Biological Diversity, Soil and Water Conservation and Land Use Assessment of Wunaniya Kossoyie Landscape: North Gondar Administration Zone



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1. *Introduction*

The interaction of people and nature manifested on space called landscape with different topographic and physiognomic settings. This has been resulted in two ways: First in positive effect sustainable and balanced ecological, cultural and scenic feature benefiting the communities with out altering or losing natural process; effective and little scientific modification for the benefit of human. Second in negative effect in which ecological process and natural resources disturbance and degradation through altering natural and ecological settings. In Ethiopia the second is more prevalent in many of natural areas through soil depletion, deforestation and absence of effective rain fall contributed to an alarming decline in the fertility of land, making farming a difficult and risky enterprise (MOFED, 2004). Moreover, many natural areas are being used for activities beyond its natural potential and are far from sustaining in its natural process. The matter is more tend to anthropogenic factors dominated by ever increasing winning behavior of human and need. MOFED, 2004 report to UN magnified environmental degradation in Ethiopia is closely related to the recurrence of droughts, food insecurity, and declining farm productivity. It is now widely accepted that much of the soil and water loss and land degradation in Ethiopia has to do with the human factor exploiting the environment in an unsustainable manner.

This study was intended to assess and evaluate biophysical resources and activities of people on use of those resources in Wunania Kossoyie Landscape situated at Lay Armacheho and Wogera Woredas of North Gondar Administration Zone. The assessment was conducted based on initiatives on the primary inspection on the development of description and networking tourist destination studies November 2009 on representative areas of the zone. In Networking document Wunaniaya Kossoyie landscape is identified as natural attraction and further activities are stated in the networking plan partly.

These requirements put in the document have got immediate response from donors and authorities to execute detail assessment to use as a main input for management plan preparation for landscape conservation so as to reduce pressure on natural features and associated biological resources reconciling the need of the community and conservation objectives ,

2. Objectives

2.1 General objectives

The assessment aimed to investigate biological, geographic and topographic resources, use, management and natural resource conservation systems with associated challenges and cope up strategies. Furthermore, contribution to sustainable tourism development on its natural composition and scenic beauty features and activities.

2.2 Specific Objectives

- Identify natural habitats and land features
- Describe land uses and conservation practices
- List existing flora, fauna and management systems
- Identify traditional and scientific wildlife, forest and water conservation systems
- Describe challenges to natural habitats with associated causes
- Sort out suitable mitigation measures to challenges and reduction their causes

- Identify activities of respective stakeholders and their partnership

3. Methodologies

Secondary information on designated activities that could be accomplished prior to management plan from recommendation forwarded in networking plan for North Gondar Administrative zone used as input supplementing with preliminary field observation to develop techniques for data collection. Technical assessment team where assigned in three sub technical team to collect data these were biophysical resource and conservation systems, tourism resources and their distinctive features and tourism management, accommodations and infrastructure development assessment teams. The first which is biophysical resources and conservation assessment team is mandated to assess all data respective of biophysical resources and management.

The team further mobilized respective Woreda and Kebele experts. Moreover, key informants were involved in field study. Experts from ANRS Bureau of Culture, Tourism and Parks Development (BCTP), Lay Armacheho and Wogera Agriculture and Rural Development, Environmental Protection and Land Administration Office and development agents at Cherambezo, Gerameta and Kossoyie Ambaras were engaged in data collection at grassroots level.

The team prepared semi structured questionnaire to collect data from respective kebeles (the lowest administrative units) in the landscape. To start actual field work three distinct viewpoints and down walk ways were selected as a transect line. First in Cherambezo kebele from Ambezo hill down to Tekel Dengayie crossing Lamgidayie village that extends down to Sanja river. Second transect line start at site departing from Gondar to Debark (24km away from Gondar) main road to the direction of Wunaniya hill from Mariayam Ergecha viewing Kezkazit valley crossing down to Ayekel Sefer and Alugmuna along Wunaniya river valley. The third in Kossoyie landscape of Wogera Woreda from Kossoyie Ambaras at Cherema viewpoint down to Chugie Monastery, Zagol Amba viewing to north east to Murit Asay and west to Aykel Sefer, Wunanniya up to Geramta.

