Assessment on the Socio-Economic Significance and Management of Woynwuha Natural Forest, Northwest Ethiopia

Temesgen Mekonen[1], Belayneh Ayele[2], Yeshanew Ashagrie[3]*

[1]*Department of Soil Resources and Watershed Management, Gambella University*
[2]*College of Agriculture and Environmental Science, Bahir Dar University*
[3]*Organization for Rehabilitation and Development in Amhara*

Corresponding author: temelrm2003@gmail.com

Received: October 14, 2014 Accepted: December 23, 2014

Abstract: *A study was conducted in Woynwuha natural forest, Goncha Siso Enesie district, North West Ethiopia to assess the socio-economic significance and management of the Woynwuha natural forest. Data has been collected from 50 randomly selected households through questionnaire and key informant interview. The household socioeconomic data analysis result indicated that identified constraints for the conservation of the forest stand were stoniness of the land, lack of awareness of the community, heavy dependence on the forest products, illegal cutting, expansion of farm land towards the forest estate, open and free grazing, forest fire and lack of budget for forest development works. In order to better conserve the Woynwuha natural forest from further degradation, appropriate forest management planning has to be formulated and emphasis should be given towards educating the local community.*

Keywords: Socio-economic Significance, Forest Management Problems, Woynwuha Natural Forest

1. Introduction

The impact of environmental degradation is most severe for people living in poverty, because they have few livelihood options on which to depend (IUCN's, 2010). Most of the natural forests in Africa face pressure from communities who derive their basic livelihood from forests, or the land on which they grow crops, and even greater pressure come from commercial plantation companies and extractors of timber and other products. Conflicts often occur because of competition for forest resources from local people's livelihoods, commerce, wildlife and forestry, and the alarming rate of forest loss in African forests poses an international concern (Leon Bennun *et al.,* 2004).

The deforestation of mountain forests in Ethiopia seems to have occurred relatively early, and it was extensive in comparison to other East African countries (Bonnefille & Hamilton, 1986; Siiriäinen, 1996). However, the disappearance of the forests has been drastic during the past hundred years, and a maximum deforestation rate was reached in the 1950s and early 1960s (Pohjonen and Pukkala, 1990).

As a result of deforestation, the natural conditions on the study area have been changed. From this, it can be predicted that until acceptable alternatives can be found, deforestation will undoubtedly continue and the natural forest resource will be exhausted in the coming few years. This, in turn, may lead to reduction of soil fertility, drying up of streams and loss of flora and fauna. In order to conserve the Woynwuha natural forest from degradation, appropriate forest management planning has to be formulated and emphasis should be given towards educating the local community.

2. Materials and Methods

Description of the study area

Woynwuha natural forest is located in Debreyakob kebele, Goncha Siso Enesie district, East Gojjam Zone, Amhara National Regional State (Figure 1). The study site is located between $10^0 51' 314'' – 10^0 63' 168''$ North latitude and $38^0 13' 311'' – 38^0 14' 990''$ East longitudes. The study natural forest has an area of 162.057 ha.

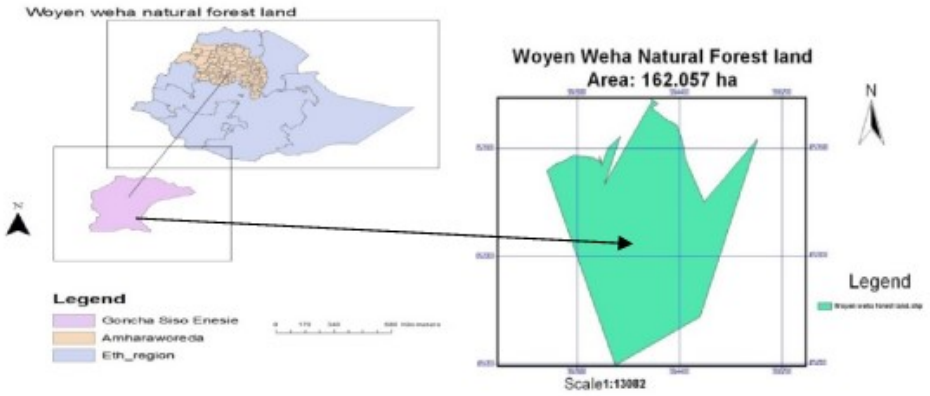

Figure 1 Map of the study area and forest.

