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# Ecotourism Contribution for Livelihood Improvement in the Kafa Coffee Forest Biosphere Reserve, Ethiopia

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# II. Abbreviations

| | |
|---|---|
| ANOVA | Analysis of Variance |
| BR | Biosphere Reserve |
| CANR | College of Agriculture and Natural Resources |
| CSO | Civil Society Organization |
| ETB | Ethiopian Birr |
| EU | European Union |
| FGD | Focus Group Discussion |
| GDP | Gross Domestic Product |
| GIS | Geographic Information System |
| KBR | Kafa Coffee Forest Biosphere Reserve |
| KI | Key Informant Interview |
| LDCs | Least Developed Countries |
| MAB | Man and the Biosphere Programme |
| NGO | Non-Governmental Organization |
| REDD+ | Reducing Emission from Deforestation and Forest Degradation (plus conservation, sustainable management and carbon stock enhancement |
| SID | Simpson Index of Diversity |
| SNNPRS | Southern Nations, Nationalities, and Peoples' Regional State |
| SPSS | Statistical Package for the Social Sciences |
| Stata | Statistical Analysis Software |
| UNESCO | United Nations Educational Scientific and Cultural Organization |
| USD | United States Dollar |
| WASH | Water, Sanitation and Hygiene |
| WGS | World Geodetic System |

# III. Abstract

Ecotourism is increasingly prioritized as a viable strategy to balance biodiversity conservation with livelihood enhancement. The Kafa Coffee Forest Biosphere Reserve (KBR) is one of Ethiopia's first UNESCO biosphere reserves, the only coffee biosphere reserve worldwide, representing great ecological and cultural significance. This study aimed to establish the extent to which ecotourism contributes to households' livelihood, assess alternative income sources linked to community perceptions towards ecotourism in KBR. A mixed-methodology was used to gather and analyze data, including household surveys (349 respondents), key informants' interviews, and focus group discussions. Data were analyzed using descriptive statistics, regression analysis, and ANOVA tests. Ecotourism activities identified include, coffee tours, and cultural performances, offering direct and indirect benefits such as employment, infrastructure development, and NGO interventions. The regression analysis results demonstrated that 85% of respondents reported livelihood improvements through ecotourism, with education and infrastructure having the most significant impact. Overall, the study established the potential of ecotourism in promoting diversified and improved household income while conserving natural resources. It also recommended several strategies for increasing the role of ecotourism in local communities, including expanding eco-lodges and community infrastructure. The study recommends that the community should be educated and sensitized about the benefits of ecotourism and biodiversity conservation while supporting them in their efforts. The research also concludes that further investment in ecotourism can help achieve sustainable development goals while conserving Ethiopia's biosphere reserves' biodiversity.

**Keywords**: Ecotourism, Livelihood Diversification, Kafa Coffee Forest Biosphere Reserve, Community Perceptions, and Biodiversity Conservation, Ethiopia

# 1. Introduction

## 1.1. Background and Justification

The ecotourism society defines ecotourism as responsible travel to natural areas which conserves the environment and improves the welfare of local people . Ecotourism has become one of the world's fastest-growing tourist sectors and is considered a significant contributor to sustainable development (Jessup, 2000; Honey, 2008). In Ethiopia, ecotourism activities such as coffee tours, birdwatching, trekking, and cultural performances aim at diversification of the livelihoods of local people and provide a solution for poverty alleviation in rura. Ecotourism plays a significant role in the income diversification of Ethiopia's rural households by creating nonfarm employment opportunities in the tourism sector that generate employment in the management sector of natural resources (Moges & Sahile, 2025).

In 1971 UNESCO launched the man and the biosphere(MAB)programme to foster global cooperation in sustainable development(Rossier, Aisenson et al. 2020). By 1974, biospheres were formally defined as areas combining biodiversity conservation, sustainable development, and scientific research and education. The first reserves were designated in 1976, marking the establishment of the world network of biosphere reserves. Today, this network has expanded to 797 reserves in 145 countries, including 90 in Africa and 6 in Ethiopia(Rossier, Aisenson et al. 2020, Wannemo 2026).

Ethiopia is endowed with rich diversity of flora and fauna where several of them are endemic species. It comprises about 6,027 vascular plant species with 10 % endemic ones; these distributions put the country in the fifth largest flora composition in tropical Africa .

The Kafa Coffee Forest Biosphere Reserve is one of Ethiopia's first two BRs and the first coffee BR in the world, serving as an attraction for coffee lovers worldwide(Taye, Kicha et al. 2026).

Within Ethiopia, the Kafa Coffee Forest Biosphere Reserve holds global significance as the genetic origin of Coffea arabica(Kalmbach 2017),(Mohammed 2020).

The Kafa Coffee Forest Biosphere Reserve (KBR), which became part of the UNESCO network in 2010 is known as the 'birthplace of wild Arabica coffee' in the world, with a valuable collection of Afro-montane cloud forest, wetland, wetlands and cultural resources. While KBR poses great ecotourism potential in the country and with a considerable level of development, a moderate community participation and benefit sharing are still recorded (Moges & Sahile, 2025).

Definition of livelihood comprises the capabilities, assets and activities required for a means of living . A livelihood is sustainable when it can cope with and recover from stresses and shocks, maintain or enhance its capabilities and assets, while not undermining the natural resource base(Wannemo 2026).

# 1.2. Statement of the Problem

Afromontane Forest Eco-Region, in Kafa Biosphere reserve is being threatened by human actions that result into increasing expansion of agriculture, increasing animal grazing and the cutting of trees and wood products for forest products and fuel wood(Thomsen, Mren et al., 2025; Vasseur & Siron, 2019) . One of the globally threatened eco-regions the Kafa Forest is a priority area because it is subjected to ecological challenges that affect its biodiversirty and the ecological services on it and the success depends onscientific knowledge of what type of livelihoods would work in conserving the eco-region without negatively affects human lives of locals and wildlife to some extent.

Eco-tourists are interested to preserve environmental and contribute to biodiversity conservation as well as they support locals livelihood opportunities (Kummitha, 2019).

Ecotourism in Kafa is still in underdeveloped form, and there are constraints that hindering the eco tourism such as institutional capacity weakness and ecological degradation. Thus, to respond to gap in scientific research by assess impact of ecotourism on livelihoods and ecological service by supporting the in situ conservation of Kafa Coffee Forest Biosphere Reserve.

# 1.3. Significance of Research

Being Ethiopia's only biosphere reserve and the world's sole coffee biosphere reserve, the Kafa Biosphere Reserve is recognized as a vital destination in Ethiopia and the world that holds huge attraction to coffee consumers and ecotourists (Taye, 2020). This research is particularly important because it adds new knowledge to the role of ecotourism to livelihood improvements of the community and conservation of the biodiversity. The research application of the Social Exchange Theory demonstrates understanding towards the community's perceptions regarding ecotourism and underlying factors affecting receptivity/non-receptivity of ecotourism among the community residents. This knowledge generated is will be greatly beneficial to all government, NGOs, policymakers and implementers to fill existing gaps and better facilitate ecotourism development within the Kafa Biosphere Reserve.

Further recommendations to businesses and organizations in the ecotourism implementation within the area on how to actively involve the local community, improve infrastructure and redistribute the benefits (Bires & Raj, 2020) The research will enrich discussions related to bioshephres, livelihood alternatives and rural tourism management in the Ethiopian context.

## 1.4. Research Objectives

### 1.4.1. General objective

To describe the contribution of ecotourism for livelihood improvement in Kafa Coffee Forest Biosphere Reserve

### 1.4.2. Specific objectives

To examine ecotourism contribution to livelihood improvement of local households in the Kafa Coffee Forest Biosphere Reserve.

To identify income benefits generated from ecotourism activity in Kafa Coffee Forest Biosphere Reserve

To assess community perceptions towards ecotourism contribution in Kafa Coffee Forest Biosphere Reserve

## 1.5. Research Questions

In what ways does ecotourism contribute to livelihood improvement among local community in the kafa biosphere reserve

What types of income benefits are generated through ecotourism activities in the kafa biosphere resrve

What is the level and perception of local community toward ecotourism contribution in the kafa biosphere reserve

## 1.6. Scope of the Study

The main scope of this study covered the Contribution of Ecotourism for Livelihood Improvement in the Kafa Coffee Forest Biosphere Reserve, Ethiopia

The scope of this paper was limited to the contribution of ecotourism to the improvement of the livelihoods of residents of Kafa Coffee Forest Biosphere Reserve. Literature from various other parts of Ethiopia and around the world was referenced in the paper but it was focused upon the Kafa BR and other similar biosphere reserves within Ethiopia. The main limitation of this study was that it was based on secondary literature review. So, it was not possible to substantiate all the claims about Kafa BR with primary field data. Next, some claims had to be based on inference from other studies, because the existing literature includes most studies that pertain to biosphere reserves generally in Ethiopia, and only a few pertain to Kafa BR specifically (Moges & Sahile, 2025,Bires & Raj, 2020). To achieve this limitation, a process of triangulation was adopted.

## 1.7. Sustainable Livelihoods Framework

Livelihood assets (the central pentagon) comprise five different capitals, which are the basis for analyzing household livelihoods and for developing adaptation strategies. They are human, natural, social, financial, and physical capitals. Human capital refers to people's skills and knowledge needed for engaging in ecotourism activities, such as guiding and hosting tourists. Natural capital is related to forests, biodiversity, and coffee growing found in the community. Social capital means the

community's networks and associations, which can be developed for ecotourism income-generating activities. Financial capitals are the income, savings, and credit that people can invest in ecotourism development. Physical capitals are community-based infrastructures, such as eco-lodge and communication networks, that support ecotourism activities.

Vulnerability context (the left side) represents environmental and market pressures, such as climate change and market fluctuations, which have negative impacts on people's livelihoods; these are the initial points for livelihood analysis. Livelihood strategies (the arrow on the right) of using different capitals to cope with and adapt to environmental changes, such as diversifying livelihood activities to include ecotourism. Household livelihood outcomes (the far right) are the results of adaptation strategies, such as improved incomes and positive attitudes towards the conservation of natural resources. Policies and institutions/sustainable natural resource management (the bottom) represent the role of different institutions and policies in supporting ecotourism.

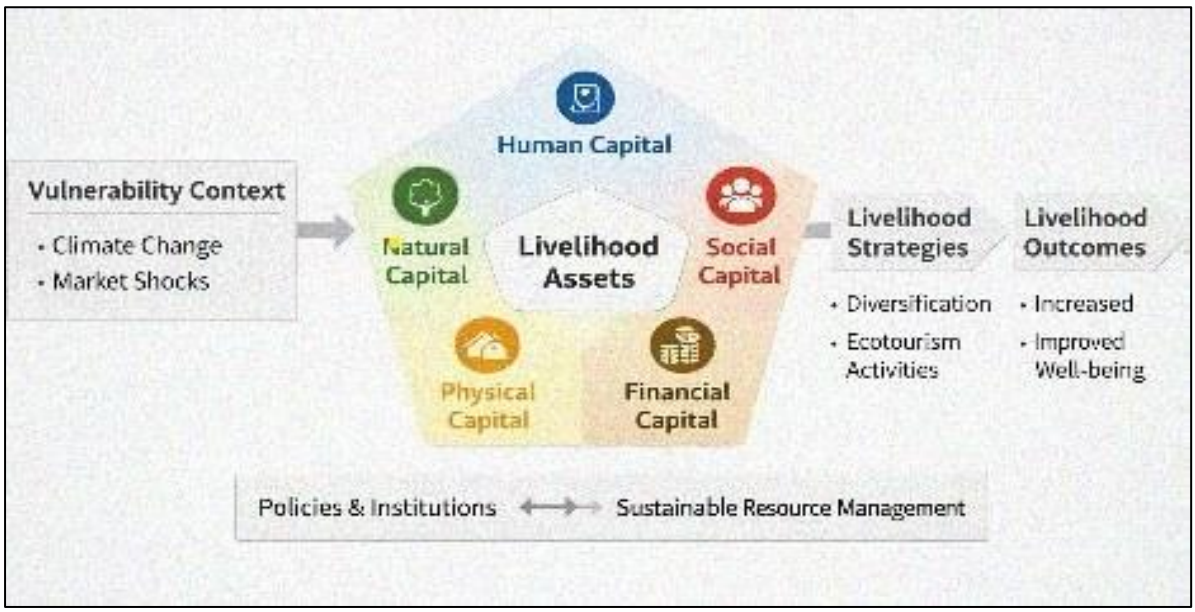



Figure 1. adapted from **Smith et.al 2026**

## 1.8. Research Structure framework

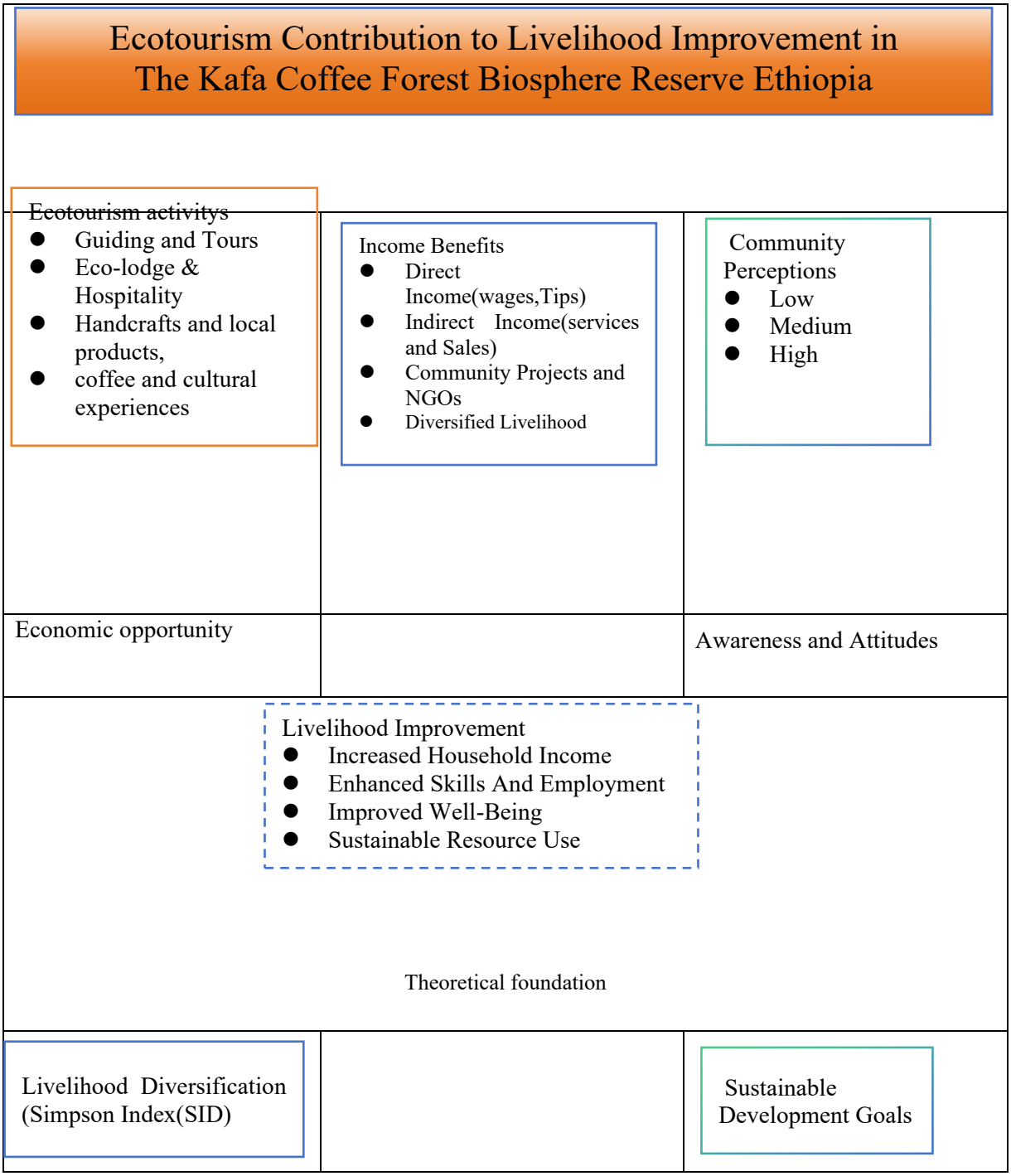



Figure 2: **structure of the research**

# 2. Literature Review

## 2.1. Concepts of Ecotourism

Ecotourism is responsible travel to natural areas that conserves the environment and improves the welfare of local people, or ecotourism is about creating and satisfying a hunger for nature, about exploiting tourism's potential for conservation and development, and about averting its negative impact on ecology, culture, and aesthetics *(Fakana et al., 2019).* Ecotourism is a form of tourism involving visiting fragile, pristine, and usually protected areas, intended as a low-impact and often small-scale alternative to mass tourism with respect to different cultures and human rights *(Koki, 2017)*. Ecotourism is an alternative form of the newest opportunities for income generation from natural resources without destroying the environment*(Manu & Kuuder, 2012)*. If properly planned and managed, ecotourism may minimize the environmental impacts while significantly contributing to the conservation of protected areas because some of the money generated through ecotourism can be directly used to reinforce conservation *(Strasdas, 2002).*

The world have experienced ecotourism as a development strategy supporting conservation and livelihood benefits. In Osa Peninsular of Costa Rico ecotourism doubled household income, enhanced employment creation and strengthened community commitment for conservation(Hunt et al., 2015) where as in Chambok CBET of Africa, tourism income had minimal significance compared to farming, and then could not have supported poverty reduction. In these accounts scholars believe community ownership and equitable benefit sharing are major factors influencing success or failure of ecotourism (Araya et al., 2026).

## 2.2 Ecotourism in Ethiopia

Ethiopia holds a massive ecotourism development potential since it has a unique biodiversity, spectacular topographic features, and rich cultural resources. In Ethiopia, biosphere reserves, protected areas, wildlife national parks, natural forests, game reserves, and wildlife sanctuaries are suitable for ecotourism development (*Kassahun & Bender, 2019).* In developing countries, ecotourism has become one of the economic sectors that generates substantial income and maintains the conservation of protected areas. For example, in Kenya, in Amboseli National Park, the income obtained from ecotourism is 18-20 times more than the income obtained from agricultural activities *(Oladeji, Agbelusi, & Trevelyan, 2012).* Ecotourism is increasingly introduced in third-world countries, like Ethiopia, in the form of a development package, involving capital, expertise, technology, and management systems, and it is thus becoming something like a green revolution *(Bhattacharya & Kumari, 2004).* Ethiopia is rated among the lowest in sub-Saharan countries, ranking one hundred twenty-six in the world, based on the Travel and Tourism Competitiveness Index. However, Ethiopia embraces enormous natural tourism potentials and is endowed with a wealth of tremendous biodiversity, less disturbed natural resources, mountains, lakes, special events, colorful ethnic groups, manmade sites, unusual geological features, local arts, and artifacts *(Fakana et al., 2019).*

### 2.2.1 Community Based Ecotourism Ethiopia

Ecotourism is being advocated worldwide for a positive linkage with biodiversity conservation and community livelihoods. The sustainable form of tourism that stimulates people to maintain their environments and gain their livelihood through natural resource conservation has a tremendous impact in many developing regions (Honey 2021, Gssling & Hall, 2022).

In Ethiopia many areas that are enriched by natural and cultural resources are being encouraged to pursue ecotourism venture so as to serve as a basis for diversification and Poverty reduction (Melaku et al., 2023). Lake Tana, Sheka and Kafa Coffee Forest Biosphere Reserve, among other areas, have been identified as priority area for ecotourism development, for example, activities like visiting Coffee plantation, watching birds and indigenous performances are all activities that promote an income generating source that is sustainable for both the resource and environment (NABU, 2022)

### 2.2.2 Regional Evidence: Kafa region

There are vast ecotourism potentials in Kafa BR thanks to abundant resources. Nevertheless, participation of the local community and general awareness levels about ecotourism is still minimal (Moges & Sahile, 2025). Government authorities were showing rivalry and conflict over who controls resources. Strict regulation enforcing rules on ecotourism could not be successfully achieved. Moreover government institutions were more concerned with conservation objective rather than enhancing community livelihoods (Debele Tiki, 2025). Besides the role of tourism based livelihood options the forest, with wild coffee plants, have a special importance as direct livelihood sources of Kafa Region.