Using these travel routes walking along hillsides and moving up and down where on a sliding surface that were challenges to the field study. Field data were organized and summarized incorporating experts' views and further development, conservation and utilization techniques with required inputs.

4. Description of Wunnaniya Kossoyie landscape

Wunnaniya Kossoyie landscape is found in North Gondar Administrative Zone in Cherambezo and Geramta Kebeles in Lay Armachoho and Kossoyie Ambaras in Wogera Woreda.

4.1 Geographic information

4.1.1 Location

Wunnaniya Kossoyie landscape is located 24 to 30 kilometers from Gondar along the high way to Debark stretched from Cherambezo to Kossoyie rural villages to the West. Cherambezo situated

at $12^0$43’24.2’’N latitude and $37^0$30’38.3’’ E longitude 2815meter above sea level. Kossoyie situated in the north view situated at 2962 meter above sea level and $12^0$45’37.4’’ N latitude and 37^0 33’ 22.6’’ E Longitude. The Western landscape with spectacular scenic beauty feature fragmented with various land forms and biophysical resources called Wunaniya Kossoyie landscape components.



Figure 1*. Cherambezo village center 22km from Gondar to Debark on main road*

4.1. 2 Topography

The topographic settings of Wunnaniya Kossoyie landscape fragmented and sharp elevated with up and down features. These features characterized by 18.3 % plain on the top and foot of the escarpments, 25% hills, 17.35% valleys and 39.4% rugged escarpments (sorted from Woreda Agricultural office 2010 six months report) fragmented one by another. These land features covered with different proportion of cultivated, settlements, shrub lands, wooded lands and forest patches. The topographic settings with associated natural and traditional land uses have been attracted visitors impression from long ago. Hence conservation of these topographic settings and facilitation of access road for visitors are indispensable issues for sustainable tourism development and sustainability of natural condition of topographic components in their nearly at natural state.



Figure*. 2 Spectacular Wunnaniya Kossoyie landscape land feature in dry season*

The over all topographic features of the area are extended about 8 kilometer on the escarpments of the highlands from Ambezo hill to Kossoyie (Cherma) view points comprise the eastern high laying mountains ranges from 2800 to 3000 meter above sea level. The low laying impressive topographic features are extended down to Tach Armacheho up to 1000mater above sea level. The water shed drains from East down to West and Northwest.

4.1.3 Climate

The Wunnaniya Kossoyie landscape comprises diverse climatic and geological features. Traditional climatic classification ranging from Kolla (hot to worm) <1500masl (18%), Woyinadega (temperate) 1500-2500masl (55%) and Dega (Cold) 2500-300masl (27%) (ARDO, report 210). However, the escarpment along the high way is situated in Dega climatic zone. The mean annual rain fall ranges from 700 to 2300mm. These show there are areas in the Western extreme with low rainfall and the Eastern highlands receive high amount of rainfall. The fragmented land feature covered with fog and cloud largely in the morning and evening one to two hours per a day frequently shifting one side to the other which creates inspiring feeling and looks areas observed from air craft down above the cloud. The weather condition is extremely variable cold in morning and worm in mid day and windy in the evening which attracts visitors not only to view spectacular landscape but also visit a clear sky and ventilating wind during the night.

4.2 Biological resources

4.2.1 Flora

The natural vegetation and the indigenous plant species and their product are vital components of the landscape. Diversity of species and greenness of the area increases visitors' inspiration and scenic beauty of the landscape**.** Biological resources of the landscape are also serves for direct use for existence as a means of livelihood beyond conservation for economic, ecological and tourism benefits.