Topography, land use and soil

According to the Goncha Siso Enesie District Finance and Economic Development Office's 2009/10 budget year statistical bulletin (October, 2010), the topography of the study area is generally characterized by undulating hill and consists of mountains (39%), plain land (45%), terrain (15.871%), and water body (0.129%). The total area of the district is 98383 ha. More than seven types of land use are identified in the district: cultivated land (47.4%), forest land (4.78%), lakes (0.07%), shrub land (9.58%), grazing land (11.93%), settlement (16.3%) and others (9.94). Scientific description of the soil types is not done in the district. According to Debre Markos Soil Laboratory (2007), four types of soils namely red (15%), black (5%), brown (60%) and light brown (20%) soils are identified in the district by color. The soils are mostly acidic with pH values ranging from 4.2 to7.3. The elevation of the study forest ranges from 2009-2733m.a.s.l and bounded by two PA (Debreyakob and Gufu) and four Gotts namely Tach Dinjet in the north, Gufu Giorgis in the east, Debreyakob kola in the west and Jibra Kola in the south. Woynwuha natural forest is owned and managed by local community.

Climate, Vegetation and wild life

Traditionally, the districts have three major types of agro-climatic zones: *Dega* (12%), *Weina-Dega* (48%) and *Kolla* (40%). The natural forest under study is characterised as sub-humid climate. The mean annual rainfall is in the range of 1100-1800mm. The monthly mean temperature is 19.5^0c, and the annual average maximum and minimum temperature of the study area is 24°c and 15°c, respectively (WAO, 2011/12).

The area around Debreyakob PA has been covered by continuous vegetation until recently. However, the vegetation in the area is being destroyed by human activities mainly by agricultural expansion, excessive exploitation for wood products and human settlement. In the study district, there is 1898 ha of natural forest and 2810 ha of plantation forest. These forests are habitat for numerous wild animals including *Lepas habessinicus, Tragelaphus scriptus, Canis aureus, Papio hamardias, Silvicapra grimmia, Oreotragus grimmia, Felis sivcestris, Cercopithecus pygeythrus, Panthera pardus, Corcuta corcuta* and a variety of bird species (FTC, 2012/13). The most commonly known plant species are *Albizia gummifera, Olea europaea, Carissa edulis, Acacia abyssinica, Juniperus procera* and *Croton macrostachys*. Bush, Shrub and herbs are also common in the area.

Demographic characteristics and socio-economic features

The district consists of 37 rural and 1 urban PAs. According to CSA's (2009) census, human population of the district was 156012 with 77495 (49.7 %) male and 78516 (50.3 %) female with an average household size of about 5 people. The number of rural HHs was 32687, among which 82.1% were men and 17.9 % were women headed. The average land size in the area is 1.43 ha per household. Out of the total land size, on average, 0.26ha and 1ha of land is allocated for private grazing and crop production, respectively (CSA, 2009).

The people around the study area employ a mixed subsistence agriculture where crop production and animal husbandry is carried out side by side. The major crops grown in the district are *Eragrostis tef,*

Sorghum bicolor, Triticum aestivum, Eleucine coracana dgs, Oryza sativa, Sesamum indicum, Carthanus tinktorius, Brassica carinata, Hordeum sp (Phaseolus vulgaris, horse bean, Pisum sativum, Cicer arietinum, soya bean and Vicia faba), Guizotia abyssinica, Linum usitatissimum and vegetables. The dominant livestock in the study area include: cattle, sheep and goats, horses, donkeys, and also some bee keeping activity.

Data collection

Before the actual data collection started, reconnaissance survey has been conducted in the study area for three consecutive days in order to get general information about the physiognomy of the vegetation, and the nature of the landscape. After conducting the reconnaissance survey, actual data were collected from December 2012 to May 2013. Socio-economic data were collected to assess the perception of the local community towards the forest and about their management practices. The socio-economic data were collected using semi-structured questionnaire and key informant interview. Semi-structured interviews as described by Martin (1995) and Cunningham (2001) were used to obtain both qualitative and quantitative data from the community.

