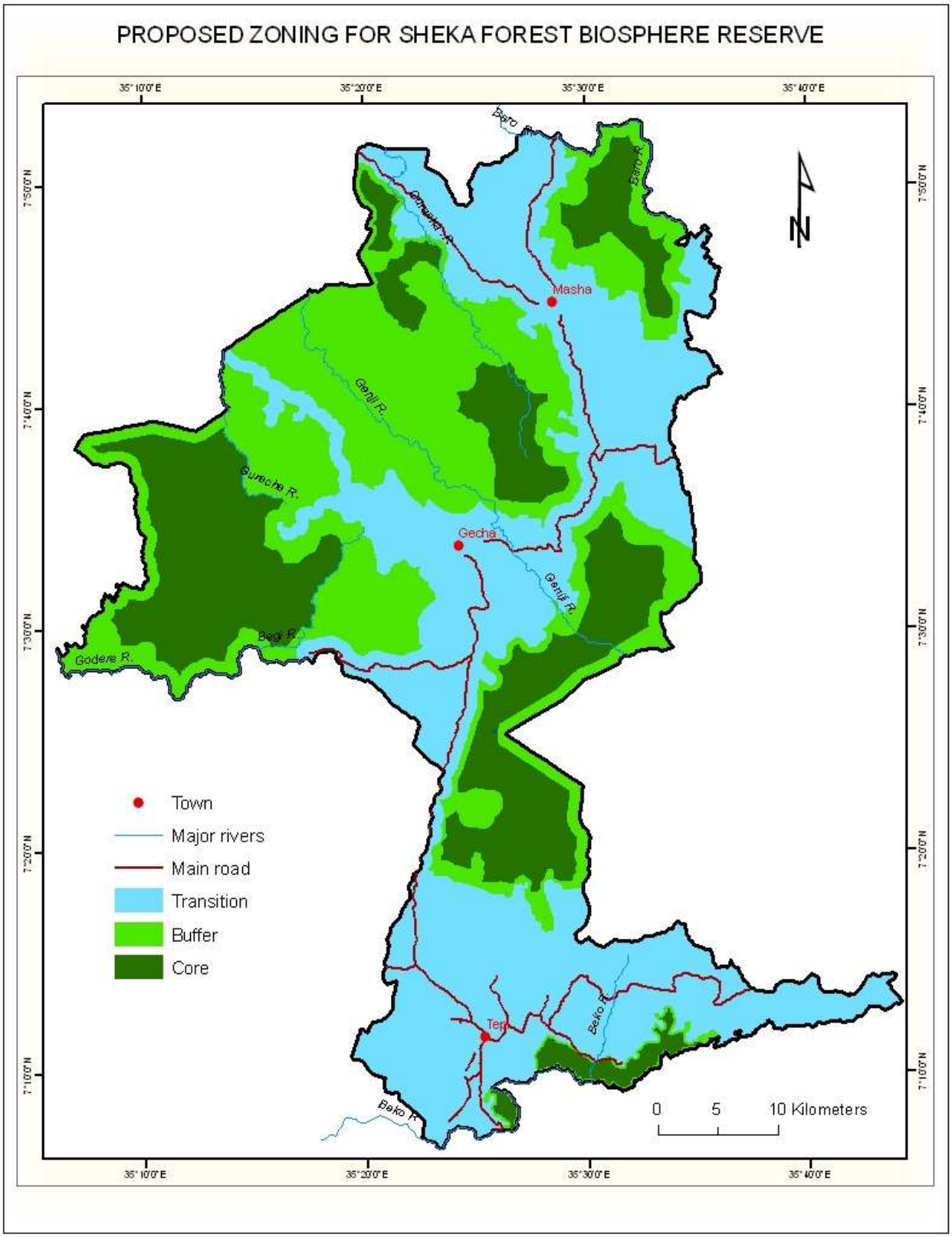


Figure8. Map showing the three management zones of Sheka Forest Biosphere Reserve

8. BIOGEOGRAPHICAL REGION:

[Indicate the generally accepted name of the biogeographical region in which the proposed Biosphere Reserve is located. You may wish to refer to the map of the World Network of Biosphere Reserves presenting 12 major ecosystem types.]

Classification by UNESCO/MAB: Tropical Forest Ecosystem

Classification by White (1983): Afromontane Region (Afromontane rainforest)

9. LAND USE HISTORY:

The south western part of Ethiopia, including the Sheka area became part of Ethiopia in 1890s. Before the 1980s, land was owned by the community. Even though there was no written policy document of the early feudal system, the feudal landlords were owners of land, including forest land. Even though members of the local community lost land ownership rights to the landlords, ownership was fragmented and decentralized. The local people were allowed to manage the forest for NTFPs production by reaching agreement with the landlord. Such local level decision-making regarding forest management has led to the evolution of the *Kobo* system of forest use. *Kobo* refers to customary ownership of a block of forest land bounded and demarcated by big trees or other physical features – like rivers and small streams – and exclusively used for traditional beekeeping and hunting (Dereje and Tadesse 2007). In 1974, the Military regime overthrew the feudal system and nationalized all lands in 1975. Farmers were given land use rights, but forest lands remained under the custody of the state. This new policy failed to recognize the customary use rights. However, the traditional *Kobo* tenure system has survived at the local level since the livelihood of the local community is highly dependent on the forest. Since the overthrough the Military regime in 1991, land, including forests, became state property. Under the current system, farmers have use rights certificate for agricultural lands. Forest area, however, remained under state ownership, with restrictions of use. Despite the federal and regional state laws declaration of forests as state property, the traditional customary tenure system, *Kobo*, still exists.

There is also an evolution of land use types over decades and centuries. Historically, most parts of the area in Sheka under forest cover, with agricultural practices only limited to home gardens. In 1960s and early 1970s, private coffee plantations began to emerge around Teppi area, which were later nationalized under the Military regime. In 1970s and 1980s large scale coffee plantations were established around Teppi by the state. This was accompanied by massive settlement programs in 1980s after servere famine in the country. This led to clearance of large forest areas for agriculture. In late 1990s, private coffee plantations and a Tea plantation were established in Anderacha and Masha woredas in areas formerly covered by dense natural *Kobo* forest. The major land use types in the area today include dense forest and bamboo thickets, manged forest for honey, coffee and other NTFPs production, coffee and tea plantations and agricultural lands (extensive home gardens, and cereal crops based farming systems).

The forest areas still cover large part of the Sheka zone (ca. 47%, Bedru 2007). The forest areas and bamboo thickets fall within the boundaries of Masha-Anderacha national forest priority areas (NFPAs) (formerly parts of Mocha Forest, Gebre-Dima Forest, Sele-Anderacha Forest, Godere Forest and Yeki Forest).

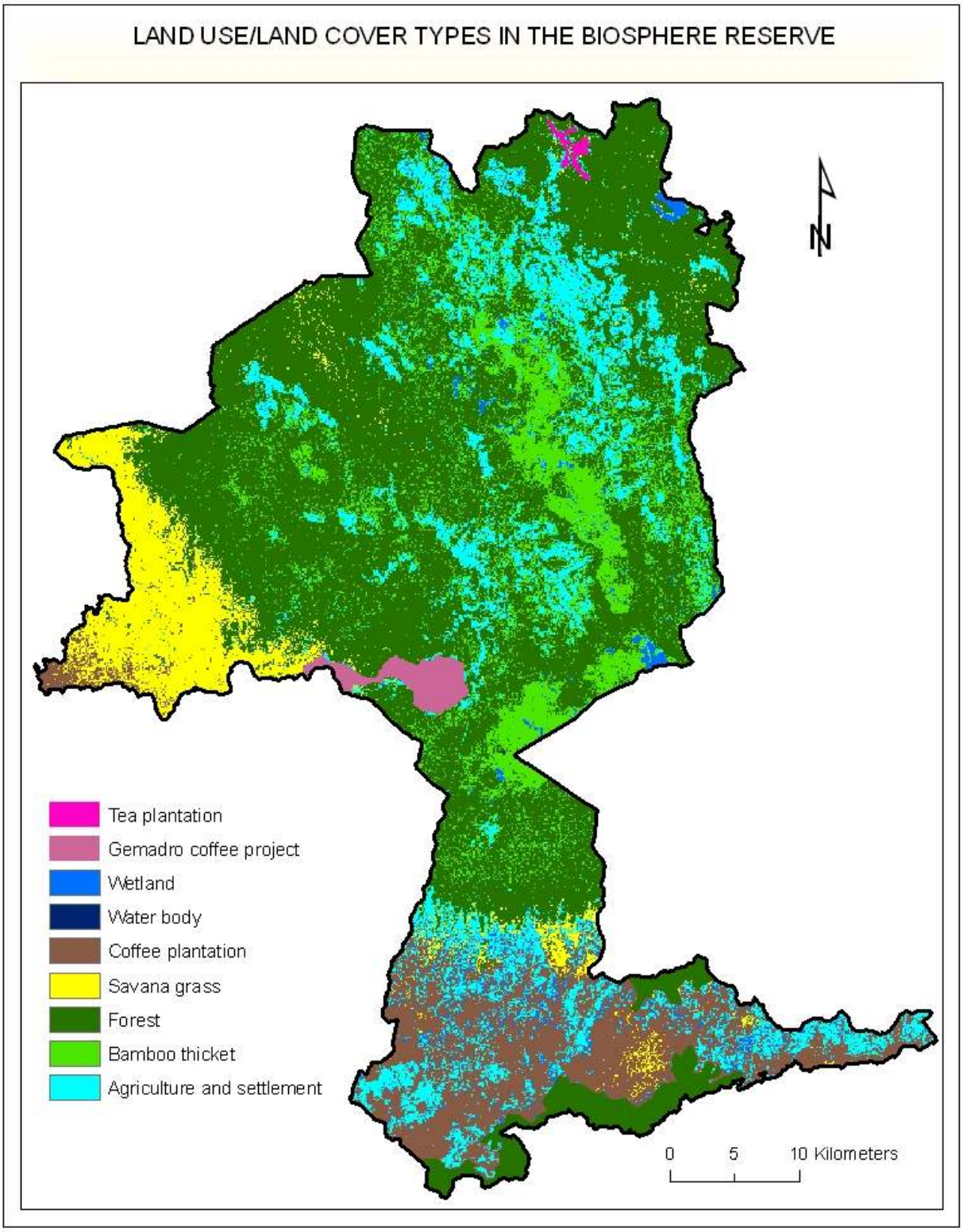


Figure9. Land use land cover map of Sheka zone

10. HUMAN POPULATION OF PROPOSED BIOSPHERE RESERVE:

permanently / seasonally

10.1 Core Area(s): 0 / 0

10.2 Buffer Zone(s): 9,984 / 5%

10.3 Transition Area(s): 189,687 / 95%

10.4 Brief description of local communities living within or near the proposed Biosphere Reserve:

The ethnic composition of Sheka Zone is quite diverse today. Of the total population, the proportion of the major ones are: 34.7% Shekacho, 20.5% Kafficho, 20.5% Amhara, 9.6% Oromo, 5.0% Sheko, 4.8% Bench, and 2% Mezengir. There are also other ethnic groups living in the zone, but only in small numbers. Shekacho and Mejengir are the native population, while others are settlers coming from neighboring woredas as well as central and northern Ethiopia.

The Shekacho ethnic group represents the dominat native population. Though well documented information is lacking, local informants point to different places of origin of the Shekacho people, including Jerusalem. Written documents also did not trace to any place of origin other than stating the Shekacho kingdom was established by migrants in the 16th century in southwest Ethiopia (Mengistu Seyoum 1995; 2001). According to informants, the Sheka king making was interrupted for some time, and then started after their occupation of the current place, the Sheka Zone in 19th century.

According to key informant, there were fourteen (some stated fifteen) kings altogether and gabairi divide these fourteen/fifteen kings in to two. This division could also be based on the time difference besides the interruption of the king making due to different historical events. Lange (1982) stated that “The Bushasho dynasty's rule from the late 16th century to the end of the 19th was interrupted during the period of Oromo expansion towards the mid 18th century, when the Sheka kingdom, ruled by Bedi Gochi, was conquered and its political elite fled to neighboring Kafa.”

At the top of the social organization of the Shekachos, there was a king (*Shekitato*). Under the king, there were councilors (*mikiracho*), clan leaders (*gepitato*) and individuals appointed under them. The social organization maintained the systematic relation among members guarding against social disorder that may exacerbate environmental degradation (Zewdie 2007). Next to the king were seven councilors (*Mikiracho)*. The seven members of the council included *katarasha, welasha, akakerasha, farasha, gesherasha, shisherasha* and *chiterasha.* The seven councilors had the right to dismiss the king.

Under the councilor, there were a number of clan leaders (*gepitatos*) who are responsible for administrative activities. Clan leaders give titles for the individuals they appoint under them. Their titles include: *weltata, atestata, abeltata, arettata, shibitata, yaphitata, betata, degitano, akitano, yewitano* and the like. The position of cland leaders and their functions susrvided up today. The position of a clan leader among the *Shekachos* is the most influential traditional position that an individual acquires through inheritance. The individual who gets appointed to the position of clan leader slaughters a bull on the occasion. If the bull he slaughters on the occasion does not moan, he will not be appointed or the people will not accept his rule.

Clan leaders assume a range of responsibilities that have serious concern with socio-cultural, religious and economic affairs. They are both ritual leaders and administrators responsible for the arbitration of dispute among clan members. Until the end of the imperial period, clan leaders controlled the whole aspect of people living in their territory, usually land equivalent to the size of the present *kebele* administration. Traditional responsibilities performed by the gepitatos include the following:

- Perform and lead various religious ceremonies and rituals. Provide blessing to their land and pray for the peace of their people, cattle and crop;
- Informally administer natural resources such as cultural forests and wetlands;
- Play a primary role in customary dispute resolution; and
- Impose and enforce punishments to the violation of traditional rules related to resource management and celebration of religious ceremonies. The punishments usually involve fines in kind, advices, ostracism, *etc*. *Gepitatos* identify offenders through swearing and cursing. Fire, egg, water and ash are materials used in the swearing process while spear is commonly used in the cursing process.

Thus, clan leaders have been performing different social, cultural (religious) and economic activities that are substantially related with resource management and the livelihood of the community.

Traditionally, there were four casts among the *Shekacho* ethnic group. This included the Shekacho proper, black smiths, potters and the Menjos. The Shekachos used to be the highest cast and the rest were found at descending rank with the Menjos at the bottom of the ladder. The low cast groups acquired their status due to their work habit. The Menjos used to be hunter-gatherers and most marginalized casts in terms of social, economic and cultural aspects and depended on selling forest products, mainly charcoal and firewood. Over the past few decades, efforts of social, political and economic integration were made. Today, there is only little difference among the different casts. The Shekachos and other ethnic groups in the area also live in harmony with each other.

10.5 Name(s) of nearest major town(s):

Masha, Gecha and Teppi are located within the prposed biosphere reserve. Mizan Teferi is located at 50 km away from Teppi to the southeast, while Gore and Mettu are 60 and 80 km north of Masha town.

10.6. Cultural significance:

The area is very interesting historical place where different ethnic groups occuppied at different times. Little is known about the culture and history of possible settlers before the Shekacho. Besides, the origin as well as history of the Shekacho and the situation under which they developed an interesting environment-friendly culture is not well known and worths further investing.

The most interesting and culture of the Shekachos is their cultural values for nature, and the sustainable reource management practices that they have developed over centuries. The cultural value is still vivid and practiced in many communities in the area.

Resource management practices of Shekacho people is based on their traditional ecological knowledge that is highly influenced by their social organization, religious conception and worldviews. The Shekachos classify the natural environment into different types of management zones, having strong interrelation to one another that allows maintaining environmental stability. Their social organization makes possible to manage the different categories of the environment. It provides different responsibilities of resource

management to the people along their traditional layers starting from the king (*Shekitato*) down to individuals and groups at grass-root level. Clan leaders (*gepitato*) are administrators as well as ritual leaders as they allocate land to the new comers and "purify" the people (Mengistu Seyoum 1995). The conception and beliefs of the community towards different natural resources management is summarized to highlight the cultural values developed over decades.

A. Forest:

Forestlands in the proposed biosphere reserve area are divided into cultural forests and large forest areas that are administered through the *kobo* customary right. Cultural forests and large forest areas administered through *kobo* differ in two major ways. Firstly, cultural forests are found around villages and on hilly or steep slope mountainous areas while large forest areas are found relatively far from people's settlements. Secondly, the attitude, conception and belief of the local community towards the two types of forests are very different. The management of cultural forests is based on the resource and habitat taboos. The management of large forests (*kobo*) is based on the rights and obligations of the individual who inherited the forestland from his ancestors.

The holder of the forest who is allotted or has inherited a block is responsible for its management through traditionally known use and conservation rights. Other people are not allowed to use resources in *kobo* for hanging beehive and extraction of other NTFPs unless it is beyond the knowledge of the owner of a particular *kobo*. Clan leaders enforce the customary rules of forest management, though to a less extent nowadays.

Traditionally, clan leaders control the holder of *kobo* who is responsible for illegal timber extraction and other damages brought within his boundary. The clan leader has the right to impose different forms of punishments on the illegal use of forest resources. Currently, both the government and the owners control forest and NTFPs in *kobo* area. Clan leaders still provide informal advices for promoting conservation of resources in *kobo* area.

Selective hunting is also conducted in this part of the forest. Local informants indicated that the number of wild animals is highly reduced over the past few decadesin the past few decades.

B. Cultural forests:

The base for the conservation of these forests is taboos related with religious beliefs and societal values that coincide with their ecological knowledge varying from place to place. Strict observance of beliefs can play a positive role through bringing about the orderly behavior of people, which help in the conservation of the forests, land and wildlife (PLA 1997).

There are 209 cultural forest areas in Sheka. Worship place in the middle of the cultural forests (*gudo*) is central to the resource and habitat taboos enhancing cultural forest conservation. *Gudo* is a worship place inside the cultural forests where religious ceremonies, sacraments and prayers are conducted. The *gudos* are mostly found at the middle of cultural forests. The sites are unknown to most people, except for the clan leaders who provide sacraments and conduct prayers. *Gudos* are specifically situated in areas relatively elevated, around big stones and trees at the middle of cultural forests. People who enter *gudo* should not be impure. Women during their menstruation, a person who has touched coffin before few days, people with some parasitic disease and anyone who may have eaten cabbage cannot enter *gudo*. The provision of sacrament is currently not practiced due to socio-cultural changes weakening traditional beliefs. The Shekachos interpret the belief in *gudo* with biblical histories of Mosses and Abraham's prayer and sacraments described in the Old Testament on a mountain where they trace their origin.

Every forest where there is *gudo* site is forbidden from cutting. People do not even point at it showing their respect for the spirit that dewls in the area and to avoid getting inflicted by evils associated with violation of the *gudos* rule. It is prohibited to clear such cultural forest areas or to cut trees for house construction and house furniture. Though few people have recently started to violate the rule, hanging beehive, hunting and cutting climber is a taboo that every member of the community in general observes. There is also a conception among the community that as protection of the cultural forests ensures normal rainfall distribution; *gudo* should not be exposed to deforestation. The protection of cultural forest also protects wild animals as hunting in such forest is forbidden. The prohibition of hanging beehive (that has been violated in the past few decades), was to give shelter for bee colonies expelled from their hive in *kobo* during honey harvest times in May.

Resource and habitat taboos imposed on areas of cultural forest have significant ecological importance particularly for watershed protection, erosion and landslide control and conservation biodiversity and provision of various ecosystem services. The cultural

sites are also habitats for many wild relatives of crop plants and hence prevent genetic erosion. The surrounding communities believe that people who violate the taboos will die or face evil things. The belief by the community that clearing *gudo* for cultivation brings drought, heavy rain and other forms of catastrophes protects the forests.

C. Wetlands (*Ceco*):

In many of the areas, forests surround wetlands. The wetlands are believed to be the source for many of major rivers and their tributaries. A taboo forbids cultivating the wetlands and the forest in its surrounding. Wetlands were under the management of clan leaders until the coming of the *Dreg* Regime. Clan leaders used to organize and conduct worship ceremonies and provide sacrament in the area. Prayer and sacrifice was conducted through the guide of clan leaders. A clan leader has to be "pure" by keeping himself from any "impure activities" for few days before the provision of sacrament sometimes without wearing cloth. No one is supposed to reach this place except the clan leader. The religious celebration involves blessing, praying for rain, for productivity, health and peace of the people, crop and cattle. They also slaughter cattle and prepare local beer for the occasion. The traditional culture of protecting wetlands has important ecological value in watershed protection, continuous flow of water, sustainable production of wetland grasses for economic use, regulation of pollution and water flow and conservation of biodiversity.

D. Rivers and waterfalls:

Traditional beliefs also protect forests along river banks and waterfalls. If a person cuts such trees, there is a belief that he may die, for he is against the rule of the guardian spirit for which sacrament is provided by clan leaders in wetland areas and waterfall points. Taboos on the forests at along rivers are based on the assumption that rivers need cover (*acheiedo*), as people require cloth in the views of the Shekichos. The forest is also important for continuous flow of the rivers and for the supply of cold and clear waters for drinking and other purposes. The local community members understand the strong relation between the wetlands, rivers and forests in the area. Wetland is a source of rivers; and forests keep wetlands from drying. Research findings also confirm their traditional ecological knowledge that wetlands are important contributors to groundwater and hence to the maintenance of water supply (Yilma and Geheb 2003).

11. PHYSICAL CHARACTERISTICS

11.1. General description of site characteristics and topography of area:

The area is characterized by a rolling topography, and is highly dissected by several small streams, which drain into the Baro, Akobo and Gojeb Rivers. The landform frequently changes from flat surfaces on the top of plateaus to very steep slopes and valley bottoms within short distances. The area is characterized by wetlands, marshes, mountain ranges and narrow valleys. Wetlands on the highlands are dominated by ferns, grasses and bamboo, while the lowland wetlands are dominated by palm trees. Mountain ranges are mostly covered by dense natural forests and bamboo thickets.

11.2.1 Highest elevation above sea level: 2700 metres

11.2.2 Lowest elevation above sea level: 900 metres

11.3. Climate:

Reliable climatic data of the area is not available due to lack of weather station for many years. Based on the information from the nearby stations at Gore, Tepi and Mizan Teferi, the mean annual rainfall is estimated to be well over 2200 mm. The mean maximum temperature is estimated to be between 25^{O}C and 34^{O}C, and the mean minimum is estimated to be between 10^{O}C and 15^{O}C. The rainfall distribution is uni-modal, with the highest rainfall between June and September. Rain falls throughout the year, with monthly minimum and maximum of about 70 and 220 mm. It also has a relatively long growing season of well over 250 days per year.

11.3.1 Average temperature of the warmest month: 28 °C

11.3.2 Average temperature of the coldest month: 12 °C

11.3.3 Mean annual precipitation: 2200 mm, recorded at an elevation of 2100 metres

11.3.4 If a meteorological station is in or near the proposed Biosphere Reserve, indicate the year since when climatic data have been recorded:

a) manually: ____1965_____

b) automatically: _____

c) Name and location of station: _Gore

11.4. Geology, geomorphology, soils:

The Cenozoic and Proterozoic volcanic sediments underlie most parts of the southwestern Ethiopia (Schlüter 2008). Generally, the soils of the area are red or brownish ferrisols derived from volcanic parent material. The prevalence of high rainfall has masked other soil forming-factors and hence, very similar soils have developed on a variety of parent materials. Other soil groups in the area include nitosols, acrisols, vertisols, and cambisols (Tafesse Asres1996).

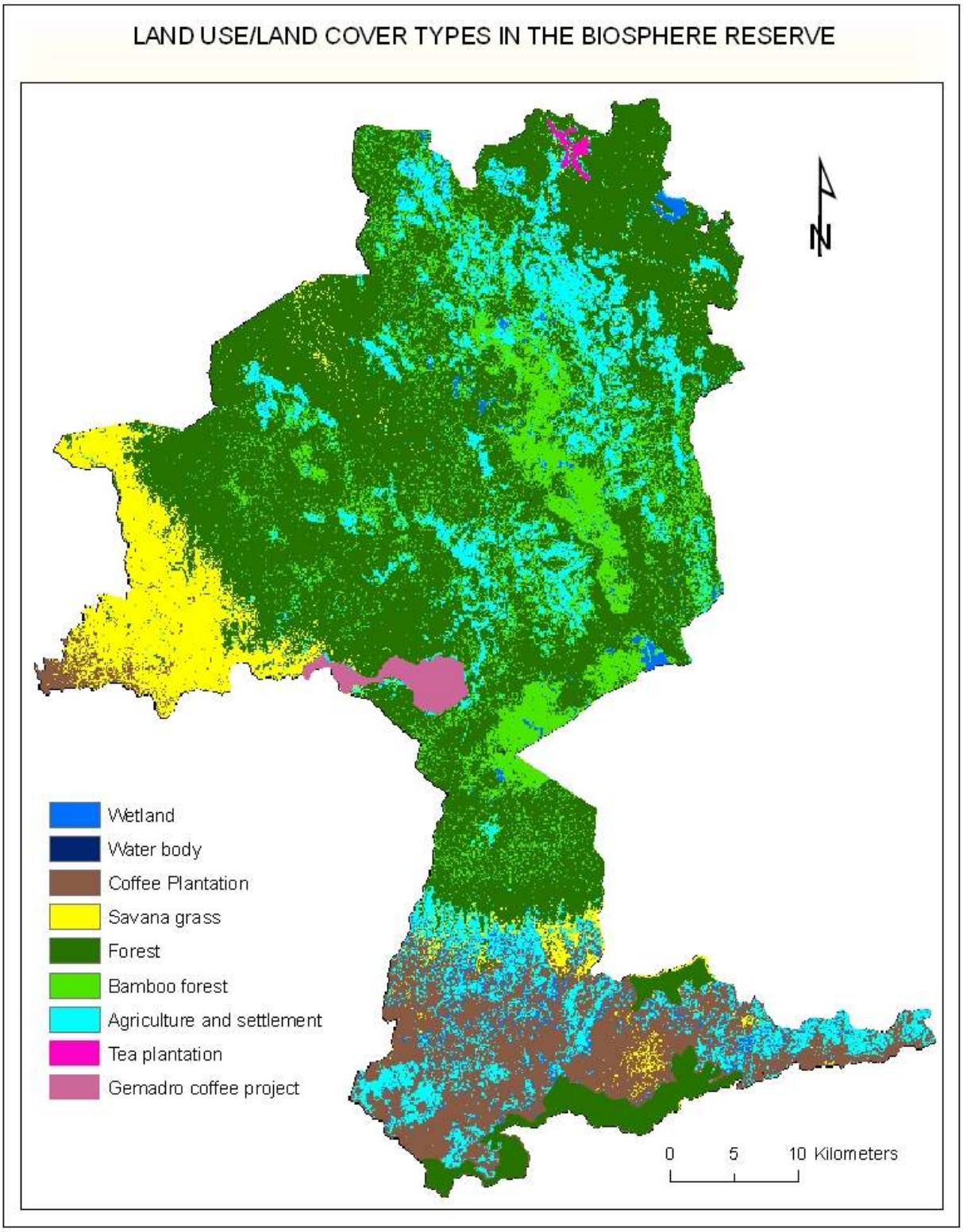


Figure10. Land use land cover map of Sheka zone

12. BIOLOGICAL CHARACTERISTICS

The main important habitat types in the proposed biosphere reserve area include: forests, wetlands, bamboo thickets, sacred sites, agricultural lands, grazing lands, built-up areas, and wooded grassland. Each habitat/land use type is described as follows.

12.1. Forests

Ecologically, the forest vegetation of the proposed biosphere reserve can be categorized into two types: (1) Afromontane rainforest and (2) transitional rainforest (Friis, 1992). The Afromontane rainforest occurs in the south-western highlands, in Wellega, Illubabor, Sheka and Kafa. It is found at elevations 1,500 and 2,500 m asl, with average annual temperatures of 18 to 20^0C, and an annual rainfall between 1,500 mm and 2,000 mm, sometimes even more than 2,000 mm (note: the average of the region is 2,200 mm), with rain all the year round, but at a maximum between April and October. In the proposed biosphere reserve area, the average rainfall is 2,200 mm, with ranges between 1,400 and 3000 mm, and the Afromontane rainforest occurs at altitudes between 1,500 and 2,300 m.

The transitional rainforest is also found on the escarpments of the south-western highlands in Wellega, Illubabor, Sheka and Kafa, between the dry peripheral semi-deciduous Guineo-Congolian forest and the Afromontane rain forest. These forests occur at altitudes between 500 and 1,500 m, partly in river valleys, and partly in areas with a high water table. The annual temperature ranges from 20 to 25^0C. The mean annual rainfall is about 2,000 mm, with rain falling all year round, and the highest amounts falling in September. The transitional rainforests are similar in physiognomy and composition to the Afromontane rainforest. In the proposed biosphere reserve area, this forest type occurs at elevations between 1,100 and 1,500 m (Friis, 1992).

These forests are sources of various direct uses for the local community. These include construction materials from climbers/liana, tree ferns (locally called Seseno), timber, fuelwood, logs for beehives construction, wood for utensils, bee forage and traditional beehives hanging, spices production and medicinal plants collection. Among the products highly valued by the community include timber doors, windows, dining table, chairs, bench,

beehive, and coffin, and timer for sale. Non-timber forest products collected from the forest include medicinal plants, spices like Korerima and leaves of phoenix. In kebeles at lower altitude (<2000 m), coffee is becoming an important NTFP, next to honey. Fuel wood collection from dense forest is common only in kebeles at higher, where settlement is close to the forest areas, for example. Moreover, wild fruits are vital for the local house not only because it is part of their food stuff but also serve as food for wildlife and in turn save their crops from wildlife.

