

Research Article

Local Communities' and Parishioners' Perceptions on Monasteries' Forest Patch Plant Biodiversity Conservation in Northern Wollo Ethiopia

Arayaselassie Abebe Semu ^{1,2}, Tamrat Bekele,¹ Ermias Lulekal,¹ and Edelina Coayla³

¹Department of Biology and Biodiversity Management, College of Natural and Computational Sciences, Addis Ababa University, Addis Ababa, Ethiopia

²Range Ecology, and Biodiversity Program, College of Agriculture and Environmental Sciences, Haramaya University, P.O. Box 138, Dire Dawa, Ethiopia

³Faculty of Economic Sciences, Universidad Nacional Federico Villarreal, Lima, Peru

Correspondence should be addressed to Arayaselassie Abebe Semu; arayaselassie.abebe@haramaya.edu.et

Received 25 July 2022; Revised 10 January 2023; Accepted 13 January 2023; Published 30 January 2023

Academic Editor: Anna Żróbek-Sokolnik

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Both anthropogenic and climate change threaten Ethiopia's forest regions. Sacred and religious sites maintain most indigenous and native plant species. Northern Ethiopia farmed and settled for thousands of years, causing environmental damage and deforestation. This study examines biodiversity conservation perceptions and biodiversity preferences by local communities and churchgoers. Among the five monasteries in the area, two were selected based on the stated criteria. The selection criteria for monasteries were a historical antiquity of more than 50 years and a thick forest cover of more than 10 hectares. Multistage sampling was utilized to choose sample residences. Respondents were chosen using simple random sampling and proportion to population size. Among the total population, 310 survey participants were selected. It was found that the commitment to biodiversity conservation of local people and parishioners is directly explained by age, education, the number of years in a status region, and income. It is highlighted that a higher level of education, age above 51 years, and middle-income socioeconomic status most significantly affect respondents' biodiversity engagement.

1. Introduction

Ethiopia's forest cover has been declining due to fast population growth, urbanization, and a poor land management system. Forests provide a wide range of ecological benefits to both local communities and the entire country. In Ethiopian highlands, there are several forest patches, most of which are situated near monasteries, churches, graveyards, and religious schools [1].

With over 40 million parishioners, the Ethiopian Orthodox Tewahedo Church (EOTC) is one of Africa's oldest churches. In all, there are about 35,000 churchyards in the country, with the majority of them in the country's central and northern highlands [2]. Because it honestly analyzes and accepts all life forms, the church has a long history of

sustaining, growing, and restoring plant variety. When the ecosystems around them deteriorate, they act as in situ conservation zones, appearing as green patches in the middle of degraded landscapes [3–7]. The monks, nuns, and inhabitants of the monasteries rely on the monastery forest for food, fuel, and shelter. According to [6], monastic forest areas provide seedlings seeds, as well as lowering floods in lowlands and increasing crop yield.

These regions of greater economic, environmental, and cultural value are deteriorating as a result of human and climate changes. The church's reputation is being harmed by the country's government transition and globalization [2, 6, 8]. The local population is encroaching on the forest's boundaries and woody species are being removed for agricultural uses. Furthermore, these relict monastic forest

areas confront problems such as unrestricted livestock grazing, access to the monastery through the forest from all directions, and gathering nontimber commodities [9–11].

According to Wassie et al. [8], in addition to economic advantages, cultural norms and attitudes play an important role in encouraging society toward long-term conservation and restoration of natural capital. Shiferaw et al. [12] discussed the importance of community participation in forest patch conservation for better agriculture and decrease flooding. According to Shiferaw et al. [12], the parishioners of EOTC in Debre Libanos Monastery do not have the clear perception towards biodiversity of the monastery forest. Both the parishioners and local community tend to cut trees for the sake of arranging burial spaces and constructing monuments to be acceptable. Having concise understanding of the importance of the church/monastery forest has not been clearly understood by both the local community and parishioners.

Number of studies has been conducted focusing on church forest; the researches focus on the natural resource. In addition, the researches focus on the importance of the church forest for the restoration and rehabilitation of degraded areas of the country. The focus of the research has been carried to the fauna and flora contents of the forest and their importance for conservation [13–19]; church trees have the potential to help Ethiopia's rehabilitation effort.

The current study focuses on adherent and local community perceptions about monastery forest patches conservation. The study tried to find how people view and use the monastery forest patches. A deeper knowledge of local communities and adherent perceptions might aid policy-makers and the church in its development. Focusing on perceptions and how they impact people's decision-making gives an alternative to more standard ways to assess the economic values of community forest usage.

2. Methodology of the Study

2.1. Description of the Study. The research was carried out in the Northern Ethiopian, Amhara National Regional State, Raya Kobo district of Northern Wollo (Figure 1). The average annual rainfall is 7500 mm³ and the average temperature is 27°C. With cumulative land coverage of 266,116.72 hectares, the study area covered lowland trees and shrubs, as well as highland dry evergreen alpine vegetation. The people in the district are parishioners of EOTC, while others are Muslim and other Christian faiths jointly [20].