In order to determine sample size on total households living in the forest surrounding, data were obtained from DAs of the two PAs. The total household heads residing in the forest were 216. The number of sample household selected for the interview was determined by using the following formula (Cochran, 1977).

$$n_0 = \frac{Z^2 pq}{d^2}$$

$$n = 1 + \frac{\left(\frac{n_0}{n_0 - 1}\right)}{N}$$

Where,

n_0 is the desired sample size when the population is greater than 10000

n is number of sample size when population is less than 10000

Z is 95% confidence limit i.e. 1.96

p is 0.1 (proportion of the population to be included in the sample i.e. 10%)

q is 1-0.1 i.e. (0.9)

N is total number of population

d is margin of error or degree of accuracy desired (0.05)

Based on the above sample size determination, a total of 50 sample households who live around the forest from two PAs and four Gotte were randomly selected (19 from Debreyakob Kola, 13 from Jibra Kola, 13 from Gufu Giorgis, 5 from Tach Dinjet) depending on population size, accessibility and familiarity to the forest and key informants were identified purposively from people who are knowledgeable about the general overview of the socio-economic aspects of the study area.

Thus, socio-economic information collected include tree/shrub species preference and types, perception of farmers on the forest and its degradation, family size, age, religion and educational statuses. For better communication with the respondents, questionnaires were translated into the local language (Amharic). Also video and digital camera photographs of the study site were used.

Data Analysis

Socio-economic information obtained through field observation, semi-structured interview and key informant interview were summarized and described using descriptive statistics like mean. The use values of species were calculated and ranked following frequencies and percentage of the respondents. The qualitative and quantitative data were analyzed using frequencies, tables, and histograms by means of Statistical Package for Social Sciences (SPSS) version 16 software and with Microsoft Excel.

3. Results and Discussions

Perception of the community towards the forest

According to the views of the respondents (88%), the current forest statuses against its status which used to be before have increased. However, 10% of the respondents said that there gradual decline in the condition of the forest, while 2% said the status is the same (Table 1)

Table 1 Current forest status against its previous status

Current status	Number of respondents	Percent
Increased	44	88.0
Decreased	5	10.0
Same	1	2.0
Total	50	100.0

Socio-economic importance of the forest

According to the response from the key informants, there are different economic, social and ecological benefits being obtained from the forest (Table 2). Moreover, during the focus group discussion, it was learnt that there is also holly water (*lideta tsebel*) that originates from the forest that is positively contributing for the conservation of the forest. Apart from this, there is a rock stele called '*miseso dingay'* that serves as tourist attraction and income generation (Figure 2).

Table 2 Socio-economic importance of Woynwuha natural forests

No,	Socio-economic importance	Number of respondent	Percent	Rank
1	Source of fuel wood	7	14.0	2
2	Used as grazing land	5	10.0	3
3	Source of construction material	5	10.0	4
4	Cultural value/ holly water	2	4.0	5
5	Climate amelioration	1	2.0	6
6	Recreation	1	2.0	7
7	All of the above	29	58.0	1
Total		50	100.0	

Figure 2 Miseso Dingay, D/kidanemihret church and Millennium Park in the study area

Economic importance

The discussants from the group discussion mainly underlined that due to the closure of the area and rehabilitation of the vegetation, the community is getting grass both for roof thatching and animal feed in drought season under the permission of the PA administration agricultural offices free of charge. The residents used to go far in search of grass for roof thatching (Table 3 and Figure 3).

Table 3 Economic importance of Woynwuha natural forest

Economic importance	Number of respondent	Percent (100%)
Fuel wood	16	32.0
Grazing	11	22.0
Both	23	46.0
Total	50	100.0