12.1.1. Characteristic species:

The two forest types have many species in common. However, there are some species which are common and characteristics of each type. The characteristic species of the Afromontane rainforest are a mixture of broadleaved tree species and include: *Pouteria adolfi-friederici*, *Syzygium guineense, Polyscias fulva, Olea welwitschii, Diospyros abyssinica, Manilkara butugi, Cordia africana, Trilepisium madagascariense Croton macrostachyus*, and *Schefflera abyssinica.* A discontinuous canopy of smaller trees (less than 10 m) include *Allophylus abyssinicus, Chionanthus mildbraedii, Clausena anisata, Coffea arabica, Deinbollia kilimandischarica, Ehretia cymosa, Galiniera saxifraga, Lepidotrichilia volkensii, Nuxia congesta, Oxyanthus speciosus, Pittosporum viridiflorum, Ritchiea albersii, Rothmannia urcelliformis, Teclea nobilis,* and *Vepris dainellii.* Natural coffee is one of the characteristic species in the understory. The shrub layer includes *Acanthus eminens, Dracaena fragrans, Lobelia giberroa, Senecio gigas, Cyathea manniana, Maytenus* spp., *Whitfieldia elongata* and others. The lianas and scrambling shrubs are numerous: *Landolphia buchananii*, *Jasminium abyssinicum*, *Hippocratea goetzei, Combretum paniculatum, Embelia schimperi, Dalbergia lacteal, Paullinia pinnata, Oncinotis tenuiloba*, *Tiliacora troupinii*, and *Hippocratea africana.* Epiphytes are very common and include *Canarina abyssinica, Scadox nutans, Peperomia tetraphylla*, *Asplenium sandersonii*, *Loxogramme lanceolata*, *Aerangis luteoalba*, *Arthropteris monocarpa*, *Asplenium spp.,* different orchids, mosses, and others. The ground-cover is also very rich and includes: *Dorstenia sorensenii, Elatostema orientale, Impatiens ethiopica, Thalictrum rhynchocarpum*, and many others (Friis, 1992; Tadesse, 2003; Feyera, 2006).

The characteristic species unique to the transitional rainforest include *Aningeria altissima, Anthocleista schweinfurthii, Campylospermum bukobense, Celtis philippensis, Celtis zenkeri, Croton sylvaticus, Dracaena fragrans, Elaeodendron buchananii, Eugenia bukobensis, Ficus exasperata, Garcinia huillensis, Manilkara butugi, Morus mesozygia, Phoenix reclinata, Strychnos mitis, Trichilia dregeana, Trilepisium madagascariense* and *Vepris dainellii* (Friis, 1992; Tadesse, 2003).

In the Afromontane rainforest and transitional rainforest, animal species are varied and include a diverse range of invertebrates inhabiting all niches, from the soil to high forest canopies; and vertebrates, including amphibians, reptiles, birds and small and large mammals. A list of common forest mammals and birds species in the area is published in EWNHS (1996) and completed by field observations. This list includes: *Hystrix cristata* (porcupine), *Cercopithecus aethiops* (Chlorocebus), *Cercopithecus mitis* (blue monkey), *Cercopithecus neglectus* (De Brazza's monkey), *Papio anubis daguera* (baboon), *Colobus guereza* (*colobus monkey), Syncerus caffer (African buffalo), Tragelaphus scriptus* (bushbuck), *Redunca redunca* (Bohor reedbuck), *Tragelaphus strepsiceros* (greater kudu), *Sylvicapra grimmia* (common duiker), *Phacochoerus aethiopicus* (warthog), *Leptailurus serval* (serval), *Lycaon pictus* (wild hunting dog), *Potamochoerus larvatus*
Panthera leo (lion), *Panthera pardus* (leopard), *Civettictis civetta (African civet), Genetta abyssinica (Abyssinian genet), Lepus fagani (Ethiopian hare), Orycteropus afer (aardvark), Viverrdae sanguineus* (shelmitmat), and many bats.

According to EWNHS (1996), the common bird species having conservation importance, either as endemics or Afromontane highland biome species, found in or around the proposed biosphere reserve include: *Oriolus monacha (*Abyssinian black-headed oriole), *Bucorvus abyssinicus* (Abyssinian ground hornbill), *Turdus piaggiae* (Abyssinian ground thrush), *Dendropicos abyssinicus* (Abyssinian woodpecker), *Alcippe abyssinica* (African hill babbler), *Lybius guifsobalito* (banded barbet), *Agapornis taranta* (black-winged lovebird), *Francolinus leucoscepus* (chestnut-naped francolin), *Nectarinia olivacea* (olive-bellied sunbird), *Rougetius rougetii* (Rouget's rail), *Apus myioptilus* (scarce swift), *Cinnyricinclus sharpei* (Sharpe's starling), *Cossypha niveicapilla* (snowy-headed robin chat), *Poeoptera stuhlmanni* (Stuhlmann's starling), *Tauraco ruspolii* (white-checked turaco), *Poicephalus flavifrons* (yellow-fronted parrot), *Bostrichia caruculata* (watttled ibis), *Cyanochen*

cyanoptera (blue winged goose), *Parophasma galinieri* (Abyssinian cat bird), *Parus leuconutus* (white backed black tit), *Onchoganthus albirotris* (white-billed starling), and *Caruvus crassirostris* (thick-billed raven).

The common bee fodder trees important for honey production include *Pouteria adolfi-friedrichi, Croton macrostachyus, Polyscias fulva, Schefflera abyssinica, Syzygium guineense, Vernonia amygdalina, Ilex mitis, Maesa lanceolata, Allophylus abyssinicus, Phoenix reclinata, Olea welwitschi,* and *Dracaena afromontana*. Most areas of dense forest are divided into forest blocks customarily owned by individual farmers and used for beekeeping. Such forest blocks are called KOBO, traditionally being inherited from generation to generation.

12.1.2. Important natural processes:

The area is known for high rainfall throughout the year, with only few dry months. Because of presence of cloud throughout the year, it is often described as 'cloud forest'. It is common to see natural gaps greated by dead or fall trees. However, these gaps are filled quickly. These internal forest dynamics allowed the forest to develop and regenerate naturally through natural succession with varying age and size of trees and decaying wood of varying dimensions and in various states of decomposition. Diverse understory vegetation also makes use of light from the canopy gaps to regenerate and fill the forest gaps. Standing and fallen dead wood provides a range of habitats and promotes a variety of ecological processes in the forest. Similarly, fallen trees and dead biomass enrich the habitat for many epiphytes, arthropods and micro-organisms. It also houses natural pollinators, decomposers and seed dispersers, which play an important role ecosystem services

12.1.3. Main human impacts:

There is a growing trend of forest areas conversion subsistance agriculture by small holders and monoculture plantations of tea nad coffee over the past decades (Bedru 2007). Large areas were cut for settlement and villagization in 1980s, investments in plantations in 1980s and 1990s and smallholder agriculture thoughout the last two decades. There is also a growing demand for investmennts in coffee plantations in the

area over the past decade. Coffee management and conversion of the intact forest into managed, semi-forest coffee production system has affected the diversity of plant species. Additionally, illegal logging for timber in lowland forests around Teppi and recent infrastructure development like roads and electric power line construction, are some of the human impacts on the natural ecosystems. Many people also extract timber, for local house constructions, and non-timber forest products like spices, honey, medicinal plants for household consumption and income generation. In degraded forest areas and settlement areas, the introduction of fast growing exotics like *Eucalyptus* spp., *Gravillea robusta* and several fruit trees is changing the landscape to some extent. The establishment of the proposed biosphere reserve shall put appropriate management guidelines in place, in order to attain both conservation and sustainable development. Introductions and management of resources will also be based on outputs of scientific research for sustainability.

12.1.4. Relevant management practices:

The forest in the area is important for biodiversity conservation, since it is part of the Eastern Afromontane Hotspot, one of the 34 global biodiversity hotpot areas in the world. The forest also has productivity and hence high capacity for carbon sequestration. If protected, it serves two functions: reduce emission from deforestation, and capture carbon from the atmosphere, and has high capacity for climate change mitigation. It is an important part of the watershed of the Baro and Akobo rivers, which are the major tributaries of the Nile river, and Gojeb- a tributary of the Omo river. The relevant management practices are, therefore, to protect the dense forest as it is, design mechanisms of using it for environmental sustainability, economic growth and preservation of the Sheka cultural values. This can be achieved through developing different payments for ecosystem services, beside the non-destructives uses of NTFPs. Immediate activities should include development of project idea note (PIN) and preparation of project design document (PDD) in order to tap into the carbon market through REDD+. Besides, methodologies to value the watershed protection service has to be developed and payment for the service provided are implemented.

In order not contradict with the culture of the community; trees of high demand for cultural practices like *Ficus sur* for coffin for burial purposes have to be planted in degraded areas

and around homestead areas for future uses. Traditionally, the Sheka people use coffin made from *Ficus sur*, which often grows in river banks and wet valleys.

Gradual shift to use of modern a beehive which lasts longer and produces more honey should be the preferred priority with regard to beekeeping. Besides, locally made transitional beehives similar to modern ones, but from non-timber forest products and mud can be the economically feasible shift at early stage the improvement in beekeeping technology around dense forests.

Conversion of intact coffee forest into managed, semi-forest coffee or to monoculture agriculture is no longer permitted following the acceptance by the local government and local community, for the establishment of a biosphere reserve. Recognition of the impacts of past logging practices and agricultural expansion in the reserve area means that these activities also will be limited to managed areas of the reserve. For high-yield coffee and spices in the area, the Teppi Agricultural Research Center began providing promising selections from the local land races. Degraded forest margins are also being revegetated by planting seedlings of wild coffee and shade trees, which serves as buffer zone expansion and a source of cash income for the surrounding communities, through sales of coffee.

12.2. Wetlands and water bodies

Wetlands and other water bodies include permanently or seasonally waterlogged areas, primarily covered with tall grasses, lakes, and riverine habitats. In Sheka, there is high cultural value for wetlands. Such value for wetlands emanates from their spiritual values and understanding of their ecological functions. In Shekacho culture, there is a very good understanding of the fact that wetlands are sources of water, and that over exploitation leads to degradation and drying up of streams and springs. There are several wetlands, steams, rivers and some small lakes in the area. The wetlands are covered with tall grasses and ferns.

Figure 11. Typical wetland during dry season

All wetlands, lakes, streams and rivers normally have buffer zones of forest cover. According to the traditional ecological knowledge of the Sheka people, such areas should not be “naked” and are always with buffer areas to protect from erosion or other forms of degradation.

Wetlands and other water bodies provide multiple economic and ecological functions. Wetlands provide grasses for roof thatching of traditional houses and animal fodder or, for grazing cattle and pack animals during dry seasons. In some areas, where the buffer areas are degraded, bamboos are planted to serve both the protection and production function. They are also sources of water, springs. Most rivers and streams in the area originate from wetlands. Wetlands are habitats for different wild animals, including birds, like the endemic Rouget’s Rail. Rivers and lakes also provide water for humans as well as animals. They also serve as habitats for other organism. Wetlands and water bodies play an important role in regulation of hydrological cycle.

There are customary rules on uses of wetlands. They are regulated as common pool resources. The Kebele Administration, clan leaders, and elders provide permits of use to members of the community. There are as many as 16 and more wetlands in one Kebele.

12.2.1. Characteristic species:

This habitat type consists of at least two physiognomically different vegetation types: riparian forest along the rivers and streams, and the treeless swamp vegetation with stagnant or slowly moving water. The characteristic of the riparian plant species include: *Ficus sur, F. mucuso, F. sycomorus, Syzygium guineense* ssp *guineense, Polyscias fulva, Schefflera abyssinica, Schefflera myriantha, Schefflera volkensii, Cyathea manniana, Manilkara butugi, Bridelia micrantha, Mimusops kmmel, Phoenix reclinata* and *Sesbania dummeri.* The major vascular plant species that characterise the wetland habitat include: *Cyperus latifolus, Leersia hexandra*, *Cyperus papyrus*, *C. dereilema*, *Panicum hymeniochilum*, *Floscopa glomerata*, *Phyllanthus boehimi, Fuirena stricta, Aeschenomene abyssinica* and *Anagalis serpens.*

The major characteristic species of birds observed in the wetlands and riverine system include Watttled ibis, cattle egret, great white egret, grey heron, black-headed heron, hamerkop, Abdim's stork, wooly-necked stork, white stork, Hadada ibis, Egyptian goose, black-crowned crane, Rouget's rail, green sandpiper, and common sandpiper (EWNHS 1996). The characteristic species of fish in the wetlands and rivers include barbus, catfish, brown trout and rainbow trout. According to ZNHM (1987), the characteristic species of reptiles and amphibians in wetlands and running water include: *Kassina senegalensis, Leptopelis bocagei, Conraua beccarii, Hylarana galamensis, Hemisus marmoratus, Mabuya guinguetaeniata, M. striata, Agama agama spinosa, Chamaeleo senegalensis,* and *Causus rhombeatus*. *Hippopotamus amphibius* is also the characteristic species in Baro River and wetlands around the river.

12.2.2. Important natural processes:

Wetlands, lakes and riverin habitats are sources of water. These habitats are characterised and shaped by awailability of water. They play important roles in regulation of the quality and quantity of water flow, regulating movements of sediments and ground water recharge. The soils are spongy in nature, with high water holding capacity. Plants

are adapted to water-logged conditions. Plants are dominated by few species that are adapted such water logged habitats. Though diversity relatively low, such habitats are important for the conservation of habitat specific species and provision of many ecosystem services.

12.2.3. Main human impacts:

In recent years, there is a growing trend of over grazing by livestock during dry season. Traditionally, there is a belief that trampling by animals dry upwetlands. This has parallelism with scientific knowledge, since animals compact the soils and deduce spongy nature to hold water. Changes in soil structure also affect the plant species that grow in the area. Besides, the forests at the edges of wetlands, river banks and small lakes are degrading due to fuel wood collection and expansion of agriculture. This can partly be due to cultural changes, where some youth fail to abide by the traditional practices.

12.2.4. Relevant management practices:

The main management objective here is to protect wetlands and water bodies for biodiversity conservation, ecosystem services and their cultural values.

There is already a good traditional ecological knowledge for the management and use of such areas. Building on the traditional practices, a new management rules that are acceptable to members of the community should be put in place by the local authorities. Wetlands, lakes, rivers and buffer areas around them should be part of the community conserved areas like forest, and hence can also serve as habitat corridors connecting isolated areas. Relevant management practices and activities suggested by the community, local experts and authorites (Tadesse et al. 2011) include the need to maintain a buffer area covered by forest vegetation of at least 50 m in width, controlled grazing during dry season, and preferably use the cut-and-carry system to feed animals, clearly define use rights and management rules. This includes level and pattern of wetland grasses harvest, uses of buffer area vegetation for NTFPs production. There is also a need to rehabilitate degraded buffer areas around wetlands, lakes, river banks; plant bamboo and indigenous trees like *Polyscias fulva* in degraded buffer areas; and train farmers on sustainable level of harvest and harvesting techniques of grasses for roof thatch and fodder.

12.3. Bamboo Thickets

Bamboo thickets in the area represent highland vegetation dominated by alpine bamboo (*Arundinaria alpina*). Such vegetation is found at areas higher than 2300 m in Sheka zone. A notable place to observe such vegetation is around Gada in Masha Woreda and Yokchichi in Anderacha. The bamboo thickets are largely found in Gada, Kanga, Ateso, Yina, Atile, Gatimo, Tugiri, Chicha and Yokichichi kebeles. The bamboo thickets are almost monoculture stands, except very few scattered trees.

Bamboo is highly valuable for the local community. It has several local uses: construction (fence and house), beehive (both culm and sheath are used), floor mat, chairs, baskets, *Dollo* (water container), cups, *Gemo* (traditional tray), pipe used for smoking tobacco, bed, food, *etc*. It is also sharpened like a knife and used to separate carbohydrate/edible parts of *ensete* from the fiber. The bamboo thickets also have several other services like habitat for wildlife and watershed protection. The resource is currently underutilized. It can be used to develop small-scale industry/ enterprises for the local community to produce processed bamboo products of high quality, curved and laminated furniture.

12.3.1. Characteristic species:

Though it is dominated by one species, *Arundinaria alpina,* the bamboo thicket is quite rich in plant species. Some Afromontane tree species are represented in the canopy layer. These include *Polyscias fulva, Schefflera myriantha, Schefflera volkensii, Dracaena afromontana, Euphorbia ampliphylla, Ekebergia capensis, Bersama abyssinica, Syzygium guineense subsp. Guineense, Prunus africana, Zanha golungensis* and *Allophylus abyssinicus*

Figure12. Bamboo stand in Gada Kebele (picture taken in 2005)

Small trees and shrubs represented in the babmboo tickets include *Ilex mitis, Polyscias fulva, Maytenus adat, Cyathea manniana, Chionanthus mildbraedii, Hallea rubrostipulosa, Maesa lanceolata, Oxyanthus speciosus, Galiniera saxifraga, Oxyanthus speciosus, Deinbollia kilimandscharica* and *Brucea antidysenterica*

Climbers include *Oncinotis tenuiloba, Saba comorensis, Landolphia buchananii, Hippocratea africana, Peponium vogelii, Embelia schimperi, Phytolacca dedocandra, Rubus steudneri, Rubus apetalus* and *Urera hypselodendron.* The heraceous layer vegetation is the most diverse. The common species in the herbaceous layer includes *Amorphophallus gallaensis, Arisaema flavum, Arisaema schimperianum, Crassocephalum vtellium, Guizotia scabra sbsp schimperi, Impatiens rothii, Impatiens hochstetteri, Crambe hipanica, Canarina abyssinica, Lagenaria abyssinica, Piper capense, Snowdenia polystachya, Persicaria setosula, Rumex natalensis, Laportea alatipes* and *Girardenia bullossa*.

12.3.2. Important natural processes:

The Bamboo thicket is a unique ecosystem. Bamboo reproduces mostly vegetatively. New bamboo shoots raise from runners, form dense stands clustering here and there. The stems grow fast, outcompeting other plants in the surrounding. Vegetative reproduction and fast growing nature could be one of the reasons for having a nearly monocuture natural bamboo stand. When gaps are created, and alson on slopes, tree and shrubs regenerate. At flowering stage, bamboo stems of all age flower as the same time, seet seed and die, followed by woody plants invasion or colonization by trees. Later, succession of bamboo takes place from the seeds. Natural succession of bamboo from seeds takes several years to reach climax vegetation.

12.3.3. Main human impacts:

The bamboo stand in the area started drying since the last 2-3 years. This is a natural phenomenon which happens cyclically every 40 or 70 years, according to local informants. Bamboo stands flower in cyclical generation of every 40 or 70 years, irrespective of the age of individual plant. The generation age is not certain, since the silviculture of highland bamboo is poorly known. All individuals in flower die, and regeneration after the death of all stands is from the seeds. All bamboo stands have flowered and are dying. There was no seedling from seeds or sprouts from vegetative reproduction up to August 2011. Local informants indicated that there are 7 years gap between flowering and germination from the seeds.

Local communities are letting their cattle to graze in the dying bamboo stands. Besides, woody plants are regenerating in the open gaps created by the dead bamboo stands. Seedlings of trees waiting for such openings as seedling banks in the bamboo stands are taking over.

12.3.4. Relevant management practices:

The management objectives of alpine bamboo vegetation in in the area are: (1) to rehabilitate and conserve the ecosystem, focusing on enhancement of natural regeneration by minimizing damage by cattle and human activities; and (2) to utilize the bamboo resources sustainably, through processing and production of high value products-introducing small scale bamboo industry.

Recommended actions and management practices inclue assisting rehabilitation through digging hole (exposing soil surfaces) for seeds germination, planting varieties that are not currently flowering- to avoid woody plants colonization, seting up management rules, and conducting trainings and awareness creation activities, conducting research on bamboo biology and optimal management practices, harvesting part of the drying bamboo stands and supply to potential users or industry in the country, introducing technologies for improved use of the resources and organize youth and train/ build capacity on bamboo products processing and marketing.

12.4. Agricultural land

Agricultural land covers areas used for annual as well as perennial crops production on field as well as home gardens, and those covered by rural villages. It also includes fallows cyclically used for agriculture. The agricultural practice in the area is mixed farming, i.e., crops production and livestock husbandry. Both annual and perennial crops are grown. Ensete (*Ensete ventricosum*), a perennial crop, is the source of staple food in most parts, characterizing the agricultural landscape in the area.

Farmers in the area practice low input agriculture. Fertilizer application nearly does not exist. Instead, shifting cultivation and land fallowing is practiced to maintain soil fertility. Crops growing cyclically in shifting cultivation are cereals followed by pulse and vegetables. In areas where vegetable production is not suitable, the practice is shifting of cereals and pulses only. Intercropping is not common, but sometimes practiced in *ensete* plots where maize, beans, anchote, adenguare, sweet potato and kote hare are inter-cropped. There are more than 260 growing days, and with almost year round rainfall. There is little physical limiting factor for crop production. A plot of land is ploughed for 5-6 years and left for 1-2 years as fallow to rest, and increase in fertility. During the fallow years, organic fertilizers like manures/ animal dung are added to the land. Maximum harvest per year is two times, often harvest of maize followed by teff. Other than the traditional agricultural practices, there are large scale plantations of coffee and tea in the area.

Livestock husbandry is also an important sector. Cattle, goat, sheep, horses and chicken are among the most commonly kept animals. Horses are used to transport both humans

and other items, while others for protein supplement. Small ruminants are mainly reared for sell, as source of cash income.

12.4.1. Characteristic species:

Ensete (*Ensete ventricosum*) is the dominant crop cultivated in most parts of Sheka, along with maize and sorghum in lowland areas. Other crops commonly grown in the area include: teff, maize, field pea, barely, wheat, haricot bean and Faba bean. In recent years, there is a growing tendency of producing vegetables such as cabbage, onion, carrot, red beat, garlic, chilli pepper, and tomatoes. Major root crops in the area are potato, sweet potato, anchote, and godere. Vegetables like potato, cabbage (tikil-gomen), onion, carrot and red beat are mainly produced for commercial purpose. The practice of vegetable production for sale is a recent phenomenon of not more than 3-4 years.

Spices that can grow in the area include: Korerima, Fenugreek (Abish), Ginger, long pepper (Timiz), Black cumin or black seed (Tikur azimud), Carom or Ajowan (Nech Azmud) and so on. Fruits trees of grown in the area include peach, avocado, mango and banana. Sugar cane is also becoming common in many kebeles. Trees planted for timber and fuelwood in the area include *Gravillea robusta, Cupressus lusitanica* and *Eucalyptus grandis.*

12.4.2. Important natural processes:

These area human dominated landscapes. The presence of high rainfall throughout the year might have shaped human activities related crop plants selection and cultural practices. There is a very fast regeneration of trees and shrubs in areas that are left as fallows following 4-5 years of growing food crops. If an area is left as fallow for a decade, it can be rehabilitated and form secondary forest through natural regeneration alone. This is due to the presence of regional seed pool from the surrounding natural and disturbed forests, and the role played by animal seed disperser.

12.4.3. Main human impacts:

Human activities have highly modified the agricultural landscapes compared to the surrounding nnatural habitats. However, agriculture in the area is low input and low impact

compared to other areas, since perennial crops like ensete and many fruit trees and coffee are grown. There is, however, problem of low productivity, which leads to farmland expansion by small holder farmers in order to produce enough for subsistence. This leads to deforestation of the surrounding natural forests, and degradation of managed forests.

Preliminary assessment indicated that large areas of agricultural land in Sheka are affected by soil acidity. However, it is manageable if farmers use manures and crop residues as organic fertilizer. Some crops like ensete, coffee and barley are highly affected by different bacterial and fungal diseases. In the area, there is no seed multiplication center and trial plot. Hence, farmers rely on limited crops of local varieties, which are often low yielding. Fencing farm plots needs a lot of time, wood and production space. However, farmers continued to fence, since it is used as boundary mark as well as protect from damage by livestock and some wild animals.

Problems associated with livestock production are disease, lack of supply for additional feed and lack of improved breeds for dairy and beef. Veterinary clinic are not within reach for many Kebeles. Vaccination and disease surveillance are not sufficiently conducted to prevent disease.

12.4.4. Relevant management practices:

The main management objectives in agricultural lands are to: (1) increase productivity and production on existing areas under agriculture through better/ efficient utilization of inputs and management practices; (2) introduce high value crops production for income generation, and (3) increase income from livestock production by improving management practices and breeds.

The strategy with regard to agriculture is to increase productivity of land and income for the local community without expansion of agricultural land. This entails agricultural production intensification, using selected local varieties of crops and livestock adapted to the areas, provision of adequate inputs and heath services, creating market opportunities and access to credits, etc. Sustainability of the environment and improvement of local livelihood depends on successes of the agricultural sector. Agriculture in turn depends on the health of the surrounding natural environment, forest ecosystem and the whole landscape at large. The extension services in the area, should therefore be holistic, and focus on

educating the community about the interrelationships among the different components of the landscape and sustainable agricultural practices.

In order to achieve the management objectives and increase productivity and income from agriculture, the following activities are identified as relevant management practices:

- Promote application of organic fertilizer- since it can easily be produced in the area, and good for soil fertility management
- Liming to reduce soil acidity in areas where application of organic fertilizer is not possible
- Increase production of highly demanded cash crops
- Establish and promote cooperatives- for better inputs supply, access to credit and marketing
- On farm Action Research/ demonstration in each peasant association - to undertake adaptation trials of new crops and technologies
- Organize field day every year and demonstrate the technologies
- Use integrated disease and pest management: for ensete and coffee, recommended activities for disease prevention and control are use of disease tolerant varieties and destroying diseased plants, while use of traps is recommended to control animal pest
- Promote coffee production- by integrating it with management of disturbed forest and cultural sites.
- Introduction and production of valuable fruits like apple, pineapple, avocado, mango, papaya and banana
- Linking the producers to bigger regional markets in the area, Oromia and Gambella regions
- Value addition through processing and packaging of the products for longer shelf life.

12.5. Sacred sites

The cultural/ sacred sites refer to areas identified by the community for different rituals, religious and traditional ceremonies. They include, lowland forests (protected to prevent malaria), *gudo* (religeous ritual sites), *ceco* (wetlands), *dedo* site, *dero* (lake) sites, rivers

and lakes. Sacred groves (gudos) are the most obvious expressions of the sacred sites, as they are kept separate, with certain taboos surrounding them. Cultural sites also cover burial sites with trees: which is part of the Shaka tradition of preserving forests with traditional ecological and spiritual motivation. All cultural/ sacred sites include the practices of maintaining forest cover around them, since there is a belief that such sites should not be exposed or "naked". Except lowland forests, most cultural sites are close to settlements, and are relatively disturbed. These sites coincide with ecologically sensitive areas like steep slopes, water bodies and wetlands. The traditional practice of maintaining forest cover as buffer to such sensitive sites has parallelism with scientific ecological knowledge.

12.5.1. Characteristic species:

The sacred sites are similar in structure and functions to that of Afromontane rainforests. Sacred sites close to settlemennts can be a bit disturbed as compared to the natural forests far away from human disturbance. The characteristic species are a mixture of broadleaved tree species and include: *Pouteria adolfi-friederici*, *Syzygium guineense, Polyscias fulva, Olea welwitschii, Diospyros abyssinica, Manilkara butugi, Cordia africana, Trilepisium madagascariense Croton macrostachyus*, and *Schefflera abyssinica.* A discontinuous canopy of smaller trees (less than 10 m) include *Allophylus abyssinicus, Chionanthus mildbraedii, Clausena anisata, Coffea arabica, Deinbollia kilimandischarica, Ehretia cymosa, Galiniera saxifraga, Lepidotrichilia volkensii, Nuxia congesta, Oxyanthus speciosus, Pittosporum viridiflorum, Ritchiea albersii, Rothmannia urcelliformis, Teclea nobilis,* and *Vepris dainellii.* Natural coffee is one of the characteristic species in the understory. The shrub layer includes *Acanthus eminens, Dracaena fragrans, Lobelia giberroa, Senecio gigas, Cyathea manniana, Maytenus* spp., *Whitfieldia elongata* and others. The lianas and scrambling shrubs are numerous: *Landolphia buchananii*, *Jasminium abyssinicum*, *Hippocratea goetzei, Combretum paniculatum, Embelia schimperi, Dalbergia lacteal, Paullinia pinnata, Oncinotis tenuiloba*, *Tiliacora troupinii*, and *Hippocratea africana.* Epiphytes are very common and include *Canarina abyssinica, Scadox nutans, Peperomia tetraphylla*, *Asplenium sandersonii*, *Loxogramme lanceolata*, *Aerangis luteoalba*, *Arthropteris monocarpa*, *Asplenium spp.,* different orchids, mosses, and others. The ground-cover is also very rich and includes: *Dorstenia sorensenii,*

Elatostema orientale, Impatiens ethiopica, Thalictrum rhynchocarpum, and many others (Friis, 1992; Tadesse, 2003; Feyera, 2006).

In the Afromontane rainforest and transitional rainforest, animal species are varied and include a diverse range of invertebrates inhabiting all niches, from the soil to high forest canopies; and vertebrates, including amphibians, reptiles, birds and small and large mammals. A list of common forest mammals and birds species in the area is published in EWNHS (1996) and completed by field observations. This list includes: *Hystrix cristata* (porcupine), *Cercopithecus aethiops* (Chlorocebus), *Cercopithecus mitis* (blue monkey), *Cercopithecus neglectus* (De Brazza's monkey), *Papio anubis daguera* (baboon), *Colobus guereza* (*colobus monkey), Syncerus caffer (African buffalo), Tragelaphus scriptus* (bushbuck), *Redunca redunca* (Bohor reedbuck), *Tragelaphus strepsiceros* (greater kudu), *Sylvicapra grimmia* (common duiker), *Phacochoerus aethiopicus* (warthog), *Leptailurus serval* (serval), *Lycaon pictus* (wild hunting dog), *Potamochoerus larvatus Panthera leo* (lion), *Panthera pardus* (leopard), *Civettictis civetta (African civet), Genetta abyssinica (Abyssinian genet), Lepus fagani (Ethiopian hare), Orycteropus afer (aardvark), Viverrdae sanguineus* (shelmitmat), and many bats.