2.2. Sampling Techniques and Sampling Size. There are five monasteries in Northern Wollo diocese of EOTC, situated in various areas; in order to select the monastery, the following criteria has been set:

- (1) Monasteries with a history of more than 50 years and
- (2) Forest coverage of more than 10 hectares.

Based on the criteria, the following two monasteries were selected: Debre Zemeda Abune Bertolomious and Saint Mary

monastery and Rama Debresina Kidane Mehret Monastery are the two monasteries in the Raya Kobo area that match the selection condition. The monasteries bordered by urban and rural communities wherever an enormous population is living might be a hazard for the forest covers.

The research employed a multistage sampling approach to choose sample houses. The respondents were picked using basic random sampling and proportion to population size (PPS) procedures. Respondents were picked from the worshipers of two monasteries forests, with diverse groups represented (i.e., youth and female- and male-headed families; Table 1). The individual home survey was made from March 5–30 2020 after creating standardized sample questionnaires. From seven Kebeles, 310 respondents from two monasteries/church forest were chosen for the home survey (Table 1). In addition, 7–21 participants participated in focus group discussions (FGDs) and exploratory research was conducted in each location.

2.3. Method of Data Analysis. For data analysis, both descriptive and econometric methodologies were employed. The descriptive process includes the use of percentages, means, maximum and minimum values, and elementary statistical approaches. The dichotomous choice logit model was used to investigate the factors that affect community perceptions of forest management. The community answer was built with two responses (YES or NO), resulting in a dummy dependent variable.

Socio-demographic and economic factors were used as explanatory variables to investigate the perception of determinants. In this respect, gender, age, number of families, number of years lived in the area, educational status, and income were considered independent factors (predictor variables), while understanding of biodiversity were considered dependent variables.

The econometric method discrete choice model (DCM) was used to investigate consumer preferences for characteristics or attributes of an environmental good such as the forests of monasteries, DCM allows for obtaining monetary values in a flexible way for nonmarket externalities [21].

The conservation of biodiversity increases the well-being of individuals. The welfare or utility of the individual (u) is shown in the following equation:

$$u = u(y, q, z). \quad (1)$$

In econometric terms, the random utility model would be as follows:

$$u = v(y, q, z) + \varepsilon, \quad (2)$$

where y represents the income of the individual, q represents the provision of the environmental good or services provided by the forest, z represents the particular characteristics of the individual, and ε represents the error term.

If the results are to serve policymakers, they must reflect people's preferences, and people need to make informed decisions. In the case of a local good, people might be familiar with it and its current quality, and if so, little information may be enough [22].