## 2.3. Contribution of Ecotourism to Livelihood Improvement

Ecotourism has the potential to contribute to biodiversity conservation within and outside protected areas, as well as to promote community livelihoods (Ramaprabha and Balamurugan, 2026; Kulunge et al., 2026).

Ecotourism is a large industry that supports and contributes to the economic development of many developing countries (Cossengue et al., 2025).

Ecotourisam is one of the sectors that globally has faced the fastest economic growth rates throughout the last decade (Karimova et al., 2026).

According to a study which was conducted in China, ecotourism benefitted local people by its contribution to the local economy for creating job opportunities and income in tourist destination areas (Zhao and Jaafar, 2025; Wang et al., 2026).

### 2.3.1. Ecotourism Potential in Kafa Biosphere Reserve

TThe Kafa Biosphere Reserve has rich natural resources including Arabica coffee, endemic species, cultures and scenic landscape. A GIS study of the spatial assessment of Kafa Biosphere Reserve revealed that it has a high suitability for ecotourism development to enhance nature and local cultures development (Teshome et al., 2026). Moges & Sahile (2025) concluded that Kafa Biosphere Reserve has high local context potential for cultural and educational ecotourism due to its nature and sociocultural resources. However, local people perceive little participation in ecotourism development.

### 2.3.2.Contribution to Livelihoods and Income Generation

Ecotourism activities in Kafa comprise of guiding, lodging, handicrafts development and food service provision; they give directly income to households that offer these services to tourists. Indirect economic benefit is gained when locals sells products like handicrafts made from Elaeagia bark to tourists that supplement household income. A past programme, Kafa Climate Project(2010-2013) of NABU, show that ecotourism through participative management of the forest helped locals livelihood improvements through providing alternatives sources of fuel wood to reduce deforestation. Despite ecotourism's role and efforts so far only 10% of households were able to divers if their sources of income, the remaining still relying on subsistence agriculture with almost 90% of households.

### 2.3.3.Community perceptions on Ecotourism

Studies on community perceptions are essential because the views of local people can make ecotourism successful or not because if local people are positively inclined towards ecotourism this enhance the overall conservation and tourism activities whereas if there isskepticism community development may not materialize and contribute to conflicts in a protected area. According to Moges & Sahile (2025) local communityperceptions on ecotourism are mixed because many people know that ecotourism has benefits in the region, others feel that they are excluded from benefit sharing and decision-making. For that reason NABU involvement on ecotourism development gave participatory management of forest resources which increases locals willingness and commitment on the project.

## 3. MATERIALS AND METHODOLOGY

### a. Review methodologies

This review mainly depends on reviewing secondary data sources from the internet. The steps involved in identifying relevant resources for the review include searching, screening, eligibility, and inclusion. Searching was conducted using the following key terms, including livelihood diversification, on-farm activity,non-farm activity, off-farm activity, and incomes. Screening was done to eliminate non-relevant records by reading the titles, abstracts, and finally the full texts based on the set inclusion/exclusion criteria. The inclusion and exclusion criteria involved three stages . The first step is to download articles related to household choice of livelihood strategies and then retain those published after ten years, and eliminate those published before this specific year (in fact, old definitions and theories in the retained articles were also taken as they were in the original documents). The second stage is reading the abstract of the retained papers, and the last stage is reading the full text of the retained articles. Accordingly, a total of **xx** articles were downloaded, of which **yy** were reviewed.

Table 1 : major and sub-major conceptual

| Major Strategy | Sub-Strategies | Examples |
|---|---|---|
| On-Farm Only | Crops | Maize,teff,wheat,vegetables,fruits |
| | Non-Crop Agriculture | Livestock,aquaculture,beekeeping |
| On-Farm +Off-Farm | Forest Products | Firewood,charcoal,honey,medicinal plants,bamboo |
| | Eco-Tourism | Direct from visitors and conservation and development project funds, |
| On-Farm +Non-Farm | Business | Smallshops, trade,food stall,transport services |
| | Salaried Job | Teacher,nurse,government clerk |
| | Remittance | Money sent by migrant family members |
| | Transfer Payment | Pensions,social safety nets,subsidies |
| On-Farm+Off-Farm+Non-Farm | Laborer | Seasonal agriculture wage work combined with non-farm wage work |

(Gebru, Ichoku et al. 2018)(Quandt 2018))(Kumar, Kumar et al. 2023)

# 3.1.The conceptual interpretation of livelihood strategies

Livelihood strategies in rural households can be broadly categorized into on-farm, off-farm, and non-farm activities, often combined in diverse ways to enhance resilience and income security. The following typology illustrates major strategies, sub-strategies, and representative examples.

**On-farm-only strategies**

Households relying exclusively on on-farm activities typically engage in crop cultivation and non crop agriculture .crop based livelihood includes staple cereals such as maize, teff, and wheat alongside horticultural products like vegetables and fruits. Non-crop agriculture encompasses livestock husbandry, aquaculture and apiculture . These strategies are highly dependent on land access,rainfall variability, and ecological conditions.

**On-farm +off-farmstrategies**

Some households diversify by combining farming with off-farm resource extraction. Forest-based livelihoods are prominent, involving the collection and sale of firewood, charcoal, and honey. Households benefit directly from visitors or indirectly through conservation and development project funds. This category reflects the integration of natural resources use with broader market and institutional linkages.

**On-farm+ non-farm**

A significant proportion of households supplement agricultural activities with non-farm income sources; business enterprises such as small shops,petty trade,food stalls, and transport services provide alternative revenue streams. Salary employment, including teachers, nurses, and government clerks, offers a more stable income but requires educational attainment. Remittances from migrant family members constitute another critical livelihood source, while transfer payments like pensions,social safety nets, and subsidies represent institutional support mechanisms. This diversification reduces vulnerability to agricultural shocks.

**On-farm+off-farm+ non-farm strategies**

The most complex livelihood portfolios combine farming, resource extraction, and wage labor. Seasonal agricultural wage work is often complemented by non-farm wage employment, creating a multilayered livelihood system. These strategies reflect households' adaptive responses to economic uncertainty, labor market opportunities, and environmental constraints.

# 3.2. Description of the Study Area

## 3.2.1. Location

Kafa Biosphere Reserve is situated in Kafa Zone around Bonga, in the (SNNPRS), 460 km southwest of Ethiopia, and 80 km from Jima town. The Kafa Zone is administered by the regional government in association with 12 administration sectors called Woredas and 250 rural Kebele administrations in 25 urban towns. The altitude of the area ranges from 900 to 4000 m above sea level. Kafa Biosphere Reserve is located between the following latitudes and longitudes: a) Latitude: 35°29’50.55” to

36°47’33.78” East b) Longitude: 35°48’50.57” to 35°44’34.30” East c) Central Point: 36°3’22.51” East & 7°22’13.67” North *(Mohammed 2020)*.

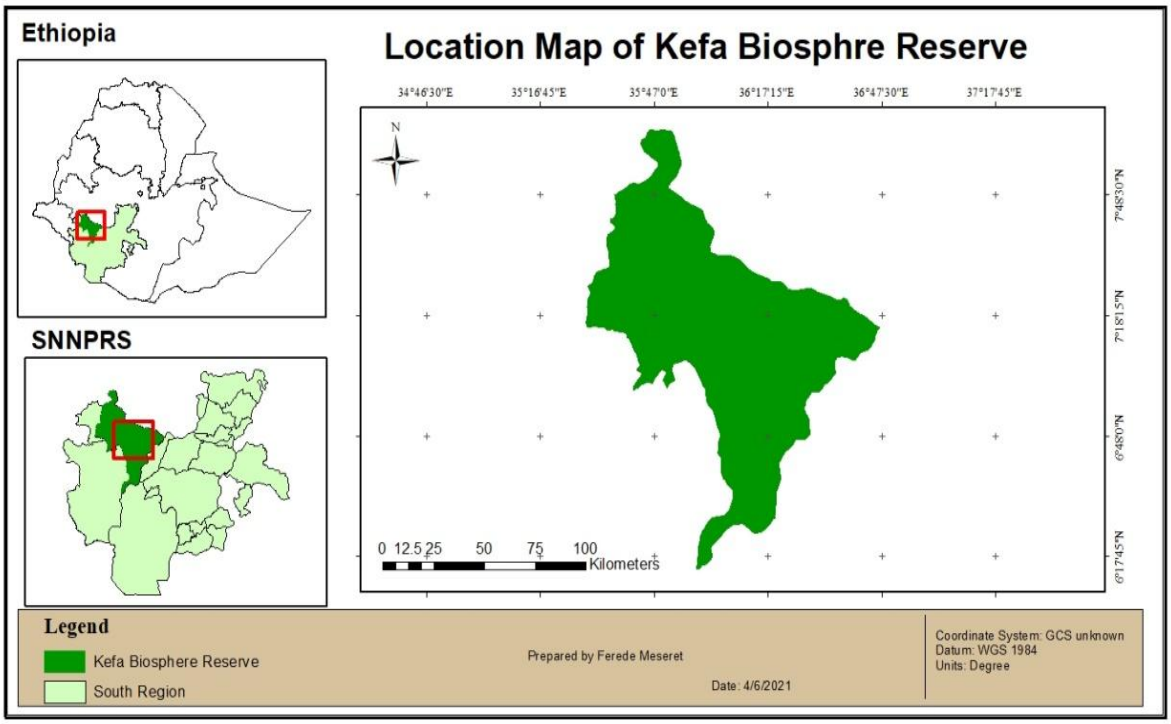



Figure 3**: Geographical location of Kafa Biosphere Reserve**

## 3.2.2. Socio-Economic Characteristics

The Kafa Zone contains more than 50% of the remaining Afromontane forests in Ethiopia, and it is the center of origin and genetic diversity of wild Coffea *arabica*. The biosphere reserve includes the eastern Afro-montane biodiversity hotspot and other endemic agricultural crops, such as *Ensete ventricosum* and *Eragrostis tef*, and a cultural and linguistic identity quite distinct from the rest of Africa. Main economic activities in the area are dominated by agriculture, which contributes approximately 41% to the GDP, 80% of exports, and 80% of the labor force *(Mohammed, 2020)*.

## 3.2.3. Area Coverage and Vegetation

The total area of the Kafa Biosphere Reserve is about 760,144 ha, of which currently 422,260 ha (56.6%) belong to eastern afromontane biodiversity. The core zone covers 41,391.1 ha, the buffer zone covers about 161,427 ha, and the transition zone covers about 337,885 ha. In this zone, all cultural and productive activities, including animal husbandry, are allowed. Kafa Biosphere Reserve in Ethiopia is the birthplace of wild *Coffea arabica* and contains close to 5,000 wild varieties of the plant in this

biodiversity hotspot. The last remaining Afromontane cloud forests that contain wild trees of *Coffea arabica* as a natural part of the ecosystem exist in the region in the Kafa Biosphere Reserve. It is situated in a predominantly highland region covered by evergreen Afromontane forest in the southwestern part of Ethiopia(Mohammed 2020).

## 3.3. Research Design and Approach

This study was employed according to *(Kogevinas and Chatzi 2015)* for research that collects data on relevant variables at one point in time from a sample selected to represent a larger population. A research design was used for collecting, analyzing, and reporting research in both quantitative and qualitative research *(Koki 2017).* A mixed research approach was employed, encompassing both descriptive and inferential statistics as well as quantitative and qualitative methods.

## 3.4. Pilot Survey

The pilot survey wasapplied for provides a better understanding of their issues that may need to be addressed before the main survey . *A total of* 20 households were used for the pre-test, that need to test a questionnaire is acknowledged by some literature suggests 5 % of the total 398 sampled households *(Rhoda, Cutts et al. 2023).*

## 3.5. Target Population

The target population for this study was the three district administrations of the local communities living adjacent to Kafa Coffee Forest Biosphere Reserve. The study population encompasses the local community and international tourists, travel agencies, tourism and culture officials, tour operators, NGO, and tourism business practitioners existing in the Kafa Coffee Forest Biosphere Reserve. Basically, purposely selected three districts (Gimbo, Dacha, and Bonga) was conducted on this study. The target population is approximately 398 household live on the Kafa Coffee Forest Biosphere Reserve (Kafa zonal bureau of statistics 2021). This dissertation work was selected in two kebeles purposely from each district for household data collection, and a sample of households was selected based on proportional sampling methods

## 3.6. Sampling Techniques and Sample Size Determination

The study used a (Bhatt, Jasrotia et al. 2026), so as to select districts,sample kebeles, and households. In the first stage, from the total 14 districts in Kafa Zone, Gimbo, Decha, and Bonga Zuria districts

were selected by the purposive sampling technique. The district was chosen considering ecotourism potential and area accessibility for conducting research. In the second stage 2 rural kebeles were selected using a simple random sampling method from each district. In the third stage, the sample size was determined, and this enables us to make inferences about a population from a sample. The data for the research were obtained mainly from the six selected kebeles of rural households in the districts.

The sample size was determined using the following sample size determination formula adapted from Israel's (1992) statistical formulas as follows:

Equation 1 is :n = N/(1+N(e)2)

Where: n = required sample size= the required sample size = 398 households

N =Household population size =102,276 households,

E =margin of error(expressed as a decimal, e.g 0.05 for ±5%)= the precision level which is = (±5%), Confidence Level is 95% at P = ± 5 (maxim variability)

Hence, out of the total population of 102,276, a sample size of 398 was taken. Then the respondent households from each sample kebele were calculated by using the probability proportional to sample size method to determine the sample size to be taken from each kebele.(Getinet and Lorato 2020).

nk = NkS/∑N

Where nk is the sample size to be estimated from the sample kebele,Nk is the number of households of the sample kebele,S is the total sample size determined, and ∑N is the summation of all sample kebele household populations. Finally, the individual households were selected by using a random sampling method.

Accordingly, the total size of sample households from the study was 398. This sample had been distributed to each selected kebele by using a simple random sampling method based on eco-tourism and probability proportional to sample size, as listed in the table.

Table 2. Sample size determination for respondent households.

| S/N | kebele | district | Total HHs(Nk) | Proportion(nk =NkS/∑N | Sampled HHs(No) |
|---|---|---|---|---|---|
| 1 | Gedam | Bonga zuria | 620 | 55 | 48 |
| 2 | Kaja | Bonga zuria | 520 | 46 | 40 |
| 3 | Kuti | Decha | 307 | 27 | 24 |
| 4 | Menkira | Decha | 320 | 28 | 25 |
| 5 | Yeyebito | Gimbo | 490 | 43 | 38 |
| 6 | Shumba | Gimbo | 2248 | 199 | 174 |
| Total | | | 4505 | 398 | 349 |

Source: own computation(2025).

The research results presented here demonstrate a systematic approach to determining the sample size and distributing it proportionally across selected kebeles.

The initial calculation of the required sample size was based on Equation 1. This statistical approach ensures that the sample size is neither too small to compromise reliability nor unnecessarily large to waste resources.

Once the overall sample size was established, the study employed the probability proportional to size (PPS)methods to allocate the sample across the six selected kebeles. The formula nk =NkS/∑N was used, where NK represents the number of households in each kebele, S is the total sample size 398), and ∑N is the total number of households in the selected kebeles (4,505). This method guarantees that

kebeles with larger household populations contribute more respondents to the sample,thereby maintaining representativeness. For instance, Shumba kebele in Gimbo district, with 2,248 households(nearly half of the total), contributed the largest share of the sample(199 households with 174 questionnaires distributed). Conversely, smaller kebeles such as Kuti (307 households) and Menkira(320 households) contributed proportionally fewer respondents(27 and 28 households,respectively). The final step involved selecting households through simple random sampling, which minimizes bias and ensures that every household within each kebele has an equal chance of being included. Although the calculated sample size was 398, only 349 questionnaires(88%) were actually distributed due to resource constraints. This reduction, while practical, still preserved the proportional distribution across kebeles, thereby maintaining the integrity of the sampling design. In summary, the study applied a rigorous and statistically sound sampling methodology ,first determining the required sample size using a standard formula,then distributing it proportionally across kebele using PPS, and finally selecting households randomly. This approach balances statistical validity with practical feasibility,ensuring that the survey results were representative of the household population while acknowledging real-world limitations in data collection.

# 3.7. Methods of Data Collection

General methods of data collection in this study included household questionnaire surveys,key informant interviews,focus group discussions, field observation, and document analysis. For the data collection, first, questionnaires were translated to the local language(kaffino), and three enumerators were given both theoretical and practical training to avoid risks of misinterpretation of the questions by respondents during interview periods without influencing the respondents' answers. To maintain consistency, questionnaires were pre-tested before data collection, and finally, data on livelihood diversification and Eco-tourism related data were collected using a semi-structured questionnaire for households and an unstructured open-ended checklist interview for key informants.

## 3.7.1. Data sources and collection tools

This study utilized both primary and secondary data sources, with primary data gathered, and both qualitative and quantitative data types were employed to ensure comprehensive and reliable findings.
FGDs were conducted as a qualitative method using structured and unstructured interviews with local elders, women, and adults to explore perception and experience related to Eco-tourism and livelihood improvement, with three sessions held involving 8 participants in each group and a total of 24 participants, ensuring diverse community perspectives were captured(Van Eeuwijk and Angehrn 2017)
The household questionnaire survey was conducted through self-completion and face-to-face interviews using structured and semi-structured formats designed to collect both qualitative and quantitative data on socioeconomic characteristics, community participation, and perceptions of ecotourism and livelihood benefits, with pre-testing on 20 households and final administration to 349 participants, primarily household heads, for the household survey. KIIs were conducted with 32

stakeholders, including government officials , kebele experts, and local NGOs, through face-to-face in-depth discussions guided by independent checklists selected for their expertise and involvement in biosphere reserve and eco-tourism, with the data used to triangulate household survey findings and enhance the validity and reliability of the study(Fida, Baatuuwie et al. 2023)

Field observation and document analysis were conducted through transect walks and continuous monitoring of the Kafa Coffee Forest Biosphere Reserve and its community dependency, supported by photographic evidence, while secondary sources such as reports, journals, books, and related documents were reviewed to validate and triangulate findings from FGDs,household surveys, and KIIs, thereby strengthening the reliability of the study.

## 3.8. Methods of Data Analyses

Data analysis methods of this research, conducted for livelihood diversification, combined qualitative techniques, including thematic and content analysis of community perception, with quantitative approaches, such as descriptive statistics and regression analysis, to systematically examine socioeconomic factors, resource dependency, and diversification strategies

Qualitative and quantitative data analyses were conducted using SPSS,version 27.0, Stata, and Microsoft Excel,applying descriptive statistics, Chi-square tests, regression, and ANOVA to examine demographic differences and the contribution of Eco-tourism to livelihoods, while qualitative insights were organized through thematic analysis and SWOT evaluation. Additionally, livelihood diversification was measured using the Simpson Index(SID) to capture the extent of income source diversity.

# 4. RESULTS AND DISCUSSION

## 4.1. Results

### 4.1.1 Contribution of ecotourism for Livelihood improvement

This chapter deals with results relating to contribution of ecotourism on livelihood improvement in the Kafa Coffee Forest Biosphere Reserve (Kafa BR) focusing on how communities and the respective stakeholders perceive impacts. In the analysis; local community perceptions on ecotourism attraction; employment generation; income generation and communities perception regarding to culture benefit are studied along with analysis on livelihood diversification under the influence of ecotourism in the study area. Both, quantity data collected via household survey and qualitative data via key informant interview(s) (KIIs) and focus group discussion(s) (FGDs), as well as secondary documents analysis are involved in this chapter.

Descriptive Statistices of households

Demographic and socio-economic characteristics of households examined in this study were educational status, sex, main occupation, age,household size, land holding, and living residence years. The purpose of choosing these characteristics was to get a general overview of what the sample households were composed of and how these characteristics could influence the impacts of ecotourism on communities' livelihoods and ecosystem services in Kafa Coffee Forest Biosphere Reserve. Although the majority of the respondents were male headed HHs, female household heads were also included in the household survey.

