

Research Paper

Attitudes and Perceptions of the Local Community towards Yayo Coffee Forest Biosphere Reserve, Ilu Abba Bora Zone of Oromia National Regional State

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Abstract

Yayo Coffee Forest Biosphere Reserve is part of the Afromontane rainforest in southwestern Ethiopia, and it is the center of origin for the most popular wild populations of Arabica coffee (*Coffea arabica*). The forest was designated as UNESCO biosphere reserve to conserve coffee genetic resources and overall biodiversity of the forest. The coffee forest is, however, threatened by different factors. The major objective of the study was to collect data on attitudes and perceptions of the community towards the biosphere reserve in general and threats to it in particular. Data were collected through semi-structured interviews held with 212 (N = 1479) household heads selected randomly from 3 of the 5 gandas (ganda, in the local Afan Oromo language, is the lowest level of administrative body below district) which are considered by UNESCO as the most important transition zone in the biosphere reserve. Data were analyzed using descriptive statistics. About 51 % of the respondents supported the establishment of the Biosphere Reserve. The respondents recognized the forest values like as home of wild coffee (100 %), source of fuel wood (99.6 %) and construction materials (95.7 %) and because of these values, 57.7 % of them agreed that the community has the responsibility to protect the forest from threats. All the respondents were aware of the presence of large-scale development projects like Yayo coal mining industry and Yayo fertilizer factory which were legally established around the forest, Gaba Hydropower Dam, road construction and electric transmission line established legally inside the forest, and coffee plantation carried out illegally inside and around the forest (27 %) which have adverse effects on the biodiversity of the area if not properly managed. Ninety-one percent of the respondents mentioned that there were conflicts between the management bodies of the biosphere reserve and the local community over timber logging (100 %), charcoal production (45.1 %), expansion of coffee plantation, and gain of no benefits/incentives from the government (92.5 %). Understanding the main source of conflict is critical to the resolution of conflict. All the forest managing bodies found at different levels should give due attention in protecting the forest from anthropogenic activities such as farmland expansion and illegal extraction of forest products.

Keywords: *Attitude, Biosphere reserve, Conflict, Perception, Population growth, Yayo*

1. Introduction

Biosphere reserves are natural protected areas included in a global network organized by the United Nations Educational, Scientific, and Cultural Organization (UNESCO). Participating countries propose land and water sites within their boundaries as potential Biosphere reserves, and accepted sites are designated at the international level by UNESCO's Man

and the Biosphere Reserve (MAB). UNESCO's MAB Program was launched in 1971 with the aim of promoting interdisciplinary research, training, and communications in the field of ecosystem conservation and the rational use of natural resources (OEFCCA and OFWE, 2018).

The last update report of July 2018 of the Directory of the World Network of Biosphere Reserves shows that there are 686 World Network of Biosphere Reserves in 122 countries, including 20 trans-boundary sites (<http://www.unesco.org/new/en/natural-sciences/environment/ecological-sciences/biosphere-reserves/world-network-wnbr/>). To date, there are five UNESCO registered Biosphere Reserves in Ethiopia and these are Yayo Coffee Forest Biosphere Reserve and Kafa Biosphere Reserve registered in 2010, Sheka Biosphere Reserve registered in 2012, Lake Tana Biosphere Reserve registered in 2015 (Tesfu Fekensa et al., 2018) and Majang Forest Biosphere Reserve registered in 2017 (OEFCCA and OFWE, 2018).

Yayo Coffee Forest Biosphere Reserve (YCFBR) is situated in Ilu Abba Bora Zone and Buno-Bedele Zone of the Oromia National Regional State, southwestern Ethiopia. The forest is part of the Afromontane rainforest in southwestern Ethiopia, and it is the center for Arabica coffee (*Coffea arabica*) which is globally a highly popular wild coffee species. The reserve is an important place for the conservation of the wild *Coffea Arabica* in particular but also the vast biodiversity living in the forest reserve in general. The reserve also includes Afromontane biodiversity hotspots, important bird areas, archaeological sites, ritual sites, caves, and waterfalls (Tilahun Mulatu and Abebe Getahun, 2018).