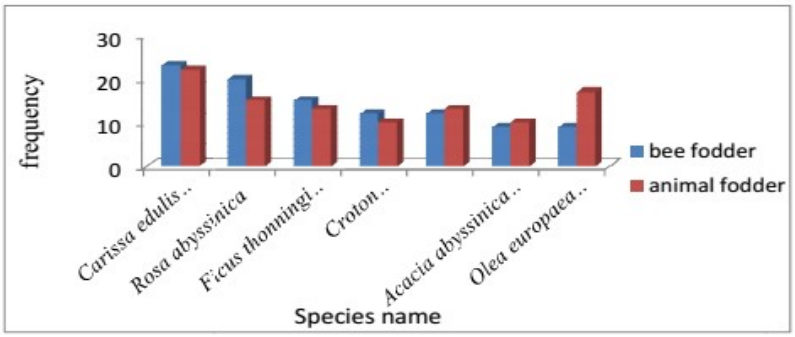

Figure 3 Species preference for bee forage and other domestic animal fodder

Social importance and view of local people

According to the respondents during group discussion, there was unrestricted fuel wood collection and free grazing before some years. The enclosure of the area helped the rehabilitation and growth of different vegetations and has contributed for the maintenance of the traditional knowledge regarding plant species and their use. The results of the interview made with local community (Table 4) showed that 96% (48 of the respondents) have agreed on the benefits from the forest, which include availability of woody species, wind break by the vegetation, and growth of grasses used for different purposes.Ecotourism outweighs its negative impacts like restriction of domestic animals from entrance into the forest, domestic animal hunting and crops damaged by wild animals and lack of benefit sharing. Moreover, greater than 88% (44 of the respondents) strongly emphasized the sustainability and willingness for managing the area (Table 4). Perception of the local people is a key issue to the successful management of communal resources (Emiru, 2002). Even though, few of the respondents have negative attitude, 98% (49 of the respondents) have positive attitude towards the sustainability and rehabilitation of the forest (Table 4).

Table 4 Beneficiaries and participants in the management of Woynwuha natural forest

Respondents	Answer	Number of respondent	Percent (100%)
Beneficiary	Yes	48	96.0
	No	2	4.0
Participant	Yes	44	88.0
	No	6	12.0
Feeling	Happy	49	98.0
	Unhappy	1	2.0
Degree of participation	Excellent	29	58.0
	Good	5	10.0
	Medium	14	28.0
	Poor	2	4.0

About 15 of the respondents (30%) feel that the enclosure of the forest is the reason that made them landless/shortage of farmland (Table 5). Yet, there seems to be a visible reluctance to take full participation in the conservation effort, and considerable incidences of intrusions are recorded. This may be due to the crises that people had experienced before.

Table 5 Major problems due to the presence of Woynwuha natural forest

Problem	Number of respondent	Percent
shortage of farm land	15	30.0
damages on crops and domestic animals by wild animals	5	10.0
no problem	30	60.0
Total	50	100.0

The respondents stressed that the forest will have great benefit for the future only if it is managed by the alliance of the government and the local community (Table 6). According to the rules and regulations set by the local people, if domestic animals entered the territory of the forest, the owner will pay 10 ETB per animal as punishment. Besides this, the local people have great tendency to listen seriously whatever is told to them by their own community members and elders rather than any outsider. This shows that including such knowledgeable persons has tremendous value for future awareness creation campaigns and sustainable conservation of the resources in Woynwuha natural forest.

Table 6 Management approach of Woynwuha natural forest

Management approach	Number of respondents	Percent
State management	2	4.0
Community management	2	4.0
Collaborative management	46	92.0
Total	50	100.0

Ecological importance/change in the ecosystem

About 96% of respondents have sense of ownership on Woynwuha natural forests. The major reasons are increase in the availability of multipurpose trees (54%), decrease in soil erosion and drought (16%) and increase in species diversity (26%). Now, they observed that there was ecological benefit that people of the study area obtained from the forest including rejuvenation of different woody species and grasses, re-occurrence of different wild animals, gully stabilization, good air regulation and recreation to the surrounding town of Mertule Mariam and other neighboring villages.

After the closure, the gullies became stabilized and the expansion stopped. From this point of view the respondents from the surrounding dwellers realized the importance of protecting the area and some knowledgeable consider the protected areas as part of their daily life because directly or indirectly their life is associated with the resources in the forest. Based on individual's interview of 50 informants, the economic importance ranked first, ecological importance takes the second rank, whereas social importance ranked least.

Common tree/shrub species and their use

The most common tree/shrub species preferred in order of dominance of response include *Olea europaea* (17.82%), *Albizia gummifera* (14%), *Carissa edulis* (13.55), *Rhus retinorrhoea* (11.21%), *Dodonaea viscosa* (7.94%) and *Croton macrostachyus* (7.48%) (Table 7). The most common tree/shrub species managed currently in order of dominance of response include *Albizia gummifera* (18.39%), *Olea europaea* (13.33%), *Carissa edulis* (11.67%), *Allophylus abyssinicus* (10%) and *Rhus retinorrhoea* (9.4%).