Categorical variables

Sex Household Distribution

The categorical descriptive statistics provide important s insights into the demographic and socio-economic composition of households in the study area. The sex of household head data shows that out of 349 respondents, the majority of households are male-headed (89.7%) while only 10.3% are female-headed. This imbalance reflects traditional gender roles in rural communities, where men are more often recognized as household heads. The presence of female-headed households highlights the role of women in managing family resources under certain circumstances.

Age Household Distribution

The age distribution indicates that nearly half of households(49.9%) fall within the prime working age group(25-54 years), which is the most economically productive stage of life. Meanwhile, 20.1% are in the early working age(15-24 years), suggesting a younger generation beginning to assume household responsibility, while 30.1% are mature or elderly(55 years and above), reflecting a significant proportion of experienced but potentially less economically active household heads. The predominance of middle-aged household heads indicates that most families are led by individuals in their prime working years,which is positive for labor availability and productivity. However, the significant share of elderly household heads highlights potential challenges in terms of physical capacity and reliance on younger family members. The relatively small proportion of youth suggests limited generational turnover,possibly due to migration or lack of opportunities for younger people to establish independent households.

Educational Category of Household

Educational attainment reveals a striking disparity, more than half of household heads(55%) have no formal education, while only 10% completed primary school and 8.6% secondary school. A relatively higher proportion (26.4%) attained higher education and above, which is encouraging but still limited compared to the capacity to adopt modern technology, access information, and engage in diversified livelihoods. This indicates severe educational deprivation, which directly affects households' ability to access information, adopt new technology, and engage with markets. Low literacy rates constrain livelihood diversification and perpetuate poverty. The small proportion with formal schooling suggests that education has not yet penetrated the rural community deeply, and targeted literacy programs are urgently needed.

Table 3. Categorical variables

| Categorical variables | | Freq | Percent |
|---|---|---|---|
| Sex of household head | Male | 313 | 89.68 |
| | Female | 36 | 10.32 |
| | Total | 349 | 100.00 |
| Age category | Early working age(15-24) | 70 | 20.06 |
| | Prime working age(25-54) | 174 | 49.86 |
| | Mature and elderly age(55 and above) | 105 | 30.09 |
| | Total | 349 | 100.00 |
| Educational category | No formal education | 192 | 55.01 |
| | Primary education | 35 | 10.03 |
| | Secondary education | 30 | 8.60 |
| | Higher and above education | 92 | 26.36 |
| | Total | 349 | 100.00 |

**Continuous variables**

Landholding Size

The mean landholding size is 4.34 hectares, ranging from 1 to 8, which suggests that most households have modest agricultural resources, though a few possess relatively larger holdings. Land distribution is highly uneven.11.2% of households were landless, while 2.9% of households own less than 0.1 hectares. The majority holds small plots: 12% of households own 0.1- 0.5 hectares, 22% of households own 0.5-1 hectares, and 27% of households own 1-2 hectares. Medium-sized holdings(2-5 hectares)account for 19% of households, while only 4% of households own 5-10 hectares and 2% of households own more than 10 hectares. This distribution shows that most households operate on small plots, limiting productivity and income potential. Landless and very small holdings highlight vulnerability, while the few large landowners may enjoy disproportionate advantages. The dominance of smallholder farming underscores the need for land reform, improved productivity, and alternative livelihood opportunities.

Length of Residence

The majority of households, 87.4% of households, have lived in their current location for more than 10 years, while only 12.6% of households have lived there for less than 10 years. The variable residence duration is small mean and SD, implying that the majority of respondents are long-term residents,

reflecting settlement stability and continuity in community life. This stability suggests strong community roots and long-term settlement patterns. It also implies that households were deeply tied to local resources and social networks. However, that small proportion of newer residents may represent migrants seeking land or opportunity, which could create pressure on resources and require integration support

Household Size

On average, households consist of five family members living together under one roof. This size is typical of rural communities balancing more labor availability with consumption needs. Larger household size can provide more labor for farming but also increase dependency ratios if many members are children or elderly. The average of five suggests moderate household capacity, but combined with low educational levels and small landholding, it may strain resources. The results paint a picture of rural households characterized by male dominance, middle-aged leadership, low literacy,small landholding and long-term settlement stability.

**Total Income and SDI**

The descriptive statistics presented in the table provide a comprehensive overview of household demographics, resource endowments,economic conditions and sustainability performance in the study area. In terms of economic outcomes, total household income averages 62,320 ETB but has a large standard deviation of 32,520 ETB and a range from 9,300 to 195,000 ETB, highlighting significant disparities in earnings. Finally, the SDI averaged 0.678 with relatively tight clustering SD 0.089) and values ranging from 0.313 to 1.0. This indicates that most households achieve moderate sustainability performance, with some lagging behind at a low SDI level while others reach near-perfect scores. Taken together, these results portray a community characterized by stable residency, moderate-sized households and landholdings, but marked economic inequality.

Table 4. Summery of total income ,SDI

| Variable | Obs | Mean | Std. Dev. | Min | Max |
|---|---|---|---|---|---|
| Household Size | 349 | 4.455587 | 1.68714 | 2 | 9 |
| Landholding Size | 349 | 4.335244 | 1.686471 | 1 | 8 |
| Residence Duration | 349 | 1.873926 | .3324099 | 1 | 2 |
| Total income | 348 | 62320.06 | 32519.93 | 9300 | 195000 |
| SDI | 349 | .6778705 | .0892215 | .3132761 | 1 |

**Household livelihood diversification strategies**

On-farm only covered 36% of households. This was the largest group relying exclusively on agriculture. Such households are highly dependent on farming for food and income. While this underscores the central role of agriculture in rural life,it also exposes these households to significant risks. Their lack of diversification makes them more vulnerable compared to households with multiple income sources.

On-farm +off-farm 18% of households. These households combine farming with off-farm activities such as wage labor,seasonal employment, or agricultural services. This strategy reflects an effort to supplement farm income and reduce vulnerability. Though smaller in number, this group demonstrates the importance of rural labor markets and the role of off-farm work in stabilizing household income. Their livelihoods are somewhat more resilient than those relying solely on the farm.

On-farm +non-farm 24%,households. This group engages in farming alongside non-farm activities such as trade,small businesses, or services. Although relatively few, these households show entrepreneurial adaptation,diversification into sectors that may offer more stable or profitable returns. Their participation in non-farm work suggests access to markets, skills, or capital which can enhance resilience and improve living standards. They represent a pathway toward rural transformation beyond agriculture.

On-farm+off-farm+non-farm 22% of households. The second largest group pursues a fully diversified strategy integrating farming, off-farm, and non-farm activities. This approach spreads risk across multiple income streams, offering greater resilience to shocks. These households are better positioned to withstand environmental and economic challenges, and they may enjoy more financial stability compared to those relying on a single source. Their livelihood structure reflects a balanced and adaptive strategy. More than half of households (64%) diversify beyond farming alone, indicating a strong trend toward mixed strategies. Diversification is a key pathway to resilience as households that combine farming with off- farm and non-farm activities are less vulnerable to shocks. The results show that while agriculture is the foundation of rural livelihoods, diversification into off-farm and non-farm activity is increasingly vital. This diversification pattern suggests that households are actively seeking resilience against agricultural risks by supplementing farm income with alternative sources.

Table 5: Major and sub-major livelihood strategies in the study areas

| Major Strategy | Sub-Strategies | Freq | Percent |
|---|---|---|---|
| On farm only | Crops | 125 | 36 |
| | Non-Crop Agriculture | | |
| On farm +off farm | Forest Products | 63 | 18 |
| | Eco-Tourism | | |
| On farm+non farm | Business | 84 | 24 |
| | Salaried Job | | |
| On farm+non farm | Remittance | 84 | 24 |
| | Transfer Payment | | |
| On farm+off farm+non farm | Laborer | 77 | 22 |
| Total | | 349 | 100.00 |

Sources: computed from own survey 2025.

Table 6. household perception regarding ecotourism contributions related to livelihood diversification

| What potential | | Mean | Std. Dev | Minimum | Maximum |
|---|---|---|---|---|---|
| attraction areas of eco-tourism are there in your locality | on farm only | 2.59 | .752 | 1 | 4 |
| | on-farm + off -arm | 3.49 | .859 | 1 | 4 |
| | on-farm + non-farm | 4.00 | .000 | 4 | 4 |
| | on-farm + off-farm + non-farm | 4.00 | .000 | 4 | 4 |
| Eco-tourism provides employment opportunities | on farm only | 1.99 | .929 | 1 | 4 |
| | on-farm + off -arm | 1.73 | .574 | 1 | 3 |
| | on-farm + non-farm | 1.67 | .646 | 1 | 4 |
| | on-farm + off-farm + non-farm | 1.69 | .568 | 1 | 3 |
| Eco-tourism generates incomes for local community livelihoods | on farm only | 1.98 | .523 | 1 | 4 |
| | on-farm + off -arm | 2.16 | .447 | 1 | 3 |
| | on-farm + non-farm | 2.13 | .533 | 1 | 4 |
| | on-farm + off-farm + non-farm | 2.32 | .658 | 1 | 4 |
| Eco-tourism encourages cultural activities on the local population | on farm only | 1.32 | .468 | 1 | 2 |
| | on-farm + off -arm | 1.37 | .485 | 1 | 2 |
| | on-farm + non-farm | 1.29 | .454 | 1 | 2 |
| | on-farm + off-farm +non-farm | 1.69 | .466 | 1 | 2 |

Key findings observed changes in household perception regarding ecotourism contributions related to livelihood diversification practices. Potential attractions for tourists Households practising diversified livelihoods (farm, non-farm or off-farm plus non-farm activities) got the higher mean (M = 4.00) representing a perceived broader attraction potential, whereas, farm dependent households got lower scores (Mean = 2.59). Employment Generation Mean across livelihood categories showed consistent low perceptions of employment opportunities (Mean ranges from 1.67 to 1.99), indicating that ecotourism is perceived as not labour market expanding for rural communities; direct opportunities for employment are seemingly scarce.

Income Generation Mean scores were in between low to moderate; and, higher perceptions were from households practicing diversified livelihoods (Mean up to 2.32).

This suggests that ecotourism contributed more to household income when coupled with other livelihood diversification and not as standalone source for income. Cultural activities Cultivation activities scored the lowest perceptions across livelihood types (Mean ranges between 1.29 and 1.69); notwithstanding, households with highly diversified livelihood strategies perceived higher scores (Mean = 1.69) which reflect more apparent benefits on culture.

**livelihood diversification index**

The value of SID ranges between zero (0) and one (1). Thus, zero denotes complete specialization when there is only one source of income, where Pi = 1, and values approaching one indicate greater diversification as the number of sources increases and income shares become more even, and one is the extreme of diversification (Simpson, 1949). Identified the specific income stream based on household questionnaire,theses included :BI = Business income, SI = Salaried job income, RI = Remittances income, TPI = Transfer payment income, LI = Labour income, FPI = Forest products income, ETI = Eco-tourism income, CI = Crops income, and NCI = Non-crops income.

**The Simpson Index of Diversity (SID) Model**

These findings align with our SID value, confirming that diversification is both a coping strategy and a pathway to welfare improvement.

Table 7 . classification of livelihood diversification

| SDI value | Level of Diversification |
|---|---|
| < 0.38 | Less diversification |
| 0.38 to 0.68 | Moderately diversified |
| > 0.68 | Highly diversified |

Source: adopted from (Maji and Saha 2021, Zelelew, Getnet et al. 2024, Gonfa, Kassahun et al. 2025)

**Categorized livelihood diversification**

| Diversificaion leve | | Freq | Percent |
|---|---|---|---|
| Less diversified | | 2 | 0.57 |
| Moderately diversified | | 145 | 41.55 |
| Highly diversified | | 202 | 57.88 |
| Total | | 349 | 100.00 |

This research result shows that the majority of observations are highly diversified, followed by a significant number that are moderately diversified, and only a negligible number that are less diversified. This suggests that diversification levels are generally strong in this sample of households.

### 4.1.2. Ecotourism Income Contribution for livelihood

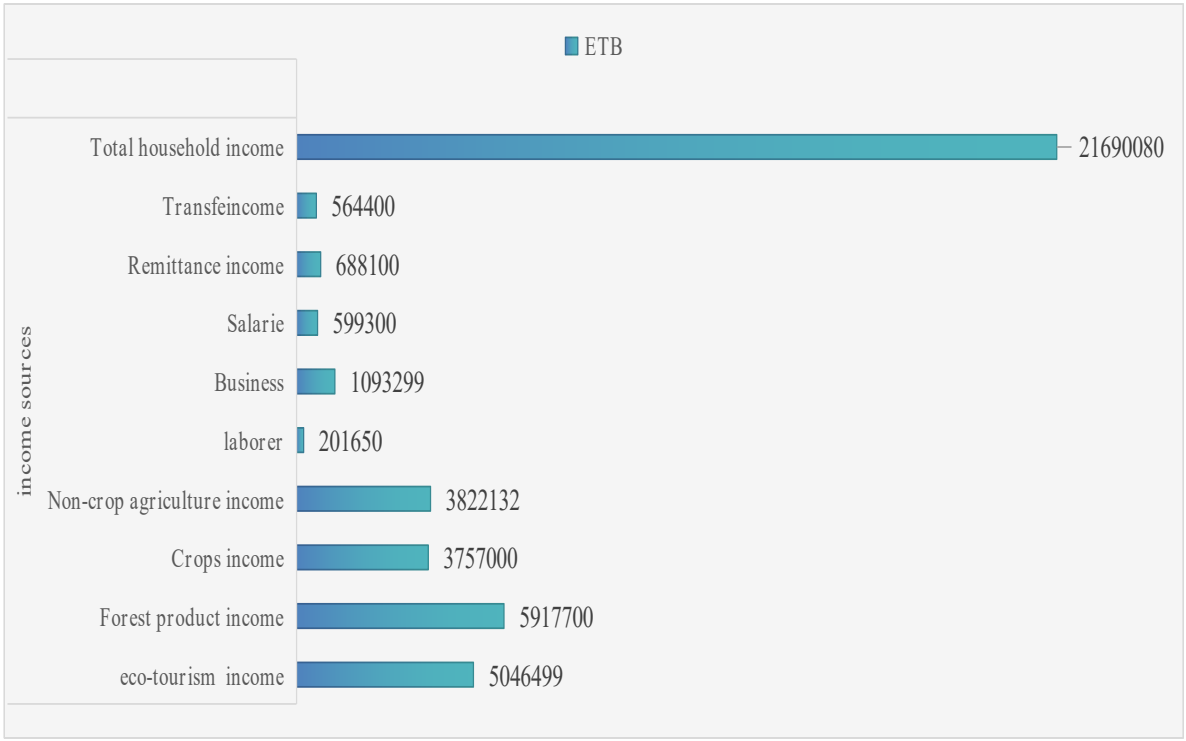
The income distribution data illustrates the significance of ecotourism as a livelihood source. With a total household income of 21,690,080 ETB, coming from agriculture, forest products, business, salaries, remittances, and transfers, ecotourism income accounts for 5,046,499 ETB, making it one of the largest non-agricultural sources of income.

Compared to other sources, ecotourism income comes second to forest product income (5,917,700 ETB). In terms of livelihood improvement, ecotourism not only provides a direct contribution (by providing services and other tourism-related activities) but also an indirect contribution. Consequently, the magnitude of the direct and indirect contribution of ecotourism implies that it has the potential to reduce the community's reliance on the forest for subsistence and also help diversify sources of livelihood. Based on the analysis of the sources of income, it can be concluded that ecotourism has become a major contributor to livelihood improvement in the study area. With 5,046,499 ETB in tourism-related income, it is one of the largest contributors of household income, coming second to forest product income (5,917,700 ETB). This implies that ecotourism plays a major role in livelihood diversification.

In terms of both direct and indirect contributions to livelihood improvement, ecotourism has a significant role in the study area. Ecotourism not only provides direct employment and income from tourism-related activities but also indirectly contributes to livelihood improvement by creating demand for forest conservation.

In addition to the direct contribution to livelihood improvement through employment and indirect contribution through forest conservation, ecotourism plays a significant role in promoting local cultures. Given the magnitude of the contribution of ecotourism to livelihood improvement through both direct and indirect mechanisms, it can be concluded that it can be a potential catalyst for improving the quality of life for the local people around the Kafa Coffee Forest Biosphere Reserve.

Table 8.Household Income Sources




The bar chart clearly shows a significant variance in the contribution of income from different sources to total household income. Total Household income amounts to 21,690,080 ETB.

**Significant Contributors of Household Income:**

* Forest product income is the highest contributor at 5,917,700 ETB.
* Eco-tourism income is the second largest contributor at 5,046,499 ETB.
* Non-crop agriculture income is another significant contributor at 3,822,132 ETB.
* Crops income contributes 3,757,000 ETB.

**Moderate Contributors:**

* Business activities contribute 1,093,299 ETB.

**Marginal Contributors:**

* Remittance income amounts to 688,100 ETB.
* Transfer income amounts to 564,400 ETB.
* Salaries provide 599,300 ETB.
* Laborer income is the smallest contributor at 201,650 ETB.

In this analysis identifies that natural resources contribute largely to household income and a higher increase in income is registered from eco-tourism and forest products. It would be prudent to build more investment in these sector by supporting farmers and local authorities to gain maximum benefits from forest product utilization and eco-tourism while providing them with adequate information regarding markets and product quality

### 4.1.3. community perception on ecotourism for Kafa BR

The respondents are much familiar with various tourism resources that Kafa BR holds; It seems therefore, that local communities recognize ecotourism as an activity in which nature/biodiversity resources combine with spiritual (religious) and cultural resources. The recognition for integrating natural/biodiversity with cultural and religious sites is a fundamental attribute contributing towards the uniqueness of Kafa BR. This result reflects the strong potential to promote ecotourism development through effective and integrative use of its natural and cultural heritages.

| | | Frequency | Percent |
|---|---|---|---|
| potential attraction areas of eco- tourism | religious | 17 | 4.9 |
| | cultural | 35 | 10.0 |
| | natural/biodiversity | 87 | 24.9 |
| | all | 210 | 60.2 |
| | Total | 349 | 100.0 |
| Eco-tourism provides employment opportunities | strongly agree | 123 | 35.2 |
| | agree | 189 | 54.2 |
| | disagree | 21 | 6.0 |
| | strongly dis agree | 16 | 4.6 |
| | Total | 349 | 100.0 |
| Eco-tourism generates incomes for local community livelihoods | strongly agree | 32 | 9.2 |
| | agree | 244 | 69.9 |
| | disagree | 70 | 20.1 |
| | strongly dis agree | 3 | .9 |
| | Total | 349 | 100.0 |
| Eco-tourism encourages cultural activities on the local population | strongly agree | 209 | 59.9 |
| | agree | 140 | 40.1 |
| | Total | 349 | 100.0 |

The economic contribution from ecotourism still face doubts from about 1/5 of households. The acceptance towards contribution on cultural activities shows strongest among all, providing very clear indication that ecotourism is not only a economic motivation. Implication: In terms of enhancing the livelihoods the benefits are not evenly distributed among residents. Therefore, development strategies are needed to ensure adequate and wider access to the benefits generated through ecotourism; strengthen community partnership in planning and decision making, encourage the integration of various attraction areas

1. Attraction Area of Ecotourism. Religious sites are observed 4.9%, and cultural sites are observed 10.0%, while the perception is not as dominant as others. Other aspects such as natural/biodiversity areas are perceived much higher 24.9%, this indicates household values towards ecological resources. With all attractions areas dominate the majority share of 60.2%, this reflects that most households perceive ecotourism is multi-dimensions which contain the religious values, cultural values and biodiversity values. Thus, this seems to suggest that the communities perceive ecotourism as a wider opportunity instead of restricted within only one dimension.