According to EWNHS (1996), the common bird species having conservation importance, either as endemics or Afromontane highland biome species, found in or around the proposed biosphere reserve include: *Oriolus monacha (*Abyssinian black-headed oriole), *Bucorvus abyssinicus* (Abyssinian ground hornbill), *Turdus piaggiae* (Abyssinian ground thrush), *Dendropicos abyssinicus* (Abyssinian woodpecker), *Alcippe abyssinica* (African hill babbler), *Lybius guifsobalito* (banded barbet), *Agapornis taranta* (black-winged lovebird), *Francolinus leucoscepus* (chestnut-naped francolin), *Nectarinia olivacea* (olive-bellied sunbird), *Rougetius rougetii* (Rouget's rail), *Apus myioptilus* (scarce swift), *Cinnyricinclus sharpei* (Sharpe's starling), *Cossypha niveicapilla* (snowy-headed robin chat), *Poeoptera stuhlmanni* (Stuhlmann's starling), *Tauraco ruspolii* (white-checked turaco), *Poicephalus flavifrons* (yellow-fronted parrot), *Bostrichia caruculata* (watttled ibis), *Cyanochen cyanoptera* (blue winged goose), *Parophasma galinieri* (Abyssinian cat bird), *Parus leuconutus* (white backed black tit), *Onchoganthus albirotris* (white-billed starling), and *Caruvus crassirostris* (thick-billed raven).

12.5.2. Important natural processes:

These forests are often located on steep slopes and ecologically fragile habitats. It is common to see tree fall gaps due to wind through or other natural causes of disturbance. These internal forest dynamics allowed the forest to develop and regenerate naturally through natural succession with varying age and size of trees and decaying wood of varying dimensions and in various states of decomposition. Diverse understory vegetation also makes use of light from the canopy gaps to regenerate and fill the forest gaps. Standing and fallen dead wood provides a range of habitats and promotes a variety of ecological processes in the forest. Similarly, fallen trees and dead biomass enrich the habitat for many epiphytes, arthropods and micro-organisms. It also houses natural pollinators, decomposers and seed dispersers, which play an important role ecosystem services.

12.5.3. Main human impacts:

Many cultural/sacred sites protected for centuries are being degraded due to cultural changes. Most converts to other religions do not have cultural values for the sites. Hence, there is a trend of converting sacred sites to other land uses in some areas, despite resistance from clan leaders. Besides, some forests that were given to investors included sacred sites and have been converted to tea and coffee plantations. Many people also extract timber, for local house constructions, and non-timber forest products like spices, honey, medicinal plants for household consumption and income generation. In some areas, the introduction of fast growing exotics like *Eucalyptus* spp., *Gravillea robusta* and several fruit trees is changing the landscape to some extent.

12.5.4. Relevant management practices:

The management objectives of sacred/ culltural sites are primarily to protect the areas for their ecosystem services, biodiversity conservation, economic, cultural and spiritual values. The traditional practices and value systems had a paramount impact on shaping perceptions towards natural resources and the way they are managed, based on traditional ecological knowledge (TEK). The TEK based on the belief system has parallelism with scientific ecological knowledge and recommended management practices. Hence, the management activities should support the TEK of cultural sites and resource management with scientific method, with due recognition and respect for the clan leaders and elders in

the community. The following are management activities/ actions are recommended for sacred/cultural sites:

- Protection of core areas as cultural/ sacred sites that have high ecological and spiritual values,
- Sustainable management of buffer areas, e.g., coffee production, bee keeping, etc
- Promotion of the culture and practices as tourist attraction and source of income
- Recognition of the roles of clan leaders and engagement in management decisions for cultural sites and communal land with Kebele administration.

12.6. Grazing land

Grazing lands are communally used areas for livestock grazing. It is often common to see scattered trees in grazing lands, some with even beehives on top. Grazing lands are relatively large open lands, and found close rivers or perennial water sources for cattle. Most households, however, keep their cattle on own fallow lands near homes. Compared to other land uses, grazing lands cover a very small proportion. Most are also not over grazed and hence of less concern for management.

12.6.1. Characteristic species:

The common vascular plant species that occurs in this habitat include *Digitaria abyssinica, Hyparrhenia cymbaria, Desmodium repandum, Trifolium* spp*., Oplismenus compositus, O. hirtellus, O. undulatifolius, Panicum calvum, P. Repens, P. ruspolii, P. Hochstetteri, P. maximum, Pennisetum clandestinum, P. ramosum, Poa leptoclad, Setaria atrata*, *Vernonia auriculifera, Mayentus spp., Acacia abyssinica,Abutilon longicuspe Ocimum urticifolium, Rubus* spp*., Rhus* spp*., Bersama abyssinica, Calpurna aurea* and others shrubs and small trees species mentioned in the other sections also.

The characteristic mammal species include *Cercopithecus mitis* (blue monkey), *Tragelaphus scriptus* (bushbuck), *Redunca redunca* (Bohor reedbuck), *Sylvicapra grimmia* (common duiker), *Phacochoerus aethiopicus* (warthog), *Lepus fagani* (Ethiopian hare), and *Viverrdae sanguineus* (shelmitmat).

According to EWNHS (1996), the characteristic bird species include: *Onchoganthus albirotris* (white-billed starling), *Caruvus crassirostris* (thick-billed raven), *Cinnyricinclus sharpei* (Sharpe's starling), *Bucorvus abyssinicus* (Abyssinian ground hornbill), and *Turdus piaggiae* (Abyssinian ground thrush), *Francolinus leucoscepus* (chestnut-naped francolin), *Onchoganthus albirotris* (white-billed starling), and *Poeoptera stuhlmanni* (Stuhlmann's starling).

12.6.2. Important natural processes:

When management intensity is reduced or ceases altogether, invasive species of herb dramatically increase in abundance and shrubs and trees regenerate. The disturbance-dependent vegetation that characterizes dry, sandy areas has been preserved by the trampling by cattle. Retarded or disturbed regeneration of forest vegetation is usually indicated by lower biomass, lower number of trees, especially forest species, and higher depletion of soil nutrients. There is increased erosion due to lower infiltration and higher runoff rates because there is lesser biomass available to protect pastures under higher stock density. More-or-less extensive flooding has a seasonal impact on grazing along the larger watercourses and wetlands.

12.6.3. Main human impacts:

Grazing lands, are important habitats for certain species. With increase in cattle and human population, however, these areas are affected in two ways: (1) over grazing by animals and (2) conversion to agricultural lands. In the later case, total conversion leads to loss of many grass land species and associated ecosystem service. Cattle also suffer from lack enough fodder and do not produce needed products like milk. In some cases, over grazing has led to soil erosion, and weed invasion.

12.6.4. Relevant management practices:

The management objectives of the grazing land is to improve the range conditions and management through institutionalization of ownership. Though there is less pressure on grazing lands, its sustainability is questionable with increases in human and cattle population. Grazing lands are communally owned. Under the current land certification (issued to dididividual househollds), certificates of ownership/use rights have not been issues to anyone. Hence, the management should ensure sustainability through regulated

grazing. For this, user groups have to be identified and agreements made with relevant government agency on sustainable management, and a communal ownership certificate issued to the group. Further, the following management actions are recommended:

- determine the carrying capacity of grazing lands and setup management rules
- regulate intensity of grazing and allocate quota for member HHs
- Integrate livestock production with other agricultural activities. This includes feeding livestock through cut & carry of grasses and fodder, and leftover of crops and vegetables.

12.7. Built-up area

Major built up areas in the proposed biosphere reserve are Masha, Gecha and Teppi towns. Masha is the capital of Sheka zone and Masha woreda, while Gecha and Teppi are the capital towns of Anderacha and Yeki woredas. Teppi is the biggest of all, followed by Masha and Gecha. Other small towns include Kubito, Gemadro, Yena and Chewaka. The character of these environments has generally been greatly modified by recent human activities and continued development. Hence, there are only a few areas where the original habitat and/or land cover remains intact. Public infrastructures such as churches, mosques, research centers, schools, university campus and clinics are found in the built-up areas.

12.7.1. Characteristic species:

The flora in built-up areas is characterized by introduced species and much of the vegetation has been planted, with a lesser proportion of naturally occurring plants. Vascular plants include *Mangifera indica* (mango), *Persea americana* (avocado), *Catha edulis* (chat), *Carica papaya* (papaya), *Musa acuminata* (banana), *Rhamnus prinoides* (gesho), *Ensete vetericosum* (Ensete), *Spathodea campanulata* (African flame tree), different eucalyptus species, and some indigenous tree species. The characteristic animals are mainly domesticated, including cattle, sheep, goats, dogs and cats, with occasional visitors like colobus monkey, and several bird species.

12.7.2. Important natural processes:

The natural processes that occur in built-up areas are human induced land use/land cover dynamics, with varying degrees of disturbance.

12.7.3. Main human impacts:

The major impacts in these areas are solid wastes and other human induced pollution. In addition, land cut and fill, related to construction, changes the landscape. Built-up areas may also pose pressure on surrounding habitats through the increasing demand for construction and fuel wood, leading to deforestation, wetland degradation, and water abstraction.

12.5.4. Relevant management practices:

For built-up areas, like towns, proper planning and implementation of the management plan should solve most problems related urbanization. Organic wastes composting for fertilizing land is a relevant management practice. In order to minimize the impacts on forests, establishment of woodland plots and small forest tree plantations for fuel and construction wood is a timely management measure.

13. CONSERVATION FUNCTION

13.1.Contribution to the conservation of landscape and ecosystem biodiversity

The proposed Sheka Forest Biosphere Reserve area comprises an extraordinary natural and cultural landscape mosaic of dense natural forest, sacred/cultural forest, managed forests for coffee and beekeeping, bamboo thicket, wetlands, agricultural land, historical sites, natural landmarks like waterfalls, caves, interspersed with settlements. These landscape elements or habitat types contribute to the conservation of biodiversity, unique to such mosaic landscapes and ecosystems. These landscape/ecosystem parts have their own uniqueness and internal characteristics in composition and structure, which adds value to biodiversity conservation. The establishment of the proposed biosphere reserve will set rules to maintain the balance of the proportion of these landscape elements, through management guidelines and implementation.

Natural and cultural landscape elements with high value for conservation in the area include the following:

- A natural, undisturbed forest ecosystem

- Sacred/cultural forests
- Managed forests (for beekeeping and coffee production system)
- Bamboo thickets
- Valleys, gorges and ravines along major rivers
- Woodlands, bush lands
- Wetlands and swamps
- Grazing lands
- Agricultural land
- Settlement and urban areas

Each of these landscape elements and their conservation values are presented in the following section.

Undisturbed forest ecosystem

The undisturbed forest represents intact Afromontane rainforest, and upper parts of the transitional rainforest, in Ethiopia. It is part of an important ecoregion, which has global importance for the conservation of biodiversity, i.e. the Eastern Afromontane Biodiversity Hotspot. The Afromontane forest ecosystems in general, and parts in Ethiopia in particular, are considered as the most threatened ecosystem in Africa. Due to its rugged topography, the forest landscape varies greatly. It provides several free ecosystem services of local and regional importance. In the proposed biosphere reserve this part of the landscape is the most important part for biodiversity conservation.

Managed forest (beekeeping and coffee production system)

Most of the managed forest areas are kobo lands individually owned (customary tenure) for beekeeping. Kobo forest lands are as intact as the undisturbed forests, with little impact related to a one or two times honey collection from sparsely distributed traditional beehive throughout the forest. The kobo forestlands represent the largest proportion of forests in

the area and plays a significant role for conservation and provision of various ecosystem services.

The other managed forest represents those managed for coffee production. Its floristic composition is similar to the undisturbed forests and kobo forests. However, the vegetation structure is reduced to two layers, i.e., the canopy layer of shade trees and the lower stratum of coffee. Shrubs, lianas, small trees, ground vegetation and some canopy trees are cleared to enhance coffee production. Management of includes weeding two to three times per year, and initial planting of coffee seedlings. This coffee production system is the closest to natural coffee forests, and has a high value for conservation of biodiversity. It serves as a habitat for many plant species including epiphytes, birds and other animals. Underneath the coffee bushes spices such as correrima and black pepper are often produced.

Bamboo thickets

Bamboo thicket (*Arundinaria alpina*) occurs on the highland plateau. It exists almost as pure stands in clumps at elevations above 2300 m; sometimes descending down to 2000 meters. The bamboo thicks also occur along with highland wetlands. Though dominated by *A. alpina,* it is rich in species of plants, especially herbaceous plants at ground level. It has various ecosystem services like watershed protection, climate change mitigation, regulation of hydrological cycle, erosiopn control and the like. It represents unique ecosystem and plays an important role for conservation of biodiversity at different levels..

Valleys, gorges and ravines along rivers

These parts of the forest are characterized by steep slopes, deep gorges and ravines, occasionally interspaced with flat areas. On steep slopes, this habitat type is mainly dominated by lianas, natural tree-fall gaps and secondary succession in the tree-fall gaps. On gentle to flat slopes, it is characterized by very tall trees with closed canopy. Because of its difficult terrain, this part of the forest is the least affected by humans. Floristically, it is very diverse and is dominated by transitional rainforest and lowland forest species.

Tree-fall gaps are common due to the presence of many steep slopes. Trees naturally fall due to wind throw. Dead and decomposing wood creates special micro-habitat for many species of decomposers and other life forms adapted to such environments. Many

secondary succession species invade these gaps. This is a dynamic ecosystem, with high biodiversity due to the presence of forest vegetation at different stages of natural succession. This type of forest ecosystem is found at altitudes between 1100 and 1600 m, along the courses of Baro, Beko, Genji, Godere, and Guracha rivers.

Woodlands/ bushlands

This includes natural woodland/bushland, with small trees on shallow soils; or degraded forest margins. Such areas are covered with open stands of bushes, usually 3 to 7 m tall, with canopy cover of at least 40% cover, and an open stand of wood at least 8 m tall and with 40% canopy cover. The field layer is dominated by grasses of the savannah formation type. Natural woodlands on shallow soils are mostly found at lower altitudes, in the western part of the proposed biosphere reserve bordering Gambella region.

Such cover types are rich in small trees of the open country type and grasses, and has important economic value as range-land for local communities. In some cases such areas are converted to either agricultural land by clear cutting, or to coffee plantation by planting coffee and shade trees.

Wetlands and swamps

These landscape elements are wetlands of herbaceous freshwater swamps and marshy aquatic vegetation, although some interaction with the surrounding terrestrial areas may occur. For the sake of simplicity, it is possible to classify swamps as waterlogged sites dominated mainly by woody vegetation while marshes are waterlogged sites dominated by herbaceous vegetation; this cover type is known locally by Ceco and is mainly protected by the local community for ecosystem services and grass harvesting during the dry season. Wetlands and marshy areas are always surrounded by buffer zones covered by forest vegetation to protect them from degradation.

Grazing lands

In Sheka area, grazing lands are found in every Kebele and majaor villages. Grazing lands are communally managed. Scattered trees of different species similar to the surrounding forest vegetation are common. Major grass species are *Cynodon dactylon* and *Andropogon abyssinica* grassland. It has a high value for conservation of plants found in human dominated landscapes. In addition, it is an important cultural landscape element

useful for livestock production in the area. Parts of its diversity also can be attributed to human intervention, through livestock grazing and grass cutting for roof thatching in house construction.

Agricultural land

This part includes farmlands under annual and perennial crop production, coffee plantations, tea plantation, old-semi-forests or forest gardens, home gardens and woodlots between farms. It is of value for the conservation of agro-biodiversity and cultural landscapes, particularly for crop plants, and livestock and traditional spices landraces in home gardens. Different cultural coffee, honey, spice, and food crop production (especially Ensete) activities are practiced in the area by the local community and settlers from other parts of the country. This has contributed to the conservation of a wide natural and agro-biodiversity within this landscape. Scattered trees in these agricultural lands are important for many animal and plant species. They also add to the scenery of the agricultural landscape. In addition, the agricultural landscape also supports many land races, or farmers varieties, for different cultivated crops.

Settlement and urban areas

Within the proposed biosphere reserve the important elements of the rural settlement areas and towns are the diverse home gardens of annual and perennial plants, live fences, woodlots, church forests and other cultural and public sites. Like agricultural lands, this area is predominantly important for the conservation of agro-biodiversity. However, many exotic plants and newly introduced useful plants are found in these areas, too. The cultural backgrounds of urban dwellers and settlers add value to the diversity of the cultural landscape of the area.

Natural caves and Waterfalls

There are several natural caves and waterfalls in the proposed biosphere reserve. Around 37 natural caves and 67 waterfalls have been identified and mapped by the local community and department of Culture and Tourism with the support of MELCA-Ethiopia. These caves are important homes and habitats for many wild animals, especially bats,

nightjars and swifts. They were also used by people during periods of war. These caves may have historical importance and deserve further studies. The waterfalls contribute to the scenic beauty of the landscape. In addition, many life forms associated with cliffs and fast moving waters, especially birds occur in these areas. In general, both waterfalls and caves add to the complexity and diversity of the landscapes and ecosystems, and the scenic beauty. They have high potential for future tourism development.

Figure13. Shesheko fall in Masha woreda

13.2 Conservation of species biodiversity

The proposed biosphere reserve provides critical habitat of sufficient size to promote the conservation of species diversity. The area is characterized by high species diversity. There are over 300 higher plant, 50 mammal, 30 bird, and 20 amphibian species in the proposed biosphere reserve. There are over 55 endemic species of plants, birds and

mammals. The threatened species (INCN Red list) includes around 65 species, including four birds, two mammals and 58 plant species. The forest is part of a National Forest Priority Area, and an important bird area (IBA), for Ethiopia. It is also part of the Eastern Afromontane Biodiversity Hotspot, Center of Plant diversity as well as center of crop plants origin.

From the perspective of species diversity conservation, the area accomodates different categories of species with high conservation priority:

- Internationally threatened species
- Nationally threatened species (some taxa, especially plants, require further study)
- Ethiopian endemic species
- Afromontane endemic species (plants)
- Afromontane highland biome restricted species (birds)
- Crop plant species with their center of origin or diversity in Ethiopia

Vascular plant

International red-listed species

The proposed biosphere reserve area harbours at least 55 red-listed endemic flowering plants of Ethiopia (Vivero et al. 2005, 2006). These include *Acalypha marissima, Acanthus sennii, Aframomum corrorima, A. zambesianicum, Amorphophallus gallaensis, Ascolepis eriocauloides, Bothriocline schimperi, Berkheya chiesiana, Brillantaisia grottanelii, Ceropegia recurvata, Ceropegia sobolifera, Crotalaria agatiflora, Crotalaria exaltata, Crotalaria gillettii, Crotalaria intonsa, Crotalaria rosenii, Cussonia ostinii, Cyperus bifolius, Cyphostemma pannosum, Dombeya aethiopica, Dombeya kefaensis, Dorstenia soerensenii, Echinops longisetus, Eriosema scioanum, Erythrina brucei, Eulopia albobrumea, Impatiens rothii, Justicia bizuneshiae, Justicia diclipteroides, Laggera tomentosa, Liparis abyssinica, Millettia ferruginea, Pentas concinna, Phyllanthus dewildiorum, Phyllanthus limmuensis, Pilea bambuseti, Pimpinella heywoodii, Plumbago truncata, Polyscias farinosa, Polystachya caduca, Polystachya rivae, Pycnostachys abyssinica, Pycnostachys recurvata, Rinorea friisii, Satureja paradoxa, Scadoxus nutans, Senecio myriocephalus, Sesbania melanocaulis, Solanecio gigas, Tiliacora troupinii, Trachycalymma minutiflorum, Trifolium calocephalum, Trifolium mattirolianum, Vepris*

dainellii, Vernonia gilbertii Vernonia leopoldi, Vernonia rueppellii and *Prunus africana* (non-endemic). A large number of red-listed endemic plant species are extremely important for the biodiversity of the area. This may be because other organisms depend directly on them; alternatively, they may play an indirect role in the ecosystem by having highly specialized habitat requirements; or, because of their sensitivity to change, they act as indicators of ecosystem function and health.

Nationally red-listed species

The proposed biosphere reserve area supports many vascular plant species that are nationally considered as threatened species. Because of the level of the threat, four tree species are legally protected; the use of these species is restricted to specific purposes (Proclamation 542/2007 and the amended-94/1994). The species are: *Cordia africana*, *Pouteria adolfi-friederici, Podocarpus falcatus,* and *Hagenia abyssinica*. The first two species occur in the proposed biosphere reserve area. In addition to these two, many tree species occurring in the proposed biosphere reserve are also nationally recognized as threatened species because of overuse or exploitation. Some of these species include: *Acacia abyssinica*, *Antiaris toxicaria*, *Milicia excelsa, Morus mesozygia*, *Manilkara butugi*, *Pouteria altissima* and *Trilepisium madagascariense.* The data sources for the above information are based on records from the National Herbarium, Addis Ababa, Ethiopia. These tree species warrant conservation within the proposed biosphere reserve since they are already at risk and becoming rare nationally. More importantly, most Afromontane rainforest species are rare and restricted in their distribution range, and often have a low frequency of occupancy (Tadesse 2007).

Afromontane endemic/ near-endemic trees

Afromontane endemic trees are those trees restricted to the Afromontane eco-region, while near-endemics are trees primarily restricted to the region, with some extension into other eco-regions in Africa and its surrounding islands. Quite a large number of species fall under these categories. Some of these include: *Albizia grandibracteata, A. gummifera*, *Apodytes dimidiata, Bersama abyssinica, Breonadia salicina*, *Brucea antidysenterica*, *Canthium oligocarpum, Cassipourea malosana, Celtis africana, Coffea arabica, Cordia africana, Croton macrostachyus, Dracaena steudneri, Elaeodendron buchananii*, *Eugenia bukobensis, Euphorbia ampliphylla, Galiniera saxifraga, Macaranga capensis* var.

kilimandscharica, Maytenus arbutifolia, Mimusops kummel, *Olea capensis, Oxyanthus speciosus* subsp. *stenocarpus*, *Pittosporum viridiflorum*, *Podocarpus falcatus*, *Polyscias fulva*, *Prunus africana*, *Psychotria orophila*, *Psydrax parviflora*, *Rhus quartiniana, Ritchiea albersii, Schefflera abyssinica*, *Senna petersiana, Teclea noblis*, *Trichilia dregeana* and *Vepris dainelli*

Ethiopian endemic plants

There are 55 Ethiopian endemic plant species recorded in the area. Some of these include: *Canarina abyssinica, Cussonia ostinii, Dombeya kefaensis, Dorstenia soerensenii, Rinorea friisii, Scadoxus nutans, and Tiliacora troupinii*. For some of these endemics the forest habitat in Afromontane eco-region is critical for their conservation.

Crop plant species with their center of origin or diversity in Ethiopia

The Sheka area is the center of origin and diversity for Ensete (*Ensete ventricosum*), an important staple food crop in southern Ethiopia. Some parts of the forest also harbor the wild gene pool Arabica coffee. In addition, many cereals have their center of diversity in Ethiopia, and many of these are cultivated in the proposed biosphere reserve area. These include: *Brassica carinata, Brassica nigra, Brassica oleracea, Capsicum annum, Cicer arietinum, Coccinia abyssinica, Colocasia antiquarum, Coriandrum sativum, Cucurbita pepo, Dioscoria bulbifera, Eleusine coracana, Eragrostis tef, Hordeum vulgare, Linum usitatissimum, Lycopersicon esculatum, Nigella sativa, Ocimum basilicum, Pimpnella anisum, Piper capense, Plectranthus edulis, Ruta chalepensis var. tenuifolia,* and *Saccharum officinarum, Sorghum bicolor* and *Vicia faba.*

Mammals

Internationally red-listed species

The proposed biosphere reserve contains one globally red-listed mammal species: *Panthera pardus* (leopard). The species has been displaced in many areas, and is very much further threatened because of growing habitat fragmentation.

Nationally red-listed species

Additionally, there are also nationally and/or locally threatened mammal species, which are under threat due to habitat fragmentation and killings: *Hystrix cristata* (porcupine), *Orycteropus afer* (aardvark), *Genetta abyssinica* (Ethiopian genet), and *Civettictis civetta (*African civet). The establishment of this proposed Sheka forest biosphere reserve will safeguard the red-listed species and other associated species in the area.

Birds

Two globally red-listed bird species occur in the proposed biosphere reserve; these are: *Rougetius rougetii* (Rouget's rail), and *Bugeranus carunculatus* (Crowned Crane). The area is one of the most important sites for the conservation of these threatened bird species, and other associated species, in the region and in Ethiopia.

Endemic birds of Ethiopia recorded in the proposes biosphere reserve are: *Bostrychia carunculata* (wattled ibis), *Ruogetius rougetii* (Rouget's rail), *Columba albitorques* (white-collared pigeon), *Agapornis taranta* (black-winged lovebird), *Poicephalus flavifrons* (yellow-fronted parrot), *Lybius undatus* (banded barbet), *Dendropicos abyssinicus* (Abyssinian woodpecker), *Macronyx flavicollis* (Abyssinian longclaw), *Melaenornis chocolatinus* (Abyssinian slaty flycatcher), *Parphasma galinieri* (Abyssinian catbird), *Oriolus monacha* (Black-headed forest oriole) and *Corvus crassirostris* (thick-billed raven).

The area is also important for the conservation of the Afrotropical Highland Biome (HB) restricted bird species. There are around 32 species of a total 48 HB birds species in Ethiopia (62.5%). The list of HB species is marked in the checklist of birds for the area (see Appendix 7).

Other species

Although the data recording is not yet complete there are findings which show the presence of many endemic (and probably red-listed) species of fish, reptiles and amphibians in the proposed biosphere reserve area.

13.3. Conservation of genetic biodiversity:

The area is important for the conservation of the genetic diversity of many useful plants, and most notably ensete (*Ensete ventricosum*), Arabica coffee (*Coffea arabica*), Oromo dinich (*Plectranthus edulis*), Anchote (*Coccinia abyssinica*) and yam (*Dioscoria bulbifera*). Other crop plants with locally cultivate land races include *Brassica carinata, Brassica nigra, Brassica oleracea, Capsicum annum, Cicer arietinum, Coccinia abyssinica, Colocasia antiquarum, Coriandrum sativum, Cucurbita pepo, Eleusine coracana, Eragrostis tef, Hordeum vulgare, Linum usitatissimum, Lycopersicon esculatum, Nigella sativa, Ocimum basilicum, Pimpnella anisum, Piper capense, Plectranthus edulis, Ruta chalepensis var. tenuifolia,* and *Saccharum officinarum, Sorghum bicolor* and *Vicia faba.* Besides, there are also many species here that are used as traditional medicines and wild food, available in both the wild and human dominated parts of the landscape in the area.

Of all genetic resources in the area, the case of ensete deserves elaboration in more detail. Ensete is one of the major staple food crops in Ethiopia. It feeds close to over 18 million people. Though the wild plant occurs in many parts of Africa, it is cultivated as food crop in Ethiopia, where it has been domesticated. As it is well known, Ethiopia is one of the 12 centers of crop origin in the world, and per haps the third most important after China and India. The wild populations of Ensete occur in the forests of Sheka. Cultivated ensete might have been domesticated in this region. Today, it is cultivated in most parts of southern and south-western Ethiopia. The cultivated ensete is adapted to wide ecological range, growing in very humid parts like Sheka and drier areas in the central and rift valley area. It is considered as drought tolerant and plays important roles in food security.

14. DEVELOPMENT FUNCTION

14.1. Potential for fostering economic and human development which is socio-culturally and ecologically sustainable:

Various factors contribute to the potential of the area to promote economic and social development that is socio-culturally and ecologically sustainable, and which therefore makes the area appropriate as a pilot site for the region. The proposed biosphere reserve is an area that possesses great natural and cultural values both from a national and an

international perspective. At the same time, the area is endowed with diverse biological resources (Tadesse 2007; Tadesse and Dereje 2007; Tadesse et al. 2011). Tapping these resources by improving agricultural development and creating alternative incomes is an important precondition for conservation. The establishment of the biosphere reserve is an additional incentive to invest in the area. In general, the potential of the area to serve as a pilot site for promoting sustainable development in the region can be attributed to many natural and human intervention activities. These include: its agro-ecological location and natural resources, existing development interventions by different stakeholders, and market promotion by cooperatives.

1. It is an agro-ecology high rainfall area in the country, with high productivity
2. Major coffee and tea growing area in plantation
3. Ongoing and planned development activities by government agencies and enterprises
4. Ongoing projects by NGOs
5. Ongoing and planned activities by research organizations
6. Interventions of farmers primary cooperative

Location and natural resources

From the agro-ecology perspective, Sheka is a high rainfall area and is found at mid-altitude, which makes it suitable for major agricultural development. It has high potential for food crops, vegetables and fruit production. The area is one of the few food self-sufficient areas in the country, where food aid is not known to the local community. There is also plenty of water for irrigation during dry season.

The diverse ecosystems and mosaic landscape of the area, natural caves, waterfalls and historical sites make it attractive to visitors, and there is the potential to generate additional income for local inhabitants. For landscape eco-tourism development, there is a lack of infrastructure, like lodges, good roads, site profiles and trained tourist guides. Currently, a highway connecting Ethiopia with southern Sudan is under construction. Such developments have the potential to attract private investors in the hotel and hospitality businesses.

The area is one of the major producers of honey, spices and in the country. Honey production is a highly praised traditional practice which also helped the conservation of forest biodiversity. Currently, honey from the area is being processed and sold on local and international markets. Establishment of a biosphere reserve in the area can create better market for honey and other local products, and thereby contribute the improvement of the livelihood of the local community.

Development interventions by different stakeholders

The regional government, NGOs, and partner research institutions have several ongoing development activities, adding up to the potential of the area. The area has already been identified as a priority area for honey, spices and coffee production by the government, and production is set to double in five years.

This will be achieved through sustainable forest management, improved beekeeping practices, improved coffee stands management and planting of coffee and shade trees in the transition areas. This will also have conservation value due to its contribution to buffer zone expansion. Agricultural extension in the area promotes diverse vegetable and fruits production, which will contribute to nutrition and income diversification.

NGOs and research organizations play an important role in knowledge generation and dissemination of information and lesson from good practices. MELCA-Ethiopia, Sheka Development Association and Ethio-Wetlands and Natural Resources Association (EWNRA) are active in applied research and development in the area. MELCA-Ethiopia focuses on sustainable resources management and conservation of cultural biodiversity. MELCA-ETHIOPIA is also engaged in household income diversification through introduction of improved and sustainable production technologies. Sheka Development Association is engaged in capacity building and infrastructure development, while EWNRA is engaged in non-timber forest products research and development, especially honey. EWNRA is also egaged in sustainable natural resources management through implementation of participatory forest management (PFM).