Survey conducted by the International Union for Conservation of Natural Resources (IUCN) on protected areas in 10 key forested countries found that only 1 % of protected areas were secure from threat (Hayes and Ostrom, 2005). Ethiopian natural forest has been lost or degraded to a level of disturbed forest lands in the time span of 1971 to 1997 by 50 % (Daba Wirtu, 2000). Reusing (1998) reported that 60 % of the Ethiopian forest area has been modified or destroyed by anthropogenic influences such as new settlements, conversion to other land uses and timber extraction in the past three decades. About 2000 km² of extremely fragmented rain forest remain in the country (ZEF and EARO, 2002). Forest cover in some parts of Southwest Ethiopia has decreased from 71 % to 48 % between the years of 1973 and 2005 (Wakjira Dereje and Tadesse Woldemariam, 2007). Due to widespread human influence on the natural forest, larger portions of the existing forest areas have been planted by man and are hence secondary (Kidane Mengistu, 2002).

The ever-increasing human population coupled with unwise land use and farming systems, un-sustainable forms of agricultural intensification, and catchment degradation has resulted in serious degradation of these important forest resources. These coupled with the impacts of climate change lead to economic destabilization and habitat destruction and loss. This calls for urgent conservation action undertakings in the Yayo forest biocultural resources as a cure against the prevailing high risk and the resulting tremendous effects of overall Yayo Coffee Forest Biosphere reserve territory. To restore and sustain the ecological functioning of forest resources, the introduction of participatory sustainable Biosphere reserve management and offering alternative use options for coffee forest resources in the proposed biosphere reserve area could be appropriate option (OEFCCA and OFWE, 2018).

Therefore, the aim of this study was to explore attitudes and perceptions of the local community towards forest values, conflicts, establishment, and conservation of the Yayo Coffee Forest Biosphere Reserve. Clear knowledge of factors influencing people's perceptions and attitudes could be incorporated into a co-management approach for improving the relationship between the biosphere reserve and the local community.

2. Materials and Methods

2.1. The Study Area

The YCFBR is located in the Ilu Abba Bora and Buno Bedele Zones in Oromia National Regional State, Southwest Ethiopia (Figure 1). The site covers a total area of 167,021 hectares of biodiversity hotspots that has three management zones namely, core zone with (16.6%), buffer zone (12.9%) and transitional zone (70.5%) hectare area (Tesfu Fekensa et al., 2018). The entire biosphere reserve is stretched over six districts: Doreni, Yayo, Bilo-Nopa, Algie-Sachi, Hurumu and Chora. It is located between 8°0'42" and 8°44'23"N and 35°20'31" and 36°18'20"E. Its elevation is between 1,100 and 2,337 meters above sea level. The most important landscapes of the biosphere were forest, agricultural lands, wetlands and running water, grazing lands and built-up areas (Tadesse Woldemariam, 2010). The biosphere reserve includes eastern Afromontane biodiversity hotspot and important bird areas of

international significance and one of remnant montane rainforest fragments with wild Coffee (*Coffea arabica*) populations in the world (Tesfu et al., 2018). The biosphere reserve was established to conserve coffee genetic resources and overall biodiversity of the forest (UNESCO, 2013).

2.2. Study Population and Sampling Techniques

Three *gandas*, Wabo, Gechi, and Hamuma, were randomly selected from five *gandas* which were considered by UNESCO as the most important transition zone in the biosphere reserve. [In the local Afan Oromo language, *ganda* is the lowest level of administrative body below district, *anaaa*. *Kebele* is an equivalent word to *ganda* in Amharic language]. In total the number of households in the three *gandas* was 1479. Data on attitudes and perceptions of the community towards the biosphere reserve in general and threats to it in particular, were collected through semi-structured interviews held with 212 (N = 1479) household heads selected randomly from 3 of the 5 *gandas*. The list of

households of was obtained from each *ganda* administration. The sample size was determined by using the following formula (Daniel, 1999):

$$n = \frac{NZ^2P(1 - P)}{d^2(N - 1) + Z^2P(1 - P)}$$

Where n = sample size with finite population correction, N = Population size, Z = Z statistic for a level of confidence (Z = 1.96 at 95 % confidence), P = Expected proportion (in proportion of one; if 20 %, P = 0.2), and d = Precision (in proportion of one; if 5 %, d = 0.05).