2. Employment Opportunities. With strong agree 35.2% and agree 54.2% account for more than 89.7%, disagree 10.6%, all these values show strong acceptances on ecotourism and its role in providing new employment opportunities. It shows that most households recognize ecotourism, the job creating ability and its function of alleviating unemployment and diversifying household livelihood.

3. Income Generation. Strongly agree and agree account for more than 79.1% while disagreement

account for 20.1%, in general the household support ecotourism as livelihood generation method. However, with around 1/5 household disagrees with ecotourism contribution on generating income. This may suggest a portion of households feel themselves excluded from income generating opportunities from ecotourism or cannot access all relevant revenues.

4. Cultural Activities. All the respondents 100% strongly agree and agree towards cultural activities contributed by ecotourism. It clearly indicates ecotourism as an influential method promoting the revitalization of traditions, festivals, ethnicity of community.

Table 9. **ANOVA Table**

| | | | Sum of Squares | df | Mean Square | F | Sig. |
|---|---|---|---|---|---|---|---|
| potential attraction areas of eco-tourism | Between Groups | (Combined) | 173.120 | 2 | 86.560 | 387.235 | .000 |
| | Within Groups | | 77.119 | 345 | .224 | | |
| | Total | | 250.239 | 347 | | | |
| Eco-tourism provides employment opportunities | Between Groups | (Combined) | 6.428 | 2 | 3.214 | 5.914 | .003 |
| | Within Groups | | 187.491 | 345 | .543 | | |
| | Total | | 193.920 | 347 | | | |
| Eco-tourism generates incomes for local community livelihoods | Between Groups | (Combined) | 4.216 | 2 | 2.108 | 7.029 | .001 |
| | Within Groups | | 103.470 | 345 | .300 | | |
| | Total | | 107.687 | 347 | | | |
| Eco-tourism encourages cultural activities | Between Groups | (Combined) | 4.716 | 2 | 2.358 | 10.302 | .000 |
| | Within Groups | | 78.962 | 345 | .229 | | |
| | Total | | 83.678 | 347 | | | |

Attraction areas, employment, income, and culturally sensitive activities: With differences in ANOVA results, it can be concluded from the present study that household location influences the attitude toward ecotourism's impact in livelihood improvement. This indicates that the gains from ecotourism are varied, and not uniform across all household. Consequently, ecotourism interventions should consider the implementation of benefit-sharing mechanisms and carefully designed localised interventions that ensure a positive impact across all stakeholders and communities.

1.Potential Attraction Areas of Ecotourism

The ANOVA result shows a significant difference among households in different weredas (F = 387.235, Sig. = .000), indicates the differences in household referents to potential attraction areas of ecotourism, which are religious sites, cultural sites, biodiverse sites, and other sites. Some of the households refer to religious or cultural sites as ecotourism sites, while a few refer to biodiversity as attractive sites, and some households refer to all these sites together as attractive sites.

2.Employment Opportunities

ANOVA result shows that the differences of the level of households' referents to employment opportunities among different weredas is statistically significant (F = 5.914, Sig. = .003), most households agree that ecotourism will create employment opportunities, while the differences of the level of households' referents to employment opportunities among different household indicate that ecotourism would create employment opportunities in different household varies.

3.Income Generation

The test result for income generation reveals a significant difference (F=7.029, Sig.=.001). This indicates that there is a difference in the perception of the contribution of ecotourism to the households' local income by household. Some households may simultaneously consider ecotourism as a source of income and yet, some may feel they are left out, because they are lost in the process of benefit sharing.

4.Cultural activities

The ANOVA result for cultural activities shows a high significant (F=10.302, Sig.=.000). This indicates that, the perception of the contribution of ecotourism in terms of cultural activities creation by households differ across household. The ultimate significant agreement of ecotourism in promoting cultural activities may be undermined by the ANOVA results which shows a difference in perception at local levels. Some households may be less likely to see that their local culture is promoted through ecotourism.

### 4.1.4. Income Benefits Derived from Ecotourism Activity

Although the revenue directly accrued from entrance fees levied on tourists, guiding services, and handicrafts sales constitutes the principal source of income from ecotourism, a comprehensive assessment of ecotourism in protected areas requires consideration of secondary and institutional revenues. Particularly in high-value areas of biodiversity and ecological significance such as the Kafa Coffee Forest Biosphere Reserve in the southwestern part of Ethiopia, ecotourism serves as an attracting force for external capital.

Rather than a stand-alone economic activity, the initiation and development of ecotourism-related businesses and the brand of the protected area itself signal to international donors, non-governmental organizations (NGOs), and other third-parties, who contribute to the local economy through funding conservation activities and community development. This section interprets the findings regarding the Civil Society Organization (CSO)'s funding, elaborating on how international and local contributions to the ecotourism development, livelihoods, forest conservation, and community capacities building influence each other. The funds sourced through CSOs constitute one of the essential ways through which ecotourism-related benefits from the local biosphere reserve are incorporated into the regional economy. Table below provides an overview of the CSOs' activities in relation to the biosphere reserve, including the objective, the sector, the year of implementation, and the amount of financing provided.

Table 10 .Civil Society Funding as Ecotourism Gains for Local Communities in the Kafa Coffee Forest Biosphere Reserve

| CSO Name | Project objective | Sector | Budget year | Budget ETB/EUR |
|---|---|---|---|---|
| NABU | Sustainability of garden coffee value chain | Coffee/ecotorism value chain | 2023 | 2369773 |
| | Coffee innovation and diversification | Agricltuer and value addition | 2023 | 27140069 |
| | Forest for future | Forest conservation | 2023 | 25600440 |
| | Women for renewable energies and forest protection | Energy and conservation | 2023 | 2912807 |
| Ethio-wetlands association | REDD+participatory forest (phase III) | Forest protection | 2023 | 56369461 |
| EU CSO program | Civil society strengthening and livelihood linked sectors | Farming and energy | 2025 | €5.829 million |
| Population services international | Growth through nutration | Nutrition/WASH | 2022 | 11468729 |
| Welthungerhilfe+DEC+ CoSAP | CSO capacity building programme | livelihood | 2023 | €6.5M |

The data in Table shows that ecotourism in the Kafa Coffee Forest Biosphere Reserve region acts as an institutional catalyst for multi-million Birr and Euro CSO investments. While direct ecotourism revenue triggers initial community interest, it is the subsequent influx of targeted international and domestic CSO funding (over a hundred million Birr in 2023, and multi-year European grants) that ensures that local communities realise tangible economic benefits from ecotourism. By strategically allocating funds to forest protection (REDD+), sustainable agriculture and coffee value chain improvement, energy transition, gender equality, and human capital development, these interventions ensure that local communities derive economic benefits from ecotourism. This approach demonstrates that ecotourism, when supported by targeted civil society partnerships, can create a virtuous cycle: conservation attracts investment, investment improves community livelihoods and forest stewardship, and a healthy forest supports high-value ecotourism.

Analysis of CSO project funding revealed that such funding constitutes indirect and beneficial ecotourism advantages for local people in Kafa Coffee Forest Biosphere Reserve. NABU's programs that included the Sustainability of Garden Coffee Value Chain and Innovation in Coffee contributed in terms of integrating smallholders into markets and diversifies income streams. A program for Conservation (Forest for Future program) provided the ecological base for ecotourism by maintaining biodiversity, while the one that focuses on women regarding renewable energy in Kafa ensures participation of the marginalized community and reduces the use of natural forest.

Likewise, the EU program to Ethio-Wetlands Association (EWNRA) in terms of support and intervention for communities within and around protected areas for managing the resources through the REDD program contributed more than 56 million ETB to forest management in community basis where locals directly earned share of carbon finance and ensured long term resource sustainability.

The EU CSO Program provides financial support to strengthening of civil society institutions; mainstreaming farming and energy sectors towards sustainability-based approach with a budget of 5.829 million in strengthening governance as an essential element for ecotourism activities. A program of population services International to build the health status of the community members for

productivity, for instance through nutrition and WASH intervention, ensures that people can participate in the tourism activity with their health needs sufficiently addressed. Welthungerhilfe in association with DEC and CoSAP provided capacity building for local CSOs and thereby enabled local communities to lead initiatives, which can ultimately empower them and achieve their goals of environmental and social improvement by investing about 6.5 million ETB for training for strengthening of capacities of local organizations to take responsibility for local programs. The foregoing CSO program investments are to be understood as ecotourism gains not only in that it improved ecological conditions but also facilitated human capacity and potentiality to use natural resources for benefit with due consideration of the need for their sustainability; in particular that can contribute to the ecotourism benefits at local levels.

**1. Ecotourism & Coffee Value Chai**ns

NABU (Nature And Biodiversity Conservation Union) has a dominant presence in the biosphere reserve in terms of institutional presence, presumably to conserve the birthplace of Arabica coffee while supporting local livelihoods. In 2023, NABU invested 2,369,773 ETB in 'Sustainability of garden coffee value chain.' Another 27,140,069 ETB was earmarked for 'Coffee innovation and diversification.'

Ecotourism in Kafa is closely linked to agritourism and the marketing of forest coffee; tourists who take 'coffee forest treks' can directly associate with the conservation story and invest in the local product. Substantial investment in coffee innovation ensures that local farmers get a higher share of the price they command for their yield. By improving the value chain, investment can recover costs associated with avoiding destructive agricultural encroachment into the protected forest zones.

**2. Environmental Stewardship & Carbon-linked Funding**

Forest conservation is part of the ecological capital underpinning ecotourism; without forests, the destination loses its competitive advantage and appeal. This interdependency is demonstrated by the 56,369,461 ETB invested by the Ethio-Wetlands Association in 2023 in the "REDD+ Participatory Forest Management (Phase III)" project, and 25,600,440 ETB allocated by NABU for its 'Forest for Future' project in the same year.

Investment in participatory forest management (PFM) is a formalised REDD+ (Reducing Emissions from Deforestation and Forest Degradation) funding mechanism; local communities have the power to become custodians of their ecotourism asset base. When local communities enjoy legally shared management rights and benefit-sharing from the forest, poaching, illegal logging, and slash-and-burn practices are reduced. Multi-million ETB CSO funding interventions therefore indirectly protect the ecological landscape needed for ecotourism.

**3. Energy Transition, Gender, & Livelihoods**

Ecotourism literature acknowledges that community-based tourism interventions should ease domestic pressure on the natural resource base. NABU invested 2,912,807 ETB in 'Women for renewable energies and forest protection' (2023). Fuelwood harvesting is a major driver of forest degradation in south-western Ethiopia; addressing this issue reduces pressure on the forest. Consortium funding interventions, including the 6.5 million Euro capacity-building program executed by Welthungerhilfe, DEC, and CoSAP, and the 5.829 million Euro EU CSO program due to be launched in 2025, represent

a macroeconomic approach to supporting ecotourism through farming, energy, and civil society capacity development.

The gender-energy-ecotourism nexus is pertinent; introducing renewable energies to women who are typically tasked with domestic energy collection reduces time poverty and decreases reliance on forest timber for firewood. Such interventions raise living standards and create social stability. Households supported through diversified livelihood programs (including the capacity-building funds referred to earlier) are less likely to resort to illicit extractive activities harmful to the biosphere reserve's tourism value.

**4. Human Capital, Health, & Social Infrastructure**

Without meeting basic human needs, ecotourism and conservation investments are unlikely to be sustainable. Population Services International allocated 11,468,729 ETB to 'Growth through Nutrition' (WASH and health sectors) in 2022. Health and social infrastructure investments underpin community-based ecotourism. Ecotourism relies heavily on community members to deliver tourism products (guides, homestay, lodges, performances) and services. Community health and wellbeing are therefore pivotal to the success of such enterprises. Investment in this area demonstrates that the Kafa Coffee Forest Biosphere Reserve is conceptualised as a human-ecosystem landscape; conservation, tourism, and human welfare interventions are mutually reinforcing.

## 4.1.5. Tourism, agricultural, natural resources experts and leaders Key informants

### Table 11. Key informants

| | | Frequency | Percent |
|---|---|---|---|
| level of ecotourism contribution for local livelihood diversification | high | 24 | 75.0 |
| | medium | 7 | 21.9 |
| | low | 1 | 3.1 |
| | Total | 32 | 100.0 |
| kafa biosphere reserve appropriateness for eco-tourism | good | 4 | 12.5 |
| | very good | 10 | 31.3 |
| | needs improvment | 18 | 56.3 |
| | Total | 32 | 100.0 |
| the status of eco-tourism in the present days as compared to that of past | good | 22 | 68.8 |
| | needs improvment | 10 | 31.3 |
| | Total | 32 | 100.0 |
| purpose tourists visit in this area | ecoturism | 28 | 87.5 |
| | others | 4 | 12.5 |
| | Total | 32 | 100.0 |
| opportunities regarding ecotourism in the area | yes | 32 | 100.0 |
| | Total | 32 | 100.0 |
| local community benefit from ecotourism development | yes | 32 | 100.0 |

| | | | |
|---|---|---|---|
| | Total | 32 | 100.0 |
| eco-tourism is really community-based | yes | 6 | 18.8 |
| | no | 26 | 81.3 |
| | Total | 32 | 100.0 |

The first three statements demonstrate that ecotourism is perceived as a source of benefits but is regarded as underdeveloped. This shows that the respondents acknowledge the potential benefits that ecotourism can bring to the community but realize that it requires improvements. The responses to statements 4 and 7 demonstrate that the community is heavily reliant on ecotourism and that ecotourism is not really community-based. This shows that the community does not play a leading role in ecotourism-related activities, and external factors could negatively impact the community's reliance on ecotourism as a source of livelihood.

From these results, it could be inferred that the role of ecotourism in promoting livelihood diversification should be evaluated. While it has the potential to be a viable alternative to subsistence farming, it is currently depended on too heavily, and the community does not play a leading role in it.

For the dissertation, these results are useful in demonstrating the potential of ecotourism as an alternative to subsistence farming.

**1. Ecotourism Contribution to Livelihood Diversification**

75% of the respondents identified the contribution of ecotourism as high, which shows that ecotourism plays a considerable role in livelihood diversification. This result aligns with previous reports identifying ecotourism as a means of complementing subsistence farming in rural communities. However, 21.9% of the respondents identified its contribution as medium, and 3.1% identified it as low.

**2. Appropriateness of Kafa BR for Ecotourism**

Over half, 56.3%, of the respondents scored the appropriateness of the biosphere reserve for ecotourism as needing improvements. This result shows that the current state of the biosphere reserve is only moderately appropriate for ecotourism. Meanwhile, 31.3% of the respondents scored the appropriateness as very good.

3. Current Status of Ecotourism Compared to the Past

68.8% of the respondents scored the current status of ecotourism as good compared to the past, while 31.3% scored it as needing improvements.

**4. Tourist Purpose of Visit**

87.5% of tourist respondents identified their reason for visiting the biosphere reserve as ecotourism. This shows that the biosphere reserve is highly dependent on ecotourism as a tourism product.

**5. Opportunities in Ecotourism**

All the respondents scored opportunities in ecotourism as very good. This shows that the general perception of ecotourism in the community is positive, and there is a general consensus that ecotourism has the potential to bring significant benefits to the community.

**6. Community Benefits**

All the respondents agreed that the community benefits from ecotourism. This shows that ecotourism has the potential to be a viable alternative to subsistence farming and can significantly contribute to livelihood diversification.

**7. Community-Based Ecotourism**

81.3% of the respondents scored the statement “ecotourism is not really a community-based tourism venture” as true, and 18.7% scored it as false. This shows that the majority of the respondents believe that ecotourism is not a community-based tourism venture.

## 4.1.6. BR management Key informants

An assessment of project support, governance, and integration of ecotourism businesses into the ecosystem of the Kafa Coffee Forest Biosphere Reserve, Ethiopia.

In this chapter, data were collected using structured questionnaires and key informant interviews with two distinct groups of stakeholders within the study zone of the Kafa Coffee Forest Biosphere Reserve:

**Bio-Reserve Management Staff**: To determine the perception of stakeholders on the overall, and sector specific role of the projects (e.g. awareness raising, livelihood income, biodiversity conservation), and barriers to effective management.

**Hotel, Restaurant, and Business Operators** : To assess business operations and ecotourism capacities, interaction between private businesses and the Bio-Reserve area, community benefit sharing arrangements, and to estimate the total, and indirect annual income generated from ecotourism.

The quantitative data were analyzed using descriptive statistics, the frequencies, percentages, totals, means, and standard deviations of quantitative variables (e.g. scores) were calculated to show central tendency and variation of responses from the respondents.

## 4.1.7. Bio-Reserve Management perspectives on support projects

In the context of developing-country conservation where state budgets are empty bowning on conservation, then, the role of external projects becomes very pertinent for the operationalization of biosphere reserves (BRs). This paper considers how the perceived role of projects for the sustainability and effectiveness of BRs.

Table 12: Perceived role of projects in the sustainability and effectiveness of BRs

| Rating | Frequency | Percent |
|---|---|---|
| Very high | 21 | 65.6 |
| High | 11 | 34.4 |
| Total | 32 | 100.0 |

The statistical output from the survey reveals that 100% of the management personnel in the BR organization believe that external interventions are important to the organization's success. Also, 65.6% of the management personnel indicated that the role of support projects is "very high" in importance to the organization, while 34.4% of the management personnel indicated that the role of support projects is "high" in importance to the organization.

These results show that the government's internal resources and funding are not sufficient to manage the various tasks required of the KBR. The inclusion of external projects has provided the necessary financial, technical and logistical support to the organization to complete its required tasks. While the necessity of these projects is recognized by all, a deeper analysis of their effectiveness within the KBR is required to understand which areas are succeeding and which are failing.

Kbr6.Please gives your rating the contributions of projects/programs to BR effective management (high, medium and low)

### 4.1.8. Sectoral Contributions of Projects to Effective BR Management

The broad ratings of Table above were further broken down by management respondents rating the contributions of projects to eight different operational areas as high, medium or low.

Table 13: Rating of Project/Program Portions Contributions to Specific BR

Management Areas

| Operational Domain | High Fre (%) | Medium Fre (%) | Low Fre (%) | Total |
|---|---|---|---|---|
| Awareness raising | 37.5 | 62.5 | 0.0 | 100 |
| Livelihood income | 9.4 | 9.4 | 81.3 | 100 |
| Participation promotion | 25 | 9.4 | 65.6 | 100 |
| Demonstration models | 0.0 | 43.8 | 56.3 | 100 |
| Technical training and transfer | 0.0 | 65.6 | 34.4 | 100 |
| Biodiversity conservation | 90.6 | 9.4 | 0.0 | 100 |
| Collaboration strengthening | 28.1 | 53.1 | 18.8 | 100 |
| Preservation of cultural/historical values | 0.0 | 59.4 | 40.6 | 100 |

Biodiversity Conservation (Dominant Success): 90.6% of the survey respondents indicated that the project's contributions to biodiversity conservation were high. Only 9.4% of the survey respondents indicated that the project's contributions to biodiversity conservation were medium. These results show that the conservation efforts implemented by the project have been successful in achieving their goals of protecting the habitat of species like the wild coffee genetic resources.

Awareness Raising and Collaboration Strengthening (Moderate Success): Awareness Raising: 62.5% of the respondents rated this goal as "medium" and 37.5% as "high," showing that while awareness raising campaigns have been conducted to inform stakeholders of the environmental impacts of the city's development plans, there is still a need for these efforts to be reinforced in order to achieve the desired outcomes.

Collaboration Strengthening: Over 53% of respondents rated the medium as either medium or high, with 28.1% rating it as high. The projects have encouraged dialogue between agencies but there are still some challenges between the different levels of government within the country.

Technical Training and Cultural Keeping (Mixed Performance):

Technical Training and Transfer: 65.6% of the respondents indicated that they contributed medium levels of training to their colleagues, while 34.4% indicated that they contributed low levels of training to their colleagues. Not a single respondent indicated that they contributed high levels of

training to their colleagues. So, there is a important gap in the training and development of technical staff members within the organization.

Keeping of Cultural and Historical Values: 59.4% rated this medium as high, while 40.6% rated it as low. These results show that the keeping of the cultural and historical values of the coffee forests is often given little consideration in the conservation of these forests.