Table 1. Different species of plants and plant forms listed below

No	*Vernacular name*	**Scientific Name**	**Plant form**
	Gerar	*Acacia abyssinica*	Tree
	Embes	*Allophylus abyssinicus*	Tree
	Ret	*Aloe vera*	*Shrub*
	Dong	*Apodytes dimidiata*	Tree
	Shembeko	*Arundo donax*	Grass
	Yeset kest	*Asparagus africanus*	Shrub
	Adey Ababa	*Bidens macroptera*	Herb
	Yenebir tifir	*Bridelia micranath*	Tree
	Anfar	*Buddleja polystachya*	Tree
	Zigta	*Calpurnia aurea*	Tree/shrub
	Gumero	*Capparis tomentosa*	Wood climber
	Agam	*Carissa edulis*	shrub
	Kawot	*Celtis africana*	Tree
	Azo Hareg /Abeta/	*Clematis simensis*	Climber
	Misrch	*Clerodendrom myricoides*	*Tree*
	Fiyelefegi	*Clutia abyssinica*	Shrub
	Avalo	*Combretum molle*	Tree

No	*Vernacular name*	**Scientific Name**	**Plant form**
	Wanza	*Cordia africana*	Tree
	Bisana	*Croton macrostachyus*	Tree
	Yefenj Tid	*Cupressus lusitanica*	Tree
	Yemidr koso	*Deliphinium dasycaulon*	Herb
	Ameraro	*Discopodium penninervum*	Shrub
	Keteketa	*Dodonaea viscosa*	Shrub
	Wulkifa	*Dombeya torrida*	Tree
	Koshim	*Dovyalis abyssinica*	Shrub
	Moata/Tomketel	*Dracaena steudneri*	Tree
	Dendero	*Echinops giganteus*	Shrub
	Sembo/Lol	*Ekebergia capensis*	Tree
	Asta	*Erica arborea*	Tree
	Korch	*Erythrina brucei*	Tree
	Key Bahir Zaf	*Eucalyptus camaldulensis*	Tree
	Nech Bahir Zaf	*Eucalyptus globulus*	Tree
	Dedeho	*Euclea schimperi*	Shrub
	Shola	*Ficus sur*	Tree
	Ashekit	*Gaium asparinides*	Herb
	Somaya	*Grewia bicolor*	Shrub
	Kosso	*Hagenia abyssinica*	Tree
	Yewaliya Eshoh	*Helichrysum spp*	Shrub
	Tembele	*Jasminum abyssinicum*	Shrub
	Yehabesha Tid	*Juniperus procera*	Tree
	Sensel	*Justicia schimperiana*	Shrub
	Andahula	*Kalanchoe petitiana*	Shrub
	Ashenda /Abelbila/	*Kniphofia foliosa*	Herb
	Kese	*Laggara tomentosa*	Shrub
	Kelewa	*Maesa lanceolata*	Shrub
	Shenet	*Myrica salicifolia*	Tree
	Kumbel/ Atat	*Mytenus arbutifolia*	Shrub
	Atat	*Mytenus ovatus*	Shrub
	Woyira	*Olea europaea*	Tree
	Sigid weira	*Olea welwitschii*	Tree
	Tefie	*Olinia rochetiana*	Tree
	Keret	*Osyris quadripartita*	Tree
	Woynagft	*Pentas schimperana*	Shrub
	Indod	*Phytolacca dodecandra*	Woody climber
	Pinus	*Pinus patula*	Tree
	Chocho	*Premna schimperi*	Tree
	Gesho	*Rhamnus prinoides*	Shrub
	Qammo	*Rhus vulgaris*	Shrub

No	Vernacular name	Scientific Name	Plant form
	Kega	*Rosa abyssinica*	Shrub
	Enjory	*Rubus apetalus*	Shrub
	Tult	*Rumex nepalensis*	Herb
	Embuaco	*Rumex nervusus*	Shrub
	Chifreg	*Sedum spp*	Shrub
	Nechilo	*Senra incana*	Shrub
	Yeshikoko gomen	*Solanecio gigas*	Shrub
	Embuay	*Solanum marginatum*	Shrub
	Washeta/zana	*Stereospermum kunthianum*	Tree
	Sama	*Urtica simensis*	Herb

The landscape is endowed with different species that are not identified even with local name but require conservation for ecological, economical, medicinal and socio-cultural benefit which are not included in the study.

4.2.2 Fauna

Wunaniya Kossoyie landscape comprises various wild animals and suitable habitats which harbor many species amide disturbance and encroachment of natural habitats. Currently existing higher animals are Gelada Baboons, Columbus Baboons, Leopard, Spotted Hyena, Wild pig, Common Dicker, Rock hyrax, Squirrels and various bird and Reptiles, Butterfly and lower mammals.