Accordingly, 77 households were selected from Wabo *ganda* from a total of 536 households, 90 households from Gechi *ganda* from 629 households, and 45 households from Hamuma *ganda* from a total of 314 households.

2.3. Data Analysis

Collected data were analyzed both quantitatively and qualitatively using descriptive statistics (percentage, frequency and mean) with Microsoft excel.

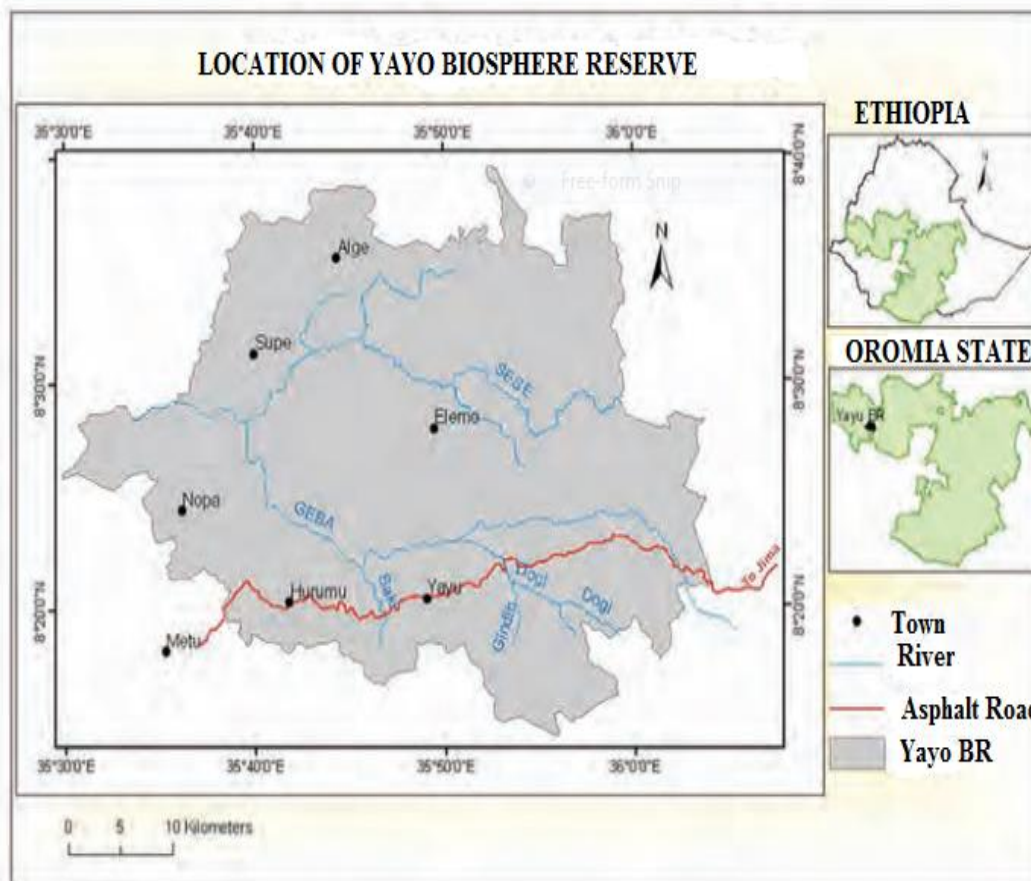


Figure 1: Map of Yayo Coffee Forest Biosphere Reserve (Source: UNESCO, 2013)

3. Results and Discussion

3.1. Some Socio-demographic Characteristics of the Respondents

The socio-demographic characteristics of the households participated in the survey is shown in Table 1. Of the total respondents 80.7% (171) were males and 19.3% (41) were females. Age of most of the respondents (64.6 %) was between 31 and 50 years. About 83 % of the respondents had attended formal education.

It is believed that educated people are more concerned in conservation of natural resources than uneducated ones. Previous studies have found that understanding factors influencing the perception of local people as it relates to forest values and attitudes toward protected areas is critical to the long-term sustainability of forests (Graham et al., 2003). In addition, education, age and distance between a residence and a forest can significantly influence the perceptions of local residents as it relates to forest values and attitudes toward protected areas (McFarlane and Boxall, 2000). Stoll-Kleemann and Welp (2008) identified many factors contributing to the success of biosphere reserves around the world. Although the most influential factor was 'environmental education', several factors relate to public participation, collaboration with local authorities, community participation, leadership, political support at regional level and consideration of traditional knowledge, to mention some.