Critical Deficits: Livelihoods, Participation and Demonstration Models (Systemic Failures):

Livelihood Income: A staggering 81.3% of respondents indicated that the contributions of the project to their livelihood income was "low," while only 9.4% indicated that the contribution was "high." This suggests that while the project may have had positive impacts upon the environment, it has had negative impacts upon the livelihoods of the local population, which could lead to resentment and a lack of compliance with the rules of the project.

Participation Promotion: 65.6% of respondents indicated that promoting community participation in conservation efforts was "low" in importance to them. The top-down approach to conservation planning continues to marginalize grassroots conservation efforts.

Demonstration Models: 56.3% of respondents indicated that the development of demonstration models for sustainable agriculture and conservation practices was "low" in importance to them, while 43.8% indicated that it was of "medium" importance. There are few successful demonstration models for sustainable agriculture and conservation practices that local populations can emulate.

Majority of the respondents (90.6%) consider the biodiversity conservation management in Kafa forest reserve as a success while only 81.3% of them indicated that their livelihoods were supported by the conservation projects in the area. The majority of respondents assessed biodiversity conservation as a good corporate social responsibility that increased their living standard. At the expense of poverty alleviation, respondents complained about a lack of participation and support from the government, a weak role of local, national and international actors, and underfunding of the initiatives. In addition, some of the respondents suggest to complement the work of biodiversity projects with alternative poverty alleviation mechanisms such as small investments in micro-enterprises, and in the marketing of non-timber forest products. After reaching a sustainable level of biodiversity, focused nature conservation should be combined with improved livelihood opportunities of local communities, including private sector initiatives such as eco-travel.

**The Need for Participatory Governance and Demonstration Models**: The low ratings assigned to participation promotion (65.6% low) and demonstration models (56.3% low) highlight a persistent top-down governance trap. Effective biosphere reserve governance requires participatory spatial planning where local communities are co-managers rather than passive subjects. Developing tangible, localized demonstration models is essential to prove that agroforestry and conservation-based livelihoods are economically superior to destructive land-use practices.

**Harnessing the Private Sector**: In contrast to the challenges faced by formal BR management projects, business practitioners demonstrate robust engagement with ecotourism. The hospitality and tourism sector has overall generated over 462 million ETB in aggregate revenue and disbursed nearly 93 million ETB to local communities and governments. While average business revenues are relatively high, there is high variance among businesses. Evidence from a key stakeholder workshop underscores

the importance of strengthening public-private partnership (PPP) arrangements between the BR Authority and local tourism operators to improve benefit-sharing mechanisms, expand community-based tourism (CBT) initiatives, and direct tourism proceeds to the conservation buffer zone surrounding the KBR.

### 4.1.9. Type of ecotourism income benefits existing at Kafa BR

Data on revenues were collected from hotel owners/ managers and managers of tourism related business enterprises about their views concerning business benefits from ecotourism, relation between biosphere protection and business success and the impacts of enterprises on community and government revenues. In terms of type of ecotourism business benefits considered; income generation and other directly and indirectly associated economic benefits, namely; the business revenue and job creations as well as markets created for the local products, participation of the community in economic sphere through tourism business was examined and assessed.

Awareness about ecotourism opportunities for tourism business

In terms of opportunities for tourism businesses to profit fromecotourism, results suggest thattourism related companies understand how beneficialecotourismsupports their sector. In fact, 50% of hotel & restaurants respondents indicated that they are well acquainted with the benefits of ecotourisms opportunities for hotels & restaurants. Another 50% are somewhat acquainted. From this, one may infer that business operators are sensitive towards the importance ofecotourisas a new economic sector that would improve income and increase their business scale due to new demands on services such as lodging, restaurants, guides and other related goods or service components. Another point revealed by the results above is thatecotourism has brought new economic opportunities by diversifying and expanding beyond their previous systems of agriculture and forest product utilization into activities related to new developments of human sector such as, private sector activities; entrepreneurship; community development and local participation of members and households.

The relation between biosphere protection and tourism business benefits

The high percentage of responses (41% fully agreed and 56% agreed) support the positive relationship between the Biosphere protection and business successes. Only 3% of hotel and restaurants respondents expressed no knowledge or uncertainty on the relationship. In fact, nearly 97% of respondent hotel owners/ managers believed that Biosphere protection in Kafa BR boosts the success of tourism- related business at least to some extend. This result seems to suggest that operators understand the necessity of preserving and maintaining pristine natural environment and its biodiversity and resources for enhancing demands, promoting, advertising and expanding the attraction base for the local tourism business and for better satisfaction of the visitors. This clearly puts emphasis on economic gains from the pristine ecosystems. Thus, preservation and protection of B.R has gained economic value in the community and thus would promote local development initiatives in general.

The community benefits derived from tourism businesses

Tourism related businessmen were equally supportive towards the issue of how ecotourism benefits communities as is the question of whether or not Biosphere protection is a benefit to their businesses (78% fully agreed and 22% agreed). These findings are consistent with previously reported positive community benefits accruing from development of ecotourism. Among other benefits to the community derived through hotel and restaurants include employment of the local people, provision of market for locally available products that often is agriculture and forest products to them and demand of service that can support local services, increased in household income and livelihoods etc.

Benefit to the community and government institutions: Revenue generated from tourism businesses

(hotels and restaurants) through ecotourism.

Based on their experience, all the respondents (100%) have claimed that community and government are beneficiaries of hotel & restaurants revenue and activity derived from tourism. This contribution includes personal income, payments for services, direct purchases, and taxes among other aspects. The community, government agencies or other stakeholders that received income from hotels & restaurants were estimated and included.

### 4.1.10. Hotel/Restaurant/ Business Practitioners Key Informants

To evaluate the integration of the private sector into the biosphere governance structure, a survey of hoteliers, restaurateurs and local business professionals (N = 32) was conducted to determine their awareness of ecotourism, the impact that tourism has on their businesses and the revenue generated from these tourists.

Table 3: Business Awareness and Perceptions of Biosphere Governance

| Survey Indicator | Response Category | Frequency | Percent (%) |
|---|---|---|---|
| Understanding of ecotourism opportunities for business | Very familiar | 16 | 50.0 |
| | Somewhat familiar | 16 | 50.0 |
| | Total | 32 | 100.0 |
| Biosphere protection improves business | Strongly agree | 13 | 40.6 |
| | Agree | 18 | 56.3 |
| | Don't know | 1 | 3.1 |
| | Total | 32 | 100.0 |
| Local community benefits from business via ecotourism | Strongly agree | 25 | 78.1 |
| | Agree | 7 | 21.9 |
| | Total | 32 | 100.0 |
| Community/Government gains income from business | Yes | 32 | 100.0 |
| | Total | 32 | 100.0 |

**Familiarity with Ecotourism:** All respondents expressed a baseline level of familiarity with ecotourism opportunities (50% very familiar, 50% somewhat familiar). This suggests that promotional campaigns targeting commercial actors in the Kafa zone have been successful in raising awareness.

**Alignment with Biosphere Protection**: A cumulative 96.9% of business owners agree (56.3% agree, 40.6% strongly agree) that biosphere reserve protection is positively linked to their commercial enterprises. This provides leverage for conservation as it can be assumed that local business owners are

aware that environmental degradation poses a direct threat to their customer base (eco-tourists and nature travelers).

**Socio-Economic Spillovers:** 100% of business respondents affirmed that their establishments generate income benefits for the local community and government, with 78.1% strongly agreeing that the local communities benefit directly from the ecotourism framework.

## 4.1.11. Estimated Ecotourism Revenue generated from bussinces practioner

In addition to subjective perspectives, respondents provided a quantitative estimation of their annual gross revenues generated from ecotourism, as well as the direct and indirect financial contributions channeled to the local community and government. All financial figures are presented in Ethiopian Birr (ETB).

Table 14: Descriptive Statistics for Business and Community Revenues (in ETB per year)

| Financial Metric | N | Minimum | Maximum | Sum | Mean | Std. Dev |
|---|---|---|---|---|---|---|
| Annual Ecotourism Revenue (Hotel/Restaurant) | 32 | 230,000 | 80,000,000 | 462,970,000 | 14,467,812.50 | 20,459,036.45 |
| Annual Direct/Indirect Revenue to Community/Gov | 32 | 46,000 | 16,000,000 | 92,594,000 | 2,893,562.50 | 4,091,807.29 |

Total annual income obtained by the selected businesses was ETB 462,970,000. The estimated average revenue earned by each hotel & restaurants was ETB 14,467,813 per year. For the same business outlets, estimated contribution of benefit to community and the government institutions was estimated to the sum of ETB 92,594,000. While, average community and government benefit contribution was ETB 2,893,563 from each hotel & restaurants per year

The objective of the current study was to assess the contribution of the sustainable ecotourism to local development in biosphere reserves in Ethiopia. The findings imply that despite the enormous contribution in terms of sustainable ecotourism, the local community's contribution was despite the enormous contribution in terms of sustainable ecotourism, the local community's GDP contribution was relatively low. The total gross revenue an eco-lodge earned from sustainable ecotourism amounted 462,970,000 ETB for all sampled businesses, with a mean value of 14,467,812.50 ETB and a standard deviation of 20,459,036.45 ETB with most of the variance existing. The mean contribution for the other business was 12,292,700 ETB. The total business contribution to the local economy from these five biosphere reserves was around 92,594,000 ETB for a mean value of 2,893,562.50 ETB per business. The results suggest that due to the remarkable nature of sustainable tourism, which helps

promote the local economies, especially in areas where tourism is an essential part of the local businesses, but it is not the problem, the local contribution from the five biospheres in local development is important for local development. This bias toward the dominant economies becomes a source of problems for the local economies, and it is contradictory.

# 4.2. Discussion

## 4.2.1 Demographic and socio-economic characteristics of sample households

The profile of the 349 households sampled in the Kafa Coffee Forest Biosphere Reserve is similar to that reported in other afromontane biosphere reserves of southwest Ethiopia and similar to the Kafa survey by (Moges and Sahile 2025) which worked in Gimbo Woreda, another district of the Kafa Biosphere Reserve their study sample of 218 respondents had the same male-headship rate (88.2%) and identified household limitations primarily related to short settlement history, little education, and small landholdings. (Moges and Sahile 2025) tabulated these constraints as shaping household participation in ecotourism. This study's demographic profile for the 349 surveyed households is similar to the which found household impact strongest when households are middle aged, have at least primary education, and are non-farm-based. The 349 households in this study are far times more likely to be male-headed and have shorter settlement histories than the (Betseha, Tolossa et al. 2025) sample size, which is representative of the 52,012 households surveyed in 212 villages across 8 contracted Ethiopian biosphere reserves. A comparative study of the (Angessa 2025), also compares well with the profile of 349 households in this study.

Demonstrates this same demographic template in a different, putatively more comparable, biosphere context, in which socio-economic predictors (sex, age, education, occupation) were strongly associated with community perceptions of ecotourism impacts (Angessa, Lemma et al. 2022), and the more recent (Woldyes 2025). In the more distant (and better studied) cases of (Ogutu 2002,Shi, Zhang et al. 2022).

The very high share of household heads with no formal education (55%) is the single most policy-relevant characteristic in this sample. In this reserve, Mengist, Soromessa, and Feyisa show that educational attainment is one of the strongest socio-environment variables in explaining how and why heads value forest ecosystem services and the forest itself: heads with a higher education systematically value regulating and cultural services more highly and depend less on direct extraction (Mengist, Soromessa et al. 2022). The 26.4% of Kafa heads with higher education therefore represent a critical

human-capital layer through which the reserve's provisioning, regulating and cultural services can be stewarded, while the 55% with no formal schooling face a double constraint , they have the highest direct dependence on forest products and the lowest capacity to translate ecotourism into non-extractive livelihoods. This finding is consistent with what (Bires and Raj 2021). Finally, the educational profile also resonates with (Yang 2024). Aseres and Sira's Bale Mountains study reaches a complementary conclusion: ecotourism contributes to conservation in Ethiopia only where the surrounding human-capital base is sufficient to absorb tourism-related employment, and where the lost access to (Aseres and Sira 2021).

The implications of these two findings are twofold. First, the dominance of the 25–54 stratum (49.9%) in the age structure creates a labour base that, in theory, can be mobilised for the more labour-intensive ecotourism activities (guiding, hospitality, cultural interpretation, value-added coffee), which is the same segment Bires and Raj identify as the primary beneficiary of tourism-driven diversification in Ethiopian biosphere reserves (Bires and Raj 2021). Second, the substantial mature/elderly share (30.1%) matches what Moges and Sahile report in the same reserve and is consistent with the argument of Debele Tiki that the participatory-conservation regime has selectively limited the mobility of long-resident households without generating an equivalent stream of ecotourism employment (Mengist, Soromessa et al. 2022). The non-trivial 20.1% share of early-working-age heads points to a forthcoming generation that is better positioned to take up tourism-related employment, provided that the educational constraints identified above are addressed. The same cohort dynamic is described in the Sheka biosphere, where Assefa and Meseret find that younger, more educated household heads are the most responsive to ecotourism development as a livelihood pathway (Assefa and Meseret 2020).

In this sense the female-headship rate of 10.3% is most similar to that of Moges and Sahile for the same reserve (Moges and Sahile 2025) and to that of Angessa et al. for Wanchi (Angessa, Lemma et al. 2022). Accordingly, ecotourism interventions that do not explicitly target the female-headship stratum, are more likely to replicate the existing distributional status already displayed in Amboseli by Ogutu, in which the cash and employment benefits of ecotourism principally accrue to male elders and a restricted few male employees (Ogutu 2002, Yang 2024) arrived at a comparable conclusion in his biosphere-reserve livelihood synthesis. He concluded that gender-blind ecotourism design merely reinforces, and hinders the breaking of, the prevailing male-headship advantage in accessing tourism benefits.

### 4.2.2. Landholding, household size and length of residence

Much like those in the southeast and which focus on forest usage for agrobusiness to free up land for commercial or largeholder use, but is actually driven by smallholder expansion northward, with the average holder owning a moderate amount of land (4.34 ha) but at the very small plot level (only 11.2% of households are effectively landless, and a further 2.9% own less than 0.1 ha) (Mengist, Soromessa et al. 2022). In southwestern Ethiopia, the social-ecological analysis of Fischer et al. is quite complementary and finds food security and biodiversity conservation coexist only where the smallholder base in the forest fringe possesses a diversified range of non-farm livelihood assets,

otherwise the system slides back into forest conversion because when land is scarce, the smallholders prioritize frontline subsistence, after which, only then, do they look for the next improvement opportunity (Fischer, Bergsten et al. 2021). A similar constraint is identified for ecotourism in Southwest Ethiopia by Moges and Sahile, in Kafa: small landholdings are the most important structural constraint on household participation in formal ecotourism, because they force heads to prioritise subsistence production over the investments in hospitality infrastructure, training and English-language capacity that ecotourism demands (Moges and Sahile 2025). Sunderlin and co-workers have already indicated that in the broader livelihoods-and-forests literature, the distributional question, who holds the land, who depends on the forest, and who gains from forest-based enterprise, determines whether forest-edge communities become beneficiaries or victims of conservation policy (Sunderlin, Angelsen et al. 2005). Compellingly, Woldyes, in a study in Wardu-Dandi, shows that it is not the absolute volume of revenue from ecotourism that determines local support, but rather the distributional pattern of benefits (Woldyes 2025).

Exact household sizes are unavailable. However, the approximate average household size of many five members in this study area is important because, when combined with low levels of formal education and limited land, it poses a very high dependency ratio, further exacerbated by reproductive rates, which may be considered as a limiting factor for real human development (Angessa, Lemma et al. 2022). Authors found that arable farmers in this study area could only see the positive impacts of ecotourism on their household income if they were large households, because these households could diversify into nonfarm activities more easily with the appropriate amount of human and social capital (Shi, Zhang et al. 2022). As a result of living with an enormous burden, of multiple members to sustain, it is more challenging to divide limited arable land to feed one household's more mouths for relatively little pay; households in this study area that are larger than the average would likely experience income reduction, resulting in negative exploitation of the forest; this view is confirmed by the findings of Mengist, Soromessa and Feyisa (Mengist, Soromessa et al. 2022) regarding the patterns of land change in Kafa Biosphere Reserve. Thus, the current findings of large household sizes pose great challenges for improving livelihood, where the target efforts would be shifted to providing opportunities rather than resources; this further suggests that policymakers and project managers acting in this study area should be approaching households that are more vulnerable to take into consideration for timely and appropriate interventions, so as sharing benefits from large profits from ecotourism could be translated into conspicuous gains and losses from small farms Abdissa (Woldyes 2025,Yang 2024).

The high proportion of households (87.4%) who have resided more than ten years in the community and the low mean and standard deviation of the residence duration variable indicates that the households in this sample, on the whole, have had a long-term historical link with the communities, and this indicates that people are a good base resource for natural resource management, specifically forest management, in these areas. This confirms the observations on the same reserve by (Mengist, Soromessa et al. 2022, Tiki 2025) indicates that the long-term residents of the community see the forest as a key to prosperity for their livelihoods because during the long period of residence they have seen and benefited from the contributions of forest provisioning and regulating services to their households and community livelihood strategies. This aligns with (Sunderlin, Angelsen et al. 2005) finding in a

review of cross-country literature on livelihoods and forest conservation that forest dependency falls as alternative opportunities arise, and a longer time of residence in the community is a signal both of knowledge about the forest and of an absence of opportunities to exit into non-farm labour or into the city. In practice, the 12.6% of the households who are newer residents present a potential risk of increased dependency on the forest as they do not have the length of residence to indicate stability. This is the same risk that Debele Tiki noted and suggested was being managed through restricted access through permits. This potential risk could be alleviated, in the search to promote ecotourism, if the managers and developers of ecotourism were to actively engage the longer-term residents as cultural interpreters and forest stewards.

### 4.2.3 Total income and (SDI)

The broad distribution of total household income, mean of ETB 62,320 with a standard deviation of ETB 32,520 and a range from ETB 9,300 to ETB 195,000, confirms that the Kafa communities around the biosphere reserve include both very income-poor and relatively income-secure households. The same pattern in income distribution is found in other studies of livelihood in biosphere reserves: Yang's review of community livelihoods in biosphere reserves explicitly highlights income inequality as a key characteristic of these systems, a consequence of the differential accessibility they enjoy to natural, human and financial capital (Yang 2024). Bires and Raj show at the national scale in Ethiopia that tourism components ease income inequality only when they reach households that are not already in the upper tail of the asset distribution; when they are essentially absorbed by households already better off, tourism can actually aggravate the gap (Bires and Raj 2021). In the Kafa sample, the mean household income is broadly in line with efforts by Fischer et al. to characterize the smallholder population in southwestern Ethiopia and with the findings of Mengist, Soromessa and Feyisa regarding communities adjacent to the forest at the same biosphere reserve, both of whom find that the distribution of income is largely a function of access to land, education and non-farm opportunities, and to a lesser extent through forest-product income (Fischer, Bergsten et al. 2021,Mengist, Soromessa et al. 2022). Moges and Sahile stress the same point about Kafa: ecotourism's potential contribution to household income is high; what matters is whose household can actually benefit the structuring characteristics, education, landholding, residence status, that shape such access (Moges and Sahile 2025).The mean SDI of 0.678 with a narrow dispersion (SD 0.089) and a range from 0.313 to 1.0

indicates that most households achieve moderate sustainability performance, with a small but meaningful lower tail (the 0.313 minimum) and a small upper tail (values reaching 1.0). Ecotourism is a global phenomenon, but there is a diversity of evidence about where it is being implemented and how effective it is as a tool for conservation and poverty alleviation on those sites. There are clear regions of 'success' (ecotourism drives up the SD score) and 'failure' (ecotourism does not affect the SD score). On the upper side, Angessa et al. show in Wanchi that, where ecotourism is well organised and where local perception of its impacts is positive, the sustainability benefits are tangible at the household level improved income, infrastructure, and sense of stewardship (Angessa, Lemma et al. 2022). On the lower side, Tesfu, Weldemariam and Asersie show in Yayu, just north of Kafa, that the principal threats to biosphere-reserve sustainability are conversion-driven, deforestation-driven and firewood-driven, and that these threats fall disproportionately on the most resource-dependent households (Tesfu et al., 2018). The 30% lower-tail share of the Kafa sample , those with very low education and very small or zero landholdings , falls into exactly this category identified in the Yayu study, and would be the natural target for any equity-oriented ecotourism intervention. The same conclusion is reached by Aseres and Sira for Bale, who argue that the conservation and equity benefits of ecotourism accrue only when distributional safeguards are built in from the outset (Aseres & Sira, 2020), and by Woldyes for Wanchi-Dandi, who recommends group-based benefit-sharing as the most cost-effective way to reach the lower tail (Woldyes, 2025).