Table 2. List wild animal species recorded within the landscape

No	Local name	Common name	Scientific name
1	Tera Kebero	*Common Jakal*	*Canis aureus*
2	Tota	*Vervet Monkey*	*Cercopithecus aethiops*
3	Gureza	*Abyssinian black and white colobus*	*Colombus abyssinicus*
4	Netebetab jib	*Spotted hyaena*	*Crocuta crocuta*
5	Faro	*Gent*	*Genetta genetta*
6	Jart	*Porcupine*	*Hystrix cristata*
7	Aner	*Serval Cat*	*Leptailurus serval*
8	Sesa	*klipspringer*	*Oreotragus oreotragus*
9	Neber	*Leopard*	*Panthera pardus*
10	Nech Zenjero	*Hamadryas baboon*	*Papio hamadryas*
11	Ydure asama	*Bush pig*	*Potamochoerus porcus*
12	Megoza/Kefodefi/	*Retal (Honeybudger)*	*Procavia capensis*
13	Shekoko	*Rock Hyiraxs*	*Procavia capensis*
14	Midaqua	*Grey duiker*	*Sylvicapra grimmia*
15	Chilada Zenjero	*Gelada baboon*	*Theropithecus gelada*
16	Ayit	*Rat*	*Arvicanthis Spp*

4.3 Habitats and land features

4.3.1 Major Habitats

Natural habitats and their components condition prevails the status of the relationship between people and nature which is prevalent in landscape conservation. Furthermore it shows the effect of anthropogenic influences in natural habitats. Natural habitats in the landscape classified as grasslands, wooded lands, dense forest patches, hillsides and escarpments, valleys, rivers, springs, water falls, and caves and used for various human activities and shelter, feeding and resting sites for wild animals.

Extent of each natural habitats and land features in their area coverage is difficult to estimate as one habitat is interrupted by another with in a short dist one following other or in combination with in a short distance.



Figure. 3 Distant views of Gerameta and vicinities of Tekel Dengayie from hill top of Cherambezo above Lamgiedaye and Hill side dry season view of Kossoyie Ambaras .



Figure 4 Composite of cultivated, grazing and settlement plain area of Lamgidayi

Table 3 Distribution of habitats and current uses

No	Natural habitats	Sub villages (Got)	Current Uses
1	Grasslands	Ambezo	Communal grazing lands Social gathering Traditional play ground
		Tijambel	
		Janway	
		Gomengie	
		Gedelgie	
		Lamgidiye	
2	Hills and escarpments	Tijambel	Grazing lands Farming Fuel, farm tools and construction wood collection Monastery
		Wunaniya	
		Schubelgid	
		Gibrah	
		Kossoyie	
		Cherema	
		Chugie	
3	Wooded lands	Enkoyie defa	Grazing lands Fuel, farm tools and construction wood collection Shifting Cultivation
		Janway	
		Wunnnaniya	
		Shebele	
		KIeree	
4	**Valleys**	Kezekazit	Shelter for wild animals Grazing lands
		Keree	
		Gebrha	
5	**Rivers**	Godeir	Source of drinking water for human and animals
		Wunanniya	
		Sanja	

As shown on table natural habitats have been used for different use often beyond its designation for sustainable use and carrying capacity. For instance, overgrazing, repeated cultivation and over use / deforestation of vegetation cover are devastating natural habitats and its components which have been observed in loss of naturalness as a result productivity and scenic beauty subjected to diminishing return. Rehabilitation and maintenance of natural composition of natural habitats and land features requires due attention.