The finding of this study is almost consistent with this idea: younger people and less educated people hold negative attitude toward the establishment and current management of the biosphere reserve.

The respondents had one or more different sources of income and 92.5 % (196) of them mentioned that they obtained their income by collecting wild coffee berry from the forest while 81.1 % (172) were involved in crop production and only 39.2 % (8) were involved in livestock rearing. Their sources of income were related to forest and combined with population increase; it is believed that they have impacts on the forest. By citing the official report of the former Yayo-Hurumu District Rural and Agricultural Development Office, Zewdie

Jotte (2010) reported that crop, animal, and coffee production account for 51 percent, 14 percent and 30 percent of the total production in the district, respectively. The remaining 5 percent of the production is covered by *khat* growing and other agricultural production activities.

Table 1: Socio-demographic characteristics of the respondents around Yayo Forest Coffee Biosphere Reserve (n = 212)

	Variables	Frequency	Percent
Gender	Males	171	80.7
	Females	41	19.3
Age	21-30 years	24	11.3
	31-40 years	66	31.1
	41-50 years	71	33.5
	51-60 years	42	19.8
	> 60 years	9	4.2
Educational level	No formal education	37	17.5
	1-4	78	36.8
	5-8	73	34.4
	9-12	17	8.0
	Higher education	7	3.3
Source of income	Crop production	172	81.1
	Livestock raring	8	39.2
	Wild coffee berry	196	92.5
	Wild spices	15	7.1
	Beekeeping	54	25.8
	Others	10	4.7

3.2. Community's Attitudes towards the Establishment of Yayo Coffee Forest Biosphere Reserve

Respondents' attitudes towards the establishment of the Biosphere Reserve are shown in Table 2. About 51 % (108) of the respondents had supportive attitude towards the establishment of the biosphere. About 86 % (94) of those who supported the establishment of the forest claimed that the biosphere reserve project would promote local development. Contrarily, of those who showed unsupportive attitude towards the establishment of the biosphere, 49.5 % (51) and 52.4 % (54) claimed that they gained no benefit from the forest and lost their right on the forest, respectively. All the reasons they raised would put them in conflict with forest management bodies.

Table 2: Community’s perceptions towards the establishment of Yayo Forest Coffee Biosphere Reserve (n = 212)

Question: Do you support the establishment of Yayo Forest Biosphere Reserve?				
Yes = 51.4 % (109)		No = 48.6 % (81)		
Reasons	% (number)	Reasons	% (number)	
A. Solution for land ownership conflict	37.6 (41)	A. No benefit is gained from the forest	49.5 (51)	
B. Promotion of local development	86.2 (94)	B. Loss of right over forest	52.4 (54)	
C. Generation of direct income	30.3 (33)	C. Generate interest of conflict	25.2 (26)	
D. Participation of local people in the forest management	33.0 (36)	D. Lack of awareness	14.0 (14)	
E. Promotion of the natural environment	64.2 (70)			

3.3 Community’s perception about the values of the Yayo Coffee Forest Biosphere Reserve

The respondents were aware of the different values of the biosphere reserve. All (100 %) of them mentioned that the biosphere reserve was a home of wild coffee, a source of fuel wood (99.6 %), and a source of construction materials for the community (95.7 %) (Table 3). This implies that combined with population growth, extensive forest clearing for cultivation, over-grazing, and exploitation of forests for fuel wood and construction materials, without replanting, obviously reduces forest cover.

Understanding the perception of local people as they relate to forest value is an important part of gaining a better understanding of major sources of conflict between those who want to emphasize community development and those in charge of nature management (Xu and Bengston, 1997). Perception of forest values are a valuable sources of information on local perspectives, knowledge, and beliefs (Silori, 2007). Similarly Buttoud (2000) suggested the way local people perceive the value of forests needs to be considered in the sustainable development of forests. In addition, McFarlane and Boxall (2000) also reported that a better understanding of how local people perceive the value of forests is fundamental to the development and implementation of sustainable forest management strategies. Furthermore, changing perceptions of forest values over time can reflect the effects of forest management on local communities. Consulting local communities, and understanding their views, therefore plays an important role in achieving public acceptance of protected areas, and ultimately in the conservation success.