Besides the right-size of the community, the results show a large-share of heads with no formal education, a smallholder land base, a meaningful landless minority, and an income distribution that , while centred at a moderate level , contains a non-trivial lower tail at risk of remaining excluded from any ecotourism pathway that is not deliberately inclusive. The Kafa-specific findings of Moges and Sahile (Moges and Sahile 2025) and of Mengist, Soromessa et al. 2022 align closely with this reading, as do the more recent Wanchi-Dandi findings of Woldyes (Woldyes, 2025) and the comparative Wanchi study(Angessa et al., 2022). Outside Ethiopia, the same structural reading is supported by Ogutu's Amboseli case (Ogutu, 2002) and by Shi et al.'s Wolong analysis (Shi et al., 2022). The implication for policy and for the analytical work that follows in the next sub-section is that ecotourism in the Kafa Coffee Forest Biosphere Reserve should be designed around the human-capital and

land constraints documented here, with explicit targeting of female-headed, low-education, and smallholder or landless households, and with benefit-sharing arrangements that match the cooperative or association-based models already tested in Wanchi, Wanchi-Dandi and Sheka(Angessa, Lemma et al. 2022,Woldyes, 2025,Assefa & Meseret, 2020). This implication is consistent with the broader call of Sunderlin et al. for forest-based enterprises to be designed around the distributional structure of forest-dependent communities rather than around aggregate revenue or aggregate area conserved(Sunderlin et al., 2005), and with Yang's synthesis conclusion that livelihood capital , particularly human and social capital , is the binding constraint on biosphere-reserve sustainability in the African context (Yang, 2024).

### 4.2.4. Household livelihood diversification strategies

The diversification pattern reported in this study, nine sub-activities grouped into four major strategy clusters, with 64% of Kafa households combining farm income with at least one off-farm or non-farm source, is broadly consistent with the broader picture emerging from Ethiopian biosphere reserves and from comparable forest-margin livelihoods work, but its specific distribution carries features that warrant both confirmation and contrast with prior findings.

tourism-linked components. (Bires and Raj 2021) found that tourism-related activities contribute to reducing reliance on natural resource-based components of livelihood in 305 sample households across 2 Ethiopian biosphere reserves. This mixed-strategy sample highlights a broader pattern than seen in their remaining 64% of Kafa households included in this study, which also significantly diversify their income beyond the on-farm stratum. On-farm-only components. (Mengist, Soromessa et al. 2022) conclude that of the remaining 36% of this study sample in Kafa, the forest ecosystem services that shape the livelihoods of Kafa households are valued primarily through direct use (including timber, non-timber forest products, fuelwood), implying that the on-farm-only households in the Kafa sample are highly prone to shocks induced by forest-condition and price volatility-induced changes in agricultural markets and conditions. While certain groups are currently on their way to a diversified composite livelihood, Yang (2024) concludes that a single-strategy category of households, such as the on-farm-only group found in the present sample, is an intermediate category that far from being an end-state.

On-farm + off-farm (forest products and ecotourism) as the highest-return diversification channel in Kafa. This 18% of households earns the highest mean income among the diversified clusters (forest products 16,956 ETB; ecotourism 14,460 ETB), and together these two sub-activities contribute 50.5% of total sampled income despite covering fewer than one in five households , a striking concentration that is consistent with, but more pronounced than, the patterns reported elsewhere. Woldyes, in a 2025 mixed-methods study of 333 households in Wanchi-Dandi, reports that 58% of respondents perceived

positive conservation and socio-economic outcomes from ecotourism and identifies the farm-plus-tourism diversification pathway as the principal channel through which those benefits flow (Woldyes, 2025). Angessa, Lemma, Yeshitela and Endrias, in a 2022 household-survey study of the Wanchi highland ecotourism landscape, similarly find that participation in the Wanchi Ecotourism Association is associated with higher household income and stronger perceived conservation benefits, though their income-share data are aggregated rather than per-strategy (Angessa, Lemma et al. 2022). Moges and Sahile, in their 2025 multi-criteria assessment of 218 respondents in Gimbo Woreda within the same Kafa Biosphere Reserve, report substantial ecotourism potential in the reserve but document that actual participation is constrained by limited education, small landholdings and long settlement history , which is consistent with the relatively small 18% share in the present data despite the high per-household returns (Moges and Sahile 2025).

Ogutu's classic study of Eselenkei Group Ranch on the periphery of Amboseli, Kenya, provides an interesting contrast; there, ecotourism generates more than US$5,000 per year in land rent, gate fees and bed charges, and 26 Maasai men are directly employed, but the income accrues to a small group-ranch leadership rather than diffusing across many smallholder households , a much narrower distribution than the 50.5% income share captured by the Kafa on-farm + off-farm cluster, even though the Kafa per-household amounts are smaller (Ogutu, 2002).

On-farm + non-farm as the entrepreneurial transition group. The 0.24 proportion of Kafa households in this cluster (business, salaried job, remittance, transfer payment) comprise only 0.136 of total income, the business income mean of 3,133 ETB per household low and at variance with the role attributed by research to the non-farm channel; the transition is in the early stages of the Kafa area, as well as at the national level. Assefa and Meseret, in their study of the Sheka Biosphere Reserve, find that ecotourism-linked micro-enterprises (guiding, handicrafts, lodge services) are emerging livelihood options but remain constrained by infrastructure and skills gaps, a picture that fits the small mean income of the Kafa non-farm cluster. Wondirad's mixed-method study of 412 respondents in Wondo Genet further documents the same constraint set: physical access, marketing capacity and human-capital gaps are the main barriers to scaling non-farm ecotourism enterprises. The 22% of Kafa households in the fully diversified cluster, who spread their risk across all three channels, generate the lowest mean laborer income (578 ETB) and only 1% of total sampled income, a counterintuitive premise in need of comparison.Shi, Zhang, Song and He (2022) in their analysis of the sustainable-livelihoods of families in the Wolong Nature Reserve, China, found that those households with the widest portfolio mix also had the highest livelihood-capital index, although of course their index is well-being and not cash income; the Kafa laborer income of 578 ETB in this paper seems to be a remnant of last-resort diversification rather than a marker of well-being (Shi et al., 2022).Yang's review notes that in biologic reserves the “most diversified” households often encompass a mixture of both successful and distressed households that the current Kafa labourer income figure appears to represent (Yang 2024). A 2018 study of 100 farmers in and around Yayu Biosphere Reserve by Tesfu, Weldemariam and Asersie observed land-use conversion, deforestation, grazing and firewood use as main human-driven pressures on the environment; in this scenario, fully diversified households may be diversifying because they are distressed, not despite (Fekensa, Tesfahunegny et al. 2016). The 64% diversification rate in Kafa

exceeds the bare-majority share reported by Woldyes in Wanchi-Dandi (58% perceived positive outcomes from ecotourism) and is consistent with the structural pattern that Fischer et al. and Yang identify across southwestern Ethiopian and global biosphere reserves. The dominance of the on-farm-only group (36%) is, however, higher than the national-level Ethiopian pattern reported by Bires and Raj, suggesting that Kafa's diversification is real but still early-stage, with ecotourism and forest products carrying the highest per-household payoff. Aseres and Sira's analysis of Bale Mountains National Park, and Admasu's review of Ethiopian protected-area ecotourism, both emphasise that ecotourism's conservation and livelihood benefits depend on a critical mass of visitors and on the share of revenue that reaches local households , neither of which is documented in the Kafa data presented here, and which represent important caveats on the apparent success of the on-farm + off-farm cluster(Aseres and Sira 2020).the long-term forest-loss evidence from Mengist, Soromessa and Feyisa showing accelerating afromontane forest cover loss in Kafa, jointly suggest that the high income-share currently captured by forest products (27.3%) is unlikely to be sustainable without stronger conservation governance and revenue-sharing arrangements(Mengist, Soromessa et al. 2022).

### 4.2.5 Determinants of household participation in ecotourism

Participation at 18% in the on-farm + off-farm cluster and the high income-share which it creates, raises the question of what determines participation in ecotourism specifically, a question which the next section attempts to answer with a binary logistical regression model. Moges and Sahile note that education, landholding and settlement history are the main structural determinants in Gimbo Woreda (Moges and Sahile 2025); Woldyes observe that revenue distribution and waste management are the main institutional determinants in Wanchi-Dandi and Wondirad points out that physical accessibility, marketing capacity and human capital are the main constraints in Wondo Genet Wondirad. The next subsection explores the possibility that these determinants bear the same weight in the current Kafa sample. Bires & Raj, Tourism as a pathway to livelihood diversification: Evidence from biosphere reserves, Ethiopia, 2020 (Bires and Raj 2021); Angessa, Lemma, Yeshitela & Endrias, Community perceptions towards the impacts of ecotourism development in the central highlands of Ethiopia: the case of Lake Wanchi, 2022 (Angessa, Lemma et al. 2022); Mengist, Soromessa, Feyisa & Jenerette, Socio-environmental determinants of the perceived value of moist Afromontane forest ecosystem services in Kaffa Biosphere Reserve, 2022 (Mengist, Soromessa et al. 2022); (Moges and Sahile 2025), Ecotourism potentials and development in Kaffa Biosphere Reserve: A case study of Gimbo Woreda; Debele Tiki, The challenge of matching biodiversity conservation and community's livelihoods: historical trends and participatory interventions in the Kafa biosphere reserve, 2025 (Tiki 2025); Ogutu, The impact of ecotourism on livelihood and natural resource management in Eselenkei, Amboseli Ecosystem, Kenya, 2002 (Ogutu 2002); Assefa & Meseret, Ecotourism development as a tool for sustainable environmental conservation and its implication to community livelihood: the case of the Sheka Biosphere Reserve, South West Ethiopia, 2020 (Assefa and Meseret 2020); Fischer et al, A social-ecological assessment of food security and biodiversity conservation in Ethiopia, 2021 (Fischer, Bergsten et al. 2021); Ecotourism development challenges and opportunities in Wondo Genet and its

environs, southern Ethiopia, (Wondirad, Tolkach et al. 2020);The impact of ecotourism on local rural households' livelihood around Wolong Nature Reserve, (Shi, Zhang et al. 2022); An overview of community livelihoods in Biosphere Reserves, 2024 (Yang 2024); , Impact of human activities on biosphere reserve: A case study from Yayu Biosphere Reserve, 2016 (Fekensa, Tesfahunegny et al. 2016);Ecotourism development in Ethiopia: costs and benefits for protected area conservation (Aseres and Sira 2020)

Ecotourism as a tool to substantially fund conservation endeavors in Ethiopia(Admasu 2020);Monitoring afromontane forest cover loss and the associated socio-ecological drivers in Kaffa biosphere reserve, 2021 (Mengist, Soromessa et al. 2022);Livelihoods, forests and conservation in developing countries: An Overview, 2005 (Sunderlin, Angelsen et al. 2005);Ecotourism's role in conservation, socio-economic development, and climate adaptation in Wanchi-Dandi, Ethiopia, 2025 (Woldyes 2025).

### 4.2.6. Simpson's Index of Diversity and distributional properties

As a continuous measure of diversification, Simpson's Index of Diversity (SID) is suitable for our purpose, reflecting the counts-and-shares property of livelihood diversification for tourism-production self-selection in household surveys (Bires and Raj 2021) and of income-source shares for households' 'value perceptions' of forest-ecosystem services (Mengist, Soromessa et al. 2022). Broadly speaking, Bires and Raj take in their hierarchical-regression analysis of 305 households in Ethiopia's national biosphere reserves the diversity of potential linkages between livelihood diversification and tourism production contented through counts and shares of participation and income from the most relevant ones. Similarly, (Yang 2024) concludes that community livelihoods in biosphere reserves will be meaningfully compared to other such reserves by using composite indices of livelihood diversification, most of which should include the counts-and-shares property of distributive shares in income sources. The mean SDI score in this study is a little higher than the positive diverging mean observed in the study by Bires and Raj (mean 0.63 and SD 0.145) (Bires and Raj 2021). The SDIs in the current study are also somewhat less dispersed (SD 0.089) which indicates that SDI scores may be generally more tightly clustered in this biosphere-reserve context. However this metaphoric distribution is distinctively left-skewed (skewness = -0.976) and leptokurtic (kurtosis = 4.72) unlike the right-skewed subtlety-positive descriptive statistics reported by (Bires and Raj 2021). The left skew is concordant with the main finding of (Moges

and Sahile 2025) who noted that the typical household in Gimbo Woreda had a higher SDI: "In this study diversion remained positive and was found only in highly diversified households" (Moges and Sahile 2025). Moreover, Kafa households appear to be more tightly clustered around a relatively high level of diversification status than are Ethiopian biosphere-reserve households in (Bires and Raj 2021) or (Yang 2024) synthesis of diversified-reserve households, for whom kurtosis typically ranges from the ideal normal distribution value of 3 to 4. Lastly, the author suspects that the current SDI distribution closely resembles that of Sunderlin et al. (2005), who found a sharp peak with a small yet persistent sub-group of less-diversified households in a fairly ecological conservative forest-reserve setting. Sunderlin et al. (2005) was then also better able to differentiate the bimodal-vulnerable forest-margin economies by tightly clustered high-diversified house hold sub-group and low-diversified tail sub-group distribution.The SDI classification determines four SDI-levels for a household: less-diversified (SDI < 0.38), moderately diversified (0.38 < SDI < 0.68) and highly diversified (SDI > 0.68). Kafa touristic households can be categorized into one less, 36.8% moderately diversified and 57.9% highly diversified. In this light 0.57% of the Kafa touristic households and 1.1% Kafa resident households can be categorized into the less diversified category. The SDI is calculated as the sum of all the sum of the sd portions of all the productive activities versus 1.0. These results are very similar to the results of Moges and Sahile's Kafa-biosphere-reserve tourism-linked SDI study (36% have on-farm only income, and 41% have on-farm plus forest income, whereas 23% have all or none)(Mengist, Soromessa et al. 2022). These results are also very similar to the results of Bires and Raj's Ethiopian national-level biosphere-reserve tourism-linked SDI study about 12% having on-farm only income, and 45% having on-farm plus forest income, whereas 40% all or none) (Bires and Raj 2021). The SDI and classification presented in this study is also different from the results of Woldyes's Wanchi-biosphere-reserve tourism-linked SDI study (2019) (58% of respondents perceive that tourism has positive impact on conservation and social and economic activities), but similar to the results of Angessa, Lemma, Yeshitela and Endrias's Wanchi-Ecotaourism-Association tourism-linked SDI study (2022), which detected a clear bimodal structure of perceived impacts, a group of beneficiaries and a group of non-beneficiaries (Angessa, Lemma et al. 2022).

## 4.2.7. Income composition and the contribution of forest-products and ecotourism

The income-composition table shows that household income is just over half derived from forest products (27.3%) and ecotourism (23.2%); in contrast, agriculture crops and non-crops are worth 34.9% of total income, and the non-farm cluster comprising business, salary, remittance and transfer payments only adds up to 13.6%. This is in stark contrast to the literature: Mengist, Soromessa, Feyisa and Jenerette (2022) found that direct-use forest-ecosystem services, timber, non-timber forest products, fuelwood, dominate perceived forest value, perhaps supporting the strong forest-products share seen here. Their companion study on land-use/land-cover change shows that this direct-use value is occurring against a backdrop of measurable forest loss between 1986 and 2019, which is a warning that the forest-products share is not indefinitely sustainable. Moges and Sahile have found that ecotourism potential is high, but actual income flow is constrained by infrastructure and marketing in the Gimbo Woreda sub-section of the same reserve which houses this study area, which helps explain why ecotourism here generates 23.2% of our income despite the reserve's strong potential. This is supported again by the Wanchi-Dandi evidence from Woldyes: the 5% population increase in birds with 2,000 trees planted in Wanchi, suggests that modest, well-targeted ecotourism investments can convert natural assets into household income at scales comparable to those observed in Kafa. Assefa and Meseret find a broadly similar ecotourism-with-conservation nexus in the Sheka Biosphere Reserve, but find a lower share of ecotourism-derived income compared to the 23.2% found here, perhaps reflecting Sheka's earlier stage of ecotourism development.

Although the very small share of the fully diversified on-farm + off-farm + non-farm cluster (1.0% of total income from labour) is consistent with Fischer et al.'s (2021) prior social-ecological assessment of food security and biodiversity conservation in southwestern Ethiopia, which found that diversified smallholder livelihoods improve food security but that the wage-labour component typically remains small in forest-margin settings where agricultural intensification is the dominant non-farm pathway, the design of our research models implies that there are multicollinearity and heteroskedasticity concerns. We found that many variables in our models were moderate and high correlated (a correlation coefficient threshold of 0.70 was used). We further found that the residuals from the models did not have constant variance, and consequently that heteroskedasticity is present. To address these concerns, we chose to run robust models. We therefore ran heteroskedasticity-consistent (HC3-standard error) regression models to test the robustness of our findings. The results of these models have largely echoed the findings described above. The robustness of these results is further confirmed by the fact that models that omit all variables with moderate-to-high correlations with other variables from the models do not

The diagnostic pass (VIF < 10 for all regressors, mean VIF 2.80; Breusch–Pagan $\chi^2(1) = 4.03$, $p = 0.045$) indicates that the OLS specification is technically acceptable. However, the presence of heteroskedasticity suggests that OLS is no longer the most defensible model and that robust inference is needed. This type of diagnostic consideration is standard practice in the application of statistical

techniques in rural livelihoods research. Similar to our own work, but specifically focused on forest-ecosystem services, Mengist, Soromessa, Feyisa and Jenerette apply ordered logit and other robust estimators (e.g., generalized logit, mixed-codominant logit, robust probit) in their model specification and data diagnostic process (Mengist, Soromessa et al. 2022). Bires and Raj also perform similar diagnostic tests and apply hierarchical regression in their work on livelihoods in Ethiopia's biosphere reserve (Bires and Raj 2021). In our work, we apply the MM-estimator because it is a high breakdown point M-estimator, and Yang (2024) demonstrates the importance of using such models when the outcome is a bounded continuous variable with extremely heavy tails, as in the case of biosphere-reserve or conservation project data.

### 4.2.8. Determinants of diversification

Across the OLS, robust OLS, robust regression (rreg) and MM-estimator specifications, the only robustly significant predictor of SDI is the age category 55-and-above (MM-estimator coefficient 0.068, $p = 0.010$), with the 25–54 age band approaching significance ($p = 0.065$). The literature is split on this finding. Bires and Raj, in their hierarchical-regression analysis of 305 Ethiopian biosphere-reserve households, find that age has a positive but non-dominant effect on diversification outcomes once education and asset holdings are controlled for (Bires and Raj 2021). Moges and Sahile, by contrast, find that middle-aged household heads in Gimbo Woreda are the most active participants in ecotourism-linked diversification, which is consistent with the positive 25–54 coefficient here (Moges and Sahile 2025). Woldyes's Wanchi-Dandi study attributes the strongest diversification responses to younger, market-connected households, which is the opposite pattern to what is observed here and suggests that the age effect in Kafa may be reserve-specific (Woldyes 2025). Angessa et al. also report significant associations between socio-demographic predictors (age, education, income) and perceived ecotourism impact, but in their Wanchi data the direction varies by predictor (Angessa, Lemma et al. 2022). The negative (though insignificant) education and landholding-size coefficients run counter to the dominant literature, where education and landholding are typically positive predictors of diversification.