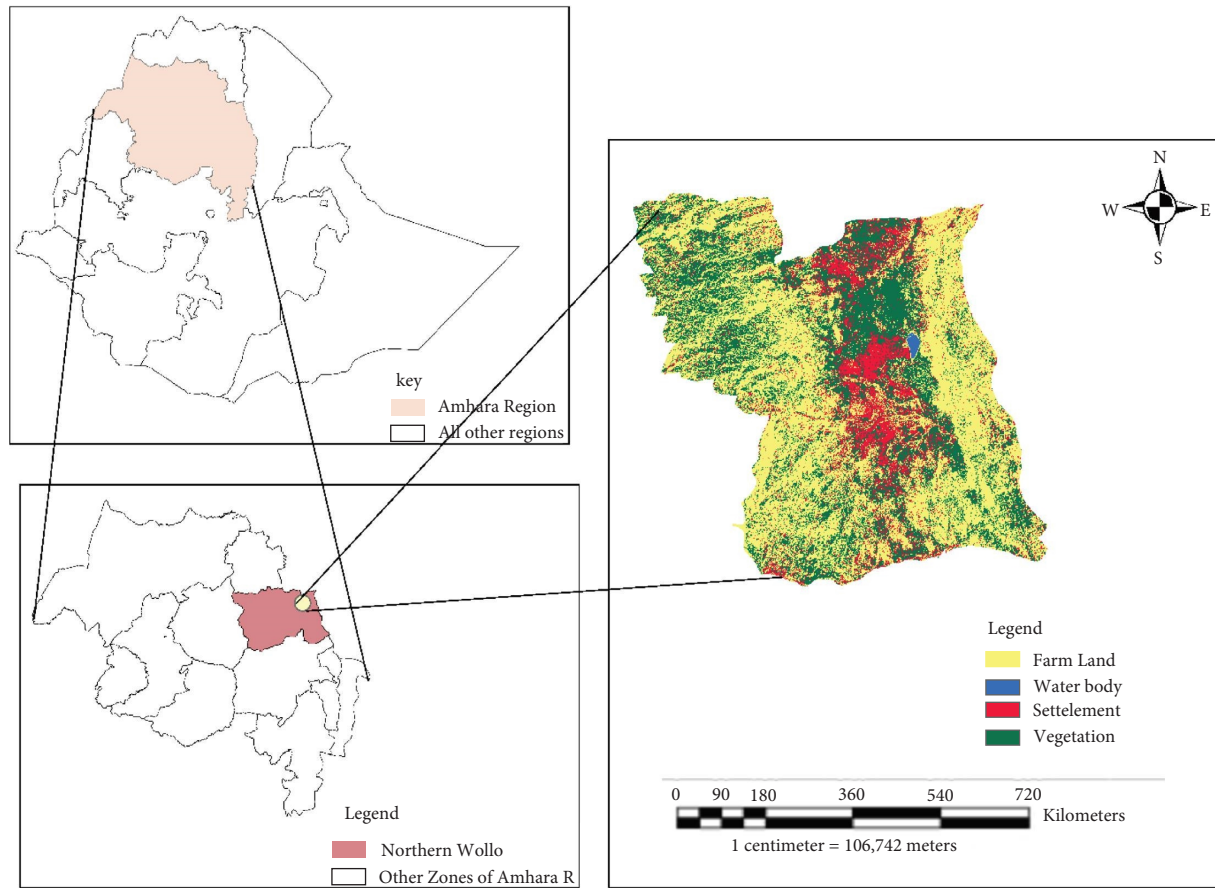


FIGURE 1: Map of the study area.

TABLE 1: Respondents in terms of kebele.

Kebele	Respondents	Monasteries	Remark
Zobel	40	Rama Debresina Kidane Mehret monastery	
Kebele 035	55	Rama Debresina Kidane Mehret monastery	
Jemedo	95	Debre Zemedab Abune Bertolomious and Saint Mary monastery	
Arquate	30	Rama Debresina Kidane Mehret monastery and Debre Zemedab Abune Bertolomious and Saint Mary monastery	
Keyugaria	30	Rama Debresina Kidane Mehret monastery and Debre Zemedab Abune Bertolomious and Saint Mary monastery	
Kobo zuria	30	Rama Debresina Kidane Mehret monastery and Debre Zemedab Abune Bertolomious and Saint Mary monastery	
Kobo city	30	Rama Debresina Kidane Mehret monastery and Debre Zemedab Abune Bertolomious and Saint Mary monastery	

The probability that the person is willing to conserve biodiversity says yes to proposal B to participate in biodiversity conservation, and/or prefers biodiversity would be as follows:

$$\Pr\left(\frac{si}{z}\right) = \Pr(v(y - B, q_1, z) + \varepsilon_1 > v(y, q_0, z) + \varepsilon_0). \quad (3)$$

These probabilities can be calculated using a binary logit model. The dependent variable (Y_i) is dichotomous, 1 or 0 if the respondent agreed to conserve the environmental goods or not. Income was determined based on the central statistics agency initial income determination figures of 2020.

3. Result

3.1. Descriptive Statistics

3.1.1. General Information of Respondents. The oldest age ranges up to 65, while the youngest is 18, showing that they are qualified to answer the questions given, according to the information gathered. 150 (or 56%) of the 310 respondents were men, and the remaining respondents were women. The largest number of households is seven, while the smallest number is two. The region's longest stay was 15 years, and the shortest was 4 years. Their lowest level of education was illiteracy, and their greatest level was a BSc or BA. Income

concerns were also brought up; based on the current exchange rate, the lowest monthly wage was 750 ETH Birr (22.5 USD) and the highest was 7500 ETH Birr (187.5 USD) (Table 2).

3.2. Econometric Model

3.2.1. Perception Related to Biodiversity. A logistic regression was performed to ascertain how variables, such as gender, age, number of stay, educational level, profession, and monthly income, affect the parishioners and local communities participation in conservation activities.

The logistic regression model was statistically significant ($\chi^2 = 860.558$; $df = 299$; $p \leq 0.001$). Variables such as gender, age, number of stay, educational level, profession, and monthly income significantly determine respondent's participation.

Preferences for biodiversity mean the increase in the well-being of the local community and parishioners determined by the characteristics of age, education, income, and permanence in the region for more than six years (Table 3).

4. Discussion

As stated in the findings of the study, perception is strongly affected by age, educational status, income, and preference to the area for more than 6 years. A similar result was achieved by Mekuriaw and Hurni [23]; Wassie [24] in his research conducted in Tigray and northern Gonder has implicated that the participation of the local community is determined by their age, gender, and educational status, respectively. In addition, participation and understanding of what it means to biodiversity are essential in planning conservation strategy. The participation in natural conservation is a reflection of the understanding of the importance of the forest patches.