Table 3: Community’s perceptions of values of Yayo Forest Coffee Biosphere Reserve (n = 212)

Forest values	Frequency	Percent
Home of wild coffee	212	100
Fuel wood	211	99.6
Construction	203	95.7
Medicinal plants	129	60.9
Pasture	119	56.0
Beekeeping	132	62.1
Ecotourism	49	23.2

3.4 Community’s attitudes and perceptions towards forest protection and the management system of Yayo Coffee Forest Biosphere Reserve

Community’s attitudes and perceptions towards protection and the management system of the forest are depicted in Table 4. The respondents were aware of the existence of the nature reserve and 57.7 % (122) agreed that the community has a responsibility to protect the forest because of the forest values (especially, as a source of fuel and construction materials) the community gets from it. However, 60 % of the respondents mentioned that they were in disagreement to the implementation of restriction measures to forest resources to sustain the forest. In addition, 78.2 % did not agree on the conflict resolution management system because of the restrictions on the extraction of forest products and the punishment of those who break the devised rule. About 51 % (109) of the respondents mentioned that they were not satisfied with the management system of the forest mainly because of the restrictions on the extraction of forest products and the resulting punishment when they break the rule. Dissatisfaction is the results of conflicts that exist

between the local community and the managers of the biosphere reserve. The local people involved in illegal logging and forest clearing for farmland expansion, especially, for coffee farming.

Most (64 %) of the respondents mentioned that they were not satisfied with the forest management system because of low level of the involvement of the local people in the decision making process. Local communities, at any cost, have to be consulted on decisions affecting their life and building appropriate channels that enable them to get benefits from the protected area. It also helps to get and maintain their positive attitude and relationship between protected area and the local community Zewdie jote (2010). Full implementation of the co-management system of the forest with local community will help in conflict resolution and forest conservation. Co-management approaches are more effective than top down approaches (Karanth and Nepal, 2012). Co-management joins management and improvement of the livelihoods of the local people (Ting et al., 2012). Local people may support nature reserve management if their livelihoods are met (Karanth and Nepal, 2012).

3.5 Threats of the biosphere reserve and conflicts between the community and the biosphere reserve management

Community perceptions about threats currently facing Yayo Coffee Forest Biosphere Reserve are shown in Table 5. Although all the respondents were aware of that the forest was protected from settlement by the law, most of the respondents (71 %) mentioned that the forest was not free from agricultural encroachment. Besides, all the respondents (100 %)

were aware of the presence of large-scale development projects like Yayo coal mining industry and Yayo fertilizer factory which were legally established around the forest, Gaba Hydropower Dam, road construction and electric transmission line established legally inside the forest, and coffee plantation carried out illegally inside and around the forest (27 %). These projects are planted some inside and some adjacent to the biosphere buffer zone and transition area. The emergence and implementation of large-scale development projects which accommodate a range of intensive land-uses have adverse effects on the biodiversity of the area if not properly managed. To some extent, depletion of natural resources such as land, forest, water, soil, etc. is inevitable. As a result of the project expansion to the buffer and core areas, its forest cover has been declining. Particularly, the establishment of Yayu fertilizer industry resulted in the establishment of smaller towns in the area. Witate town could be an indication of its implication. The factory attracted many people (workers) with their large families to the area. It is assumed that the factory will create job opportunities for more than 30,000 workers. These workers are coming to the area with their accompanies. It is also expected that they intend to sustain their living depending on the natural resource of the area, which further implicate the loss of biodiversity (OEFCCA and OFWE, 2018). About 62 % of the respondents reported that they did not support investments carried out both in the vicinity and inside the forest as investments expel native residents from their places, benefit oriented rather than conservation, damage forests, lead to climate change, and impacts on wild animals.