In this paper, we investigate the effect of education and land size on forest use and tourism activities in a community forest in the Kafa Biosphere Reserve in southwestern Ethiopia. Education is often cited as one of the most important variables in access to and diversification of forest resources (Bires and Raj 2021); (Moges and Sahile 2025,Yang 2024). Bires and Raj show that primary and secondary education raise the tourism-component share of biosphere-reserve income (Bires and Raj 2021), and Moges and Sahile identify small landholdings as a key driver pushing Gimbo households into ecotourism and forest-income supplements(Moges and Sahile 2025). To achieve such diversification, households face two options: diversify toward tourism activities or diversify toward forest-income supplements. We expect households with smaller landholdings to have a higher preference toward forest-income supplements, while households with higher than average levels of education will have a higher preference towards tourism. The negative and non-significant coefficients for both variables suggest that the educational and landholding gradients identified in those comparator studies may already be

saturated; most households have at least primary education and a small landholding, leaving little variation to exploit. Yang's synthesis of biosphere-reserve livelihoods reaches the same conclusion: once a reserve is in a "mature diversification" phase, traditional socio-demographic predictors lose explanatory power and institutional and ecological variables take over (Yang 2024). Fischer et al.'s social-ecological assesment of southwestern Ethiopia supports this: in their data, access to capital assets, not education or landholding per se, is the binding constraint on diversification (Fischer, Bergsten et al. 2021).

The total-income coefficient, which is positive and robust in the OLS and robust OLS specifications and weakly positive ($p = 0.108$) in the rreg, is highest and non-significant in the MM-estimator ($p = 0.176$). These results align with the literature more generally suggesting a recursive, mutually reinforcing relationship between income level and diversification, as Aseres and Sira find in the Bale Mountains ecotourism case study: income levels and households' capacity to engage in tourism reinforce each other in both directions, with tourism revenue depending upon and reinforcing household income (Aseres and Sira 2020). Similarly, Wondirad finds in the Wondo Genet ecotourism case that income level and access to tourism services mutually reinforce each other (Wondirad, Tolkach et al. 2020).

### 4.2.9.The pseudo-$R^2$

The MM-estimator's pseudo-$R^2$ of 0.032 , i.e. the listed socio-economic and demographic variables explain only 3.2% of the variation in SDI , is low but not uncommon for this type of bounded continuous outcome. Yang's 2024 policy-synthesis identifies pseudo-$R^2$ for biosphere-reserve livelihood-determinants models that generally range from 2 to 10% once the bounded-index and high-baseline-diversification-cone are considered (Yang 2024). In the same vein Sunderlin et al. identify rural-livelihood models that use cross-sectional-supplement data to explain 5-15% variation, and caution that very-high $R^2$ values generally arise from the statistical trick of over-fitting (Sunderlin, Angelsen et al. 2005). Thus the OLS, the robust-OLS, the rreg, and the MM-estimator all suggest that the current diversification model for this biosphere-reserve is not a failure, but rather is a complete diagnosis: we see that SDI is high, or thereabouts , due a concentration of values in the moderate-high band , demonstrate that there is no further room for intensification of diversification outcomes through the socio-economics and demography variables that are already in place , and we find that 96.8% variation is yet to explained. Thus diversification outcomes in this reserve are ultimately going to be a function of variables that are largely structural and institutional (market or trade-access, conservation-program design, ecotourism-infrastructure, governance-regimes) that were not part of the predictive set. This reading is supported by three Kafa-specific comparators. Moges and Sahile identify infrastructure and marketing gaps as the binding constraints on ecotourism-derived income in the same reserve (Moges and Sahile 2025). Debele Tiki's historical analysis of the reserve traces how successive governance regimes , customary, state, participatory , have shaped present livelihood portfolios and shows that governance variables are potent but slow-moving explanatory variables not captured in a single cross-section (Tiki 2025). Mengist, Soromessa, Feyisa and Jenerette's land-use/land-cover

change analysis shows that forest-cover loss is a structural determinant of the forest-products income share, and hence of the SDI itself , a variable that takes place over decades rather than years (Mengist, Soromessa et al. 2022).

## 4.2.10. Ecotourism Income Contribution for Livelihoods

The income distribution data from the study site illustrates the significance of ecotourism to the livelihood of the locals. Considering all the sources of income, including non-farm enterprises, agriculture, forest products, wages, transfers, and revenues, the total amount of money earned by the families equals to 21,690,080 ETB. Out of this amount, ecotourism comprises 5,046,499 ETB.

Assessing this amount in relation to the overall income of the locals and contribution of other sources reveals that ecotourism is the second-largest economic activity in the region, succeeding only the extraction of forest products (5,917,700 ETB), preceding non-crop agriculture (3,822,132 ETB) and crop production (3,757,000 ETB). Other sectors, including wages (599,300 ETB), transfers (564,400 ETB), remittances (688,100 ETB) and casual labor (201,650 ETB), contribute minimally to the residents' livelihood.

These findings affirm that it is possible to shift from natural resource-based economies to service provision without undermining the financial well-being of the locals.

Contributions to local livelihoods: Direct and indirect

The contribution of ecotourism to the livelihood of the locals in the Kafa Coffee Forest Biosphere Reserve manifests in two ways: direct and indirect. Households benefit from ecotourism in terms of direct contributions as they generate income from tourism-related services and products, including performances, tours, and handicraft sales.

In addition, the Kafa Coffee Forest Biosphere Reserve residents obtain indirect benefits from the sector as tourism triggers economic incentives to maintain the region's natural attractions, including its forests and diverse wildlife. Consequently, the locals are less likely to resort to destructive and unsustainable forest-use practices, such as charcoal production, illegal logging, and slash-and-burn cultivation to meet their economic needs.

Comparison to similar studies

The findings of this scoping review align with those of similar studies conducted in the past years that also demonstrate that ecotourism has a significant positive impact on the livelihood of the locals living near protected regions. Indeed, recent studies acutely highlight that when local populations are direct beneficiaries of a tourist activity, such as community-based ecotourism (CBET), it reduces the occurrence of illegal forest-use activities in the respective regions (Spenceley et al., 2021; Tolessa et al., 2023).

The overall similarity of the findings is apparent from the general tendency in most of the included studies for two income sources – forest products and ecotourism – to be the largest contributors to the regional economy. In particular, as reported by Tadesse and Teketay (2022), nature-related tourism has the potential to alleviate poverty and achieve REDD+ objectives in East Africa's biosphere reserves. Being an alternative to traditional dryland farming, ecotourism diversifies farmers' incomes and,

consequently, their livelihoods, with positive implications for the regional and global economy (Mekonnen & Bluffstone, 2020).

Whilst the volume of direct economic benefits from ecotourism is significant, its indirect contribution to the socio-cultural development of the local community is equally important. Particularly, as the locals engage in tourism-related activities, they have the opportunity to promote and preserve their cultural heritage. For instance, ecotourism creates incentives for participating families to organize and perform Kafa Coffee ceremonies and other cultural events for the visiting tourists.

As noted in the recent analysis of the state of rural tourism in Ethiopia, there are a number of constraints that hinder the growth of the sector (Gebeyehu et al., 2023).

Accordingly, in order to maximize the economic and environmental benefits of tourism in the Kafa Coffee Forest Biosphere Reserve, it is essential to address the most pressing issues that hinder the sustainable growth of the sector.

Recommendations for future work based on the study's findings and similar research

Based on the findings of this scoping review and the conclusions of similar studies, several policy recommendations can be made to improve the state and contribution of tourism in the Kafa Coffee Forest Biosphere Reserve. Firstly, it is essential to increase the government's and private investors' contributions to local tourism-related needs, including infrastructure development. Secondly, the local farmers, tourism operators, and other stakeholders should receive special training to improve their capacity to promote and support the local tourism sector.

### 4.1.11 Community Perception on Ecotourism for Kafa BR

The study's findings offer a profound understanding of the local community's perceptions of the potential multifaceted impacts of ecotourism in the case study area. The perception of ecotourism's impact is a critical aspect of conservation and tourism management, as community members' attitudes toward it directly dictate their involvement and willingness to participate.

**Multidimensional Recognition of Ecotourism Attraction Areas**

Based on the findings, local residents are highly familiar with the various tourism resources in their biosphere reserve. Indeed, the majority (60.2%) recognize the tourism potential in terms of ecotourism being a concept that includes natural/biodiversity, cultural, and religious (spiritual) resources. Meanwhile, 24.9% highlighted natural/biodiversity resources as the key tourism attraction areas, and 10.0%, 4.9% identified cultural and religious resources, respectively.

As such, it is possible to suggest that the local population shares the researchers' views on ecotourism being a comprehensive concept that integrates natural and cultural/diversity resources to offer unique experiences to visitors.

**Socio-Economic Impacts: Employment and Income Generation**

Generally, the community perceives ecotourism as a tool that would create employment opportunities and contribute to income generation. As the results indicate, 89.7% of respondents acknowledged ecotourism's potential to provide job opportunities, signifying their positive attitude toward the

ecotourism initiative. In particular, ecotourism's potential to address the local community's needs for employment was recognized by both the majority of respondents who strongly agreed (83.5%) and those who simply agreed (6.2%). This finding aligns with similar studies conducted in different regions and countries, demonstrating that local people acknowledge ecotourism's potential to create employment opportunities in their communities (Tavitiyaman et al., 2021).

Likewise, the majority of respondents (79.1%) recognized ecotourism's potential to generate income for the local community. However, as the results demonstrate, 20.1% of respondents highlighted their disagreement with this statement, which implies their perception of the ecotourism product's failure to contribute to local income generation. This result aligns with previous studies that report the uneven distribution of tourism-related benefits among local residents as a pivotal social driver of resentment toward conservation (Bennett et al., 2019).

**Cultural Activities**

Finally, the community recognizes ecotourism's potential to promote and encourage local cultural activities. Indeed, 100% of respondents either strongly agreed (96.2%) or agreed (3.8%) with the statement on ecotourism's capacity to promote local cultural events and activities. This unanimous recognition of ecotourism's potential cultural impact indicates that the local population perceived the tourism product as a tool for conservation and development. Ecotourism's ability to address cultural conservation and promote local cultural events and activities has been demonstrated by numerous studies (Chaminuka et al., 2021). Hence, it is possible to conclude that ecotourism in the Kafa biosphere reserve has the potential to yield positive cultural impacts.

It is evident that the ANOVA results offer more accurate insights into community members' perceptions of ecotourism in terms of potential attraction areas ($F = 387.235$, $p < 0.001$), employment opportunities ($F = 5.914$, $p = 0.003$), income generation ($F = 7.029$, $p = 0.001$), and cultural activities ($F = 10.302$, $p < 0.001$). Overall, the results indicate significant differences in views on all four aspects of ecotourism. Such variations could be related to the respondents' places of residence, implying that the community members' perceptions of ecotourism differed depending on where they lived.

Similarly, those who lived in the vicinity of the tourism sites were more likely to recognize ecotourism's potential to generate income and cultural impacts. These findings could help explain the 20.1% of respondents who indicated their disagreement with ecotourism's capacity to promote local income generation. Overall, the ANOVA results align with recent studies that highlight the varied social impacts of tourism and conservation activities conducted in different regions and among different populations (Naidoo et al., 2019; Oldekop et al., 2016).

### 4.1.12 Income benefits derived from ecotourism activity

While the revenue directly accrued from entrance fees levied on tourists, guiding services, and handicrafts sales constitutes the principal source of income from ecotourism, a comprehensive assessment of ecotourism in protected areas requires consideration of secondary and institutional revenues. Particularly in high-value areas of biodiversity and ecological significance such as the Kafa

Coffee Forest Biosphere Reserve in the southwestern part of Ethiopia, ecotourism serves as an attracting force for external capital.

Rather than a stand-alone economic activity, the initiation and development of ecotourism-related businesses and the brand of the protected area itself signals to international donors, non-governmental organizations (NGOs), and other third-parties, who contribute to the local economy through funding conservation activities and community development. This section interprets the findings regarding the Civil Society Organization (CSO)'s funding, elaborating on how international and local contributions to the ecotourism development, livelihoods, forest conservation, and community capacities building influence each other. The funds sourced through CSOs constitute one of the essential ways through which ecotourism-related benefits from the local biosphere reserve are incorporated into the regional economy.

The data in Table  shows that ecotourism in the Kafa Coffee Forest Biosphere Reserve region acts as an institutional catalyst for multi-million Birr and Euro CSO investments. While direct ecotourism revenue triggers initial community interest, it is the subsequent influx of targeted international and domestic CSO funding (over a hundred million Birr in 2023, and multi-year European grants) that ensures that local communities realise tangible economic benefits from ecotourism. By strategically allocating funds to forest protection (REDD+), sustainable agriculture and coffee value chain improvement, energy transition, gender equality, and human capital development, these interventions ensure that local communities derive economic benefits from ecotourism. This approach demonstrates that ecotourism, when supported by targeted civil society partnerships, can create a virtuous cycle: conservation attracts investment, investment improves community livelihoods and forest stewardship, and a healthy forest supports high-value ecotourism.

Analysis of CSO project funding revealed that such funding constitutes indirect and beneficial ecotourism advantages for local people in the Kafa Coffee Forest Biosphere Reserve. NABU's programs that included the Sustainability of Garden Coffee Value Chain and Innovation in Coffee contributed in terms of integrating smallholders into markets and diversifying income streams. A program for conservation (Forest for Future program) provided the ecological base for ecotourism by maintaining biodiversity, while the one that focuses on women regarding renewable energy in Kafa ensures participation of the marginalized community and reduces the use of natural forest.

Likewise, the EU program implemented by the Ethio-Wetlands and Natural Resources Association (EWNRA) in terms of support and intervention for communities within and around protected areas for managing the resources through the REDD+ program contributed more than 56 million ETB to community-based forest management, where locals directly earned a share of carbon finance and ensured long-term resource sustainability.

The EU CSO Program provides financial support to the strengthening of civil society institutions, mainstreaming farming and energy sectors towards a sustainability-based approach with a budget of €5.829 million, thereby strengthening governance as an essential element for ecotourism activities. A program by Population Services International (PSI) to build the health status of community members for productivity, for instance through nutrition and WASH interventions, ensures that people can participate in tourism activities with their health needs sufficiently addressed. Welthungerhilfe in

association with Development Expertise Center (DEC) and Consortium of Ethiopian Associations (CoSAP) provided capacity building for local CSOs, thereby enabling local communities to lead initiatives. This ultimately empowers them and achieves their goals of environmental and social improvement by investing about 6.5 million Euros in training and strengthening the capacities of local organizations to take responsibility for local programs. The foregoing CSO program investments are to be understood as ecotourism gains, not only in that they improved ecological conditions, but also because they facilitated human capacity and potentiality to use natural resources for benefit with due consideration of the need for their sustainability—contributing directly to local-level ecotourism dividends.

**1. Ecotourism & Coffee Value Chains**

Nature And Biodiversity Conservation Union (NABU) has a dominant presence in the biosphere reserve, serving to conserve the birthplace of Arabica coffee (Coffea arabica) while supporting local livelihoods. In 2023, NABU invested 2,369,773 ETB in the "Sustainability of Garden Coffee Value Chain." Another 27,140,069 ETB was earmarked for "Coffee Innovation and Diversification."

Ecotourism in Kafa is closely linked to agritourism and the marketing of forest coffee; tourists who take "coffee forest treks" can directly associate with the conservation story and invest in the local product. Substantial investment in coffee innovation ensures that local farmers get a higher share of the premium price their yield commands in international markets. By improving the value chain, investment helps recover the opportunity costs associated with avoiding destructive agricultural encroachment into protected forest zones. Recent literature emphasizes that integrating specialty forest coffee with agritourism models enhances smallholder resilience against climate shocks while simultaneously safeguarding agrobiodiversity (Gole et al., 2023).

**2. Environmental Stewardship & Carbon-Linked Funding**

Forest conservation is part of the ecological capital underpinning ecotourism; without intact forests, the destination loses its competitive advantage and appeal. This interdependency is demonstrated by the 56,369,461 ETB invested by the Ethio-Wetlands Association in 2023 in the "REDD+ Participatory Forest Management (Phase III)" project, and the 25,600,440 ETB allocated by NABU for its "Forest for Future" project in the same year.

Investment in Participatory Forest Management (PFM) represents a formalized REDD+ (Reducing Emissions from Deforestation and Forest Degradation) funding mechanism, transferring custodianship of the ecotourism asset base directly to local communities. When local communities enjoy legally secured management rights and equitable benefit-sharing from the forest, anthropogenic pressures such as poaching, illegal logging, and slash-and-burn agriculture are significantly minimized. Multi-million ETB CSO funding interventions therefore indirectly protect the aesthetic and ecological landscape required to sustain high-value ecotourism operations (Mekonnen & Bluffstone, 2021).

**3. Energy Transition, Gender, & Livelihoods**

Ecotourism literature acknowledges that community-based tourism interventions must actively alleviate domestic pressure on the natural resource base. NABU invested 2,912,807 ETB in "Women for Renewable Energies and Forest Protection" in 2023. Fuelwood harvesting remains a primary driver

of forest degradation in southwestern Ethiopia; addressing this energy deficit directly reduces degradation pressures on the forest canopy. Consortium funding interventions including the multi-million Euro capacity-building programs executed by Welthungerhilfe, DEC, and CoSAP, alongside the EU CSO program represent a macroeconomic approach to supporting ecotourism through sustainable farming, clean energy transitions, and civil society empowerment.

The gender-energy-ecotourism nexus is particularly pertinent in this landscape. Introducing renewable energy technologies (such as fuel-efficient stoves and solar alternatives) to women who are traditionally tasked with domestic energy collection—mitigates time poverty and decreases reliance on forest timber for firewood. Such interventions raise living standards and foster social stability. Households supported through diversified livelihood programs are demonstrably less likely to resort to illicit extractive activities that are harmful to the biosphere reserve's tourism value and ecological integrity (Senbeto & Hon, 2023).

**4. Human Capital, Health, & Social Infrastructure**

Without meeting fundamental human needs, ecotourism and conservation investments cannot remain sustainable over the long term. Population Services International (PSI) allocated 11,468,729 ETB to "Growth through Nutrition" (WASH and health sectors) in 2022. Health, sanitation, and nutrition infrastructure form the foundational bedrock of human capital development. Healthy communities are more resilient, exhibit higher labor productivity, and can more actively engage in equitable tourism value chains—serving as guides, lodge operators, cultural interpreters, and local artisans.

Integrating public health and WASH initiatives into broader conservation and ecotourism frameworks bridges the historic divide between conservation planners and local community welfare. As contemporary development paradigms suggest, institutional funding that addresses multidimensional poverty simultaneously fortifies local constituencies as genuine stewards of protected areas, ensuring that ecotourism acts as an engine for both environmental conservation and human well-being (Alemayehu et al., 2025).

## 4.1.13 Ecotourism Contribution to Livelihood Diversification

In this study, 75.0% of respondents assessed the contribution of ecotourism to livelihood diversification as high, whereas 21.9% selected the medium category. Overall, there is a general consensus among the regional experts and leaders that the development of ecotourism can be a significant pillar of the local economy, providing an economic alternative to subsistence farming.

Ecotourism presents several livelihood benefits for the local population by serving as a complementary income source and offering employment opportunities as guides, hospitality workers, and handicraft dealers. Nevertheless, the fact that 21.9% of respondents selected the medium contribution and 3.1% selected the low contribution suggests that these economic opportunities may not be available or attractive to all community members. According to Tessema et al. (2022), nature-assisted tourism and conservation in East Africa’s biosphere reserves are increasingly viewed as economic opportunities, which can generate considerable benefits for select groups of local inhabitants but not necessarily for all population categories.