Figure 5. *Grazing and play ground plain grassland of Cherambezo hill top (Amba) and fragmented hillsides of Wunnaniya*

4.3.2 Soil and water

Soil is a resource which helps to grow vegetation and cultivated crops and water is detrimental component for soil without it no life can stay for a few days. It is indispensable to take action to halt challenges that are decreasing soil fertility and water amount and quality. In this study Wunnanyia Kossoyie landscape soil and water explained in their physical characteristics through visual observation and productivity. Soil type is dominated by reddish to brown subjected to continuous oxen plow and hoe culture cultivation up to sloppy hills. The main water sources of the landscape are rain and its reservoirs rivers, wet grasslands, springs and seasonal ponds. There are spring at the hill tops and foot of the escarpment and small streams that drain to Goder, Wunaniya and Sanja rivers. Pressure on bare hillsides cultivation and grazing lands induced progressive water erosion as a result galleys and cutoff farmlands frequently observed in human dominated areas of the landscape. Beyond theses consequences of water erosion has been shown by decrease in crop productivity, loss of soil fertility and vegetation cover from time to time. Crop productivity in the area clearly shows high discrepancy from on farm plots to another. For example, productivity of wheat and barley ranges from 5 to 25 quintals per hector in the highlands. Low land crops sorghum and maize productivity also ranges 9 to 27 quintals per hector. This indicates variability in soil fertility and management from farm to farm. Conservation of natural vegetation and construction of biophysical soil and water conservation measures insures to increase fertility and water volume and quality.

5. Land use and natural resource conservation

5.1 Land use and management systems

Estimated area coverage of the landscape goes to the sum of total areas of Kebeles that have share in viewed areas in the landscape. The four Kebeles included in the landscape comprise Cherambezo 6178 ha, Geramta 2182 ha, Kossoyie Ambaras 5865 ha and Alegmuna 4167ha. A total area of the landscape only with in the above Kebeles believed to be about 18,392 ha. However, the distant view of the whole landscape covers other Kebeles extended down to Tach Armacheho, to the north that extends to the lowlands of Wogera and Dabat Woredas which create impressive momentary look to visitors from Wunnaniya and Kossoyie view points.

The landscape has been used for different land use systems which support the livelihood of the residents and institutions in which various activities going on such as traditional farming and related activities, churches and monastery ceremonies, schools and health institutions. During this assessment the landscape is mainly used for cultivation and grazing. The natural systems of land use such as forest patches, grasslands, wooded lands, bush lands and degraded wastelands. It was very difficult to estimate area and extent of each land use coverage because one is interrupted and overlapped by another and same areas are also used for different land uses prevailed in seasons. For instance, grazing is common to all areas that are accessible to animals and except in croplands in cropping period and inaccessible hills. Cherambezo is the most marvelous that comprises the main Wunnaniya landscape to view all areas and has been estimated in respective land uses compared with topographic features.

Table 3 Land features, uses and cover proportion of Cherambezo Kebele

No	Land features	% Cover	Land uses	% Cover
1	Plain lands	25%	Cultivated	47%
2	Hills fingered shaped	15%	Forest/ Woodland	16%
3	Escarpments	25%	Bush/ Shrub lands	15,5%
4	Valleys and rivers	35%	Grasslands	16.5%
5			Settlement/Institutions	5%

(Modified from ARDO 2010 report)

The table shows Wunnaniya in Cheranbezo is dominated by escarpments, valleys and hills interrupted by scattered plain areas of Ambezo and Lamgiday only not more than 20% is suitable for cultivation. Even plain areas of Ambezo and Lamgiday vast area of grasslands are seasonally affected by water logging mainly used for grazing.

In respect to land uses more areas are used to cultivation and no areas are free from human and livestock more likely steep slops between Ambezo and Lamgiday, Wunnaniya and sides of Woskembit, Kezkazit, Sanja river and in and around Chugie monastery.

5.2 Soil and water conservation

Traditional cultivation of many areas that are not meant for agricultural activities subjected to land degradation and soil nutrient loss which are caused by devoid of vegetation cover and absence of conservation measures. Its consequence may hamper visitors impression and inspiration scenic beauty look to the landscape which finally reduces expected benefit from tourism and difficult to reverse.

Existing soil and water conservation closely associated with cultivation and cropping systems. In some areas structural stone band and bench terraces. The villages in the higher altitude >2500masl wheat and barley are largely growing followed by legumes faba bean and field pea. While the lower altitude <2500masl teff, maize and sorghum are dominantly grown. SW conservation measures traditionally supplemented with counter farming, cover crop, stone band and grass strip. More dominantly frequency of plowing ranges 3 to 5 for cereals and 1-2 for pulse also contribute to conservation of resources.