Education, research and information

Three universities and four technical-vocational education and training (TVET) colleges are located close to the proposed biosphere reserve area. The three Universities are Mizan-

Teppi, Maettu and Jimma. The four TVET colleges are mainy in Masha, Teppi, Mizan-Aman and Bonga towns. One of the main campuses of Mizan-Teppi University is located witin the proposed biosphere reserve. The universities offer courses in biology, natural resource management, agriculture, technology, social sciences, landscape planning and watershed management, nature conservation, and health science. A number of these colleges and universities offer forestry, biology, natural resources, and related courses and are expected to visit the site for combined theoretical and practical experience in the courses they offer. Jimma University has a special curriculum, including programmes in: community based training, development of team training, and community based education, which require students to conduct group practical exercises and studies whilst living within the community.

Since 2005, MELCA-Ethiopia has been conducting studies on forest cover changes and associated changes in biodiversity and culture; organized capacity building training for community members, clan leaders, environmentalists, local authorities and justice bodies, youth and minority groups on environmental issues and sustainable resources management.

Education is investment and hence important for sustainable development. In order to bring sustainable impacts on conservation and use of forest biodiversity in the biosphere reserve area and elsewhere in the country there is a need to establish a conservation education and research centre. Sheka will collaborate with Yayu and Kafa biosphere reserves on mainstreaming education and research in the biosphere reserve management. Sheka will also share its experiences in inter-generational knowledge transfer being implemented by MELCA-Ethiopia'a SEGNI program.

Potential activities in the core area and buffer zones of the reserve

The core areas and buffer zones are forest areas within the biosphere reserve. In these zones, an operational approach of conservation and careful utilization is demonstrated by concrete examples: marketing certified coffee, and honey and spice production. These projects serve as an example of our operational approach to future themes in the biosphere reserve, for instance in forest environments.

Honey, Coffee and Spices Quality Improvement and Marketing: Ethiopia is considered as a potential giant for honey production in Africa due to its diverse habitat and flora. The forest areas in the southwest, especially in Sheka and Kaffa are also well known for their honey production. In these regions both the traditional skills and forest resources for bee forage are available. The areas can also be considered as free of pesticides and other agrochemical (Hartmann 2004). With improved management, there is a great potential for quality honey production in the region**.** Similarly**,** there is a demand for high quality Arabica coffee and also for specialty coffee. Ethiopia, being a producer of diverse types of Arabica coffee, has a great opportunity to take hold of this growing demand. In the proposed biosphere reserve area, coffee is produced by smallholder farmers as well as large private and state-owned companies. The improvement and development of the global market for Arabica coffee requires the production of good quality coffee. The traditional methods of processing coffee cherries often produce poor quality coffee, which lacks flavour and aroma (cup quality). Traditionally, coffee cherries are dried on the ground and hence the natural inherent quality of coffee is negatively affected. Prices for coffee produced by these methods are inevitably low and limit the income of smallholder farmers. Improving processing and marketing can easily triple coffee prices for the producers. With sustainable management of the buffer zone, coffee production can also be doubleed in short time.

Ethiopia, especially the mountain forest region in SW, has a great potential for spices production. Korerima, a potential substitute for the Indian cardamom, is endemic to the rainforests of the SW region. The species can easily be propagated from rhizomes and seeds. Micropropagation for mass production of seedling from good quality plants is also being developed (Wondyifraw 2004). The adaptation of korerima to a wider ecological range and its higher productivity (up to 5-fold) also makes the species a potential crop that deserves development.

Long pepper (Piper capense) can also be a substitute to black pepper. The forests in the study area (and most of the highland forests of the SW) are the natural habitat of the species. Its propagation is easily possible from seed. It does not need support like other Piper species, and has short stems for ease of management and harvesting. It can also be planted in larger density, and hence produce higher yield. Other Piper species cannot be denser than the shade and support trees, on which they depend.

Ecotourism

Ecotourism can contribute toward biodiversity conservation and livelihood improvement, if it is designed and managed properly. The proposed biosphere reserve offers excellent natural and cultural attractions for developing ecotourism. Potential tourist attractions include waterfalls, several caves in the core areas along river valleys, wild animals like colobus monkey, forest birds, traditional coffee management practices, diverse plant species, and cultural and sacred sites like *dedo, ceco, gudo,* burrial sites and *kobo* forests. Examples of potential activities include guided nature tours and guided cultural tours. Awareness creation for ecotourism has to be made, and the need to provide support for those involved in this venture is crucial. The provision of logistic support, know-how and ideas are key elements in this endeavourer.

Potential activities in the transition area

The transition area consists largely of agricultural land, forest fragments and built-up areas. In this area, there is a great potential for promoting sustainable development through agriculture, forestry and beekeeping.

Agriculture

The proposed biosphere reserve includes the main agricultural activities of the region and the cultivation of ensete, coffee, fruits, tuber crops, and pulses, oil and cereal crops, often in combination with the rearing of livestock. However, some of the cultivated crops need improved varieties to increase productivity; introduction of improved varieties of some crops, such as beans, are highly important for domestic consumption and for marketing. More importantly, cattle kept for milk and beef production in the area is a good opportunity to enhance the income of the farmers. Fattening is very important and farmers can be advised to orient the livestock management system toward this. In addition to the above, the area is also well suited for fruit and vegetable production as well as beekeeping. There is huge potential for planting economically important fruit trees on degraded forestlands and in homegardens. A number of farmers are already involved in these activities. With the growing demand for high quality food, particularly in the urban centers, this is a good opportunity to enhance the livelihoods of local communities. In this regard, the Oromiya

Forestry and Wildlife Enterprise - Illubabor Branch is planning to become a business partner for agricultural products produced by the local communities within the proposed biosphere reserve.

The area is a priority region for honey, spices coffee production. Hence, the department of Agriculture of Sheka zone and Offices at different districts in the proposed biosphere reserve have been and are still producing coffee and shade trees seedlings every year, and giving them to farmers to increase coffee production from the area. They are also introducing transitional and modern beehives to improve quality and quantity of honey produced in the area. In collaboration with research institutions and NGOs, the department is also introducing new and high yield local varities of spices.

Apiculture/Beekeeping

The Department of Agriculture (DoA), MELCA-Ethiopia and EWNRA are also assisting farmers by introducing modern beehives and beekeeping methods. The development agencies provide transitional and modern beehives and train farmers on how to manage and handle these modern hives. This initiative has considerable potential, since bees also play an important role in the pollination of coffee, which increases coffee yield significantly.

Spices production

The proposed biosphere reserve area is well-known for its diverse spice production. In this regard, there is a need to improve production, processing and marketing of spices by providing appropriate training for farmers. This can improve the income of rural households and reduce poverty through income diversification.

Forestry

Since it is a hot and high rainfall area, the area has high rate of primary productivity. Plants grow fast. It is also suitable for growth several species. Hence, it has high potential for commercial forestry.

Opportunities for future biosphere reserve projects

Sheka forest and the surrounding areas important for honey, spices and coffee production in Ethiopia. Many of the biological values in the central areas of the proposed biosphere reserve are related to the cultural landscape that has been characterized by centuries of

cultivation and livestock farming. Preserving these values requires a strong agricultural sector with a market for it products.

Hence, the aims of improving coffee, spices, honey and agriculture production to preserve the region's biological values and to incorporate these in the various projects that can be undertaken within the proposed biosphere reserve in order to promote development is crucial. Some steps have already been taken; others remain to be made.

- ***Forest coffee.*** Improving awareness of the link between biodiversity and coffee production by labelling coffee. The continually increasing use of forest coffee from the forest (buffer zone and transition area) can create the right conditions for profitable coffee production and therefore the conservation of biodiversity in core areas.
- ***Agriculture.*** One challenge is to find new uses for farmland that enable ecological value and the values of the cultural landscape to coexist alongside social values in a way that it is as economically viable as possible (for example, organic farming and alternative crops). Another challenge is to work with farmers, with the support of research organizations, to develop new agricultural techniques that can be used to improve production and productivity of the land. Organic agriculture has great potential in the area. There is little chemical fertilizer input in the area, and even this can be replaced by compost prepared from coffee husk. Normally, coffee husk it burned at the processing stations. However, it can be converted to useful organic fertilized through composting.
- ***Development of rural communities***. The need to transform rural settlements is one of the challenges the management units need to consider in the area. The rural communities need schools, clinics, roads, electricity, and the like. **Government** is providing much of this infrastructure in villages with many inhabitants. However, electricity, tap water and access roads are not adequately available. In various discussions, community members continuously request these services. The role of the biosphere reserve is, for example, to help devise activities related to ecotourism and to attract entrepreneurs and other stakeholders who are interested in providing such services and infrastructure.

- ***Enhance tourism.*** In recent years, forests in the SW are becoming destinations of many tourists interested in nature. The existence of many natural caves, waterfalls, rivers and other features in the area can be used to create attractions**.**
- ***Identify ecosystem services.*** The natural ecosystem provides us with a range of what is known as "ecosystem services". Examples include carbon sequestration, climate regulation, clean water, pollinating insects, wetlands that serve as natural water purification plants and water level regulators, and any number of other natural processes. The important challenge is to identify these ecosystem services in order to understand the need to conserve them and perhaps rehabilitate those that have disappeared or are on the verge of doing so.

14.2. If tourism is a major activity:

- how many visitors come to the proposed Biosphere Reserve each year?
- is there a trend towards increasing numbers of visitors? (Give some figures if possible)

Although there is a great potential for tourism in the proposed biosphere reserve area, so far this has hardly been exploited and little tourism infrastructure is in place.

14.2.1. Type(s) of tourism

A wide variety of tourism opportunities have potential to attract tourists to the area and the surrounding region. Some of these include:

- Natural resources (flora, fauna, vegetation, waterfalls, caves)
- Cultural resources (religious sites, sacred sites)
- Historical resources (historical sites, burrial places)
- Archaeological resources
- Geological resources
- Scenic foot paths, climbing
- Fishing

14.2.2. Tourist facilities and description of where these are located and in which zone of the proposed biosphere reserve:

At the moment, there are no tourist facilities in the area as tourism is not well developed.

14.2.3. Indicate positive and/or negative impacts of tourism at present or foreseen:

Possible positive foreseen effects of tourism include the economic benefits that tourism brings to the area. Because of tourism, local communities can be involved and as a result can generate income sources through this activity. Moreover, nature tourism can promotes greater awareness and insight into conservation. This knowledge and the changes in attitudes that it inspires foster the right kind of conditions for increased local involvement. Tourism also improves the conditions for sustainable development through promoting fruitful collaboration between conservation, commercial and voluntary interests. Focusing on the unique natural features of an area provides a more solid platform from which to highlight the strengths of a rural community and increases the community's positive exposure to nearby built-up areas. Tourism also helps to inspire and consolidate new forms of partnership between public, private and commercial interests, as well as generating increased participation from regional authorities and organizations.

Negative forseen effects of tourism include the risk of over-exploitation and degradation of the environments and, the disturbance of sensitive flora and fauna. Measures will be taken within the proposed biosphere reserve to direct visitors towards less sensitive areas by using posters and paths

14.3. Benefits of economic activities to local people:

Agriculture

Agriculture is the main means of livelihood in the area. The community members are the prime beneficiaries from agriculture related developments by different stakeholders such as honey and coffee quality improvement through processing, marketing through branding and as certified products. And through cooperative union, diversification of income sources through modern beekeeping, fruits, spices and vegetable production, improved food crops production, forest plantations, and soil and water conservation. For instance, in Tanzania TechnoServe has discovered that quality improvement, couple with specialty marketing of

coffee could help farmers to get premium prices of 150% higher than other coffee growers in Tanzania (TechnoServe, 2008).

Services sector

The area was once considered remote, with little access to education, health and transport facilities. The last two decades have seen tremendous improvements due to development interventions of he government. Schools and clinics are now found in all towns and major settlement areas. Basic health care services are accessible to most villages, being located within walking distance. The road network has opened up markets for local products. Tens of thousands of community members have benefited from these services.

Ecotourism

Tourism is quite underdeveloped in the area. If its potential can be exploited through promotion and infrastructure development, it can benefit the local community and private sectors, through the creation of jobs as tour guides, in small businesses, as services providers and accommodation/ lodges.

15. LOGISTIC SUPPORT FUNCTION

15.1. Research and monitoring

In the 1970s, 1980s and 1990s, several independent studies on the biodiversity of the forest vegetation and wetlands were conducted by different individuals and institutions (Chaffey 1979; Friis 1979, 1983, 1992). A coordinated and multi-disciplinary study on the forest resources, institutions and social changes, and economic values was conducted by MELCA-Ethiopia recently (Aseffa 2007; Bedru 2007; Dereje and Tadesse 2007; Mellese and Mohammed 2007; Tadesse 2007; Tadesse and Masresha 2007; Zewdie 2007). The study has documented the diversity and economic value of the Sheka forests, changes in forest cover, biodiversity and social values, as well as legal and institutional changes over the past few decades. Based on the study, and additional practice researches, land use management plan of Masha was prepared in 2010 and agreement was reached by the community and local authorities to manage the whole Sheka zone as UNESCO biosphere reserve (Tadesse et al. 2011; Minutes of the Sheka zone and woreda meetings).

Environmental monitoring began relatively recently. In the 1980s the Sheka Forest was designated as one of the 58 National Forest Priority Areas within Ethiopia. Since the early 1980s, regular monitoring has been conducted, particularly for forest cover changes (Reusing 1998), forest conditions assessment and woody biomass (WBSPP, 2004). Recently, forest cover changes were assessed over the last decade (Bedru 2007) and participatory eco-mapping activities carried out as a bases for further monitoring works by the community (MELCA Mahiber 2010).

15.1.1. To what extent has the past and planned research and monitoring programme been designed to address specific management questions in the potential biosphere reserve?

Most of the research activities over the past 6 years focused on sustainable management of naturaö resources in the area. These include:

- Forest Biodiversity, Management Practices and NTFP-production (Tadesse and Ararsa 2004): looked at traditional resource management activities for non-timber forest products (NTFP) production, their impacts on biodiversity and measures needed for sustainability.
- Forests of Sheka: Ecological, social, legal and economic dimensions of recent land use/land cover changes (Tadesse and Masresha 2007). This study summarized a multi-disciplinary research works conducted on the land use/land cover changes (Bedru 2007), impacts of land use/land cover changes on biodiversity (Tadesse 2007), impacts of cultural changes on the people of Sheka and their traditional resource management practices (Zewdie 2007), legal and institutional analysis for sustainable use of forest resources (Mellese and Mohammud 2007) and economic value of Afromontane Natural Forest in Sheka zone (Aseffa 2007).
- Land use management plan of the Masha woreda was prepared in 2010, with the aim of maintaining healthy ecosystem and conserving bio-cultural diversity while contributing to the welfare of the local households in particular and to the nation at large through allocation of land resources to its best use with recommended management practice (Tadesse et al. 2011). These works laid ground for the Sheka for initiative to nominate the Sheka Forest Biosphere Reserve. MELCA-Ethiopia has

coordinated the nomination support, with financial support from the Norwegian Peoples Aid and technical support from ECFF staff.

15.1.2. Brief description of past research and/or monitoring activities

•Abiotic research and monitoring

Research works accomplished in the past include:

- Description of Precambrian rocks, tertiary basalt and weathering (Mohr 1971; Schlüter 2008)
- Soil surveys, description of soil types and maps by FAO and the national atlas of Ethiopia (EMA 1988)
- Basin development studies on surface and ground water, geomorphology (MoWR 1996)
- Studies on coal phosphate deposit and its potential for exploitation
- Eco-cultural mapping of Sheka Zone in 2009-2009 (unpublished report 2009, Maps presented in Appendix 3)

Monitoring on works includes:

- Measurement of water flows in main rivers
- Measurement of land degradation, specially soil erosion by water
- Recording of weather data at Teppi and other sites in the area by the National Meteorological Agency

• **Biotic research and monitoring** [flora, fauna]:

Research: Since the second half of the twentieth century, several research activities were conducted. These include:

- Studies on the forest vegetation of the region, since the 1970s, by Addis Ababa and Copenhagen universities (Friis ,1979; 1983; 1992)
- Studies on diversity and distribution of mammals in the area by Joint Ethio-Russian Biological Expedition (JERBE) since 1990s.
- Past forest cover type reconstruction from studies on forest (e.g. Bonnefille et al., 1993)

- Plant community analysis and ecology of Afromontane and transitional rain forest vegetation of southwestern Ethiopia (Kumelachew and Tamrat 2002).
- "No Tree, No Bee – No Honey, No Money": The Management of Resources and Marginalisation in Beekeeping Societies of South West Ethiopia (Hartmann 2004).
- Inventory of the forests of south-west Ethiopia (e.g. Chaffey, 1979; Reusing, 1998)
- Avifaunal diversity and distribution of important bird areas of Ethiopia (EWNHS, 1996)
- Mammals diversity and distribution (e.g. JERBE publications)

Monitoring:

Socio-economic research:

Socio-economic research of international importance

List of socio-economic research of international importance are:

- Economic value of Afromontane natural forest in Sheka zone (Aseffa 2007)

Socio-economic research of local/national importance

List of socio-economic research of local/national importance are:

- Socio-economic drivers of deforestation (Dereje et al, 2007)
- People of the Plow: an agricultural history of Ethiopia (McCann, 1995)
- Legal and institutional analysis of sustainable use of forest resources (Mellese and Mohammud 2007)
- The impact of cultural of changes on the people of Sheka and their traditional resource management practices (Zewdie 2007)
- . History of the Southern Gonga (Southwestern Ethiopia) (Lange 1982)
- Social Organization of Production among the Shekacho of Southwestern Ethiopia (Mengistu 1995).

15.1.3. Brief description of <u>on-going</u> research and/or monitoring activities:

•Abiotic research and monitoring [climatology, hydrology, geomorphology, etc.]:

- There is no on going research in this respect.

• Biotic research and monitoring [flora, fauna]

Some of the ongoing research projects are:

- **Gradient analysis of Godere and Sheka forest vegetation, southwestern Ethiopia.** This study aims as assess the patterns of distribution plants along altitudinal and climatic gradiens extending from lowladnds in Gambella region to the highlands in Sheka zone and develop regionl conservation plann. The study shall also lay ground for monitoring works.
- Varieties selection and adaptation trials of different spices, coffee and fruit trees by Teppi agricultral research center

•Socio-economic research [demography, economics, traditional knowledge, etc.]:

- Environmental law and practices- with emphhasis on forest and biodiversity conservaion.

15.1.4. Brief description of planned research and/or monitoring activities:

Most of the research works in the past focused biodiversity of plants. Through woody biomass strategic planning, forest genetic resources the Flora of Ethiopia projects, and many other small individual studies, it was possible to generate enormous data on the diversity, distribution and conservation status of plants in Ethiopia, and in particular for proposed biosphere reserve area.

•Abiotic research and monitoring [climatology, hydrology, geomorphology]:

Research areas identified for future stud include:

- Land-use dynamics and its effects on biodiversity conservation
- Vulnerability to climate change

•Biotic research and monitoring [flora, fauna]:

Research areas identified for the future:

- Silviculture of bamboo (*Arundinaria alpina*)

- **Selection of coffee accessions** for good quality, productivity and disease tolerance by Teppi Agricultural Research Center (TARC)

- **Evaluation of shade trees** for soil fertility management and coffee quality in transition areas

- **Selection of effective biological enemies** for major coffee diseases and pests.

•Socio-economic research [demography, economics and traditional knowledge]:

- Currently, there is no planned

15.1.5. Estimated number of national scientists participating in research within the proposed biosphere reserve on:

• a permanent basis: _____5_____

• an occasional basis: ____15_____

15.1.6.Estimated number of foreign scientists participating in research within the proposed Biosphere Reserve on:

• a permanent basis: _____

• an occasional basis: _____5_____

15.1.7. Estimated number of masters and/or doctoral theses carried out on the proposed biosphere reserve each year:

ca. 2

15.1.8. Research station(s) within the proposed Biosphere Reserve:

[x] = permanent [...] = temporary

Teppi Agricultural Research Center

Mizan-Teppi University

15.1.9. Permanent research station(s) outside the proposed Biosphere Reserve:

- Metu Agricultural Research Center (c. 80 km away)
- Teppi Agricultural Research Center (in side the biosphere reserve)
- Mizan-Teppi University (inside th biosphere reserve)
- Metu University (80 km)

15.1.10. Permanent monitoring plots

Currently, there is is no permanent monitoring plot. However, different landscape elements like cultural/ sacred stes, kobbo forests, wetlands, et have been mapped by the community with geo-references. These participatory eco-mapping exercises and participatory 3D maps shall be used in as basis for monitoring. Peramanent plots shall also be established in different management zones, representative land use and habitat types after the establishement of the biosphere reserve.

15.1.11. Research facilities of research station(s)

The Teppi Agricultural Research Center is a fully functioning national research center for spices. It has facilities like laboratories, field trial stations, vehicles and equipment.

15.1.12. Other facilities

Currently, there are private hotels in and around the proposed biosphere reserve. There are also guest houses built by the state coffee plantation enterprise, private coffee and tea plantations and NGOs.

15.1.13. Does the proposed biosphere reserve have an Internet connection?

Yes, there is telephone connection in the area, with dial-up internet connection facilities. Most areas are within the mobile telephone network, and cellular phones work well in the area.

15.2. Environmental education and public awareness

15.2.1 Describe environmental education and public awareness activities, indicating the target group(s):

A number of environmental education and public awareness initiatives have been conducted in and around the proposed biosphere reserve. These also include activities that have been undertaken by local government institutions and non-governmental organizations. MELCA-Ethiopia is carrying out environmental education in which the young generation learn from practices and elders through a program called SEGNI- which promotes the role and value of indigenous knowledge, traditional practices and lifestyles in achieving sustainability. It uses an intergenerational learning approach to engage students in schools in understanding their own cultural background, respect the traditional values

and practices of their communities, and become change agents for Bio-cultural diversity and sustainability. This program was recognized by UNESCO in 2010 as part of its initiative on “Linking Culture, Education and Sustainability: Good Practices and Experiences from Around the World”.

Community empowerement activitie of MELCA-Ethiopia in the area include

- Consultation meetings with experts and community to develop advocacy strategy for sustainable management of Sheka forest in 2005
- Series of consultation meetings with community and partner organizations through Sheka Forest Alliance since 2006
- Trainings of eco-advocates for selected community members and prominent local personalities on environmental and human rights in September 2006
- Eco-cultural mapping with community members, elders in 2008 and 2009
- Established clan leaders association in March 2008 to facilitate the clan leaders initiative to advocate the protection of Sheka forest and culture
- Awareness raising workshops on cultural and environmenta rights in 2007, Women’s workshop in 2008, environmental education clubs formation workshop in 2008, cultural and environmental rights of the marginalized Menja group in 2008

Experts training

- Workshop for five standing committees in Federal parliament on law and policies related to environmental and community rights in 2007
- Trainings of court officials and justice bodies including police on laws and policies related to forests at Federal and regional leve, in order to enhance awreness of the participants and improve the enforcement of communal rights and forest laws, 2008
- Sheha Zone Justice Administration trainings in 2009, 2010 and 2011- on international and national environmental laws (for judges and prosecutors).

Public awareness (together with MUs)

- In 2011, over 10 public meetings were held at various places in and around the proposed biosphere reserve area. These meetings were set up to introduce the

concept of the biosphere reserve in detail, for key stakeholders and local communities, and to clarify the remaining tasks for the biosphere reserve application. During one of these meetings, the Declaration for Sheka Forest Biosphere Reserve initiative was developed, agreed upon and signed by key stakeholders. In virtue of the Declaration, the signatories committed themselves to carry out key actions: (1) awareness raising, information and education for conservation and sustainable development, (2) clarifying land demarcation, use rights, use rules and sanction for the biosphere reserve, (3) developing activities and capacity building in the biosphere reserve, and (4) strengthening institutional structure for collaboration between government and non-governmental agencies, and local communities. Additionally, four awareness creation workshops and meetings were organized by MELCA-Ethiopia, for experts and policymakers/local authorities at all levels.

15.2.2. Indicate facilities for environmental education and public awareness activities

Facilities for environmental education include:

- Schools and farmers training centers in each village of the biosphere reserve area
- 3D model develped through participatory mapping
- MELCA-ETHIOPIA Community Center in Masha- built as mult-purpose hall for trainings and environmental education activities
- Documentary films, slide shows
- Projectors, photo and video cameras, and laptop computers.

15.3 Specialist training

- Specialist trainings are limited or none up to now, except some training for the local community.
- Some short-term trainings and workshops include:
  - Land use planning workshop in 2010,
  - Menja Home Garden management and vegetables production training in May 2009 for 30 household heads
  - Beekeeping trainings in May 2009 for over 200 household heads
  - Youth entrepreunrship and business management in June and July 2008
  - Training of Local Stakeholders on the concept of biosphere reserves in 2011,

- Workshop to review the Sheka Forest Biosphere Reserves nomination document in August 2011

15.4 Potential to contribute to the World Network of Biosphere Reserves

15.4.1. Collaboration with existing biosphere reserves at the national level:

In Ethiopia, there are two biosphere reserves, both established in 2010. These are:

1. Yayu Coffee Forest Biosphere Reserve Initiative
2. Kafa Coffee Biosphere Reserve Initiative

The Sheka Forest Biosphere initiative has been collaborating with both biosphere reserves since their establishment. Representatives of the Sheka Biosphere Reserve initiative have visited Yayu and Kafa for experience sharing, and also participated on the inauguration workshops of both biosphere reserves in 2010 and 2011.

During the inauguration of Yayu Coffee Forest biosphere reserve, participants from UNESO MAB programme, three Afri-MAB representatives, Senior officials of the German Federal Agency for Nature Conservation (BfN) have visited the Sheka area and held discussions with local officials in Masha and Gecha towns.

15.4.2. Collaboration with existing biosphere reserves at the regional or subregional levels, including promoting transfrontier sites and twinning arrangements (indicate on-going or planned activities)

The Sheka Forest Biosphere Reserve Initiative, through its coordination office-MELCA-Ethiopia has started to establish a network with existing regional biosphere reserve networks. MELCA-ETHIOPIA staff participated on Yayu Coffee Forest Biosphere inauguration workshop where they established contacts with representatives of AfriMAB, from Zimbabwe and Malawi, and some representatives of biosphere reserves in Germany in 2010. The biosphere coordination office will strengthen its network with the regional and sub regional (East Africa) biosphere reserves.

15.4.3 Collaboration with existing biosphere reserves in thematic networks at the regional or international levels (indicate ongoing and planned activities)

The Sheka Forest Biosphere Reserve initiative has began collaboratiom with the Yayu Coffee Forest Biosphere Reserve and the Kafa Biosphere Reserve on sustainable forest management, including PFM and customary forest and tree tenure issues in the area. Parenthetically, the East Usambara Biosphere Reserve in Tanzania is also found within the Eastern Afromontane Biodiversity Hotspot area. Hence, there is a potential biosphere reserve for collaboration, beside the proposed Kafa and Yayu biosphere reserves in Ethiopia.

15.4.4 Collaboration with existing biosphere reserves at the international level (indicate ongoing and planned activities:

Coordinators of the initiative have established contacts with representatives of some biosphere reserves in Africa and Germany. It is planned to broaden this contact to collaboration in research, products development and promotion and experience sharing.

16. USES AND ACTIVITIES

16.1 Core Area(s):

16.1.1 Describe the uses and activities occurring within the core area(s):

The core area is primarily set-aside for strict conservation. However some cultural uses and activities are allosed. These include: traditional beekeeping, wild spices and medicinal plants collection, controlled eco-tourism using some routes, ritual ceremonies, research, monitoring, and trainings.

Strictly prohibited uses and activities conversion to other land uses, hunting, cutting of trees/ timber, planting coffee and other plant species for production, construction of roads and buildings, permanent settlement and camping.

16.1.2. Possible adverse effects on the core area(s) of uses or activities occurring within or outside the core area(s):

Possible adverse effects due various human activities include natural events like drying up of bamboo, fire- escape from honey gatherers/harvesters, illegal hunting, habitat degradation due to human interference, and unforeseen infrastructure development.

16.2. Buffer zone(s)

16.2.1 Describe the main land uses and economic activities in the buffer zone(s):

The buffer zone has both conservation and use function. Uses and activities in the buffer zone include:

- Coffee, spices production
- Beekeeping- traditional, improved
- Participatory forest management
- Production forestry practices in degraded forest areas
- Sustainable livestock husbandry/cattle fattening
- Cultural/ ritual practices
- Sustainable harvesting and processing of bamboo
- Coffee, spice, honey processing and storage facilities
- Eco-tourism, including camping
- Forest management and used related temporary settlement
- Light infrastructure- dirt road, health post
- Logging in production forest
- Research, monitoring and training
- Traditional medicine production, wild collection

Strictly prohibited activities and uses include

- Logging in natural forest
- New permanent settlement
- High impact investment- monoculture plantation, intensive agriculture, e.g. tea
- Hunting
- Fire for forest and land management

16.2.2 . Possible adverse effects on the buffer zone(s) of uses or activities occurring within or outside the buffer zone(s)in the near and longer terms:

Possible adverse effects in the buffer zone include forest fire, population growth and settlement, land use changes, agricultural intensification by private investors, cultural changes and health related problem due to population influx and environmental changes.

16.3. Transition are

16.3.1 Describe the main land uses and major economic activities in the transition area(s):

The transitional area is a development zone where all activities for livelihood of the local community take place. Here, all kinds of traditional and modern agriculture based sustainable land management including:

- Social services (health, education, etc)
- Settlement- rural and urban
- Infrastructure- road, telecommunication,
- Agro-processing and other industries
- Sustainable harvesting of trees
- Integrated renewable energy development (solar, wild, biogas/biomass, hydro power generation)
- Promotion of energy saving technologies and practices
- Agricultural production and marketing cooperatives
- Certification of different biosphere reserve products and marketing

16.3.2 Possible adverse effects of uses or activities on the transition area(s):

Possible adverse effects include: land degradation, pollution of air and water, over crowding due to population growth, charcoal production, deforestation, unemployment, landlessness.

17. INSTITUTIONAL ASPECTS

17.1. STATE, PROVINCE, REGION OR OTHER ADMINISTRATIVE UNITS:

The Sheka Forest Biosphere Reserve is located in the Sheka Zone of the Southern Nations, Nationalities and Peoples (SNNP) Regional State in Ethiopia. It covers the whole Sheka Zone, which is divided into three Woredas (districts), namely Masha, Anderacha and Yeki.