Table 7 List of previous and current dominant tree species

List of previously dominant tree species		List of currently dominant tree species	
Species name	Percent (%)	Species name	Percent (%)
Olea europaea	17.82	*Albizia gummifera*	18.39
Albizia gummifera	14.00	*Olea europaea*	13.33
Carissa edulis	13.55	*carissa edulis*	11.67
Rhus retinorrhoea	11.21	*Allophylus abyssinicus*	10.00
Dodonaea viscose	7.94	*Rhus retinorrhoea*	9.40
Croton macrostachyus	7.48	*Cordia Africana*	8.33
Acacia seyal	7.00	*Juniperus procera*	8.33
Rosa abyssinica	7.00	*Rosa abyssinica*	8.33
Juniperus procera	7.00	*Dodonaea viscose*	6.11
Ficus vasta	7.00	*Eucalyptus spp*	6.11

Management problem of Woynwuha natural forest

Analysis of some of the factors affecting woynwuha forest conditions depicted that stoniness of land, lack of awareness, heavy demand of forest products, illegal cutting, expansion of farm land; open grazing, lack of budget and forest fire have been problems in Woynwuha natural forest (Table 8 and Figure 4). The major management intervention that improves regeneration of tree species in the forest include reducing grazing intensity, reducing intensity of wood harvest, transplanting seedlings, sowing seeds combining with litter removal and selecting/creating micro sites (Alemayehu, 2002).

Table 8 Major Management problem in Woynwuha natural forests

Production constraints	Number of respondent	Percent
Human population increment	2	4.0
Lack of awareness	2	4.0
Illegal cutting	16	32.0
Expansion of farm land	13	26.0
Open grazing	4	8.0
Forest fire	4	8.0
Stoniness	2	4.0
Lack of budget	7	14.0
Total	50	100.0

Figure 4 Major problems observed that threaten Woynwuha natural forest

Human population increment induced higher demand for forest products

According to the information from group discussion and individual informants, 86% of the respondents whose daily life depends on animal husbandry and crop production see the forest as the only place where they get grazing land/fodder which is also true in farm land expansion. As it is indicated in Table 9, 16% of individual respondents agreed that most of the people living around the forest have very low income, which even does not satisfy their daily need. Consequently, they have to secretly sneak and collect wood, in spite of the risk

of being caught by the guards and the consequence that follows.

Table 9 Wealth status of the respondents

Wealth status	Number of respondent	Percent
Poor	8	16.0
Medium	40	80.0
Rich	2	4.0
Total	50	100.0

Lack of awareness

The fuel wood demand is high. This is the case both among rural and urban people that wood is the major energy source for cooking (Derejje, 2006). The saddening situation is that these people do not collect only the dried trees but also peel the barks of the green trees to make sure that it will get dried when they come back again. Such irresponsible activities are said to be predominantly done by illegal dwellers. This justifies and reinforces the necessity of introducing fuel saving stoves and alternative energy source, which greatly contribute to the minimization of the demand for fuel wood (Tables 10 and 11).

Table 10 Sources of fuel wood in selected PA

Source of fuel wood	Number of respondent	Percent
From the surrounding forest	12	24.0
From back yard	11	22.0
From farm area	5	10.0
All	22	44.0
Total	50	100.0

Table 11 Interventions to overcome shortage of fuel wood

Way of solving shortage of fuel wood	Number of respondents	Percent
Planting seedling around the home and farm land bounder	10	20.0
Using improved energy saving cooking stove	11	22.0
Both	29	58.0
Total	50	100.0

Illegal cutting

Almost all houses are made of wood. 48% of individual respondents mentioned that people living around the forest use wood from the forest for construction (Table 12). Such needs unless met with other alternatives would remain a pressure. Besides, people's intrusion in the forest has to be discouraged by all means to the extent that dependence of the residents on construction wood decreases and their interference in the forest minimizes. Newly emerging ecosystems may help to strive to restore ecosystems that will be adaptive and resilient to local and global changes (Derejje, 2006). The existing forests provide great opportunities for restoration. They can serve as stepping stones to restore the surrounding degraded landscape. They can lead area enclosure programs to full-scale restoration trajectory and, in turn, enclosures can ensure future sustainability of forests (Alemayehu, 2005).

Illegal cutting is ranked first (Table 8 and Figure 5) as it is related to the livelihood of the local community followed by expansion of farm land and free grazing which has direct or indirect influence on the properties of the people around the forest. Whereas, lack of awareness take the last rank as it has no great problem on the daily activities of the local people and on the management and sustainable use of the Woynwuha natural forest as compared to other problems affecting the sustainability and rehabilitation of the forest.