The community aware the loss of soil and nutrient and the requirement of effective conservation measures through diminishing trends and supplemental fertility enrichment. Farmers are growing seedlings of Eucalyptus in their own nursery. Moreover they receive training and seedlings from nurseries developed by Woreda Agricultural and Rural Development office. However, these activities are not sufficient and further efforts on proper plantation, regeneration and management activities are required. At community level growing indigenous species of Acacia, Croton and Albeza are dispersedly growing in different farm plots.



Figure.6. *Scattered trees in farm and settlement areas*

5.3 Natural Resource management and threats

Natural resources conservation is limited with growing Eucalyptus trees, Ficus and croton species supported with stone and soil band terraces in few areas. Large portion of cultivated lands are only conserved traditional counter plow and cover crop. Due to long aged and traditional farming practices enhanced by uncontrolled grazing, low conservation effort and continuous deforestation and habitats use beyond natural ecological carrying capacity changed vegetation cover and scenic beauty of the landscape.



Figure 7*, Traditional stone terrace in between farm plots and non conserved cultivated farmlands above Kezkazit*

Table 4 Major threats and possible measures on habitats or land use

No	Habitats / land uses/ features	Prevalent Threats	Possible Measures
1	Grasslands/ grazing land/ open areas and seasonal water logging sites	Over grazing	Controlled grazing Limited feeding areas Shifting grazing Harvesting and carrying Minimize or prevent encroachment Restricted movement in wet season
		Soil erosion and land degradation	
		Fire hazard	
		Encroachment	
		Unrestricted movement	
2	Hills/ Valleys and escarpments	Deforestation	Area closure Physical and biological conservation
		Soil Erosion	

No	Habitats / land uses/ features	Prevalent Threats	Possible Measures
		Land degradation Land sliding Gully formation Hillside cultivation	Appropriate land use Integrated watershed management Improved agricultural management systems Limit cultivated areas
3	Cultivated lands	High human and livestock pressure Continuous farming Mono-cropping Soil erosion Land degradation High runoff Unrestricted movement	Family education Use of suitable number of livestock Crop rotation and intercropping Physical and biological conservation Introduction of improved technologies
4	Settlme3nt institution and sub villages (Got)	Scarcity of potable and clean water Low access to health services	Spring and ground water development Facilitate access to health services Construction of access road Biological and structural conservation of landslides and run off
		Landslides Run off	Land use certification
5	Wooded lands, Dense forest patch/and river banks	Deforestation Encroachment Fire Overgrazing Hunting	Area closure Protection of overgrazing Control hunting and fire Control encroachment Enrichment Control cutting of live plants Land use certification
6	Valleys rivers and caves	Hunting Fire Encroachment Deforestation	Control or prohibit hunting Area closure Prevent farmland expansion Control deforestation Monitor wildlife and fire hazards

As shown on the table different features and land uses are highly affected by various threats. However, possible measures to cope up threats reveilles integration with different stockholders and awareness development to the local community will guarantee for rehabilitation of natural components of the landscape.

6. Summary of land use and challenges for landscape conservation.

6.1. Land uses and associated challenges

In wunnaniya-kossoyie landscape the interaction of nature and people is dominated by use of resources for subsistence through traditional farming and collection practices:- continuous plow

culture, free grazing, wood and grass collection from natural vegetation and mono-cropping resulted soil and land degradation, loss of vegetation cover, which finally ended up with low productivity and water shortage. Hence, loss of vegetation cover, over hunting, contentious cropping and loss of soil nutrient are challenges to sustainability of improved livelihood of the community in the landscape.

6.2. Cope up strategies and mitigation measures

Knowledge of causes to challenges and consequences are a primary issue to develop cope up strategies and possible mitigation measures. During field study resources and associated threats and causes are identified. Identification of resources, different land uses and associated challenges are not the final goal of this assessment. Possible cope up strategies and possible practices were described to halt respective challenges in the landscape. Hence strategies to improve scenic beauty and resources abundance are:

- Awareness development on the values of resources beyond direct use tourism and spiritual values and scenic beauty
- Improvement of traditional farming accompanying with suitable structural and biological conservation systems
- Minimize dependency on use of indigenous species through cutting for various purposes
- Delineate forest patches as area closure and controlled use of vegetation.
- Stop hunting and chasing wild animals from their natural habitats.
- Introduction of improved verities of crops and cultivation systems
- Development of access roads and institutions at different sub villages for proper control and management of landscape components
- Develop integrated soil and water conservation systems through proper farming practice, grazing, area closure and partial foraging with appropriate biological and structural conservation and frequent rehabilitation,.