Country: Federal Democratic Republic of Ethiopia
Regional State: Southern Nations, Nationalities and Peoples National Regional State
Administrative Zone: Sheka zone
District (Woreda): Masha, Anderacha and Yeki

17.2 Units of the proposed biosphere reserve:

The core areas and buffer zones are designated state forest areas by the federal and regional laws. A new regulation for the conservation of the core area is being developed by the SNNP regional state.

17.2.1. Are these units contiguous or are they separate?

All the management units (core, buffer, transition) in the proposed biosphere reserve are contiguous, but different compartments of the core areas are separated by roads, foot paths managed forests form the buffer zone (see Figure 8). The core areas are always surrounded by the buffer zones, which in turn are surrounded by the transition area.

17.3. Protection Regime of the core area(s) and, if appropriate of the buffer zone(s)

The zonation that applies to the proposed Sheka Forest Biosphere Reserve is based on existing national and regional governments' laws on environment, land administration and a new regulation of SNNP National Regional Government for the Establishment of Sheka forest biosphere reserve.

17.3.1.Core area(s):

The core areas in the proposed biosphere reserve consists of 55,255 ha (23.14%) of the total biosphere reserve. All parts of the core areas are protected by the Regulation for the Establishment of 'Sheka Forest Biosphere Reserve' of the SNNP regional state, soon to be enacted. The core areas are found within the Masha-Anderacha and Yeki Forest Priority Areas, legally protected as "State Forest" by the federal government (Proclamation No. 542/2007). Such natural forests are also afforded protection by the Constitution of the Federal Democratic Republic of Ethiopia (FDRE).

The new law, regulation for the establishment of 'Sheka Forest Biosphere Reserve', is based on existing relevant federal and regional governments' laws and the constitution. The relevant laws include:

- The Constitution of the Federal Democratic Republic of Ethiopia (1995). Article 52 deals with powers and functions of the Regional Governments and Article 92 outlines the environmental objectives.
- Environmental Protection Organs Establishment Proclamation No. 295/2002, which stipulates the power of regional governments to establish an independent regional environmental agency or designate an existing agency that shall, based on the Ethiopian Environmental Policy and Conservation Strategy and ensuring public participation in the decision making process, be responsible for (a) coordinating the formulation, implementation, review and revision of regional conservation strategies, and, (b) environmental monitoring, protection and regulation
- The Federal Rural Land Administration and Land Use Proclamation No. 456/2005 Article 17 states the Responsibility of Regions to enact rural land administration and Land use law, which consists of detailed provisions necessary to implement this Proclamation
- The Federal Forest Development, Conservation and Utilization Proclamation No.542/2007, which gives power to regional states to designated, demarcate (Article 8), administers and protects forest areas by enacting laws (Article 18), various purposes, including genetic resources (Article 11, 2b).

The regulation for the establishment of Sheka Forest Biosphere Reserve is aimed at the conservation of plant animal species of the Afromontane forest vegetation and the local culture based on sustainable forest management pactices.

17.3.2 Buffer zone(s):

The Buffer zone is also legally part of the National Forest Priority area, given legal protection as state forest (Proclamation 542/2007). However, this is the forest area primarily managed for coffee, spices and honey production (also allowed by this law-Article 11 (6)). In the management guidelines, the buffer zone is proposed for the same purposes, but with a standardized practice and indicators for monitoring (see Appendix. 5).

Other relevant laws are:

- Federal Rural Land Administration and Land Use Proclamation No. 456/2005

17.4. Land use regulations or agreements applicable to the transition area (if appropriate)

The land use regulations applicable to the transition zone are set out in relevant federal and regional governments' laws, notably:

- Federal Rural Land Administration and Land Use Proclamation No. 456/2005

Land use activities allowed in the transition areas include

- Agricultural activities such cereal farming, coffee, mixed farming, spice farming.
- Livestock development and grazing.
- Coffee management.
- Collection of firewood or fuel wood.
- Settlements and schools.
- Establishing coffee washing machines, preferably eco-friendly washing machines introduced by TechnoServe in order to minimize pollution.
- Establishment of all necessary infrastructures.
- Traditional extractive uses of spices, wild edible fruits and medicinal plants.
- Domestication of spices and traditional medicinal plants.
- Establishing forest plantation using native species.
- Planting native and exotic multipurpose plant species.
- Establishing tourism and education centres.

- Wild honey harvesting and modern apiculture management.
- Hunting of wild animals, if necessary.
- Maintenance of at least 10 to 20 trees on farms.

Activities not allowed

- Farming and/or clearing forests along river banks and wetlands.
- Polluting rivers/streams by using waste disposal from coffee depulping or wet washing machine is strictly forbidden.
- Harvesting and use of endangered tree species either for household or market consumption is strictly forbidden, e.g., *Prunus africana*.
- Misuse of or change of historical landscapes or places, e.g., the Abba Gada site.
- Removal of vegetation that may cause damage to historical places.
- Establishing factories that change the existing landscape and also encourage immigration of people. But with the consultation of BR Management Unit some activities may be allowed.

17.5. Land tenure of each zone:

As per *Article 40* of the 1995 Constitution of the Federal Democratic Republic of Ethiopia, the rights to ownership of rural and urban land, as well as of all natural resources, is vested in the state and the people of Ethiopia. Land is common property of the Nations, Nationalities and Peoples of Ethiopia and shall not be subject to sell or other means of exchange. The Rural Land Administration and Land Use Proclamation No. 456/2005 states that the “right to land is exclusively vested in the state and in the people” and grants only “holding rights” to users. Holding rights include leasing rights and inheritance rights. So, practically, all areas of the proposed biosphere reserve are state property, and farmers only have use rights on some.

17.5.1.Core area(s):

The core areas are 100% owned by the Ethiopian government, and designated as state forest. Currently the Bureau of Agriculture is uthorised by the SNNP National Regional State to administers the forest.

17.5.2. Buffer zone(s):

The buffer zone is also part of the state forest, and 100% under government ownership. The Bureau of Agriculture of the SNNP regional state is authorised to administer the forest. Farmers have use rights on plots of the forest allocated to them, to produce coffee, spices and honey, with technical support from the Agriculture and Rural Development Office.

17.5.3.Transition area(s):

Like other lands, all areas in the transition areas are also 100% state property. Formers are granted “lifelong usufruct rights” by the SNNP Rural Land Administration and Utilization Proclamation 53/2003. The proclamation grants “lifelong usufruct rights” to agricultural land “free of payment” in the area.

17.5.4. Foreseen changes in land tenure:

There is no foreseen change in land tenures, as SNNP Rural Land Administration and Utilization Proclamation 53/2003 clearly rules out redistribution of land plots.

17.6. Management plan or policy and mechanisms for implementation

Since 2005, the Sheka Zone administration, MELCA-Ethiopia and other civil society associations were collaborating to promote sustainable forest resources management, livelihood diversification, environmental education and biodiversity conservatin in the area. Several workshops, consultation meetings and trainings were conducted at different levels. In 2010, Sheka zone administration and MELCA-ETHIOPIA developmed a general land use management plan for Masha woreda as a pilot case. During the conusltations with the local government authorities and community representatives, biosphere was raised as a sustainable land management for areas like Sheka, based on the experiences of Kafa and Yayu forests in nearby areas. Community members and local authorities took the initiative to nomite the whole Sheka zone as UNESCO biosphere reserve and formed a taskforce in June 2010. The initiators requested the support of MELCA-Ethiopia and Dr. Tadesse Woldemariam Gole (Yayu Coffee Forest Biosphere Reserve) to support them in the nomination process. By the end of 2010, a Management Unit (MU) to lead the nomination process for establishment of Sheka Forest Biosphere Reserve was formed. The members of the MU included representatives of Sheka Zone Administration, Sheka Zone

Department of Trade and Industry, Sheka Zone Department of Agriculture, Sheka Zone Finance and Economic Development Department, Sheka Zone Justice Department, Sheka Zone Development Association, and MELCA-Ethiopia. The MU is chaired by the Sheka Zone administration.

In early 20011, the Sheka Forest Biosphere Reserve MU organized a three days workshop on biosphere reserves and management planning. Then, MUs at woreda level were formed, with further MUs at community level. The zonal and woreda MUs have organized several consultation meetings community members and other relevant stakeholders and departments. The management guidelines for the biosphere reserve is currently under development and expected to be finished in the coming few months.

17.6.1. Indicate how and to what extent the local communities living within and next to the proposed biosphere reserve have been associated with the nomination process

The local communities and authorities initiated the nomination process of Sheka Forest Biosphere Reserve. As mentioned earlier, it was first initiated during a consultation meeting on draft land use management plan of Sheka zone in 2010. The MU united formed in 2010 then organized awareness several workshops and consultation meetings with the community representatives and different departments at zonal and woreda level. The woreda MU members made visits to different community and carriedout consultation meetings. The major consultation meetings and workshops are summarized as follows:

- Initial discussions of the biosphere reserve idea and formation of a leading taskforce in June 2010
- Visit to the Yayu Coffee Forest Biosphere Reserve and participation on its inauguration in October 2010
- Formation of zonal MU and discussions on the road of the nomination process December 2010
- Workshop on Biosphere Reserve as sustainable land management, land use planning and zonation criteria- experts and community representatives in February 2010. On this workshop, participants also signed declatation regaring their decision and comitments to manage the area as biosphere reserve (See Appendix 4).

- First round consultation meetings in Masha woreda, Anderacha woreda and Yeki woreda, in March 2011
- Community consultation meetings in each woreda and visits to different areas representing the different zones of the biosphere reserve in March 2010
- Training workshop on biosphere reserve concepts and preliminary zoning of Sheka Forest Biosphere ReserveWorkshop on biosphere reserve in April 2011, held in Masha for one week. Participants included government officials, experts, community representatives, clan leaders and representatives of different social groups like youth.
- Participatory biosphere reserve zoning, including field visits for ground reference (GPS) points recording June 2011.
- Second round consultation meetings in Masha woreda, Anderacha woreda and Yeki woreda in July 2011
- Workshop on Sheka forest biosphere reserve nomination document in Masha, August 2011. The workshop took five days during the first week of August. Participants included zonal and woreda MU members, higher offcials of the Sheka zone and the woredas, community representatives, clan leaders and experts from various departments. Uses allowed and restricted in the different management zones of the biosphere reserve were defined and elaborated. The draft zonation map of the biosphere reserve management zones was also presented and thoroughly discussed and revised, with inputs from community reoresentatives and experts.
- Presentation of the final map to the MU members for approval, after incorporating comments and revisions, 2nd week of August 2011.
- Submission of the final nomination document approved by local authorities and community representatives in Sheka to the SNNP regional state government in August 2011
- Submission of the final nomination document approved by the SNNP regional state to National MAB Committee of Ethiopia, 1st weak of September 2011.

The management unit has taken the leadership of the nomination process as local initiative, with financial support and coordination role by MELCA-Ethiopia and technical support from Yayu Coffee Forest Biosphere Reserve coordinator and other ECFF staff.

17.6.2 Main features of management plan or land use policy

The overall vision of the biosphere reserve is to achieve sustainable development through improving the livelihood of the people in the area while protection biodiversity and cultural values that maintained nature livelihood over generations.

The biosphere reserve shall achieve the following in short terms (three to five years), in terms of three functions of a biosphere reserve:

Conservation

- Conservation of core areas ensured through community participation. In the past, there was no protected area in the region. The national forest priority areas were guarded by employed personnel and local kobo owners. However, deforestation for small-holder agriculture and large agriculture investments are threatening the forest and other natural habitats in the area. With establishment of the biosphere reserve the community and government participants agreed to stop further expansion into core areas for any development activities. Trained eco-advocates and para-ecologists shall conduct assessments and monitoring of the forest condition every two years. The management units, in collaboration with designated authorities shall regulate activities to ensure proper implementation
- All forest plot users in the buffer zones shall be trained and strictly followi the management guidelines
- The proposed biosphere reserve shall become an active member of AfriMAB, and the world network of biosphere reserves

Development

- Primary cooperatives of honey, spices and coffee producers shall be established in 30% of the biosphere reserve
- Improved honey and coffee processing technologies shall be introduced to supply high quality products that can fetch premium price.
- Around 30% of honey producers use transitional and modern beehives
- Significant increase in coffee plantations in marginal lands and transition areas

- About 25 to 30% of honey and coffee produced in the buffer zone and some from transition areas certified and marketed with a premium price as specialty products.
- Coffee husk, which is produced at all processing plants, shall be used either for briquette (fuel) or compost (fertilizer)
- Development projects for income diversification, including fruits, vegetables and modern beekeeping, initiated with development agencies and private partners (e.g., MELCA-Ethiopia, EWNRA)
- Potential buyers identified and market linkage created for local products, and primarily for honey

Logistic support

- Demand driven/tailor made training for local experts, development agents and farmers offered at least two to three times per year
- Research partnership established with at least three local universities and two new international partner organizations.
- Research and monitoring protocols in the biosphere reserve prepared.
- The area becoming one of the destinations for educational tours for school, universities and special training programs.

In the long term (five to ten years), the proposed biosphere reserve is expected to fully serve the three functions of a biosphere reserve.

Conservation

- The biosphere reserve shall be a model site for sustainable development and biodiversity in Ethiopia, and will share its successes with other local, regional and global sites
- The conservation status of the core areas to become more secure and be in better condition, or at least the same as when it was established,
- Expand the biosphere reserve areas into suitable surrounding areas,

Development

- Honey, coffee and spices production, processing and storage significantly improved: over 60% of honey produced in buffer zone annd transition areas using modern and transitional beehives, and about 50% of the coffee be wet processed, with good storage facilities in each district
- Farmers begin to produces other commodities as source of income in the transition areas
- Over 50 of forest products in the area sold on the specialty market,
- Most producers become members of primary cooperatives, and Farmers Cooperative Union

Logistic support

- Collaborative research projects on honey, coffee, climate change, organic agriculture, fauna, and micro organisms, from the perspective of conservation and development
- Monitoring of forest conditions with para-ecologists and scientist
- Model training and research center for sustainable NTFPs production established become operational

17.6.3 The designated authority or coordination mechanisms to implement this plan or policy

The Sheka Forest Biosphere Reserve Management Unit was established at all levels to facilitate and lead the biosphere reserve initiative. These include the Zonal Management Unit (at zonal level), Woreda Management Unit (at district / woreda level), and Village Management Unit (at village level). The MUs at all levels have a chairman and five to seven key institutional members. The MUs coordinate all the steps towards the nomination process for the biosphere reserve establishment. The MUs were established and began operation by the end of 2010. As they will be part of and fully integrated into the existing administrative structure at village, at woreda and zonal level, there is little additional cost for performing their coordination and management functions.

The MUs are also responsible for implementation of the management guideline and management of the reserve. MELCA-Ethiopia performs coordination and scientific advisory functions during the nomination process, and will continue to support capacity building after establishment.

At village level the members of an MU include the Kebele Chairman, Village/Community Representatives, cland leaders, Kebele Manager, Youth Representative, and Development Agent. The Zonal MU plays the leading role, and has its own founding charter, in which the goals, duties and responsibilities are clearly defined.

There are plans to establish a Biosphere Reserve Office at Masha town, and sub-offices in Gecha and Teppi towns. This office will be engaged in activities relevant to fulfil three functions of a biosphere reserve. The office shall also initiate and coordinate activities within the different management zones of the biosphere reserve, particularly core areas and buffer zone. The office initiates, supports and coordinates collaboration and operational activities by the other parties, i.e. the community/farmers, department of agriculture, cooperative offices, farmers cooperative union and NGOs operating in the area. Gradually, the members of the MU shall be transformed to biosphere reserve advisory board.

17.6.4 The means of application of the management plan or policy

The management guideline is based on existing practices in different parts of the landscape, supported by scientific research findings, which will ensure sustainability. The overall implementation will be done by the MU at different administrative levels, i.e., Zone, woreda and kebele levels.

- The zonal MU inspects/overlook the implementation of the guidelines through
    - Adoption of the zoning scheme and management guidelines and prescriptions for forest management and utilisation activities;
    - Enhancing the capacity of local communities through training and establishing necessary infrastructures;
    - Ensuring that plans to use within the management zones conform with the aims of that zone or area;
    - Ensuring that modifications to the zoning scheme or other management strategies conform to the aims and targets established in the guidelines;
    - Coordinate and supervise overall planned activities of the biosphere reserve.
- The woreda and kebele MUs are responsible for:

- Ensuring that the local communities are aware of the plan;
- Ensuring that the uses are in accordance with the management guidelines;
- Implementation of specific actions in collaboration with zonal MU;
- Supervision for the appropriate implementation of the guidelines and;
- Inform local communities about the penalty in case of any rule breaking
- Coordinate and supervise overall planned activities of the biosphere reserve.

Plans in the transition areas are implemented by individual farmers and the community with the technical and extension services by office of agriculture MELCA-Ethiopia will continuously work in the area with the people in order to mediate between interest groups and incorporate improvements to the management guidelines.

17.6.5 Indicate how and to what extent the local communities participate in the formulation and the implementation of the management plan or policy

The management guideline suits existing management practices. It is based on good research of other biosphere reserves, the traditional ecological knowledge (TEK) of the local community, and evaluation of the impacts of the existing practices. Studies over the pas 6 years revealed that there is a very good cultural value for nature, and hence good TEK for sustainable management. It is also evident that some new management practices for livelihood and investments by outsiders are ddeviating from the deep-rooted cultural values and traditional resource management practices. The management plan and policy attempts complement the existing practices with scientific approachs in order to ensure sustainability. The main policy differences of the new management guideline from existing practices are basically three:

1. The core areas are strictly for conservation except the cultural uses like wild honey and medicinal plants, and that the boundaries should be respected.
2. The management practices in the buffer zone are standardized, setting what is allowed and what is not, including mitigation measures to maintain the forest conditions and their deemed economic and ecological functions. In addition, appropriate management practices for sustainability in transition areas are also recommended.
3. Activities in the core areas and buffer zones are regularly monitored and corrective measures are taken as necessary.

The concepts of sustainable management and conservation of key habitats were discussed with community members since 2005. Since 2010, these concepts of sustainable management have taken the shape biosphere reserve approach for land management in the area. Consecutive consultations were held with the communities, development agents, experts and local authorities within the three woredas found within the proposed biosphere reserve. Awareness creation and consultative meetings have been conducted by MELCA-Ethiopia and the biosphere reserve MU. The management guidelines are being developed based on the outcomes of thes consultation meetings. It is now in pipeline for approval by community representatives and local authorities.

17.6.6 The year of start of implementation of the management plan or policy

Some of the activities in the management guidelines have already been going on in most parts of proposed biosphere reserve by the community and department of agriculture. Actual implementation of the newly adopted management guideline will begin in January 2012 after approval by the community and other stakeholders.

17.7. Financial source(s) and yearly budget:

The financial sources for the proposed biosphere reserve are contributions of the MU member institutions, which can be in cash, staff time and/ or both. MELCA-Ethiopia covers the costs of technical support and coordination, while others cover the salaries of the staff members engaged in the biosphere reserve activities as MU member.

Table 2 Annual budget breakdown of Sheka Forest Biosphere Reserve by source and category

No.	Item	Amount (Birr)	Source
1	***Salaries***		
	Zone MU members	250,000	Sheka Zone
	Woredas MU Members	750,000	Sheka Zone

	MELCA-Ethiopia staffs	500,000	MELCA-Ethiopia
2	***Coordination and facilities***		
	Coordination and implementation activities	700,000	MELCA-Ethiopia
	Office facilities	100,000	Zone Administration
	Grand total	***2.300,000***	

The total annual budget is estimated at about 2,300,000.00 Ethiopian Birr, which is equivalent to US $135,300.00.

17.8. Authority(ies) in charge

17.8.1.The proposed biosphere reserve as a whole:

- Sheka Zone Department of Agriculture

Regional state administration to which this authority reports:

- Sheka Zone Administration
- SNNP Bureau of Agriculture

17.8.2. The core area(s):

Name(s): Sheka Zone Department of Agriculture, Masha Woreda Office of Agriculture, Anderacha Woreda Office of Agriculture and Yeki Woreda Office of Agriculture

17.8.3.The buffer zone(s)

Name (s): Sheka Zone Department of Agriculture, Masha Woreda Office of Agriculture, Anderacha Woreda Office of Agriculture and Yeki Woreda Office of Agriculture

18. SPECIAL DESIGNATIONS:

( ) UNESCO World Heritage Site

( ) RAMSAR Wetland Convention Site

(Yes) Other internationa/regional l conservation conventions/directives [Please specify]
National Forest Priority Area

( ) Long term monitoring site [Please specify]

(Yes) Other Conservation Priority Areas of global importance, as identified by different organizations]

- Eastern Afromontane Biodiversity Hotspot (Conservation International)
- Center of Crop Plants Origin (Bioversity International)
- Important Bird Areas of Ethiopia (BirdLife International)

19. SUPPORTING DOCUMENTS

(√) General location map

- See Appendix 1

(√) Biosphere Reserve zonation map

- See Appendix 2

(√) Vegetation map or land cover map

- See Appendix 3

(√) List of legal documents (if possible with English or French translation)

- See Appendix 4

(√) List of land use and management plans

- See Appendix 5

(√) Species list (to be annexed)

- See Appendix 6 and 7

(√) List of main bibliographic references (to be annexed)

- See Appendix 8

20. ADDRESSES

20.1 Contact address of the proposed biosphere reserve:

Name: MELCA-Ethiopia
Street or P.O. Box: 1519 Code 1250
City with postal code: Addis Ababa
Country: Ethiopia
Telephone: +251 11 550 7172
E-mail: melca@ethionet.et
Web site: www.melca-ethiopia.org

20.2. Administering entity of the core area:

Name: Sheka Zone Department of Agriculture
Street or P.O. Box: Masha Postal Agent
City with postal code: Masha
Country: Ethiopia
Telephone: _____
Telefax (or telex): _____
E-mail: _____
Web site

20.3. Administering entity of the buffer zone:

Same as entity under 20.2

Annex to Biosphere Reserve Nomination Form, February 2004

MABnet Directory of Biosphere Reserves

Biosphere Reserve Description[2]

Administrative details

Country: Ethiopia

Name of BR: Sheka Forest Biosphere Reserve

Year designated: (*to be completed by MAB Secretariat)*

Administrative authorities: (17.8) SNNP Region Bureau of Agriculture, Sheka Zone Administration, Sheka Zone Department of Agriculture, Masha Woreda Office of Agriculture, Anderacha Woreda Office of Agriculture, Yeski Woreda Office of Agriculture

Name Contact: (20.1) Mr. Befekadu Refera

Contact address: (20.1) P. O. Box 1519 Code 1250, Addis Ababa, e.mail: befekadurefera@yahoo.com or melca@ethiopnet.et

Related links *(web sites)*: http://www.melca-ethiopia.org/

[2] To be posted on the MABnet once the nomination has been approved. The numbers refer to the relevant sections of the nomination form.

Description

General description: *(Site characteristics in 11.1; human population in 10; land management units in 17.2)*

Approximately 25 lines

The Sheka Forest Biosphere reserve is located in the SNNP regional state, southwestern Ethiopia. It covers a total area of 238,750 ha of montane rainforest, bamboo thickets, wetlands, agricultural land, rural settlements and towns, dotted with several sacred and culture sites. The Sheka Forest is exceptionally important for the conservation of natural and cultural landscapes. The area is part of the Eastern Afromontane Biodiversity Hotspot and Important Bird Areas of international significance. It is rich in plant and animal species. There are over 300 higher plants, 50 mammals, 200 birds, and 20 amphibian species, occurring in all habitat types within the proposed biosphere reserve. There also many endemic species, at least 55 plants, and 10 birds. Altogether, there are over 65 endemic species of plants and birds. There are also over 38 threatened species (IUCN Red list) in the area, which include 5 bird, 3 mammals and 30 plant species. The people of Shaka have deep-rooted culture of conserving species, ecosystems and pristine natural habitats. A recent eco-mapping exercise revealed around 209 sacred sites, 67 waterfalls, 74 mineral water springs, 13 historical sites, 17 cultural huts, 37 historical caves, 417 community kobo forests and 8 burial places. All these are considered as community conserved areas. The proposed biosphere reserve is zoned into core areas for conservation, butter zone for sustainable use and traditional management of forests and transitional areas for integrated development. Sheka is an important gene pool for Ensete (*Ensete ventricosum,* sometines called 'false banana'), and several other plant species important for food, agricultural and forestry purposes. The designation as a biosphere reserve is expected to enhance sustainable forest management and agricultural practices, and create new jobs in small businesses. Within the biosphere reserve framework, local communities are familiarized with the wise use of natural resources and sustainable development techniques, and the implementation of conservation activities. Currently, the local government, MELCA Ethiopia and other stakeholders are implementing conservation and sustainable development activities.

Major ecosystem type: (13.1) Forest, bamboo thickets, wetlands

Major habitats & land cover types: (Titles of 12.1, 12.2, 12.3 Forest, bamboo thicket, wetlands, agriculture and settlement, coffee plantation, tea plantation, savana grassland

Location (latitude & longitude): $35^0 5' 48''$ – $35^0 44' 11''$ E and $7^0 6' 24''$ – $7^0 53' 14''$ N

Area (ha):

Total*:* 238,750 ha (7)

Core area*(s): 55,255* ha

Buffer zone*(s): 76,395 ha*

Transition area*(s) (when given): 107,100* ha

Different existing zonation: Core areas, buffer zone and transitional areas

Altitudinal range *(*metres above sea level):

Research and monitoring

Brief description: 15.1.3)

Approximately 5 lines

Different research activities are carried out by various organizations, including assessment of the patterns of distribution plants along altitudinal and climatic gradients by universities; varieties selection and adaptation trials of different spices, coffee and fruit trees by Teppi Agricultural Research Center; and environmental law and practices- with emphasis on forest and biodiversity conservation. Monitoring is conducted by the Forestry/ Natural Resources Department of the SNNP Bureau of Agriculture, MELCA Ethiopia and community members.