Figure 5 Illegal cutting problems

Expansion of farmland

According to key informants' group discussion and 26% of individual respondents, expansion of the farmland has been a major problem in the study. The enclosure area could not be fenced due to shortage of budget and other problems. Moreover, fencing can protect the farmers' livestock from entering the forest and farmland expansion (Figure 6).

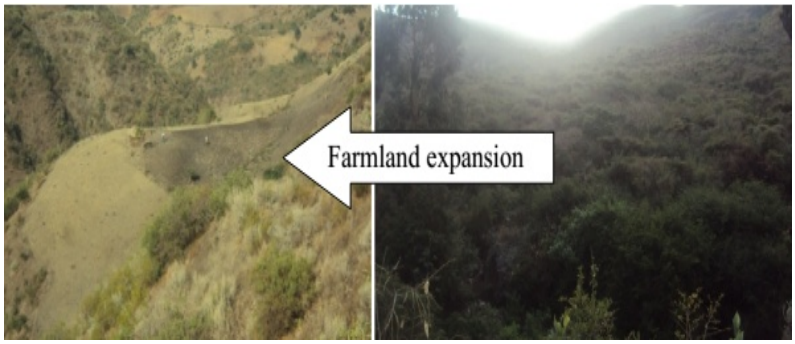

Figure 6 Expansion of farmland problems

Conflicts of wild animals of the forest and the local community

Even though the majority of the respondents agreed on the positive benefit of the forest, they stressed that their crops and domestic animals are frequently damaged and eaten by wild animals. According to key informants' group discussion, protecting their cattle and crops from wild animals becomes extremely difficult. Most of the respondents suggested that the completion of the fence would significantly reduce these negative impacts. They emphasized that the number of warthogs and hyenas has become so large that it needs arrangement of legal hunting mechanism as a means of mitigating their damage on crops and animals. Legal hunting minimizes the magnitude of the damage the animals are inflicting on the people on one hand, and generating income from controlled hunting on the other. Such suggestions also indicate the awareness level of the community members.

Table 12 Summary of the respondents' view on uses of different tree species associated to the Woynwuha natural forest

Tree/shrub	Use value %										Total value	Rank
	Fuel wood	Construction	Farm tools	Food	Soil and water conservation	Shade	Fencing	Recrea-tion	Timber	Cattle feed/ fodder		
A. abyssinica	6.43				25.28	7.37	20.45				59.53	6
A. donax					20.84						20.84	14
A. gummifera		13.4	26.5			7.37		18.75			66.02	5
A. vera					15.59						15.59	15
Al. abyssinicus	11.62	18.56	11.76			5.26				11.63	58.83	7
C. Africana			7.5	7.5		15.79		21.87	39.4	8.19	100.25	3
C. edulis	20.46			19.58	19.8		31.81			29.06	120.71	2
C. tomentosa							12.52				12.52	17
D. abyssinica				12.88							12.88	16
E. abyssinica							10.23				10.23	18
E. spp	16.05	28.87					13.63				58.55	8
F. sur				16.78		21.05			9	9.3	56.13	9
F. vasta				13.18		24.21			16.7		54.09	11
J. procera						7.37		18.75	28.8		54.92	10
O. europaea	28.4	24.74	35.22			11.58		18.75	6	17.4	142.09	1
P. falcatus								21.87			21.87	13
R. abyssinica				22.38	18.49		11.36			24.42	76.65	4
R. vulgaris				7.7							7.7	19
R.retinorrhoea	17.04	14.43	19.02								50.49	12

Stoniness and Man-made forest fire

From field data observation, young man who lives round the forest cut trees and set fire for increasing football field. Relatively, few respondents (12%) mentioned that part of the land is covered by stone, incapable of short period rehabilitation, and forest fire contributes additional problem for enforcing the wild animals out of the home because of habitat disturbance (Figure 7). So, legal measurement has to be taken to control man-made forest fire activity and others (Table 13).

Figure 7 Stoniness and man-made forest fire problems

Lack of budget

Shortage of budget is mentioned as one of the major problems to protect Woynwuha natural forests, to implement effective conservation activities and rehabilitation works. The newly regenerated forest type (*Juniperus* forest, with *Olea and Celtis*) is different from the earlier type (*Podocarpus-Juniperus* forest) (Darbyshire *et al.,* 2003).