6.3 Conservation and improved land use benefits.

- Simultaneous development of cope up strategies and possible mitigation measures implementation benefits to sustain resources of the landscape and improve the livelihood of the community.
- Application of intended strategies and practical measures used to facilitate productivity of traditional farming and increases number of visitors to put their impression on the beauty of landscape and spiritual satisfaction.
- Incomes from tourism and infrastructural development projects can support the livelihood of significant number of inhabitants.
- Over all development and conservation effort rehabilitates the natural vegetation cover and wild animals in different natural sites for biodiversity conservation
- Wunanniya kossoyie landscape conservation schemes can offer various benefit to researchers on interaction effect of natural and human, visitors' satisfaction on viewing and reconciling issues on natural and anthropogenic effect.

6.4. Operational activities and implementation.

The strategic approach from awareness to rehabilitation of natural setting in the landscape prevailed by involvement of stakeholders in respective issues. The following are operational activities, areas of implementation and time frame with in the landscape.

Table 6. Strategic activities and time frame

No	Operational activities	Sites sub villages	Time/ years		
			1st	2nd	3rd
1	Mobilization of the community and creation of awareness on values of the land scope conservation	3 kebeles and all sub villages (Got)	X		
2	Delineate specific habitats and management systems of plant and animal species	Different patches of natural areas	X		
3	Develop, select and prioritize activities on landscape conservation	In sub kebeles	X		
4	Request budget from potential donors	Zone CTD	X		
5	Establish nursery site wunanniya and Sanja valleys	Woreda and kebele	X	X	
6	Purchase improved crop varieties	Woreda office of ARD	X	X	X
7	Construct stone and soil band and bench terraces in the farm lands above Kezkazit	Woreda office of ARD and kebele development agents	X	X	X
8	Establish biological conservation an maintained structural conservation sites	Villagers		X	X
9	Maintain indigenous specie on conserved lands	Villagers			X
10	Reduce and shift forging and grazing areas	Villagers			X
10	Reduce over use of grasses and cutting of trees on woodlands	Villagers	X	X	X
11	Harvest annual grasses and herbs for cattle feed construction on agreed time from natural sites	Villagers	X	X	X
12	Constrict access road to lower side of villages from Ambezo, Wunnaniya and Kossoyie (trekking)	Woreda, Kebele Villages		X	X
13	Plant perennial plants in bush lands and enrich the woodlands of natural sites.	Wonanniya Ambezo Sanja Kossoyie		X	X

7. Approaches, values and strategies for landscape conservation

7.1. Natural and cultural resources management approaches

Detail activities implementation of land management and resources conservation should be developed consulting with the community and delineating each activities for respective implementers and sites with required financial and time budget.

Based on this study detail management plan for the next ten years should developed and comprise the natural and cultural resources, exceptional resources values, development approaches and programs, required man power, expected outputs, monitoring and evaluation techniques, three years operational activities accompanied by financial and time costs. The approaches in executing respective conservation and enhancing productivity are described as follows.

Community Based Ecotourism (CBET) and Pro-poor Tourism (PPT) which can be managed and run by the community and largely addresses the poorest members of the community**.** Community Based Ecotourism stress on fulfilling the needs and the interest of visitors.

Management decision made by the community through guidance close follow-up by respective institutions:: the community implement production, conservation and other activities in different localities with in the landscape while both government and non governmental institutions can support and provide the required inputs that could help to execute targeted activities.

Implementation of Integrated management and conservation systems; All activities should be executed in a way all natural resources, essential ecological process, sustainable biological diversity and scenic beauty maintained and the livelihood of the community support.