The recommendation of Rath [5], Gao et al. [25], and Ouko et al. [26] also suggests that the interaction between society and ecosystem linkage is crucial in understanding the view of society towards specific ecosystems. It is mandatory to inquire why they conserve and what to conserve. Maioli et al. [27] further argue that the stockholder's opinion on the conservation of the ecology is crucial. Age and education levels of the respondents are important factors because as they spend more time in the area, they are more likely to comprehend the value of the forest areas for human survival life.

The multivariate model on the importance of monastic forest patches for cultural activities, soil and water conservation, species and biodiversity conservation, and climate change mitigation suggests that three predictor factors are more likely to play a crucial role in predicting the model. The educational degree of a higher category tends to be with a higher comprehension of the perspective. The multivariate approach to assessing the recycling materials in pro-environmental behavior indicated that educational states alter people's perceptions, as stated by Amare et al. [28], Fernández-Llamazares et al. [29], Mubalama et al. [30] and Maioli et al. [27]. Similar results were obtained in the present

TABLE 2: General information of respondents.

Variables	Observation	Mean	Std. dev	Min	Max
Gender	310	0.58	0.49		
Age	310	3.7	1.02	18	Above 65
Number of HH	310	2.4	0.638	2	7
Number of years	310	3.05	0.82	4	15
Education	310	2.51	1.64	Illiterate	BSc/BA
Profession	310	5.12	1.92		
Income	310	3.42	1.82	750	7500

Source (survey data 2020).

TABLE 3: Logistic regression model result (dependent variable biodiversity preferences perception).

Definition	Coef.	St. err.	t value	p value
Gender	-0.515	0.587	-0.88	0.381
26-30	23.991***	3.666	6.54	$p \leq 0.001$
31-35	22.845***	3.715	6.15	$p \leq 0.001$
36-40	23.38***	3.479	6.72	$p \leq 0.001$
41-45	22.069***	2.943	7.50	$p \leq 0.001$
46-50	24.296***	3.453	7.04	$p \leq 0.001$
Above 51	23.413***	2.568	9.12	$p \leq 0.001$
6-8	0.455	1.482	0.31	0.759
9-12	0.301***	1.376	0.22	0.827
Above 12	13.831***	1.059	13.06	$p \leq 0.001$
≥ 10 years	4.028***	0.752	5.36	$p \leq 0.001$
More than 11 years	3.854***	0.591	6.52	$p \leq 0.001$
Write and read	3.301***	0.641	5.15	$p \leq 0.001$
Primary education	3.61***	0.672	5.37	$p \leq 0.001$
Secondary education	19.279***	1.079	17.86	$p \leq 0.001$
First degree/TVET	6.599***	2.392	2.76	0.006
Profession	0.134	0.266	0.50	0.614
1500	0.434	0.75	0.58	0.563
1501-4500	0.59	0.72	0.82	0.413
4501-6000	1.572**	0.77	2.04	0.041
6001-7500	3.749***	0.921	4.07	$p \leq 0.001$
Above 7500	0.59	1.114	0.53	0.597
Cons.	-6.067412***	0.9541789	-6.36	$p \leq 0.001$
Mean dependent var	0.442	SD dependent var		0.497
Pseudo r-squared	0.653	Number of obs		310.000
Chi-square	745.214	Prob > chi2		0.000
Akaike crit. (AIC)	179.819	Bayesian crit. (BIC)		239.604

*** $p < 0.01$, ** $p < 0.05$, and * $p < 0.1$. Source of data (survey 2020).

study that education is greatly altering the perception of the parishioners.

Eshete [31], Reynolds et al. [32], and Birara and Assefa [33] described the condition in Ethiopia as being highly attached with environment conservation and biodiversity awareness. Thus, monasteries and their surrounding communities receive holistic care which is derived from purely religious thought. In a similar manner the result reflected by Teixeira et al. [34] indicates a supportive idea with the result. Highly knowledgeable respondents were

guided by with the understanding of the environment from formal, informal, and nonformal education. Having well educated personality will make the respondents play an important role in shaping and strengthening the perception of the local community.

5. Conclusion

Monastery forests are green refuges. Education, interest, and knowledge can affect people's perceptions of biodiversity conservation. Monasteries are chosen based on the criteria settled. The study sampled households in multiple stages. Simple random sampling and proportion to population size were used to pick respondents. A total of 310 people responded. In this study, income, age over 51, and education affect the local community and parishioners' perception of biodiversity conservation. Income, age, gender, and years in the area affect conservation engagement and preferences for biodiversity. Locals and adherents should know more about biodiversity and the conservation of the monasteries' forests.

Data Availability

The data used in this study are available from the corresponding author upon request.

Conflicts of Interest

The authors declare that they have no conflicts of interest.

Acknowledgments

This work was supported by the RUFFORD Foundation under Grant number 30819-1.

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