Specific variables (please fill in the table below and tick the relevant parameters)

Abiotic		Biodiversity	
Abiotic factors		Afforestation/Reforestation	X
Acidic deposition/Atmospheric factors		Algae	X
Air quality		Alien and/or invasive species	
Air temperature	X	Amphibians	
Climate, climatology	X	Arid and semi-arid systems	
Contaminants		Autoecology	X
Drought		Beach/soft bottom systems	
Erosion	X	Benthos	
Geology	X	Biodiversity aspects	X
Geomorphology		Biogeography	X
Geophysics		Biology	X
Glaciology		Biotechnology	
Global change	X	Birds	X

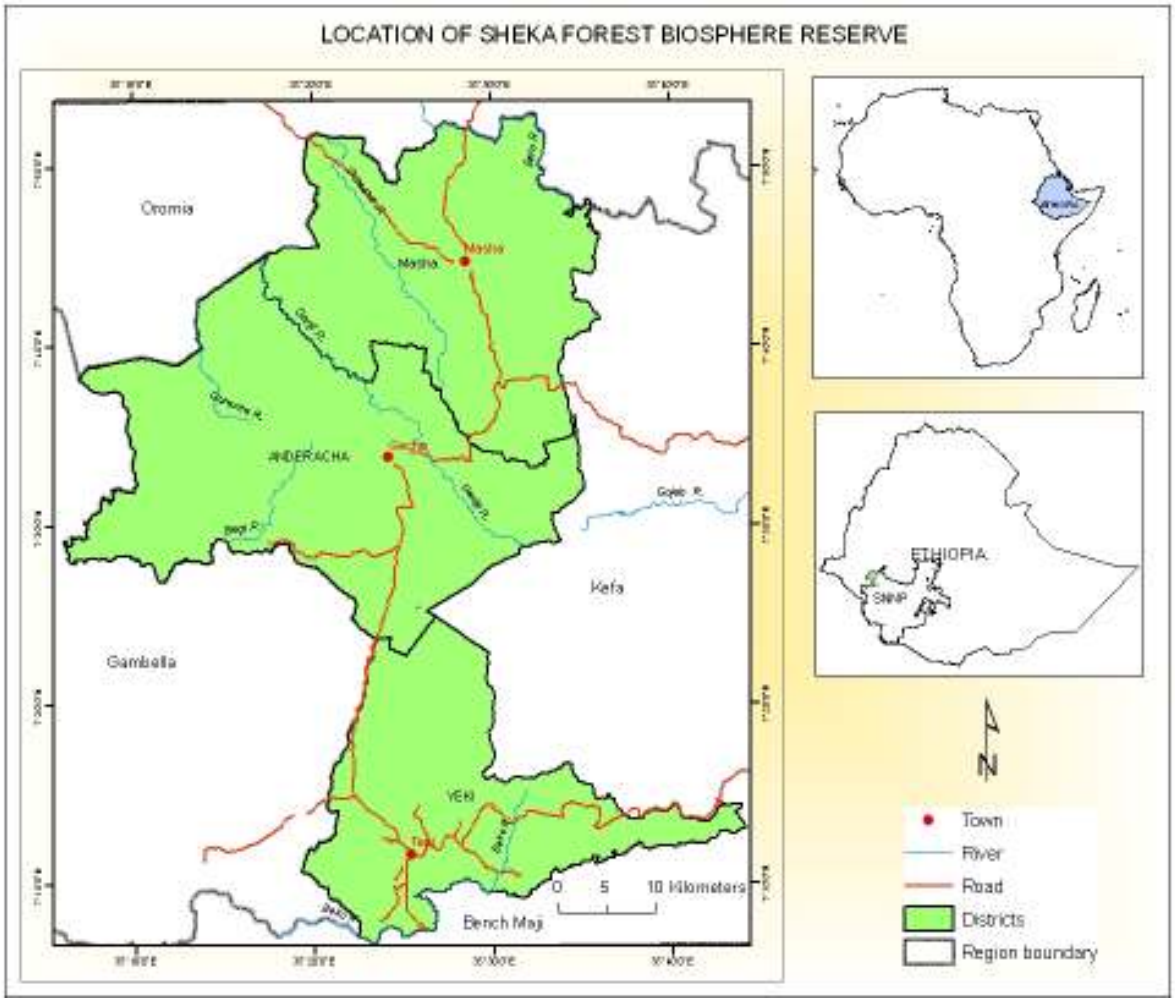
Groundwater	X	Boreal forest systems	
Habitat issues	X	Breeding	X
Heavy metals		Coastal/marine systems	
Hydrology	X	Community studies	X
Indicators	X	Conservation	X
Meteorology		Coral reefs	
Modeling	X	Degraded areas	X
Monitoring/methodologies	X	Desertification	
Nutrients		Dune systems	
Physical oceanography		Ecology	X
Pollution, pollutants		Ecosystem assessment	X
Siltation/sedimentation		Ecosystem functioning/structure	X
Soil	X	Ecotones	X
Speleology		Endemic species	X
Topography		Ethology	
Toxicology		Evapotranspiration	
UV radiation		Evolutionary studies/Palaeoecology	X
		Fauna	X
		Fires/fire ecology	X
		Fishes	X
		Flora	X
		Forest systems	X
		Freshwater systems	X
		Fungi	X
		Genetic resources	X
		Genetically modified organisms	
		Home gardens	X
		Indicators	X
		Invertebrates	
		Island systems/studies	
		Lagoon systems	
		Lichens	X
		Mammals	X
		Mangrove systems	
		Mediterranean type systems	
		Microorganisms	
		Migrating populations	X
		Modeling	X
		Monitoring/methodologies	X
		Mountain and highland systems	X
		Natural and other resources	Xx
		Natural medicinal products	X
		Perturbations and resilience	X
		Pests/Diseases	
		Phenology	X
		Phytosociology/Succession	X
		Plankton	
		Plants	X
		Polar systems	

		Pollination	X
		Population genetics/dynamics	X
		Productivity	X
		Rare/Endangered species	X
		Reptiles	
		Restoration/Rehabilitation	X
		Species (re) introduction	X
		Species inventorying	X
		Sub-tropical and temperate rainforest	
		Taxonomy	
		Temperate forest systems	
		Temperate grassland systems	
		Tropical dry forest systems	X
		Tropical grassland and savannah systems	X
		Tropical humid forest systems	X
		Tundra systems	
		Vegetation studies	X
		Volcanic/Geothermal systems	
		Wetland systems	X
		Wildlife	X

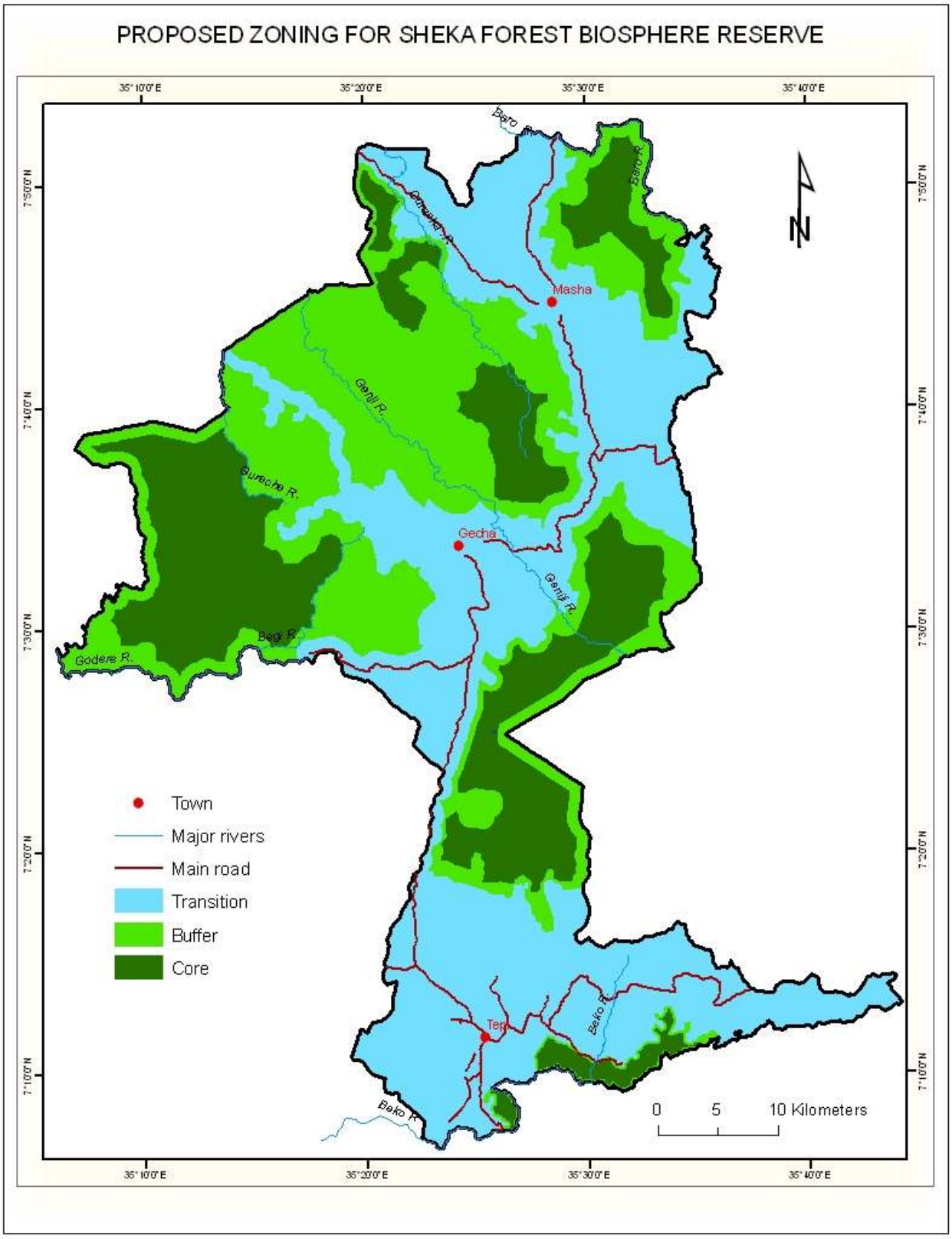
Socio-economic		Integrated monitoring	
Agriculture/Other production systems		Biogeochemical studies	
Agroforestry	X	Carrying capacity	X
Anthropological studies	X	Conflict analysis/resolution	X
Aquaculture	X	Ecosystem approach	X
Archaeology		Education and public awareness	X
Bioprospecting	X	Environmental changes	X
Capacity building	X	Geographic Information System (GIS)	X
Cottage (home-based) industry	X	Impact and risk studies	X
Cultural aspects	X	Indicators	X
Demography		Indicators of environmental quality	X
Economic studies	X	Infrastructure development	
Economically important species	X	Institutional and legal aspects	X
Energy production systems		Integrated studies	X
Ethnology/traditional practices/knowledge	X	Interdisciplinary studies	X
Firewood cutting	X	Land tenure	X
Fishery		Land use/Land cover	X
Forestry	X	Landscape inventorying/monitoring	X
Human health	X	Management issues	X
Human migration	X	Mapping	X
Hunting	X	Modeling	X
Indicators	X	Monitoring/methodologies	X
Indicators of sustainability	X	Planning and zoning measures	X
Indigenous people's issues	X	Policy issues	X
Industry		Remote sensing	X
Livelihood measures	X	Rural systems	X
Livestock and related impacts	X	Sustainable development/use	X
Local participation	X	Transboundary issues/measures	X
Micro-credits		Urban systems	X
Mining		Watershed studies/monitoring	X
Modeling	X		
Monitoring/methodologies	X		
Natural hazards			
Non-timber forest products	X		
Pastoralism			
People-Nature relations	X		
Poverty	X		
Quality economies/marketing	X		
Recreation	X		
Resource use	X		
Role of women	X		
Sacred sites	X		
Small business initiatives	X		
Social/Socio-economic aspects	X		
Stakeholders' interests	X		
Tourism	X		
Transports			

Appendices

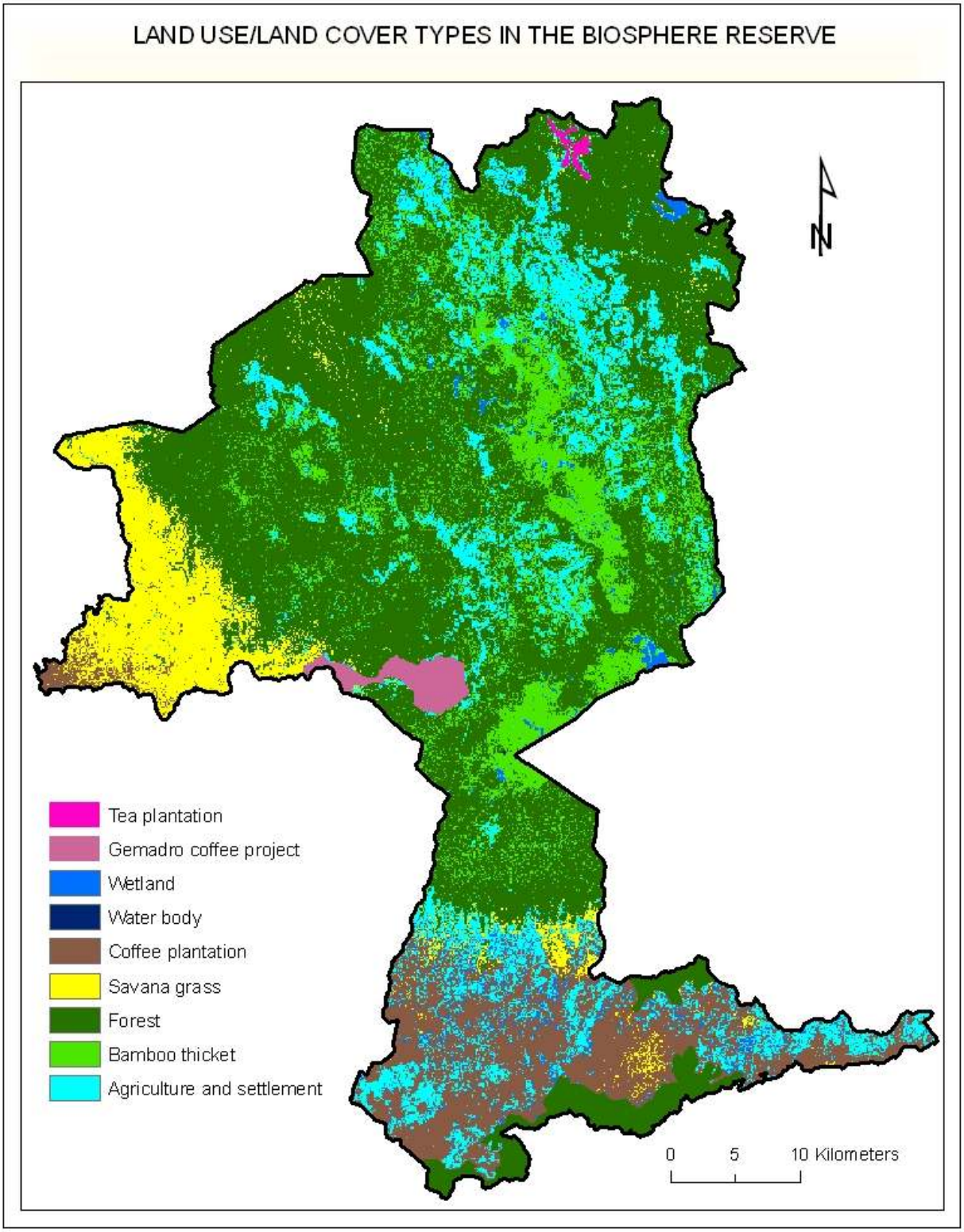
Appendix 1. General Location Map



Appendix 2. Biosphere Reserve Zonation Map



Appendix 3. Land Cover Map



Appendix 4. List of Legal Documents

- Sheka Forest Reserve Establishment Regulation, SNNP Regional State (soon to be enacted)
- The Constitution of the Federal Democratic Republic of Ethiopia (1995).
- Environmental Protection Organs Establishment Proclamation No. 295/2002
- The Federal Rural Land Administration and Land Use Proclamation No. 456/2005
- The Federal Forest Development, Conservation and Utilization Proclamation No.542/2007
- SNNP Rural Land Use and Administration Proclamation 56/2002
- SNNP Rural Land Use and Administration Regulation No. 39/2003

Appendix 5 Management Guidelines for Sheka Forest Biosphere Reserve

1. INTRODUCTION

This guideline helps government and forest users make informed management decisions about the forested landscape in Sheka zone which is to be designated as Sheka Forest Biosphere Reserve. The guideline is developed to reflect the statutory requirements to conserve biodiversity and enhance sustainable development in the area. This process focuses on social, ecological, and economic criteria. The use of these keys will help create appropriate management prescriptions for forest and other components of the Sheka Forest Biosphere Reserve management. The focus of the guideline is to confine management impacts to buffer zone and transition area of the forests so that a healthy functioning forest ecosystem is maintained in core areas.

2. THE PURPOSE OF GUIDELINES

The purpose of this management guideline is to provide consistent and coordinated guidance in conserving and sustaining the functions and values of the forest landscape through establishing Sheka Forest Biosphere Reserve. These guidelines set out specific management activities within the different management zones (biosphere reserve zones) to help balance ecological, social and economic values of the forest at the landscape level.

3. GUIDING PRINCIPLES

The guideline is developed under a set of biodiversity conservation and sustainable development management objectives. The framework includes ecological, social and economic values associated with biosphere reserve. This document and subsequent coffee forest management activities will be guided by the following principles:

- to conserve forest biodiversity and associated cultural practices
- to sustain or improve ecological function of the forest landscape
- to balance ecological, cultural, social and economic values of the forests
- to provide a framework for operating plan requirements for proposed biosphere management activities
- to provide a decision support mechanism to assist with informed decision making

4. MANAGEMENT ZONES OF THE BIOSPHERE RESERVE

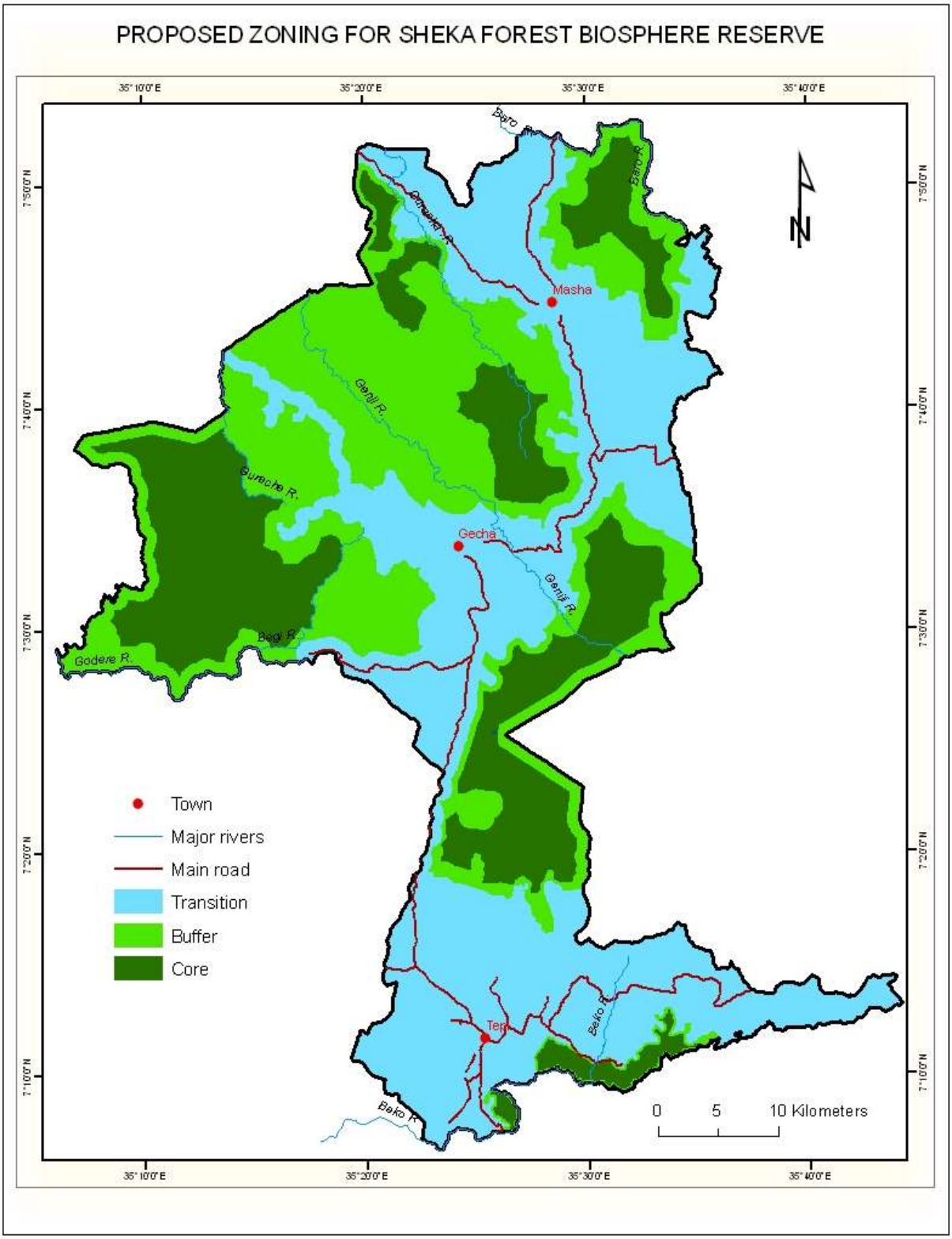
4.1 ZONING SCHEME

To achieve the aims of this guideline and to enhance the establishment of biosphere reserve in the Sheka zone, the forest landscape has been divided into three management zones (Figure 1, Table 1). These management zones include core area, buffer zone and transition area.

Core area (CA) is exclusively established for biodiversity conservation or to ensure that all plant and animal species and communities survive and flourish throughout the area;

Buffer zone (BZ) is set to buffer the core area from human interference, while allowing conservation and sustainable of forest resources; and

Transitional area (TA) will be used for a range of uses that can enhance sustainable development in the area.



Sheka Forest Biosphere reserve zonation map.

Size distribution of the different management zones

ZONE	*AREA*	*PERCENTAGE*
Core Area	55255	23.14
Buffer Zone	76395	32.00
Transition Area	107100	44.86
Total	238750	

4.2 CORE AREA (CA)

The core areas are securely protected sites for conserving biological and cultural diversity with minimal human activities - aimed at protecting the landscape, ecosystems, species, genetic resources and cultural values. The core areas are about 23.14% of the total Sheka Forest Biosphere Reserve. These core areas must be safeguarded in perpetuity as strict protection areas, and uses should be limited to cultural practices of the local community that sustained the forest to date. The restrictions on human use must be controlled and accompanied by suitable measures. Box 1 shows management guidelines in the core area

Box 1

Management guidelines in CA

Activities not recommended

- **Agricultural activities**: - Expansion of agriculture into the core areas can easily accelerate deforestation; and evidently enhances loss of plant and animal diversity or biodiversity. In order to maintain a mosaic of forest landscapes with its immense biological diversity this activity need to be avoided from the core area.
- Settlement in the area: Expansion of settlement into core areas will have a significant impact on forest and its biodiversity through forest clearance. It can also encourage new settlers once such practices started somewhere. Hence settlement is strictly forbidden in the core areas.
- **Livestock grazing**: - Livestock grazing in the core areas can affect young plants and seedlings through browsing and trampling and apparently damage the diversity and structure of the forest. Because of these reasons, livestock grazing should be restricted.
- **Reforestation using exotic trees**: - The use of exotic tree species to develop/enrich forest gaps or degraded forest areas will have ecological impacts. It can affect soil and soil microorganism, plant and animal diversity. Because of these foreseen effects, planting exotic tree species in and around the core areas is completely forbidden.
- **Any silvicultural management**: - Silvicultural systems usually focus on improving some economically important tree species and ignore/neglect some less required species. Ultimately, it can affect plant species composition and structure and promote monoculture forest types. Thus silvicultural

management is not permitted in core areas.

- **Timber harvesting and collection of dead trees:-** timber harvesting affects the compositional, structural, and functional patterns of the forest and its biodiversity. Additionally, standing dead and fallen woody material provides habitat for many species and is necessary to sustain elements of biological diversity. Hence these uses are prohibited.
- **Wild honey harvesting**: - Beekeeping and wild honey collection a very old cultural practices in the area. The whole forest in the area is divided in to blocks owned by different families and the community. Such practice has played an important role in conservation of the forest. Traditional beekeeping and wild honey collection is allowed, but with pre-cautions. Wild honey harvesting is mostly a source of wild fire in the forest. Hence, the use of fire in honey harvesting is strictly prohibited.
- **Hunting of wild animals**: - Hunting wild animals for food and other purposes, can affect the diversity of the animals. It is also not compatible with the objectives of biodiversity conservation in the core areas and hence need restriction.
- **Uses of agrochemicals and other chemicals**: - use of any chemicals in and around the core areas is strictly forbidden because of the impacts they have on the environment, e.g., on plants, soil etc.
- **Movement of heavy machinery and cars**:- the movement of heavy machineries (e.g., bull dozer) and cars can have damaging effect on the soil and associated biodiversity. Movement of these machineries in the core areas will be not allowed.
- **Quarry extraction, road construction and any other investment**: These activities affect biodiversity by changing habitat, fragmenting contiguous forest, and increasing access to a site and change the existing land use system. Hence restricted.

Management activities recommended

- Collection of non-timber forest products such as spices, wild edible fruits and traditional beekeeping without use fire during harvesting. However, any activities that gears towards improving the productivity of these forest products through management are not allowed. Collection of these forest products are only allowed without any management practices such as slashing, burning, making path and the like.
- **Enrichment planting using indigenous species**: - under certain circumstances and when believed necessary enrichment planting can be possible using only native plant species from the area.
- **Establishing research plots and demonstration sites**: - This is to understand and monitor vegetation dynamics and ecological evolution of different forest species. The area can serve as a training centers for biodiversity, ecology, botany etc. students/ researchers but with care- so that it will not affect the ecosystem.

4.3 BUFFER ZONE (BZ)

The BZ surrounds or is contiguous to the core area. This area acts as a buffer for the core areas and accommodates more human activities such as research, environmental education and training as well as tourism and recreation. Most sacred sites like *Gudo, Dedo, Checho* and Kobo forest blocks are found within the buffer zone (BZ). Besides, forests in the BZ, are important for the traditional beekeeping and other NTFPs production, which is the major sources of cash income. Within the BZ, the forests and cultural landscapes that are of high value also need protection to be safeguarded. A management plan must be drawn up in close cooperation with the people who use the areas and a system of subsidies developed that reimburses the efforts necessary for the maintenance of the area. Box 2 shows management guidelines in the buffer zone.

Box 2

Management guidelines in BZ

Management activities recommended

- **Agricultural activities**: - If there are already existing farmlands in the buffer zone these can be allowed for further use or cultivation but without any expansion. However, site preparation using fire is not allowed in order to avoid fire risks in the buffer zone or core areas.
- **Coffee production:-** In some disturbed forests in the buffer zone around Masha and Anderacha, the local community started coffee plantations under the shades of the remnant trees. On the other hand, coffee production is a well established practice in the proposed buffer zones around Yeki. It is recommended that the users maintain enough density and diversity of shade trees in the system.
- **Traditional honey production**: - As honey is the second most important income sources for the local communities in the area, traditional or modern honey production is allowed. However, in order to reduce risk of fire and related impacts during beehive hanging or honey harvesting the practices should be highly controlled. Gradual transformation of the production system to modern and transitional beehives is also recommended for improved quality and quantity.
- **Extraction of non-timber forest products**:- Extraction of spices, wild edible fruits and climbers are allowed in the buffer zone. Domestication of spices mainly *Aframomum corrorima* and *Piper capense* is also possible.
- **Fuel wood collection**:- dead wood collection for fuel wood is possible but it should be with care -as it can affect biodiversity.
- **Reforestation:-** Restoration, rehabilitation or enrichment of degraded forest land can be possible in the buffer zone using native plants only.
- **Establishing research plots and demonstration sites**:- to understand vegetation dynamics and land use changes or related issues establishing research plots or demonstration sites is possible in the buffer zone.
- **Tourism and education centers**:- tourists and students are allowed to visit or making a research. Education trips or trainings can also be possible within buffer zone with limited number participants at a time in order to reduce human impacts in the zone.

Activities not recommended

- **Settlement**:- Expansion of settlements into buffer zone is not allowed as it has impact on the biodiversity. It can also encourage new settlers once such practices started somewhere. Hence settlement expansion is strictly forbidden in the buffer zone.
- Farming wetlands and deforesting riverine forests or river banks are also not allowed.
- Burning of crop residues and forests during land preparation- affect soil and microorganisms
- Polluting rivers using wet coffee processing or through other means
- **Timber harvesting**:-Timber harvesting is not allowed in the buffer zone as it has damaging effect on the ecosystem during harvesting. But harvesting man-made plantation around home garden is possible.
- Over exploitation of endangered tree species is not allowed, e.g., *Prunus africana*
- Hunting of wild animals: - Hunting of wild animals is not allowed except only when it is believed necessary to reduce the population of vermin animals.
- Number of shade trees should not be lower than 200 trees/ha for dbh $\geq$ 10 cm which is equivalent to 1 tree per 50 m^2.
- Number of seedlings/saplings should not be lower than 200 individuals per ha which equivalent to 1 seedlings 50 m^2.
- Number of shade tree species should not be lower than 20 species per ha which is equivalent to 1 species per 500 m^2.
- Planting exotic trees: - The use of exotic tree species to develop/enrich forest gaps or degraded forest areas will have an ecological impacts in the long run. Planting exotic tree species in and around the buffer zone is forbidden.
- Uses of pesticides and other chemicals: - use of any agrochemicals in and around the buffer zone is strictly forbidden because of the impacts they have on the environment, e.g., on plants, soil etc.
- Movement of heavy machinery and cars:- the movement of heavy machineries (e.g., bull dozer) and cars can have damaging effect on the soil and associated resources including plants. Hence, movement of these machineries in the buffer zone should be minimized.
- Quarry extraction and any other investment that changes the land use system need restriction.

4.4 TRANSITION AREA (TA)

This area will contain a variety of agricultural activities, human settlements and other land uses; and has great economic and social significance for regional development. Local communities and other stakeholders must work together to manage and sustainably develop the area's resources for the benefit of the people who live there. By employing innovative sustainable economic and human use practices, the transitional area should set paradigmatic standards for the entire region with regard to agriculture and forestry, crafts, trade and industry, as well as culture and education. Box 3 shows management guidelines in the transitional area ..

Box 3
Management guidelines in TA

Management activities recommended

- Intensive agricultural activities
- Livestock development and grazing
- Coffee management
- Collection of firewood or fuel wood
- Settlements and schools
- Establishing coffee washing machine, preferably eco-friendly types in order to minimize pollution.
- Establishing all necessary infrastructure
- Traditional extractive uses of spices, wild edible fruits and medicinal plants
- Domestication of spices and traditional medicinal plants
- Establishing forest plantation using native species
- Planting native and exotic multipurpose plant species
- Establishing tourism and education centers
- Wild honey harvesting and modern apiculture management
- Hunting of wild animals if necessary
- Maintenance of at least 10 to 20 trees on farms

Activities not recommended

- Farming and/or deforesting riverine forests or river banks and wetlands
- Burning of crop residues and forest fragments during land preparation
- Expansion of large-scale forest plantation using exotic species
- Expansion of large scale tea or coffee plantation
- Introduction of improved coffee varieties into exiting farming system
- Over exploitation of endangered tree species, e.g., *Prunus africana*
- Polluting rivers through wet coffee processing or other means
- Misuse of or change of historical landscapes or places, e.g., Abba Gada place
- Removal of vegetation that may cause damage to the historic place
- Establishing factories that damage the existing landscape and also encourage immigration of people
- Quarry extraction and any other investment that changes the existing land use system
- Restricting mining, and other investment in the area
- Uncontrolled waste disposal

5. PROCEDURES FOR IMPLEMENTATION

- The guidelines will be implemented by the zonal and woreda level Management Unit (MU) and village level Management Steering Committee. In order to implement the developed guidelines the following steps are required;
- Zonal Sheka Forest Biosphere Reserve Management Unit should be established,
- Sheka Forest Biosphere Reserve Management Steering Committee (SC) should be established at village level.
- There should be a clearly identified management zones in order to implement the guidelines.
- Sheka Forest Biosphere Reserve Management Unit should agree on the guidelines first.
- Once the MU accept the guidelines, the idea should be communicated to the SC and to the local communities for any feedback.

- A memorandum of understanding (MOU) should be signed between the SC and the villager representative to ensure smooth working relationship and implementation. The MOU should define/state the procedures required.
- The MU must supervise for the appropriate implementation of the guidelines.
- A memorandum of understanding (MOU) should also be signed between the MU and MSC as to how to follow-up the implementation process on the ground.
- There should also be a written statement that supports the guidelines from the variety of public and private organizations.
- There should be a bimonthly meeting between the local MU and MSC to exchange ideas on the implementation process.
- Annual plans should be jointly developed between the two MU and SC.
- Local communities should be informed about the penalty in case of any rule break.

6. MODIFICATION OF THE GUIDELINES

This use rules is not intended to be a comprehensive treatment of every management guideline practice that pertains to every situation - specific sets of circumstances may necessitate further research or consultation to determine the most appropriate management practice to achieve the BR management outcome desired. Based on the consultation of the implementing parties, this guideline can be changed or modified when deemed necessary.

7. SANCTIONS

In case of any diminution of the guidelines indicated for each zone or areas, sanction will be imposed. The sanction will be according to the Ethiopian Proclamation No. 542/2007; a proclamation that provide for the development, conservation and utilization of forests. According to *PART FOUR no 20* of this proclamation, a person can be punishable with greater penalty in case of any misuse in any state forests. Accordingly, the following the criminal law is applicable:

- Except pursuant to this proclamation and directives issued herein under, cuts trees or removes, processes or uses in any way forest products from a state forest shall be punishable with not less than 1 year and not exceeding 5 years imprisonment and with fine Birr 10,000;
- Destroy, damages and falsify forest boundary marks shall be punishable with not less than 1 year and not exceeding 5 years rigorous imprisonment;
- Causes damage to a forest by setting fire or in any other manner shall be punishable with not less than 10 years and not exceeding 15 years rigorous imprisonment;
- Settles or expands farmland in a forest area without permit or undertakes the construction of any infrastructure in a forestland without having the necessary permit shall be punishable with not less than 2 years imprisonment and with fine Birr 20,000;
- Provides assistance in any form to those who illegally cut forest trees or transport forest products to hide or take away the forest products shall be punishable with 5 years imprisonment.