Table 4. Community’s attitudes and perceptions towards protection and management system of Yayo Coffee Forest Biosphere Reserve

Statement	Agree	Disagree
It is the responsibility of the local people to protect the forest	57.7 (122)	42.3 (90)
Restriction measure must be implemented to sustain the forest	40.0 (85)	60.0 (127)
The forest management system solved the conflict over the forest	21.8 (46)	78.2 (166)
Participation of the local people in the decision making process	35.2 (74)	63.8 (135)

Further, the establishment of these factories was not initiated by the local communities and not in consultation with the local government. For instance,

the zonal and woreda (woreda is a word in Amharic language for ‘district’) administrations were not aware of how Yayo Fertilizer Factory and Coal factory were

established in the area. As a principle, all development projects, both private and government, should submit the environmental and social impact assessment report to the Bureau/office of Environment, Forest and Climate Change Authority and get approval prior to the project (OEFCCA and OFWE, 2018).

About 49 % (103) of the respondents had unsupportive attitude towards the establishment of the biosphere reserve and the reasons they raised were related to their interest which could be considered as sources of conflicts. About 73 % (154) of the respondents mentioned that livestock graze in the forest. Ninety-one percent (n = 193) of the respondents mentioned that there were conflicts between the management bodies of the biosphere reserve and the local community over the forest. The respondents mentioned different sources of conflict like timber logging (100 %), charcoal production (45.1 %), expansion of farmland (32.6 %), and gain of no benefits/incentives from the government (92.5 %). Some respondents knew the major indigenous tree species logged from the forest by their local name and their use values. Accordingly, 26 % and 23 % of them mentioned *Cordia africana* (Waddeessa, Afan Oromo) and *Aningeria adolfi-friederici* (Qararoo, Afan Oromo), respectively, were logged mainly for timber. Whereas, 19 % and 15 % of the respondents reported that *Diospyros mespiliformis* (Qollatii, Afan Oromo) and *Diospyros abyssinica* (Lookoo, Afan Oromo), respectively, were logged for house construction and 17 % of them witnessed that *Acacia abyssinica* (Laaftoo, Afan Oromo), for Charcoal production.

There are formal institutions related with coffee forest management that operate at local and higher levels. The Ministry of Agriculture and Rural Development, Institute of Biodiversity Conservation, *Woreda* and *Kebele* Administrations, and Oromiya Government Forest Supervising Agency are some of the formal organizations operating in coffee forest management or own potential relevance to the coffee forest management. *Kebele* administrators mainly deal with the day to day activities of the rural residents. Most of the rules devised at district and zonal levels are implemented at *kebele* level, but there are no rules as such that are devised at zonal and district level for the case of coffee forest. Issues of natural resource management including coffee forest management are

monitored at *kebele* level. Violations of rules devised by many formal institutions, both government and non-governmental organizations operating at local level, are followed at *kebele* level. The *Kebeles* impose penalty on those who violate the rules. The coffee forest guards report to the *kebele* administration which has its own militias and social court to control any illegal acts like illegal logging and encroachments. *Kebele* administrators and forest committee allow people to use few trees for timber from the buffer zone based on some arrangements (Zewudie Jote, 2010).

Zewudie Jote (2010) reported that the need to expand coffee farm, disagreement on ownership right and community's dependence on forest are the principal root causes leading to various forms of conflicts on the coffee forest. A preference of exploiting the economic values of the forest in this study suggests that the needs of local people for firewood, timber for construction, and expansion of coffee plantations are a source of conflict. Regarding coffee plantations, coffee plants need less dense or moderate shade trees (Beer et al., 1998). Therefore, farmers cut dense shade trees for the effective cultivation of the coffee plants. In addition, cultivation of coffee needs cleaning of weeds that compete with. As a result, coffee plantations stay ground open and leads to local decrease in species diversity.

Western Oromia, specifically the districts adjoining the coffee forest, are identified as coffee growing priority areas for which every effort is being made towards expansion of intensive coffee production. This only served to encourage deforestation or the replacement of coffee forests with few shade trees. These are the causes for conflict between the government that tries to conserve coffee forest biodiversity and the community that is eager to use coffee forest. It can also show the conflict between the government initiative to expand coffee farms/production and the need to conserve coffee forest biodiversity in the same area (Zewudie, 2010).