Figure. 8 *Typical integrated and Improved landscape management and rehabilitated hills in North Shewa and South Wollo*

7. 2. Values of Community Based Eco tourism

Community Based Natural Resource Management (CBNRM) by the community for better conservation and productivity enhancement supported by technical and practical training and appropriate input supply



Figure 9. ***Typical Improved traditional conservation farm plots and grasslands in North Shewa***

CBET apart from sustainable tourism has the following indispensable values for resources conservation and beneficiaries.
CBET involves local and indigenous communities in its planning, development and benefit sharing largely for marginalized poor society members through pro-poor tourism development components
Contribute actively to conservation of natural and cultural heritages and sustainable productivity of the landscape
Operation contributes to communities' well being and livelihood support
Interpret the real natural and cultural heritages of the destinations to visitors
Express and lend it self for independent visitors as well as organizes tours for small sized groups

Hence CBNRC and CBET help to

- conserve the natural environment
- spread benefits to the community
- satisfy the interests and needs of visitors
- contribute to integrated sustainable development
- creates a sense of responsibility in natural resource conservation
- prevent resource degradation urged by marginalizing the community and its members

7.3 Strategies to implement the approaches and harnessing values from CBNRM and CBET

Implementation of the approaches and to magnify values of CBNRC and CBET the following activities implantable strategically put at frontline

- Community awareness development on the value of landscape conservation and problems of existing practices with associated mitigation measures
- Empowering the communities' organizations in developing integrated management and utilization systems from sustainable productivity and tourism
- Develop and apply suitable and integrated conservation and management of natural and cultural resources in the landscape along with satisfaction of livelihood demand of the local communities.

- Develop of infrastructure and accommodation facilities with effective promotion for visitors.
- Establish equitable benefit sharing systems from conservation and tourism
- Apply program based assessment, development and evaluation implementation approach of
    - Training and promotion program
    - Conservation of heritages and input supply program
    - Tourism infrastructure and facilitation program
    - Administration; project and fund raising program

8. Monitoring and implementation Modalities

Activities stated in the above should begin with discussion and formulation of suitable procedures and implementation modalities. The community should aware about anthropogenic effect on the natural resources of the landscape and common sites resource degradation and declined trends productivity. The have to a war as they are the owner of the resources and responsible to rehabilitate and sustain. They also plan activities suitable to them for rehabilitation and regeneration to nearly natural landscape.. The Woreda experts are responsible to schedule timeframe and mobilize communities at different groups during operational times. Experts at zonal level and authority's request fund from potential donors to mobilize stockholders and preparation of management plan. Close follow up and timely monitoring and evaluation followed by open discussion with the community insure the implementation of the activities and responses from the communities. Workshops for stakeholders to evaluate the assessment and designing the activities can which may lay base for development effort that could be accepted and implemented by the communities.

9. Conclusion and recommendations.

Wunanniya kossoyie landscape has spectacular topographic settings and has been attracted many visitors impression. It has various land features, biological resources and anthropogenic effects. Figure shaped hills, striped valleys and continuous escarpments, down viewing top points interrupted by valleys with associated vegetation cover are sources of its attractiveness. However, due to improper land and biological resource management many spectacular face and open air museum for different land features observed in a single view are seriously affected. Many of its beauty ingredients are changed its natural face hence, biological soil and water resource conservation and implementation of proper land use management on the landscape are issue of today. Owning this different conservation and land use systems have to be executed to sustain natural face and productivity of the landscape so as to improve ecological, economic and social benefits. As a result climatic balance, livelihood and socio cultural elements of the inhabitants and incoming visitors will improve in the coming few years.

Based on the above conclusion the following recommendations have been forwarded.

- Develop awareness to the community on ecological and sustainable tourism values
- Describe how existing land use and management system affected haphazardly the natural face of the landscape.
- Develop conservation initiatives and financial grants to implement suitable land use and management.
- Implement proper farming and conservation practices. Counter farming intercropping, soil and stone band, bench terraces, fanyaju, water harvesting structures besides biological conservation and reduction of grazing pressure on different land features.

- Introduce improved farming technologies fertilizer, seeds, livestock species, and management practices.
- Establish required institutions, health services, infrastructures and tourism facilities largely managed by the community.
- Develop mid and long term management plan that could be executed programs

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