8. MANAGEMENT AND MONITORING

The ultimate success of these guidelines is contingent upon successful management and monitoring of its impact. Adequate capacity to manage, monitor and enforce measures rests in part on MU and the BR management steering committee at village level. The impact of these processes can be assessed annual by joint mission between MU and the BR management steering committee at village level and the local communities. An understanding of the impact of threatening processes on the BR can be evaluated through observing distribution, structure and species composition of ecosystems.

Appendix 6. Lists of major plant species in the proposed Sheka Forest Biosphere Reserve area

No.	Scientific name	Family name	Life form	Status
1	*Abutilon cecilii* N.E.Br.	Malvaceae	Shrub	
2	*Acacia abyssinica* Hochst. ex Benth	Fabaceae	Tree	
3	*Acalypha acrogyna Pax*	Euphorbiaceae	Shrub	
4	*Acalypha marissima* M. Gilbert	Euphorbiaceae	Shrub	E[3]
5	*Acalypha psilostachya* Hochst.	Euphorbiaceae	Shrub	
6	*Acalypha racemosa* Baill.	Euphorbiaceae	Shrub	
7	*Acanthus eminens* C.B.Cl	Acanthaceae	Shrub	
8	*Acanthus sennii* Chiov.	Acanthaceae	Shrub	
9	*Achyranthes aspera* L.	Amaranthaceae	Shrub	
10	*Achyrospermum schimperi* (Hochst. ex Briq) Perkins	Labiatae	Shrub	
11	*Aframomum corrorima* (Braun) Jansen	Zingiberaceae	Herb	E
12	*Ageratum conyzoides* L.	Asteraceae	Herb	
13	*Albizia grandibracteata* Taub.	Fabaceae	Tree	
14	*Albizia gummifera* (J. F. Gmel.) C.A.Sm.	Fabaceae	Tree	
15	*Alchornea laxiflora* (Benth.) Pax & Hoffm.	Euphorbiaceae	Shrub	
16	*Allophylus rubifolius* (Hochst. Ex A. Rich) Engl	Sapindaceae	Tree	
17	*Amorphophallus abyssinicus* (A. Rich.) N.E. Br.	Araceae	Herb	
18	*Amorphophallus gallaensis* (Engl.) N.E. Br	Araceae	Herb	E
19	*Aneilema aequinoctiale* (P.Beauv.) G.Don	Commelinaceae	Herb	
20	*Aneilema beniniense* (P. Beauv.) Kunth	Commelinaceae	Herb	
21	*Aneilema leiocaule* K. Schum.	Commelinaceae	Herb	
22	*Aneilema recurvatum* Faden	Commelinaceae	Herb	
23	*Antiaris toxicaria* Lesch	Moraceae	Tree	
24	*Apodytes dimidiata* E. Mey. ex Arn.	Icacinaceae	Tree	
25	*Arisaema flavum* (Forssk.) Schott	Araceae	Herb	
26	*Arisaema schimperannum* Schott	Araceae	Herb	
27	*Arundinaria alpina* L.	Gramineae	Shrub	
28	*Asparagus africanus* Lam.	Asparagaceae	Climber	
29	*Asparagus officinalis* L.	Asparagaceae	Epiphyte	
30	*Asplenium aethiopicum* (Burm. F.) Becherer	Aspleniaceae	Epiphyte	
31	*Asplenium sandersonii* Hook	Aspleniaceae	Epiphyte	
32	*Berkheya chiesiana* Chiov.	Asteraceae		E
33	*Bersama abyssinica* Fresen	Melianthaceae	Tree	
34	*Blighia unijugata* Bak.	Sapindaceae	Tree	
35	*Bothriocline fusca* Oliv. & Hiern	Asteraceae	Shrub	
36	*Bothriocline schimperi* Oliv. & Hiern ex Benth	Asteraceae	Shrub	E
37	*Bridelia micrantha* (Hochst.)Baill.	Euphorbiaceae	Tree	
38	*Brillantaisia grotanellii* Pichi-Sermoli	Acanthaceae	Herb	E
39	*Brillantaisia madagascariensis* Lindau.	Acanthaceae	Herb	
40	*Bothriocline schimperi* Oliv. & Hiern. ex Benth.	Asteraceae	Shrub	E
41	*Brucea antidysenterica* J.F.Mill.	Simaroubaceae	Tree	
42	*Buddlea polystachya* Fresen.	Loganiceae	Shrub	
43	*Bulbophyllum intertextum* Lindl.	Orchidaceae	Epiphyte	
44	*Bulbophyllum sandersonii* (Hook.f.)Rchb.f.	Orchidaceae	Epiphyte	
45	*Bulbostylis abortiva* (Steud.) C.B. Clarke	Cyperaceae	Herb	
46	*Bulbostylis densa* (Wall.) Hand-Mazz.	Cyperaceae	Herb	
47	*Caesalpinia decapetala* (Roth)Alston	Fabaceae	Climber	
48	*Canna indica* L.	Cannaceae	Herb	
49	*Canthium oligocarpum* Hiern	Rubiaceae	Tree	

[3] The 'E' in Appendix 6 stands for '**Endemic species'**- those species with their ecological distribution restricted within Ethiopian boundaries.

50	*Capparis micrantha* A. Rich.	Capparidaceae	Shrub	
51	*Capparis tomentosa* Lam.	Capparidaceae	Climber	
52	*Capsicum frutescens* L.	Solanaceae	Herb	
53	*Cardamine africana* L.	Brassicaceae	Herb	
54	*Cassipourea malosana* (Baker) Alston	Rhizophoraceae	Tree	
55	*Cassytha filiformis* L.	Lauraceae	Herb	
56	*Celosia trigyna* L.	Amaranthaceae	Herb	
57	*Celtis africana* Burm.f.	Ulmaceae	Tree	
58	*Ceropegia recurvata* M.G. Gilbert	Asclepidaceae	Climber	E
59	*Ceropegia sobolifera* N.E.Br	Asclepidaceae	Climber	E
60	*Chenopodium procerum* Moq.	Chenopodiaceae	Herb	
61	*Chionanthus mildbraedii* (Gilg & Schellenb.) Stearn	Oleaceae	Shrub	
62	*Chlorophytum macrophyllum* (A. Rich.) Aschers	Anthericaeae	Herb	
63	*Chlorophytum tuberosum* (Roxb.) Baker	Anthericaeae	Herb	
64	*Cissus ellenbeckii Gilg & Brandt*	Vitaceae	Shrub	
65	*Cissus quadrangulanis* L.	Vitaceae	Climber	
66	*Clausena anisata* (Willd.) Benth.	Rutaceae	Tree	
67	*Clematis longicauda* Steud. ex A. Rich.	Ranunculaceae	Climber	
68	*Clerodendrum alatum* L.	Verbenaceae	Shrub	
69	*Clerodendrum myricoides* (Hochst.) Vatke	Verbenaceae	Shrub	
70	*Coccinia schliebenii* Harms.	Cucurbitaceae	Climber	
71	*Coffea arabica* L.	Rubiaceae	Tree	
72	*Coleochloa abyssinica* (Hochst. ex A.Rich.)Gilly	Cyperaceae	Epiphyte	
73	*Combretum paniculatum* Vent.	Combretaceae	Climber	
74	*Commelina eckloniana* Kunth	Commelinaceae	Herb	
75	*Commelina foliacea* Chiov.	Commelinaceae	Herb	
76	*Commelina latifolia* Hochst. ex A. Rich.	Commelinaceae	Herb	
77	*Cordia africana* Lam.	Boraginaceae	Tree	
78	*Corymborkis corymbis* Thouars	Orchidaceae	Herb	
79	*Costus afer* Ker-Gawl	Costaceae	Herb	
80	*Crassocephalum montuosum* (S. Moore) Milne-Redh.	Asteraceae	Herb	
81	*Crinum ornatum* (Ait.) Bury	Amaryllidaceae	Herb	
82	*Crossopteryx febrifuga* (Hochst.) Bridson	Rubiaceae	Shrub	
83	*Crotalaria agatiflora,* Schweinf.	Fabaceae	Shrub	E
84	*Crotalaria exaltata* Polhill	Leguminosae	Tree	E
85	*Crotalaria gillettii,* Polhill	Fabaceae	Herb	E
86	*Crotalaria intonsa* Polhill	Leguminosae	Shrub	E
87	*Crotalaria rosenii* (Pax) Milne-Redh. ex Polhill	Leguminosae	Shrub	E
88	*Croton macrostachyus* Del.	Euphorbiaceae	Tree	
89	*Culcasia falcifolia* Engl.	Araceae	Climber	
90	*Cussonia ostinii* Chiov.	Araliaceae	Tree	E
91	*Cyathea manniana* Hook.	Cyatheaceae	Shrub	
92	*Cynanchum abyssinicum* Decne	Asclepidaceae	Climber	
93	*Cyperus bifolius* Lye	Cyperaceae	Sedges	E
94	*Cyperus cyperoides* (L.) Kuntze	Cyperaceae	Sedges	
95	*Cyperus dichroostachyus* A. Rich.	Cyperaceae	Sedges	
96	*Cyperus digitatus* Roxb.	Cyperaceae	Sedges	
97	*Cyperus erectus* (Schum.) Mattf. & Kuk.	Cyperaceae	Sedges	
98	*Cyperus esculentus* L.	Cyperaceae	Sedges	
99	*Cyperus macrostachyos* Lam.	Cyperaceae	Sedges	
100	*Cyperus papyrus* L.	Cyperaceae	Sedges	
101	*Cyperus pauper* Hochest. Ex A. Rich	Cyperaceae	Sedges	

102	*Cyperus pectinatus* Vahl.	Cyperaceae	Sedges	
103	*Cyperus submacropus* Kuk	Cyperaceae	Sedges	
104	*Cyphostemma adenocaule* (Steud. Ex A. Rich.) Descoings	Vitaceae	Climber	
105	*Cyphostemma dembianense* (Chiov.) Vollesen	Vitaceae	Climber	
106	*Cyphostemma pannosum* Vollesen	Vitaceae	Climber	E
107	*Dalbergia lactea* Vatke	Fabaceae	Climber	
108	*Daucus hochstetteri* Braun ex Drude	Apiaceae	Herb	
109	*Desmodium hirtum* Guill. & Perr	Fabaceae	Herb	
110	*Desmodium repandum* (Vahl) DC	Fabaceae	Herb	
111	*Dioscorea alata* L.	Dioscoreaceae	Climber	
112	*Dioscorea bulbifera* L.	Dioscoreaceae	Climber	
113	*Dioscorea praehensilis* Benth.	Dioscoreaceae	Climber	
114	*Dioscorea schimperiana* Kunth	Dioscoreaceae	Climber	
115	*Diospyros abyssinica* (Hiern) F. White	Ebenaceae	Tree	
116	*Dissotis decumbens* (P. Beauv.) Triana	Melastomataceae	Herb	
117	*Dombeya aethiopica* Gilli	Sterculiaceae	Tree	E
118	*Dombeya kefaensis* Friis & Bidgood	Sterculiaceae	Shrub	E
119	*Dombeya torrida* (J.F.Gmel.) P. Bamps	Sterculiaceae	Tree	
120	*Dorstenia barnimiana* Schweinf.	Moraceae	Herb	
121	*Dorstenia soerensenii* Friis	Moraceae	Herb	E
122	*Doryopteris concolor* (Langsd. & Fisch.) Kuhn	Adiantaceae	Herb	
123	*Dracaena afromontana* Mildbr.	Dracaenaceae	R-Tree	
124	*Dracaena fragrans* (L.) Ker-Gawl	Dracaenaceae	R-Tree	
125	*Dracaena steudneri* Engler	Dracaenaceae	R-Tree	
126	*Dregea abyssinica* (Hochst.) K.Schum	Asclepidaceae	Climber	
127	*Droguetia iners* (Forssk.) Schweinf.	Urticaceae	Herb	
128	*Drymaria cordata* (L.) Schultes in Roem. & Schultes	Caryophyllaceae	Climber	
129	*Drynaria volkensii* J. Sm	Polypodiaceae	Epiphyte	

130	*Echinops longisetus* A. Rich	Asteraceae	Shrub	E
131	*Ehretia cymosa* Thonn.	Boraginaceae	Tree	
132	*Ekebergia capensis* Sparrm.	Meliaceae	Tree	
133	*Elaeodendron buchananii* (Loes) Loes.	Celastraceae	Tree	
134	*Elaphglossum deckenii* (Kuhn) C. Chr.	Lomariopsidaceae	Epiphyte	
135	*Elatostema monticolum* Hook.f.	Urticaceae	Herb	
136	*Embelia schimperi* Vatke	Myrsinaceae	Climber	
137	*Ensete ventricosum* (Welw.) Cheesman	Musaceae	R-Tree	
138	*Entada abyssinica* Steud. ex A.Rich.	Fabaceae	Tree	
139	*Eriosema scioanum* Avetta	Fabaceae	Herb	E
140	*Erythrina brucei* Schweinf.	Fabaceae	Tree	
141	*Erythrina abyssinica* Lam. ex DC	Fabaceae	Tree	
142	*Eugenia bukobensis* Engl.	Myrtaceae	Tree	
143	*Eulopia albobrumea* Kraenzl	Orchidaceae	Herb	E
144	*Eulophia cucullata* (Sw.) Steud.	Orchidaceae	Herb	
145	*Euphorbia ampliphylla* Pax	Euphorbiaceae	R-Tree	
146	*Euphorbia schimperiana* Sheele	Euphorbiaceae	R-Tree	
147	*Fagaropsis angolensis* (Engl.) Milne	Rutaceae	Tree	
148	*Ficus capreaefolia* Del	Moraceae	Tree	
149	*Ficus exasperata* Vahl.	Moraceae	Tree	
150	*Ficus sur* Forssk.	Moraceae	Tree	
151	*Ficus sycomorus* L.	Moraceae	Tree	
152	*Ficus thonningii* Blume	Moraceae	Tree	
153	*Ficus vallis-choudae* Del.	Moraceae	Tree	
154	*Ficus vasta* Forssk.	Moraceae	Tree	
155	*Flacourtia indica* (Burm.f.) Merr.	Flacourtiaceae	Tree	
156	*Galiniera saxifraga* (Hochst.) Bridson	Rubiaceae	Tree	
157	*Galinsoga parviflora* Cav.	Asteraceae	Herb	

158	*Galium simense* Fresen.	Rubiaceae	Herb	
159	*Galium spurium* L.	Rubiaceae	Herb	
160	*Gardenia ternifolia* Schumach. & Thonn.	Rubiaceae	Tree	
161	*Geophila repens* (L.)J. M. Johnston	Rubiaceae	Herb	
162	*Geranium aculeolatum* Oliv.	Geraniaceae	Herb	
163	*Girardinia diversifolia* (Link) Friis	Urticaceae	Herb	
164	*Gloriosa superb*a L.	Colchicaceae	Herb	
165	*Gompherena celosioides* Mart.	Amaranthaceae	Herb	
166	*Gomphocarpus fruticosus* (L.) Ait.f.	Asclepidaceae	Herb	
167	*Gomphocarpus semilunatus* A. Rich.	Asclepidaceae	Herb	
168	*Gouania longispicata* Engl.	Rhamnaceae	Climber	
169	*Grewia ferruginea* Hochst. Ex A. Rich.	Tiliaceae	Tree	
170	*Habenaria cirrhata* (Lindl.) Rchb.f.	Orchidaceae	Herb	
171	*Habenaria cornuta* Lindl.	Orchidaceae	Herb	
172	*Habenaria holubii* Rolfe	Orchidaceae	Herb	
173	*Habenaria malacophylla* A.Rich.	Orchidaceae	Epiphyte	
174	*Habenaria schimperiana* A. Rich.	Orchidaceae	Epiphyte	
175	*Hallea rubrostipulata* (K. Schum.) J. F. Leroy	Rubiaceae	Tree	
176	*Hibiscus calyphyllus* Cavan.	Malvaceae	Shrub	
177	*Hibiscus diversifolius* A. Rich.	Malvaceae	Shrub	
178	*Hibiscus ludwigii* Eckl. & Zeyh	Malvaceae	Shrub	
179	*Hibiscus micranthus* L. F.	Malvaceae	Shrub	
180	*Hilleria latifolia* (Lam.) H. Walter	Phytolaccaceae	Herb	
181	*Hippocratea africana* (Willd.) Loes.	Celastraceae	Climber	
182	*Hippocratea goetzei* Loes	Celastraceae	Climber	
183	*Hippocratea pallens* Planchon. ex Oliver	Celastraceae	Climber	
184	*Hydrocotyle mannii* Hook.f	Apiaceae	Herb	
185	*Hydrocotyle ranunculoides* L.f.	Apiaceae	Herb	

186	*Hymenodictyon floribundum* (Hochst. & Steud.) Robinson	Rubiaceae	Shrub	
187	*Hypoestes forskaoli* (Vahl) Röm. & Schultes	Acanthaceae	Herb	
188	*Hypoestes triflora* (Forssk.) Röm & Schult	Acanthaceae	Herb	
189	*Ilex mitis* (L.) Radlk.	Aquifoliaceae	Tree	
190	*Impatiens ethiopica* Grey-Wilson	Balsaminaceae	Herb	
191	*Impatiens hochstetteri* Warb.	Balsaminaceae	Herb	
192	*Impatiens rothii* Hook.f.	Balsaminaceae	Herb	E
193	*Ipomoea cairica* (L.) Sweet	Convolvulaceae	Climber	
194	*Ipomoea hochstetteri* House	Convolvulaceae	Climber	
195	*Ipomoea tenuirostris* Steud. ex Choisy	Convolvulaceae	Climber	
196	*Jasminum abyssinicum* Hochst. ex Dc	Oleaceae	Climber	
197	*Justicia betonica* L.	Acanthaceae	Shrub	
198	*Justicia bizuneshiae* Ensermu	Acanthaceae	Herb	E
199	*Justicia diclipteroides* Lindau subsp. *aethiopica* Hedren	Acanthaceae	Herb	E
200	*Justicia schimperiana* (Hochst. ex A.Rich.) T. Anders	Acanthaceae	Shrub	
201	*Kalancoe densiflora* Rolfe	Crassulaceae	Herb	
202	*Keetia gueinzii* (Sond.) Bridson	Rubiaceae	Climber	
203	*Keetia zanzibarica* (Klozsch) Bridson	Rubiaceae	Climber	
204	*Kniphofia pumila* (Ait.) Kunth	Asphodelaceae	Herb	
205	*Lagenaria abyssinica* (Hook. f.) Jeffrey	Cucurbitaceae	Climber	
206	*Laggera crispata (D. Don) Oliv*	Asteraceae	Herb	
207	*Laggera tomentosa* (Sch.Bip. ex A.Rich.)Oliv. & Hiern	Asteraceae	Herb	E
208	*Landolphia buchananii* (Hall.f.) Stapf	Apocynaceae	Climber	
209	*Lannea welwitschii* (Hiern) Engl.	Anacardiaceae	Tree	
210	*Lecaniodiscus. fraxinifolius* Bak.	Sapindaceae	Tree	
211	*Lepidotrichilia volkensii* (Gurke) Leroy	Meliaceae	Shrub	
212	*Leptaspis zeylanica* Nees ex Steud.	Gramineae	Sedges	
213	*Leucas urticifolia* (Vahl)Sm.	Labiatae	Shrub	

214	*Liparis abyssinica* A. Rich.	Orchidaceae	Herb	E
215	*Liparis deistelii* Schltr.	Orchidaceae	Herb	
216	*Lipocarpha nana* (A. Rich.) Cherm.	Cyperaceae	Sedges	
217	*Lippia adoensis* Hochst. ex Walp.	Verbenaceae	Shrub	E
218	*Lobelia exilis*	Lobeliaceae	Herb	E
219	*Lobelia giberroa* Hemsl.	Lobeliaceae	R-Tree	
220	*Lonchocarpus laxiflors* Guill. & Perr.	Fabaceae	Tree	
221	*Lotus discolor* E. Mey	Fabaceae	Shrub	
222	*Loxogramme lanceolata* (Sw.) Presl.	Loxogrammaceae	Epiphyte	
223	*Lycopodium clavatum* L.	Lycopodiaceae	Epiphyte	
224	*Macaranga capensis* (Baill.) Sim	Euphorbiaceae	Tree	
225	*Maesa lanceolata* Forssk.	Myrsinaceae	Tree	
226	*Malaxis weberbaueriana* (Kraenzl.) Summerh	Orchidaceae	Herb	
227	*Manilkara butugi* Chiov.	Sapotaceae	Tree	
228	*Marantochloa leucantha* (K. schum.) Milne-Redh.	Gramineae	Herb	
229	*Maytenus arbutifolia* (A. Rich.) Wilczek	Celastraceae	Shrub	
230	*Maytenus gracilipes* (Welw. Ex Oliv.) Exell	Celastraceae	Shrub	
231	*Maytenus obscura* (A. Rich.) Cuf.	Celastraceae	Shrub	
232	*Metarungia pubinervia* (T. Anders) Baden	Acanthaceae	Shrub	
233	*Microcoelia globulosa* (Hochst.) L. Johsson.	Orchidaceae	Epiphyte	
234	*Microglossa pyrifolia* (Lam.) Kuntze	Asteraceae	Climber	
235	*Milicia excelsa* (Welw.) C. C. Berg	Moraceae	Tree	
236	*Millettia ferruginea* (Hochst.) Bak.	Fabaceae	Tree	
237	*Mimosa pigra* L.	Fabaceae	Herb	
238	*Mimusops Kummel* A. DC.	Sapotaceae	Tree	
239	*Momordica foetida* Schumach	Cucurbitaceae	Climber	
240	*Morus mesozygia* Stapf	Moraceae	Tree	
241	*Myrsine africana* L.	Myrsinaceae	Shrub	

242	*Nervilia bicarinata* (Bl.)Schltr.	Orchidaceae	Herb	
243	*Ocimum lamiifolium* Hochst. ex Benth.	Labiatae	Shrub	
244	*Ocimum urticifolium* Roth	Labiatae	Shrub	
245	*Oldenlandia capensis* l.f.	Rubiaceae	Herb	
246	*Oldenlandia corymbosa* L.	Rubiaceae	Herb	
247	*Oldenlandia goreensis* (DC.) Summerh	Rubiaceae	Herb	
248	*Olea capensis* L. ssp. macrocarpa (C. H. Wright) Verdc.	Oleaceae	Tree	
249	*Olea welwitschii* (Knobl.) Gilg & Schellenb.	Oleaceae	Tree	
250	*Oleandra distenta* Kunze	Oleandraceae	Epiphyte	
251	*Olinia rochetiana* A. Juss.	Oliniaceae	Tree	
252	*Olyra latifolia* L.	Gramineae	Sedges	
253	*Oncinotis tenuiloba* Stapf	Apocynaceae	Climber	
254	*Oplismenus hirtellus* (L.) P. Beauv.	Gramineae	Sedges	
255	*Oplismenus undulatifolius* (Ard.) Roem. & Schult.	Gramineae	Sedges	
256	*Oxalis corniculata* L.	Oxalidaceae	Herb	
257	*Oxalis procumbens* Steud. ex A. Rich.	Oxalidaceae	Herb	
258	*Oxalis radicosa* A. Rich.	Oxalidaceae	Herb	
259	*Oxyanthus speciosus* ssp. globosus Bridson.	Rubiaceae	Tree	
260	*Pancratium tenuifolium* A. Rich.	Amaryllidaceae	Herb	
261	*Panicum polystachya* (Kunth) Stapf.	Gramineae	Sedges	
262	*Panicum hochstetteri* Steud.	Gramineae	Sedges	
263	*Pappea capensis* Eckl. & Zeyh.	Sapindaceae	Tree	
264	*Paullinia pinnata* L.	Sapindaceae	Climber	
265	*Pavetta abyyssinica* Fresen.	Rubiaceae	Shrub	
266	*Pavetta oliveriana* Hiern	Rubiaceae	Shrub	
267	*Pavonia urens* Cav.	Malvaceae	Herb	
268	*Pentas caffensis* Chiov.	Rubiaceae	Herb	
269	*Pentas concinna* K. Schum.	Rubiaceae	Herb	E

270	*Pentas schimperiana* (A. Rich.) vatke	Rubiaceae	Herb	
271	*Pentodon pentandrus* (Schumach & Thonn.) Vatke	Rubiaceae	Herb	
272	*Peperomia abyssinica* Miq.	Piperaceae	Epiphyte	
273	*Peperomia molleri* C. DC.	Piperaceae	Epiphyte	
274	*Peperomia retusa* (L.f.) A.Dietr.	Piperaceae	Epiphyte	
275	*Peperomia rotundifolia* (L.) Kunth	Piperaceae	Epiphyte	
276	*Peperomia tetraphylla* (Forster) Hook & Arn.	Piperaceae	Epiphyte	
277	*Peponium vogelii* (Hook.f.)Engl.	Cucurbitaceae	Climber	
278	*Periploca linearifolia* Quart-Dill. & A. Rich.	Asclepidaceae	Climber	
279	*Persicaria decipiens* (R. Br.) K.L. Wilson	Polygonaceae	Herb	
280	*Persicaria nepalensis (Meisn.)Miyabe*	Polygonaceae	Herb	
281	*Phoenix reclinata* Jacq.	Arecaceae	R-Tree	
282	*Phyllanthus dewildiorum* M. Gilbert	Euphorbiaceae	Shrub	E
283	*Phyllanthus lameness* Cuf.	Euphorbiaceae	Herb	E
284	*Phyllanthus ovalifolius* Forssk.	Euphorbiaceae	Climber	
285	*Physalis peruviana* L.	Solanaceae	Herb	
286	*Phytolacca dodecandra* L´Herit.	Phytolaccaceae	Climber	
287	*Pilea bambuseti* Engl.	Urticaceae	Herb	E
288	*Pimpinella heywoodii* Abebe	Apiaceae	Herb	E
289	*Piper capense* L.f.	Piperaceae	Herb	
290	*Piper guineense* Schum. & Thonn.	Piperaceae	Climber	
291	*Piper umbellatum* L.	Piperaceae	Herb	
292	*Pittosporum viridiflorum* Sims	Pittosporaceae	Tree	
293	*Platycerium elephantotis* Schweinf.	Polypodiaceae	Epiphyte	
294	*Plectranthus laxiflorus* Benth.	Labiatae	Epiphyte	
295	*Plectranthus punctatus* (L.F.) L´H´er	Labiatae	Herb	
296	*Plectranthus sylvestris* Gurke	Labiatae	Herb	
297	*Plumbago truncata*	Plumbaginaceae	Herb	E

298	*Pollia condensata* C. B. Clarke	Commelinaceae	Herb	
299	*Pollia mannii* C. B. Clarke	Commelinaceae	Herb	
300	*Polyscias farinosa* (Del.) Harms	Araliaceae	Tree	E
301	*Polyscia fulva* (Hiern) Harms	Araliaceae	Tree	
302	*Polystachya. caduca* Rchb.f	Orchidaceae	Epiphyte	E
303	*Polystachya cultriformis* (Thouars)Spreng.	Orchidaceae	Epiphyte	
304	*Polystachya lindblomii* Schltr.	Orchidaceae	Epiphyte	
305	*Polystachya paniculata* (Sw.) Rolfe	Orchidaceae	Epiphyte	
306	*Polystachya rivae* Schweinf.	Orchidaceae	Epiphyte	E
307	*Polystachya steudneri* Rchb.f.	Orchidaceae	Epiphyte	
308	*Pouteria adolfi-friederici* (Engl.) Baehni	Sapotaceae	Tree	
309	*Premna schimperi* Engl.	Verbenaceae	Shrub	
310	*Prunus africana* (Hook.f.) Kalkm.	Rosaceae	Tree	
311	*Psychotria capensis* (Eckl.) vatke	Rubiaceae	Shrub	
312	*Psychotria kirkii* Hiern	Rubiaceae	Shrub	
313	*Psychotria orophila* Petit	Rubiaceae	Shrub	
314	*Psychotria peduncularis* (Salisb.) Steyerm	Rubiaceae	Shrub	
315	*Psydrax parviflora* (Afz.) Bridson	Rubiaceae	Tree	
316	*Pteris catoptera* Kunze	Pteridaceae	Herb	
317	*Pteris cretica* L.	Pteridaceae	Herb	
318	*Pteris dentata* Forssk.	Pteridaceae	Herb	
319	*Pterolobium stellatum* (Forssk.)Brenan	Fabaceae	Climber	
320	*Pycnostachys abyssinica,*	Labiatae	Herb	E
321	*Pycnostachys recurvata,*	Labiatae	Herb	E
322	*Ranunculus multifidus* Forssk.	Ranunculaceae	Herb	
323	*Raphiostylis beninensis* (Planch.) Benth	Icacinaceae	Climber	
324	*Rhamnus prinoides* L´Herit.	Rhamnaceae	Climber	
325	*Rhoicissus revoilii* Planch	Vitaceae	Climber	