Local community's dependence on forest for livelihood and other uses mainly for construction materials is another source of conflict. Due to the absence of alternative energy source in the area, people depend on sale of fuel wood. Sale of timber is also a source of income, and people need forest products for agricultural tools. Poverty or absence of alternative

means of subsistence also forces people to depend on coffee forest. This breeds conflict when government authorities attempt to restrict access to the forest. Other sources of conflict in coffee forest management include the absence of community participation during demarcation, prohibition of access to forest and non-timber forest products, how to manage coffee forest, increasing coffee price, increasing population pressure, lack of grazing area, and confiscation of people's land during demarcation (Zewdie, 2010).

Population growth around the transition area of the biosphere reserve is another source of conflict. It is the major cause of deforestation and resulting increases in demand for wood products or forest land. For the rapidly growing populations, wood remains the primary fuel for cooking and heating. Previous studies show that depletion of biodiversity is high in areas of poor people who need to benefit from various development endeavors to meet their livelihood demands. For example, food production in such areas must be intensified to meet the growth in demand due to rising expectations and the rapid increase of populations. Yet agriculture, as traditionally practiced, has remained the major cause of destruction of valuable habitats, pushing species towards extinction (McNeely and Scherr, 2001).

The 2016 official report of the Yayo District Rural Land Administration and Environmental Protection Office shows that the human population statistics around the transitional area of the biosphere reserve during the establishment of the biosphere reserve in 2010 was 13,693. After six years in 2016, the population increased to 22,961. Population increase is one of the important factors in determining the rate of exploitation of the forest resources. The increasing population needs more cultivable land for livelihoods. This, undoubtedly, intensifies the conversion and/or modification processes of the land use types. They may be forced to encroach into forests for crop production, grazing, and settlement. Solomon Melaku (2016) noted that forest degradation in Ethiopia is closely linked to the ongoing population growth. More people generally lead to an increasing demand on land for living and for agricultural production. Consequently the pressure on the forest

resources themselves increased due to a higher demand on fuel wood and construction timber.

Understanding the main source of conflict is critical to the resolution of conflict (Yamsi et al., 2006). In addition, understanding the perceptions of the local people as they relate to forest value and attitudes toward the reserve is a key to gaining a better understanding the central issue of the conflict between community development and nature reserve management (Xu et al., 2006). Mitigating the conflict between biodiversity conservation and the rights to access forest resources, the twin tasks: conservation and economic development should be tackled simultaneously (Castro and Nielson, 2001; Adams et al., 2004). The communities' livelihood plays a key role for the sustainable conservation of the biosphere reserve.

3.6 Community's perceptions about trends in forest cover change and community's participation in forest conservation

About 71 % (150) of the respondents mentioned that they participated in forest protection activities and 73.7 % (156) of them mentioned that the forest cover declined because of population growth, expansion of farmland, and deforestation and about 65 % (137) of them agreed that the forest cover had been declining from time to time which has impacts on their livelihood (Table 6).

Natural resource conservation could be secured from threat when local communities are perceived to manage and conserve their resources since they live with natural resources and they are primary users of natural resources (FAO, 2010). In addition, it is already acknowledged that communities living within the vicinity of the protected areas are critical to the success of conservation efforts (Robertson and Lawes, 2005); such as the attitudes of local residents and the level of local perception as well as the conflicts between people and the protected areas have become a concern for protected areas effectiveness (Alison et al., 2005). As stated by Glasl (1999), successful conflict resolution relies on knowing how to address its triggers. The specific sources of conflict need to be recognized by conservation planners and policymakers.