Free grazing

Our results confirmed that livestock grazing is the major factor limiting seedling establishment and seedling survival and growth in Woynwuha forests. Almost none of the sown seeds were able to germinate in unfenced millennium park. Studies in Ethiopian highlands showed that heavy grazing pressure significantly increased surface runoff and soil loss and reduced infilterability of the soil, which, in turn, undermines suitability of sites for germination (Mwendera and Mohamed, 1997). The major challenge for seedlings' survival and growth again is livestock grazing. We observed signs of browsing and trampling damage in almost all seedlings in the unfenced millenniums park. Open grazing has affected the seedling establishment and seedling survival and growth. Along the gradient of forest interior to edge and open field, in general, seedling establishment was more successful inside the forest. The surrounding land is protected from grazing intervention and farming (Figure 8).

Figure 8 Free grazing problems

Water Supply / Stream flow

In the forest, there are three streams namely Wochit wuha, Shotel wonz and Sengev wonz (Figure 9). These are sources of water for wild animals and nearest people to the forest. In order to solve the problem of damage on both domestic animals and crops by wild animals coming out of the forest for

search of water, the informants pointed out constructing physical and biological soil and water conservation structures.

Figure 9 Water supply / Stream flow in Woynwuha

Human impacts on the forest ecosystems

The survey showed that the increasing demand for agricultural lands and wood products, spurred by human population growth, has led to the destruction of Woynwuha natural forests. At present, the forest resources are under great human pressure and will diminish in the near future unless appropriate and immediate measures are taken. Overexploitation of the forest for wood products has resulted in the reduction of some of the economically important tree species.

From field observation, plantations (Millennium Park) around Woynwuha natural forest and area enclosure programs are well integrated; and restoration of the lost vegetation in Debreyakob PA is possible. Caused by illegal cutting, the area has suffered a heavy loss in natural vegetation cover. Expansion of agricultural land, harvesting of construction wood and collection of fuelwood were the most important underlying causes of the loss of natural vegetation cover. Sustainable forest management systems attempt to develop systems whereby the renewable resource (e.g. wood or non-wood forest products) can be extracted without harming the environment and future generations.

Table 13 Reasons of respondents for the presence of guard

Reasons of respondents	Frequency	Percent
decreases workless people	9	18.0
thinks as owner	4	8.0
reduces illegal cutting	24	48.0
teaches the people who have lack of awareness about forest	2	4.0
All	11	22.0
Total	50	100.0

4. Conclusion and Recommendations

The socio-economic significance and management problem of Woynwuha natural forest was studied, and the results showed that Woynwuha natural forest covered dramatically. Rehabilitation and growth of different vegetations due to presence of guard and enclosure took place in the area. If appropriate management activities are applied, the nature of the study area will be improved.

Moreover, except some complaints associated to damages on crops and domestic animals by wild animals, the majority of the local respondents had positive attitude towards the preservation of the Woynwuha natural forests. This is an opportunity for forest conservation. Therefore, the isolated remnant forests with their higher woody diversity are potential for in-*situ and ex-situ* conservation sites. Despite its ecological, social and economic importance of Woynwuha natural forest, it is not under proper management.

The forest provides various products such as fuel wood, construction material, timber, farm tools, shading, animal fodder, bee forage, recreation and edible fruits. Despite their socio-economic and ecological importance, at present, the forests are under increased human pressure. Livestock grazing, illegal tree cutting for various purposes

and farmland expansion are the major threats to the forest resources. The community has played a vital role in the maintenance of the forest. Integrating conservation measures would be more effective. In general, Woynwuha natural forest is creating different opportunities and benefits to the nearby communities.

In order to ensure the conservation, management and sustainable utilization of the Woynwuha natural forest, the following recommendations were forwarded for effective management in the study area:

- Participatory forest management of the area by the local people and concerned Governmental and/or NGO's for sustainable use of the resources in the natural forests should continue.
- Make use of knowledgeable community members in the awareness creation campaigns, considering the fact that people have great tendency to listen seriously whatever is told to them by their own community members and elders rather than any outsider.
- Building strong extension services and legal protection to build awareness of the community about sustainable conservation and utilization of resource.
- Integrated research and development interventions have to be carried out for further studies on effective management in the area.

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