326	*Rhoicissus tridentate (L.f.)Wild & Drummond*	Vitaceae	Climber	
327	*Rhus quartiniana* A. Rich.	Anacardiaceae	Shrub	
328	*Rhus ruspolii* Engl	Anacardiaceae	Shrub	
329	*Ricinus communis* L.	Euphorbiaceae	Tree	
330	*Rinorea friisii* M.Gilbert	Violaceae	Tree	E
331	*Ritchiea albersii* Gilg	Capparidaceae	Tree	
332	*Rothmannia urceliformis* (Hiern) Robyns	Rubiaceae	Tree	
333	*Rubia cordifolia* L.	Rubiaceae	Herb	
334	Rubus *apetalus* Poir.	Rosaceae	Climber	
335	*Rubus steudneri* Schweinf.	Rosaceae	Climber	
336	*Rumex abyssinicus* Jacq.	Polygonaceae	Herb	
337	*Rungia grandis* T. Anders	Acanthaceae	Shrub	
338	*Rytigynia neglecta* (Hiern) Robyns	Rubiaceae	Tree	
339	*Saba comorensis* (Boj.) Pichon	Apocynaceae	Climber	
340	*Salacia congolensis* De Wild & Th. Dur.	Celastraceae	Climber	
341	*Sanicula elata* Buch.-Ham. ex D. Don	Apiaceae	Herb	
342	*Sapium ellipticum* (Krauss) Pax	Euphorbiaceae	Tree	
343	*Sarcocephalus latifolius* (Smith) Bruce	Rubiaceae	Shrub	
344	*Satureja paradoxa* (Vatke) Engl. ex Seybold	Labiatae	Herb	E
345	*Scadoxus multiflorus* (Martyn) Raf.	Amaryllidaceae	Herb	
346	*Scadoxus nutans* (Friis & I. Bjørnstad) Friis & Nordal	Amaryllidaceae	Epiphyte	E
347	*Scadoxus puniceus* (L.) Friis & Nordal	Amaryllidaceae	Epiphyte	
348	*Schefflera abyssinica* (Hochst. ex A. Rich.)Harms	Araliaceae	Tree	
349	*Schefflera volkensii* (Engl.) Harms	Araliaceae	Tree	
350	*Scutia myrtina* (Burm.f.) Kurz	Rhamnaceae	Climber	
351	*Selaginella hraussiana* (Kze.) A. Br.	Selaginellaceae	Epiphyte	
352	*Senecio myriocephalus* Sch. Bip. ex A. Rich.	Asteraceae	Shrub	E
353	*Senna occidentalis* (L.)Link	Fabaceae	Shrub	

354	*Senna petersiana* (Bolle)Lock	Fabaceae	Tree	
355	*Sericostachys scandens* Gilg & Lopr.	Amaranthaceae	Climber	
356	*Setaria megaphylla* (Steud.)Th. Dur.	Gramineae	Sedges	
357	*Sicyos polycanthus* Cogn	Cucurbitaceae	Climber	
358	*Sida ternata* L.	Malvaceae	Shrub	
359	*Siphonochilus aethiopicus* (Schweinf.) B.L.Burtt	Zingiberaceae	Herb	
360	*Solanecio gigas* (Vatke) C.Jeffrey	Asteraceae	Shrub	
361	*Solanum benderianum* L	Solanaceae	Climber	
362	*Solanum giganteum* L.	Solanaceae	Shrub	
363	*Solanum incanum* L	Solanaceae	Shrub	
364	*Solanum indicum* L.	Solanaceae	Shrub	
365	*Solanum nigrum* L.	Solanaceae	Herb	
366	*Spermacoce mauritiana* Gideon	Rubiaceae	Herb	
367	*Spermacoce princeae* (K. Schum.) Verdc	Rubiaceae	Herb	
368	Spermacoce pusilla Wall.	Rubiaceae	Herb	
369	*Stereospermum kanthianum* Cham.	Bignoniaceae	Tree	
370	*Stiotocardia beraviensis* (Vatke) Hall. F.	Convolvulaceae	Climber	
371	*Strychnos mitis* S. Moore	Loganiceae	Tree	
372	*Syzygium guineense* ssp. *afromontanum* F. White	Myrtaceae	Tree	
373	Syzygium *guineense* ssp. *guineense* (Willd.)DC	Myrtaceae	Tree	
374	*Syzygium guineense ssp. macrocarpum* F. White	Myrtaceae	Tree	
375	*Tacca leontopetaloides* (L.) O. Ktze.	Taccaceae	Herb	
376	*Teclea nobilis* Del.	Rutaceae	Tree	
377	*Tectaria gemmifera* (Fee) Alston	Aspidiaceae	Herb	
378	*Thalictrum rhynchocarpum* Dill. & A. Rich.	Ranunculaceae	Herb	
379	*Thonningia sanguinea* Vahl	Balanophoraceae	Herb	
380	*Tiliacora funifera* Oliv.	Menispermaceae	Climber	
381	*Tiliacora troupinii* Cufod.	Menispermaceae	Climber	E

382	*Toddalia asiatica* (L.) Lam.	Rutaceae	Climber	
383	*Trachycalymma minutiflorum* Goyder	Asclepiadaceae	Herb	E
384	*Trema orientalis* (L.) Bl.	Ulmaceae	Tree	
385	*Trichilia dregeana* Sond.	Meliaceae	Tree	
386	*Trifolium calocephalum* Fresen	Fabaceae	Herb	E
387	*Trifolium mattirolianum* Chiov	Fabaceae	Herb	E
388	*Trifumfetta rhomboidea* Jacq.	Tiliaceae	Shrub	
389	*Trilepisium madagascariense* DC.	Moraceae	Tree	
390	*Tristemma mauritianum* J.F.Gmel.	Melastomataceae	Herb	
391	*Uncaria africana* G. Don	Rubiaceae	Climber	
392	*Urera hypselodendron* (A. Rich.) Wedd.	Urticaceae	Climber	
393	*Vepris dainellii* (Pichi-Serm.) Kokwaro	Rutaceae	Tree	
394	*Vernonia amygdalina* Del.	Asteraceae	Tree	
395	*Vernonia auriculifera* Hiern.	Asteraceae	Shrub	
396	*Vernonia gilbertii* Mesfin	Asteraceae	Shrub	E
397	*Vernonia leopoldi* (Sch. Bip. ex Walp.) Vatke	Asteraceae	Shrub	E
398	*Vernonia rueppellii* Sch. Bip. ex Walp.	Asteraceae	Shrub	E
399	*Zanha golungensis* Hiern	Sapindaceae	Tree	

The ‘E’ stands for ‘Endemic species’- those species with their ecological distribution restricted within Ethiopian boundaries.

Appendix 7. List of birds recorded in Sheka Forest Biosphere Reserve area

No.	***FAMILY***	*LATIN NAME*	**VERNACULAR NAME**
1	***Podicipedidae***	*Tachybaptus ruficollis*	Little Grebe
2	***Phalacrocoracidae***	*Phalacrocorax africanus*	Long tailed Cormorant
3	***Anhingidae***	*Anhinga rufa*	Darter
4	***Ardeidae***	*Ardea cinerea*	Grey Heron
5		*Ardea melanocephala*	Black headed Heron
6		*Bubulcus ibis*	Cattle Egret
7		*Butorides striata*	Green backed (Straited)Heron
8		*Egretta alba*	Great White Egret
9		*Egretta garzetta*	Little Egret
10	***Scopidae***	*Scopus umbretta*	Hamerkop
11	***Ciconiidae***	*Anastomus lamelligerus*	Open billed Stork
12		*Ciconia abdimii*	Abdim's Stork
13		*Ciconia ciconia*	White Stork
14		*Ciconia episcopus*	Wooly necked stork
15	***Threskiornithidae***	*Bostrychia carunculata*	Wattled Ibis
16		*Bostrychia hagedash*	Hadada Ibis
17	***Anatidae***	*Alopochen aegyptiacus*	Egyptian Goose
18		*Anas sparsa*	African Black Duck
19		*Anas undulata*	Yellow billed Duck
20	***Accipitridae***	*Accipiter melanoleucus*	Black Goshawk
21		*Accipiter minullus*	Little Sparrowhawk
22		*Accipiter rufiventris*	Red breasted Sparrow Hawk
23		*Accipiter tachiro*	African Goshawk
24		*Aegypicus occipitalis*	White headed Vulture
25		*Aegypicus trachelious*	Lappet faced Vulture
26		*Aquila clanga*	Greater Spotted Eagle
27		*Aquila rapax*	Tawny Eagle
28		*Buteo augur*	Augur Buzzard
29		*Buteo buteo*	Common Buzzard
30		*Circaetus cinerascens*	Western Banded Snake Eagle
31		*Gyps africanus*	White backed Vulture
32		*Gyps ruppellii*	Ruppell's Vulture
33		*Haliaeetus vocifer*	African Fish Eagle
34		*Lophoaetus occipitalis*	Long crested Eagle
35		*Machaerhamphus alcinus*	Bat Hawk
36		*Milvus aegypticus*	Yellow billed Kite
37		*Necrosyrtes monachus*	Hooded Vulture
38		*Pernis apivorus*	European Honey Buzzard
39		*Polyboroides typus*	African Harrier Hawk
40		*Stephanoaetus coronatus*	Crowned Eagle
41		*Terathopius ecaudatus*	Bateleur

42	***Falconidae***	*Falco ardosiaceus*	Grey Kestrel
43		*Falco biarmicus*	Lanner Falcon
44		*Falco concolor*	Sooty Falcon
45		*Falco tinnunculus*	Common Kestrel
46	***Phasianidae***	*Francolinus castaneicollis*	Chestnut napped Francolin
47		*Francolinus squamatus*	Scaly Francolin
48	***Gruidae***	*Balearica pavonina*	Black Crowned Crane
49	***Rallidae***	*Ruogetius rougetii*	Rouget's Rail
50	*Heliornithidae*	*Podica senegalensis*	African Finfoot
51	***Scolopacidae***	*Tringa hypolucos*	Common Sandpiper
52		*Tringa ochropus*	Green Sandpiper
53	***Columbidae***	*Columba albitorques*	White collared Pigeon
54		*Streptopelia decipiens*	African Mourning Dove
55		*Streptopelia vinacea*	Vinaceous Dove
56		*Turtur abyssinicus*	Black billed Wood Dove
57		*Aplopelia larvata*	*Lemon Dove*
58		*Columba arquatrix*	*African Olive Pigeon*
59		*Columba guinea*	*Speckled Pigeon*
60		*Streptopelia lugens*	Dusky (Pink breasted) Turtle Dove
61		*Streptopelia semitorquata*	Red eyed Dove
62		*Treron waalia*	Bruce's Green Pigeon
63		*Treron calvus*	African Green Pigeon
64		*Turtur afer*	Blue spotted Wood Dove
65		*Turtur chalcospilos*	Emerald spotted Wood Dove
66		*Turtur tympanistria*	Tambourine Dove
67	***Psittacidae***	*Agapornis taranta*	Black winged Love Bird
68		*Poicephalus flavifrons*	Yellow fronted Parrot
69	***Musophagidae***	*Tauraco leucotis*	White cheeked Turaco
70	***Cuculidae***	*Centropus monachus*	Blue headed Coucal
71		*Centropus senegalensis*	Senegal Coucal
72		*Ceuthmochares aereus*	Yellowbill/ Green Coucal
73		*Chrysococcyx caprius*	Diederik Cuckoo
74		*Chrysococcyx cupreus*	African Emerald Cuckoo
75		*Chrysococcyx klaas*	Klaas's Cuckoo
76		*Clamator jacobinus*	Black and White Cuckoo
77		*Clamator levaillantii*	Levaillant's Cuckoo
78		*Cuculus clamosus*	Black Cuckoo
79		*Cuculus solitarius*	Red chested Cuckoo
80	***Strigidae***	*Bubo lacteus*	Verreaux's Eagle Owl
81		*Strix woodfordi*	African Wood Owl
82	***Apodidae***	*Apus caffer*	African White rumped Swift
83	***Coliidae***	*Colius striatus*	Speckled Mousebird
84	***Alcedinidae***	*Megaceryle maxima*	Giant Kingfisher
85		*Alcedo cristata*	Malachite Kingfisher

86		*Alcedo semitorquata*	Half collard Kingfisher
87		*Ceryle rudis*	Pied Kingfisher
88		*Ceyx pictus*	Pygmy Kingfisher
89		*Halcyon chelicuti*	Striped Kingfisher
90		*Halcyon senegalensis*	Woodland Kingfisher
91	***Trogonidae***	*Apaloderma narina*	Narina Trogon
92	***Meropidae***	*Merops oreobates*	Cinnamon breasted Bee eater
93		*Merops albicollis*	White throated Bee eater
94		*Merops apaister*	European Bee eater
95		*Merops pusillus*	Little Bee eater
96		*Merops variegatus*	Blue breasted Bee eater
97	***Coraciidae***	*Eurystomus glaucurus*	Broad billed Roller
98	***Bucerotidae***	*Bucorvus abyssinicus*	Abyssinian Ground Hornbill
99		*Bycanistes brevis*	Silvery cheeked Hornbill
100		*Tockus alboterminatus*	Crowned Hornbill
101		*Tockus deckeni*	Von der Decken's Hornbill
102	***Capitonidae***	*Lybius bidentatus*	Double toothed Barbet
103		*Lybius guifsobalito*	Black billed Barbet
104		*Lybius undatus*	Banded Barbet
105		*Pogoniulus chrysoconus*	Yellow fronted Tinkerbird
106		*Tricholaema diademata*	Red –fronted Barbet
107	***Indicatoridae***	*Indicator indicator*	Greater Honeyguide
108		*Indicator variegatus*	Scaly throated Honeyguide
109		*Prodotiscus insignis*	Cassin's Honeyguide
110	***Picidae***	*Campethera nubica*	Nubian Woodpecker
111		*Dendropicos abyssinicus*	Abyssinian Woodpecker
112		*Dendropicos fuscescens*	Cardinal Woodpecker
113		*Dendropicos goertae*	Grey Woodpecker
114		*Dendropicos spodocephalus*	Grey headed Woodpecker
115		*Jynx ruficollis*	Red throated Wryneck
116		*Thripias namaquus*	Bearded Woodpecker
117	***Hirundinidae***	*Delichon urbicus*	House Martin
118		*Hirundo abyssinica*	Lesser Striped Swallow
119		*Hirundo daurica*	Red rumped Swallow
120		*Hirundo fuligula*	African Rock Martin
121		*Hirundo rustica*	Barn Swallow
122		*Hirundo senegalensis*	Mosque Swallow
123		*Hirundo smithii*	Wire tailed Swallow
124		*Psalidoprocne prestoptera*	Black Saw wing
125		*Pseudhirundo griseopyga*	Grey rumped Swallow
126		*Riparia paludicola*	African Sand Martin
127	***Motacillidae***	*Anthus cinnamomeus*	African Grassland/ Richard's Pipit
128		*Anthus novaeseelandiae*	Richard's Pipit
129		*Macronyx flavicollis*	Abyssinian Longclaw

130		*Motacilla aguimp*	African Pied Wagtail
131		*Motacilla alba*	White Wagtail
132		*Motacilla cinerea*	Grey Wagtail
133		*Motacilla clara*	Mountain Wagtail
134		*Motacilla flava*	Yellow Wagtail
135	***Campephagidae***	*Campephaga flava*	Black Cuckoo shrike
136		*Campephaga phoenicea*	Red shouldered Cuckoo shrike
137		*Coracina caesia*	Grey Cuckoo shrike
138		*Coracina pectoralis*	White breasted Cuckoo shrike
139	***Pycnonotidae***	*Nicator vireo*	Yellow throated Leaflove
140		*Phyllastrephus strepitans*	Norhtern Brownbul
141		*Pycnonotus barbatus*	Common Bulbul
142	***Turdidae***	*Cercomela sordida*	Hill Chat
143		*Cossypha heuglini*	White browed Robin Chat
144		*Cossypha niveicapilla*	Snowy crowned Robin Chat
145		*Cossypha semirufa*	Ruppell's Robin Chat
146		*Monticola rufocinerea*	Little Rock Thrush
147		*Oenanthe isabellina*	Isabelline Wheatear
148		*Oenanthe oenanthe*	Northern Wheatear
149		*Oenanthe pleschanka*	Pied Wheatear
150		*Phoenicurus phoenicurus*	Common Redstart
151		*Psophocichla litsipsirupa*	Ground scraper Thrush
152		*Saxicola rubetra*	Whinchat
153		*Saxicola torquata*	Stonechat (Ethiopian Race)
154		*Turdus olivaceus*	Olive Thrush
155		*Turdus pelios*	African Thrush
156		*Zoothera piaggiae*	Abyssinian Ground Thrush
157	***Sylviidae***	*Acrocephalus schoenobaenus*	Sedge Warbler
158		*Bradipterus cinnamomeus*	Cinnamon bracken Warbler
159		*Cameroptera brachyura*	Grey backed Cameroptera
160		*Chloropeta natalensis*	Dark capped Yellow Warbler
161		*Cisticola cantans*	Singing Cisticola
162		*Cisticola erythrops*	Red faced Cisticola
163		*Cisticola galactotes*	Winding Cisticola
164		*Cisticola natalensis*	Croaking Cisticola
165		*Cisticola robustus*	Stout Cisticola
166		*Cisticola troglodytes*	Foxy Cisticola
167		*Ermomela icteropygialis*	Yellow billed Ermomela
168		*Hippolais languida*	Upcher's Warbler
169		*Phyllolais pulchella*	Buff bellied Warbler
170		*Phylloscopus collybita*	Chiffchaff
171		*Phylloscopus sibilatrix*	Wood Warbler
172		*Phylloscopus trochilus*	Willow Warbler
173		*Phylloscopus umbrovirens*	Brown Woodland Warbler

174		*Prinia subflava*	Tawny flanked Prinia
175		*Sylvia atricapilla*	Blackcap
176	***Muscicapidae***	*Muscicapa infuscata*	Sooty Flycathcer
177		*Myioparus plumbeus*	Lead coloured Flycatcher
178		*Bradornis microrhychus*	Grey Flycatcher
179		*Melaenornis chocolatinus*	Abyssinian Slaty Flycatcher
180		*Melaenornis edolioides*	Northern Black Flycatcher
181		*Muscicapa adusta*	Dusky Flycatcher
182	***Platysteiridae***	*Platysteira cyanea*	Banded Wattle eye
183		*Batis minor*	Black headed Batis
184		*Batis orientalis*	Grey headed Batis
185	***Monarchidae***	*Terpsiphone viridis*	Paradise Flycatcher
186	***Timaliidae***	*Parphasma galinieri*	Abyssinian Catbird
187		*Pseudoalcippe abyssinica*	African Hill Babbler
188		*Turdoides leucopygius*	White rumped Babbler
189	***Paridae***	*Parus leucomelas*	White winged Black Tit
190	***Certhiidae***	*Salpornis spilonotus*	Spotted Creeper
191	***Nectariniidae***	*Hedydipna collaris*	Collared Sunbird
192		*Nectarinia cuprea*	Coppery Sunbird
193		*Nectarinia erythrocerca*	Red chested Sunbird
194		*Nectarinia habessinica*	Shining Sunbird
195		*Nectarinia olivacea*	Olive Sunbird
196		*Nectarinia pulchella*	Beautiful Sunbird
197		*Nectarinia senegalensis*	Scarlet chested Sunbird
198		*Nectarinia tacazze*	Tacazze Sunbird
199		*Nectarinia venusta*	Variable Sunbird
200	***Zosteropidae***	*Zosterops senegalensis*	Yellow White eye
201		*Zosterops abyssinicus*	Abyssinian White eye
202		*Zosterops poligastrus*	Montane White eye
203	***Oriolidae***	*Oriolus monacha*	Abyssinian Black headed Oriole
204	***Laniidae***	*Dryoscopus gambensis*	Northern Puffback
205		*Laniarius aethiopicus*	Tropical Boubou
206		*Lanius collaris*	Fiscal Shrike
207		*Tchagra minuta*	Marsh Tchagra
208		*Tchagra senegala*	Black crowned Tchagra
209	***Corvidae***	*Corvus rhipidurus*	Fan tailed Raven
210		*Corvus capensis*	Black Crow
211		*Corvus crassirostris*	Thick billed Raven
212	***Dicruridae***	*Dicrurus adsimilis*	Fork tailed Drongo
213	***Sturnidae***	*Buphagus erythrohynchus*	Red billed Oxpecker
214		*Cinnuricinclus leucogaster*	Violet backed Starling
215		*Cinnuricinclus sharpii*	Sharp's Starling
216		*Lamprotornis chaylbaeus*	Greater Blue eared Starling
217		*Lamprotornis splendidus*	Splendid Glossy Starling

218		*Onychognathus morio*	Red winged Starling
219		*Onychognathus tenuirostris*	Slender billed Starling
220		*Poeoptera stuhlmanni*	Stuhlmann's Starling
221	***Passeridae***	*Passer swainsonii*	Swainson's Sparrow
222	***Ploceidae***	*Amblyyospiza albifrons*	Thick billed Weaver
223		*Anaplectes rubriceps*	Red headed Weaver
224		*Euplectes afer*	Yellow Bishop
225		*Euplectes ardens*	Red collared Whydah
226		*Euplectes axillaris*	Fantailed Widowbird
227		*Euplectes franciscanus*	Northern Red Bishop
228		*Euplectes progne*	Red shouldered Whydah
229		*Ploceus baglafecht*	Baglafecht Weaver
230		*Ploceus cucullatus*	Village Weaver
231		*Ploceus intermedius*	Lesser Masked Weaver
232		*Ploceus nigricollis*	Black necked Weaver
233		*Ploceus ocularis*	Spectacled Weaver
234		*Ploceus spekei*	Speke's Weaver
235		*Ploceus taeniopterus*	Northern Masked Weaver
236		*Quelea erythrops*	Red headed Quelea
237		*Quelea quelea*	Red billed Quelea
238	***Estrildidae***	*Coccopygia quartinia*	Yellow bellied Waxbill
239		*Cryptospiza salvadorii*	Abyssinian Crimsonwing
240		*Estrilda astrild*	Common Waxbill
241		*Estrilda paludicola*	Fawn breasted Waxbill
242		*Lagonosticta senegala*	Red billed Firefinch
243		*Logonsticta rubricata*	African Firefinch
244		*Lonchura bicolor*	Black and White Manikin
245		*Lonchura cucullata*	Bronze Manikin
246		*Mandingoa nitidula*	Green Twinspot
247		*Uraeginthus bengalus*	Red cheeked cordon bleu
248	***Viduidae***	*Vidua hypocherina*	Steel Blue Whydah
249		*Vidua chalybeata*	Village Indigobird
250		*Vidua macroura*	Pintailed Widow
251	***Fringillidae***	*Serinus citrinelloides*	African Citril
252		*Serinus richardi*	Stripe breasted Seed eater
253		*Serinus striolatus*	Streaky Seed eater
254		*Serinus tristriatus*	Brown rumped Seed eater

Appendix 8. List of references

Aseffa Seyoum 2007. Economic value of afromontane natural forest in Sheka Zone, southwest Ethiopia. *In* Forests of Sheka: Multidisciplinary case studies on impacts of land use/ land cover changes, southwest Ethiopia. (Masresha Fetene, ed.). PP 183-218. MELCA Ethiopia, Addis Ababa.

Bedru Sherefa 2007. Landuse/landcover changes in Andracha and Masha Woredas of Sheka Zone, SNNP Regional State. *In* Forests of Sheka: Multidisciplinary case studies on impacts of land use/ land cover changes, southwest Ethiopia. (Masresha Fetene, ed.). PP 21-56. MELCA Ethiopia, Addis Ababa.

Bonnefille et al 1993

Chaffey, D.R. 1979. Southwest Ethiopia forest inventory project: a reconnaissance inventory of forest in southwest Ethiopia. Ministry of Overseas Development. Land Resources Development Centre. Project Report **31**:1–316.

Dereje Tadesse Wakjira and Tadesse Woldemariam Gole. 2007. Forest Tenure as Social Security in Southwest Ethiopia. Forests, Trees and Livelihoods 17: 325-338Dereje Tadesse Wakjira, Tadesse Woldemariam Gole and Feyera Seneta 2008. Deforestation of Afromontane Rainforest in Ethiopia. In: Deforestation Research Progress. Ilya B. Sanchez and Carl L. Alonso (eds). Nova Science Publishers, Inc. New York, USA. (Pp 55 - 76).

EFAP 1994. The challenge for development. Volume II. Ethiopian Forestry Action Program (EFAP) Secretariat, Addis Ababa.

EMA, 1988. National Atlas of Ethiopia. Ethiopian Mapping Authority (EMA), Addis Abeba

EWNHS 1996. Important Bird Areas of Ethiopia: A first inventory. Ethiopian Wildlife and Natural History Society (EWNHS), Addis Ababa

Feyera Senbeta 2006. Biodiversity and ecology of Afromontane rainforests with wild Coffea arabica L. populations in Ethiopia. Cuvilier, Goettingen

Friis I. 1983. Phytogeography of the tropical northeast African mountains. *Bothalia* **14**: 525–532.

Friis, I., Rasmussen, F.N. and Vollesen, K. (1982). Studies in the flora and vegetation of SW Ethiopia. *Opera Bot*. **63**:1-70.

Friis, I. 1992. Forests and forest trees of northeast tropical Africa - their natural habitats and distribution patterns in Ethiopia, Djibouti and Somalia. Kew Bull., Add. Ser. 15:1–396.

Hartmann, I. 2004. "No Tree, No Bee – No Honey, No Money": The Management of Resources and Marginalisation in Beekeeping Societies of South West Ethiopia. Paper submitted to the Conference: Bridging Scales and Epistemologies, Alexandria, March 17–20, 2004.

Kassahun Embaye. 1999. The indigenous bamboos of Ethiopia: a call for attention and action. Walia 20: 3-8.

Kumilachew Yeshitila and Tamrat Bekele 2002. Plant community analysis and ecology of Afromontane and transitional rainforest vegetation of southwestern Ethiopia. *SINET: Ethiop. J. Sci.,* 25:155–175

Lange, W. J. 1982. History of the Southern Gonga (Southwestern Ethiopia). Franz Steiner Verlag, Wiesbaden.

Liese, W. 1985. Bamboos- Biology, silvics, properties, utilization. GTZ, Eschborn.

LUSO Consult GmbH 1997. The study on sustainable bamboo management (final report). Hamburg Germany.

Masresha Fetene (Ed.). 2007. Forests of Sheka: Multidisciplinary case studies on impacts of land use/ land cover changes, southwest Ethiopia. MELCA Ethiopia, Addis Ababa.

McCann, J.C. 1995. People of the Plow: An Agricultural History of Ethiopia, 1800-1990. University of Wisconsin Press, Madison.

Mellese Damitie and Mohammud Abdulahi 2007. Legal and institutional analysis for sustainable management of fores resources: the case of Sheka Forest in Southwestern Ethiopia. *In* Forests of Sheka: Multidisciplinary case studies on impacts of land use/ land cover changes, southwest Ethiopia. (Masresha Fetene, ed.). PP 137-182. MELCA Ethiopia, Addis Ababa.

Mengistu Seyoum. 1995. Social Organization of Production among the Sekacco of Southwestern Ethiopia. MA Thesis in Social Anthropology, Addis Ababa University, Addis Ababa

Mengistu Seyoum. 2001. Shakicho. *In* Living on the Edge: Marginalized Minorities of Craft Workers and Workers and Hunters in Southern Ethiopia. (Pankhurst, A. and Freeman, D., eds). Department of Sociology and Social Administration, College of Social Sciences, Addis Ababa University

MWADO 2009. Annual report of 2008/2009. Masha Woreda Agricultural Development Office, Masha.

PLA 1997. Folklore and conservation in Nigeria: Using PRA to learn from the elders Ichire Ojating and the students of the Federal University of Agriculture (FUAU) PLA Notes CD-ROM 1988–2001 Source: PLA Notes (1997), Issue 28, pp.22–24, IIED, London Reusing M. 1998. Monitoring of natural high forests in Ethiopia. Ministry of Agriculture and GTZ, Addis Ababa.

Schlüter. 200. Geological atlas of Africa. 2nd edition. Springer-Verlag, Berlin.

Tadesse Woldemariam Gole and Ararsa Regassa 2004. Forest Biodiversity, Management Practices and NTFP production. Non-timber Forest Products Research and Development Project, Mizan Teferi

Tadesse Woldemariam Gole, Denich, M., Demel Teketay and Vlek, P.L.G. 2002. Human impacts on Coffea arabica genetic pool in Ethiopia and the need for its in situ conservation. Pp. 237-247. In Managing plant genetic diversity (J. Engels, V. Ramanatha Rao, A. H. D. Brown, and M. Jackson, eds). CAB International / IPGRI.Tadesse et al 2011

Tadesse Woldemariam Gole 2007. The impact of land use/ land cover changes on biodiversity in Masha and Anderacha Woredas of Sheka Zone, SNNP Regional State. *In* Forests of Sheka: Multidisciplinary case studies on impacts of land use/ land cover changes, southwest Ethiopia. (Masresha Fetene, ed.). PP 57-88. MELCA Ethiopia, Addis Ababa.

Tadesse Woldemariam Gole and Masresha Fetene. 2007. Forests of Sheka: ecological, social, legal and economic dimensions of recent landuse/ landcover changes-overview and synthesis. *In* Forests of Sheka: Multidisciplinary case studies on impacts of land use/ land cover changes, southwest Ethiopia. (Masresha Fetene, ed.). PP 1-20. MELCA Ethiopia, Addis Ababa.

Tadesse Woldemariam Gole. 2003. Vegetation Ecology of the Yayu forest in SW Ethiopia: impacts of human use and implications for in situ conservation of wild *Coffea arabica* L. populations. Ecology and Development Series, No. 10.

Tadesse Woldemariam Gole, Aseffa Seyoum and Gashaw Assefa. 2011. Land Use Management Plan of the Masha Woreda in Sheka Zone, SNNP state. MELCA-Ethiopia, Addis Ababa.

Tafesse Asres 1996. Agroecological zones of southwest Ethiopia. Matreialien Zur Ostafrica-Forschung 13: 1-241.

Vivero JL, Ensermu K, Sebsebe D. 2005. The red list of endemic trees and shrubs of Ethiopia and Eritrea. Cambridge & Richmond: Fauna and Flora International & BGCI, 1–23.

Vivero JL, Ensermu K, Sebsebe D. 2006. Progress on the Red List of plants of Ethiopia and Eritrea: conservation and biogeography of endemic flowering taxa. In: GhazanfarSA, BeentjeHJ, eds. Proceedings of 17th AETFAT Congress: taxonomy and ecology of African Plants: their conservation and sustainable use. 761–778

White, F. 1983. The vegetation of Africa. A descriptive memoir to accompany the UNESCO/AETFAT/UNSO vegetation map of Africa. Natur. Resour. Res. 20:1–356.Wondyifraw 2004

Yilma Abebe and Geheb, K. 2003. Wetlands of Ethiopia, Proceedings of Seminar on the Resource and Status of Ethiopia's Wetlands, Vi+ 166 PP

Zewdie Jotte. 2007. The impact of cultural changes on the people of Sheka and their traditional resource management practices: the case of four kebeles in Masha Woreda. *In* Forests of Sheka: Multidisciplinary case studies on impacts of land use/ land cover changes, southwest Ethiopia. (Masresha Fetene, ed.). PP 89-136. MELCA Ethiopia, Addis Ababa.