Table 5: Threats to the Biosphere Reserve as perceived by the respondents

No.	Questions	Percent of respondents (number)		
		Yes	No	Don't know
1	Is the forest protected from settlement?	100.0 (212)	0	0
2	Is the forest protected from agricultural encroachment?	29.2 (62)	70.7 (150)	0
3	Are there any investment activities (projects) in and/or in the vicinity of the forest?	100.0 (212)	0	0
4	If your answer to the above question (3) is yes, types of investment:		0	0
	A. Coal mining industry (Around forest, legal)	100.0 (212)		
	B. Fertilizer industry (Around forest, legal)	100.0 (212)		
	C. Gaba Hydropower Dam (Inside forest, legal)	100.0 (212)		
	D. Road construction and electric transmission line projects (In and around forest, legal)	100.0 (212)		
	E. Coffee plantation (inside and around forest, illegal)	27.0 (57)		
5	Do you support the investment being carried in the forest or vicinity of the forest?	37.7 (80)	62.3 (132)	0
6	If your answer to the above question (5) is no, reasons:			
	A. Exclusion of local residents from native places		77.3 (102)	
	B. Investors are benefit oriented rather than conservation		59.1 (78)	
	C. Leads to decrease in both quantities and qualities of the forest		34.1 (45)	
	D. Leads to climate change		17.4 (23)	
	E. Leads to local migration of wild animals		10.6 (14)	
7	Do livestock graze in the forest?	72.5 (154)	15.7 (33)	11.8 (25)
8	Is there any conflict between the management institutions and the local community over the forest?	91.0 (193)	0	8.9 (19)
9	If your answer to the above question (8) is yes, sources of the conflict:			
	A. Timber logging	100.0 (212)		
	B. Charcoal production	45.1 (87)		
	C. Expansion of agricultural land (e.g. coffee plantation)	32.6 (63)		
10	Do local people in the vicinity of the forest get benefits/incentives from the government so that they feel ownership of the forest and take responsibility in conserving the forest?	0	92.5 (196)	7.5 (16)

Table 6. Perceptions of the local community towards forest resources conservation and management

No.	Statements	Percent of respondents (number)		
1	In what part are you participating in forest resources conservation and management?	Nursery management	Tree planting activities	Forest protection activities
		6.6 (14)	22.6 (48)	70.8 (150)
2	In your view, how has the size of the forest cover changed over the past seven years?	Increased	Decreased	I can't decide
		26.3 (56)	73.7 (156)	0
3	Reasons for decrease in size of forest cover			
	A. Population growth		70.8 (150)	
	B. Expansion of farmland		67.1(142)	
	C. Deforestation		69.9 (148)	
4	Is the livelihood of the community affected by the forest decline?	Yes	No	I can't decide
		64.8 (137)	35.2 (75)	

4. Conclusion and Recommendations

The study revealed that some of the respondents had unsupportive attitude towards the establishment of the biosphere lost their right on the forest and thus they were in conflict with the managing bodies of the forest. They acknowledged that the biosphere reserve was a home of wild coffee and a source of fuel wood and construction materials. Combined with population growth, extensive forest clearing for cultivation, over-grazing, and exploitation of forests for fuel wood and construction materials, logging, without replanting, obviously reduces forest cover and would lead to loss of the wild coffee and its biodiversity. Large-scale investment projects built without environmental impact assessments in and around the biosphere reserve are threats to the biosphere reserve.

Identifying problems related to protected area management enhances conservation of nature reserve. In problem solving process, active involvement of the local community in the management of the biosphere reserve, creating common understanding on the use and conservation of the biosphere reserve, and facilitating conditions to promote the livelihood of the community could manage the illegal extraction of nature reserve resources. In general, study pointed out that the local people's need, perception, and attitude contain useful information that could be incorporated into the decision-making process regarding the use and conservation of the biosphere reserve.

Concerning participation in forest resources conservation and management, creating common awareness on activities such as result-based nursery (seedling) management and tree planting could resolve depletion of the forest. Furthermore, creating common understanding of the community on ecological and social values of the forest could play a key role in sustainable conservation of the biosphere reserve.

Conflict management is an approach that can address the roots of conflicts by building upon shared interests

and finding points of agreement that accommodate the respective needs of the various parties involved. In conflict management approaches: active involvement of the community in the management of the biosphere reserve, facilitating conditions to promote the livelihood of the community living in the biosphere reserve area could manage the illegal extraction of nature reserve resources, and creating common awareness and/or understanding on the use and conservation of the biosphere reserve.

Successful co-management depends strongly on the relationship between local people and protected area managers. Local people, especially those living in and around protected areas, have important and long-standing relationships with these areas. Their needs, perceptions, and attitudes contain useful information that could be incorporated into the decision-making process. Considering their knowledge and opinions can lead to the resolution of conflicts and make management systems more effective and more favorable in practice. Access to forest benefits can positively influence the perceptions and attitudes of local people. Furthermore, local poor farmers are more concerned with immediate economic benefits than with preserving long-term forest health. Therefore, if local people recognize that the benefits are too small or unevenly distributed, conservation approaches may fail to win their genuine support, and local people may even adopt actions detrimental to the goals of conservation.

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