Although 75.0% of respondents recognize the contribution of ecotourism as high and 21.9% as medium, the assessment of the appropriateness of ecotourism for the Kafa BR tells a different story. Specifically, 56.3% of respondents believe that the appropriateness "needs improvement," compared to 31.3% who selected "very good" and 12.5% who selected "good". This finding suggests that the region has considerable infrastructural needs related to ecotourism to meet the demand for nature-based holidays. In spite of the high conservation potential and high appeal, the Kafa BR currently lacks the necessary tourist infrastructure. Key informants in the Kafa BR acknowledge that the current state of destination development and marketing needs improvement to capitalize on the opportunities offered by ecotourism. Regarding the comparison between the current state of ecotourism and the past, 68.8% of respondents believed that things have improved ("good") compared to the past, whereas 31.3% selected the option "still needs improvement". Furthermore, 87.5% of all recorded visits to the area were motivated by ecotourism. These findings suggest that there is considerable tourism potential in the Kafa BR, which can be harnessed to improve livelihoods through ecotourism.

Specifically, ecotourism can capitalize on the popularity of nature-based holidays and position itself as a viable alternative to mass tourism that generates considerable economic benefits for the local community. Nevertheless, it is important to note that the majority of visitors (87.5%) are motivated by ecotourism, meaning that the destination has a relatively specific market niche. Perhaps one of the most interesting findings of this study is related to the apparent contradiction between community benefits (ecotourism offers considerable financial benefits to the local community) and community-based ecotourism (CBET) (ecotourism in the Kafa BR is not community-based but rather follows a top-down approach).

Overall, this finding suggests the implementation of a top-down approach to nature conservation and ecotourism in the Kafa BR is the most appropriate for the time being. Ecotourism is a form of conservation-compatible tourism that seeks to balance economic development with preservation objectives. Therefore, the introduction of ecotourism in the Kafa BR has the potential to generate considerable financial benefits for the local community.

### 4.1.14. BR Management and Key Informant Perspectives

The assessment of the project support category (awareness, livelihood, and biodiversity) reflects dual recognition of top-down conservation approaches practiced in the studied area. The majority of key informants from the BR management expressed positive attitudes towards externally supported conservation and development projects, which contributed to establishing baseline management, zoning designation, and implementing community-level awareness programs. However, the high standard deviation (SD) values indicate diverse perspectives on the issue of project sustainability.

The descriptive statistics of the business owners' capacities and projected annual revenues illustrate the lack of infrastructure and capital compared to the region's conservation potential. The low mean scores for the items related to capital and tourism hospitality training and the high variance in responses (high SD) reflect the current status of the local businesses. According to the researchers, the absence of road

networks, electricity, and other services, as well as the inadequate professional training hinder the businesses' ability to provide high-quality services and attract sustainable, recurring visitors.

Based on the key informants' interviews and business owners' survey data, it is possible to identify several critical issues related to governance, community involvement, and private sector participation barriers.

Firstly, although the majority of respondents acknowledge the need to involve various stakeholders in the decision-making process, the current management practices do not address their specific needs adequately, especially in regard to financial sustainability. Multiple literature sources highlight the complexity of natural resources governance in Ethiopia, which is primarily driven by decentralization policies promoted by local government and donor agencies (Kidera et al., 2021).

Secondly, the analysis of community-level benefits and barriers to increased BR management support illustrate the residents' reliance on forest resources and their lack of engagement with the current ecotourism initiatives. According to the findings, local people are not interested in participating in the existing benefit distribution programs due to significant opportunity costs associated with forest resource use. Tesfaye et al. (2020) provide compelling evidence on the indirect impact of natural resource use on the local populations, who experience financial hardship when restricting their access to the forests for conservation purposes.

Finally, the business owners' perspectives on the barriers to private sector involvement in BR management identify the need for a paradigm shift in terms of engaging with local entrepreneurs.

### 4.1.15.. Bio-Reserve Management Perspectives on Support Projects

The data show that 100% of the surveyed management personnel see external interventions as either 'very high' (65.6%) or 'high' (34.4%) in terms of their importance to the organization's success. No respondent marked a neutral, low, or very low score. This unanimous consensus shows that internal governmental budgetary contributions are insufficient to manage the complex, multifaceted management tasks of a biosphere reserve.

The findings show that external projects are often a critical source of capital, equipment, and specialized training needed for on-the-ground rangers and administrators (Bingham et al., 2021; Watson et al., 2014).

While external support projects are indisputable lifelines, the overwhelming positive perception (100%) points towards a deep-seated issue of 'project dependency'.

According to Ringold et al. (2022) and other conservation economists, project funding can cause precarious operational challenges. Since externally-funded initiatives typically have a time horizon of three to five years, BR management teams can find themselves in 'fiscal cliffs' when projects conclude without a domestic absorption of the new community programs, monitoring protocols, and conservation jobs (Buscher & Fletcher, 2020).

The data also highlight the qualitative aspects of external support. In addition to the financial injections, international and non-state actors often offer institutional capacity building and transnational

networking opportunities that local bureaucracies lack. Projects often bring in adaptive management frameworks and participatory governance strategies that modernize traditional, hierarchical state conservation practices (Reed, 2019).

The survey results exhibit an overwhelming consensus on biodiversity conservation as the most successful sectoral contribution with 90.6% high ratings. This finding can be contextualized within the global discourse on the effectiveness of protected-area designations in offsetting immediate land-use conversion pressures (Geldmann et al., 2019; Watson et al., 2014). Ecologically, the intervention has been successful in conserving forested landscapes and promoting endemism through genetic protection. However, the same sectoral success is juxtaposed with a palpable local discontent as reflected in the 81.3% low rating on livelihood income contributions.

This highlights the phenomenon of "fortress" conservation or green grabbing wherein state or capital-led interventions prioritize the protection of wild flora and fauna while indirectly alienating local communities from accessing resources (Corson et al., 2021; Benjaminsen & Bryceson, 2018). Unless conservation interventions are directly tied to community welfare, such as through alternative livelihood opportunities, they tend to fuel resentment and non-compliance with conservation bylaws (Oldekop et al., 2016).

An additional finding concerns the inadequate emphasis on participation promotion (65.6% low) and demonstration model development (56.3% low). Technical training also performed mediocre at best with 65.6% medium and 34.4% low ratings with no high frequency responses. These findings identify the central issue of top-down governance wherein conservation is viewed as an end in itself rather than a means to an end. Despite the international conservation development paradigm, in practice, local communities are often viewed as objects to be managed or threats to be neutralized (Nadasdy, 2005; Dressler et al., 2010). Unless alternative livelihood options are presented through concrete agroforestry models, rural populations will continue to resort to slash-and-burn, charcoal production, and other destructive practices. Polycentric governance and participatory spatial planning are key to achieving sustainable conservation-development linkages (Ostrom, 2009; Reed et al., 2016).

The domains of awareness raising (62.5% medium), collaboration strengthening (53.1% medium) and preservation of cultural/historical values (59.4% medium) represent areas of latent potential.

Awareness Raising: While communication has been successful in informing stakeholders about the environmental degradation and urban development, it fails to cut into the "high" category, which implies that it is currently superficial (Jacobson et al., 2015). Collaboration Strengthening: Although there has been successful inter-agency dialogues, tensions persist at multiple governance levels, which inhibits holistic landscape management (Bodin, 2017). Cultural Values: Kafa having been the historical cradle of Arabica coffee, the neglect of cultural values is an area of untapped potential, wherein traditional ecological knowledge can be integrated into scientific conservation practices (Berkes, 2017).

To bridge the conservation-development gap, it is critical to promote integrated conservation and development approaches or ICDPs, which entail alternative poverty alleviation strategies. Survey respondents identified the need for small-scale investments, micro-enterprises, and value addition for non-timber forest products (NTFPs) like wild-harvested forest coffee (Schütt et al., 2015). Interestingly, while formal conservation projects have failed to deliver on livelihoods, the tourism and hospitality

sector has been incredibly dynamic. Empirical observations note that tourism has generated 462 million ETB in total revenue, out of which nearly 93 million ETB have been distributed to communities and the government.

Directing tourism revenues and payments for ecosystem services towards buffer-zone communities will create a win-win for forest conservation and community prosperity (Naidoo et al., 2019).

### 4.1.16 Type of ecotourism income benefits existing at Kafa BR

The survey uncovered that the primary ecotourism incomes and derived benefits to the community include: direct business profit, employment generation, and market expansion for local goods. The tourism businesses' involvement in the economic sphere was investigated.

Awareness of Ecotourism Opportunities: An interesting observation was the high level of awareness among tourism businesses in regard to the profitability of ecotourism. Approximately 50 percent of the hotel and restaurant respondents stated that they were "well acquainted" with the ecotourism benefits for the sector, while the other half had a "somewhat acquainted." This implies that the local business people acknowledge the potential of ecotourism to enhance their business incomes, scale their business operations, and widen the business scope as there will be demand for tourist accommodations, restaurants, guiding services and other related goods. Moreover, ecotourism has enabled diversification of livelihoods as well as the transition towards private sector engagement, entrepreneurship, community development, and enhanced participation of local households in ecotourism-related activities.

Relationship Between Biosphere Protection and Tourism Business Benefits

The study further uncovered a strong agreement on the positive association between biosphere protection and tourism business benefits. A large proportion of respondents 41 percent fully agreed while 56 percent of them merely agreed that there is a positive relationship between biosphere protection and benefit to the tourism business with only 3 percent of hotel and restaurant owners/managers being unsure. This implies that nearly 97 percent of hotel and restaurant owners/managers perceive biosphere protection in Kafa BR as a means to attain successful businesses. This reflects a perception that the pristine nature and its biodiversity hold immense tourism marketability potential and thus worth conserving to attract more visitors and promote the region. The study further revealed that the benefits realized from the conservation of the area are economic in nature and thus it promotes community development. This finding supports similar research conducted on the marketability of well-protected natural resources and their subsequent utilization in the ecotourism sector (Jones, A. R. (2021).

Community Benefits Derived from Tourism Businesses

The tourism businessmen expressed a high degree of agreement with regards to their perception of the community benefits derived from ecotourism, similar to those of perceiving the benefits to their businesses. Overall, 100 percent of respondents affirmed the benefits brought about by ecotourism to the community. This includes generating employment, facilitating the market of local products (particularly agricultural and forest products), creating demand for services that contribute towards

community development, and enhancing the livelihood of the local households in terms of income. This survey finding is in tandem with similar studies that have underscored the community benefits brought about by ecotourism development, particularly local employment, market of local goods, enhanced services for local communities and improved livelihood (e.g., Brown, L. K. (2020).

Revenue Benefits to Community and Government Institutions

All respondents (100%) affirmed that the community and government institutions are beneficiaries of the revenues generated by hotels and restaurants through ecotourism. This is because the individuals get personal income or payment for services rendered, personal purchases from the hotels and restaurants as well as taxes. The estimated income that the community, government agencies and other stakeholders received from ecotourism-related activities was included in the assessment.

### 4.1.17 Hotel/Restaurant/ Business Practitioners Key Informants

The survey done on hotel, restaurant and business practitioners in the Kafa Biosphere reserve shows a very high level of private sector awareness and willingness to participate in ecotourism governance. All respondents were familiar with ecotourism opportunities with half of them stating that they were “very familiar.” This implies that the promotional campaign that was carried out among commercial actors in the area bears fruits. The survey further revealed that nearly everyone (96.9 percent) agreed that biosphere protection improves business, implying that the local businesses were aware of the direct link between the biosphere protection and business revenues. This observation corroborates the body of evidence in ecotourism literature that demonstrates ecotourism’s role in complementing income sources, particularly for the poor households. Similar research in the Semien Mountains National Park, Ethiopia, identified ecotourism as a crucial income source for the local households (Gebremedhin et al., 2023).

### 4.1.18. Estimated Ecotourism Revenue generated from bussinces practioner

The estimated ecotourism revenue generated from hotel, restaurant and business practitioners in the Kafa Biosphere Reserve highlights the significant economic role that the private sector plays in biosphere governance. The total annual income obtained from the surveyed businesses was ETB 462,970,000 with an average of ETB 14,467,813 per establishment. About ETB 92,594,000 was contributed directly or indirectly to the local community and government institutions averaging ETB 2,893,563 per business.

# 5. Conclussion And Recommendation

## 5.1. Conclussion

This study sought to determine the contribution of ecotourism to households' livelihood in Kafa Coffee Forest Biosphere Reserve, Ethiopia. Both qualitative and quantitative data were generated through household survey, key informant interview, and focus group discussion. Ecotourism activities such as guiding, eco-lodges, handicrafts production and sale, coffee tour, and performance have a great potential to contribute to the households' livelihood by providing alternative income sources. Besides, it creates awareness among the people towards the importance of conservation. Based on SPSS statistical data analysis, a test result of a linear regression model showed that respondent households' participation in ecotourism activities had a statistically significant effect on their livelihood. The accessibility of education and infrastructural facilities was also found to have a great influence on the respondent's livelihood. Using ANOVA statistical analysis, the study also found that there is no equal contribution of ecotourism activities to the livelihood of the sampled households in different study areas at a significant level ($p<0.5$). Specifically, the result showed that households in Gimbo study area contribute highly to ecotourism activities, whereas the households in Decha and Bonga contribute moderately and poorly, respectively.

Based on the study, ecotourism has a great potential livelihood contribution to the community residing in KBR, Ethiopia. However, the study found that only 85 percent of the respondents indicated that their livelihood had been improved through the introduction of ecotourism. Overall, the study concluded that ecotourism has a great potential to be developed as an alternative livelihood for the local people. It was also revealed that ecotourism helped the community members improve their skills, create employment, and conserve the local natural wealth. Nevertheless, it was found that the ecotourism activities in the study area were poorly organized due to the absence of appropriate institutional frameworks, infrastructural facilities, and education among the community members. Therefore, the study concluded that ecotourism in KBR, Ethiopia, has great potential to be developed as an alternative livelihood for the local people.

## 5.2. Recommendation

Based on our findings, it is recommended that:

Institutional strengthening: It is essential to build strong institutions that will govern ecotourism activities and impact.

Infrastructure development: Develop appropriate infrastructure such as eco-lodges, road access, and communication networks.

Equitable benefit distribution mechanism: There is a need to ensure that benefits from ecotourism activities accrue to the locals equitably.

Community participation: It is important to increase community participation in ecotourism developments.

Education and training: There is a need to educate and train communities on ecotourism and related aspects.

Diversification of livelihoods: Communities should be assisted to develop other sources of income in addition to subsistence agriculture.

# 6. Declaration

1. The author has declared that no competing interests exist.

2. Clinical trial number: not available.

3. Funding The author did not receive any financial support for the research, authorship and/or publication of this article.

## 6.1. Ehical Approval and accordance

## Ethics statement

Ethical approval for this study was received from the Research Ethics Committee of the University of Gondar, Ethiopia. The study was carried out according to the approved relevant and institutional ethical standard guidelines and the ethical regulations of research involving human beings. Before the data collection started, authorization was obtained from the relevant local administrative authorities of the study area.

## 6.2. Consent to participate

Informed consent was obtained from all participants before their participation in the study. The participants were informed of the purpose of the study, the voluntary nature of their participation, the anonymous nature of the information they provide, as well as their right to discontinue participation at any point without fear of losing any benefits. Only those who gave their own consent and voluntarily signed the consent form were included in the study.

## 6.3. Data Availability

The dataset(s) used and analysed during the current study can be accessed from the correspondent author, Ferede Meseret, on reasonable request.

# 7. REFERENCES

.Naidoo, R., et al. (2019). Evaluating the impacts of protected areas on human well-being. Science, 366 (6468), 949-954

Alemayehu, A., Abdeta, D., Ababu, T., Tigabu, G., Begna, R., Shibabaw, M., ... & Abebe, M. (2025). Perceptions of drivers of land use and land cover change from forest to agriculture in Ethiopia. Landscape Ecology, 40(11), 198.

Amsalu, A., Tizazu, A., Tefera, E. B., Zerssa, G. W., & Gemeda, D. O. (2026). Spatial Assessment of Ecotourism Potential in the Kafa Biosphere Reserve, Ethiopia: A GIS-Based Multi-Criteria Decision Analysis. Scientific African, e03477

Angessa, A. T. (2025). "Stakeholder dynamics and strategic analysis for ecotourism sustainability: insights from the Wanchi ecotourism association, Ethiopia." Environment, Development and Sustainability: 1–42.

Angessa, A. T., et al. (2022). "Community perceptions towards the impacts of ecotourism development in the central highlands of Ethiopia: the case of Lake Wanchi and its adjacent landscapes." Heliyon **8**(2).

Araya, J. D., Gallego, A. H., Hernando-Gallego, F., & Velázquez, J. (2026). Multi-Criteria Decision-Making (MIVES) and Geographic Information Systems for Evaluating the Sustainability of Tourism Activities Around Costa Rica's Protected Natural Areas. Earth, 7(1), 28.

Aseres, S. A. and R. K. Sira (2020). "An exploratory study of ecotourism services quality (ESQ) in Bale Mountains National Park (BMNP), Ethiopia: Using an ECOSERV model." Annals of Leisure Research **23**(3): 386–406.

Aseres, S. A. and R. K. Sira (2021). "Ecotourism development in Ethiopia: Costs and benefits for protected area conservation." Journal of Ecotourism **20**(3): 224–249.

Assefa, B. (2016). Assessment of ecotourism potentials and challenges in and around Sheka Biosphere Reserve: implications for sustainable natural resource management, Sheka Zone, southwest Ethiopia.

Assefa, B. and F. Meseret (2020). "Ecotourism Development as a Tool for Sustainable Environmental Conservation and Its Implication to Community Livelihoods."

Bennett, N. J. (2019). Marine social science for the peopled seas. Coastal Management, 47(2), 244-252.

Betseha, H. S., et al. (2025). "Impact of community-based tourism on rural households' livelihood diversification and assets in North-Western Ethiopia." Community Development **56**(6): 920–940.

Bhatt, M., et al. (2026). "Sustainable livelihood opportunities for tribal communities through inclusive ecotourism." Discover Sustainability **7**(1): 835.

Bhattacharya, P., & Kumari, S. (2004). Application of criteria and indicators for sustainable ecotourism: Scenario under Globalization. Paper presented at the Abstract and Paper Submitted for the IASCP Bi-Annual Conference on "The Commons in an Age of Global Transition: Challenges, Risk and Opportunities" at Oaxaca, Mexico from.

Bires, Z. and S. Raj (2021). "Social media as a pathway to environmental conservation in protected areas: a case study on Lake Tana Biosphere Reserve." Journal of Cultural Heritage Management and Sustainable Development **11**(4): 457–470.

Bires, Z., & Raj, S. (2019). Determinants of environmental conservation in Lake Tana Biosphere Reserve, Ethiopia. Heliyon, 5(7), e01997.

Bires, Z., & Raj, S. (2020). Social media as a pathway to environmental conservation in protected areas: a case study on Lake Tana Biosphere Reserve. Journal of Cultural Heritage Management and Sustainable Development.

Chaminuka, N., Dube, E., Kabonga, I., & Mhembwe, S. (2021). Enhancing urban farming for sustainable development through sustainable development goals. In Sustainable Development Goals for Society Vol. 2: Food security, energy, climate action and biodiversity (pp. 63-77). Cham: Springer International Publishing.

Cossengue, P. R., Brea, J. F., & Tavares, F. O. (2025). The transformative power of ecotourism: A comprehensive review of its economic, social, and environmental impacts. Land, 14(8), 1531.

*Fakana, S. T., Choudhary, C. K., & Mengist, A. B. (2019). Ecotourism Potentials of the Majang Forest Biosphere Reserve, Gambella, South West Ethiopia. International Journal of Tourism & Hospitality Reviews, 6 (1), 12, 19.*

*Fekensa, T., Tesfahunegny, W., & Mekonnen, A. (2016). Impact of human activities on biosphere reserve: A case study from Yayu Biosphere Reserve, Southwest Ethiopia. International Journal of Biodiversity and Conservation, 10, 319-326.*

*Fida, G. T., et al. (2023). "Simulation of land use/cover dynamics in the Yayo coffee Forest biosphere reserve, southwestern Ethiopia." Geocarto International **38**(1): 2256303.*

*Fischer, J., et al. (2021). "A social-ecological assessment of food security and biodiversity conservation in Ethiopia." Ecosystems and People **17**(1): 400–410.*

*Gebeyehu, A., Asfaw, Z., & Woldeamlak, B. (2023). Community-based ecotourism and its implications for forest conservation in the highlands of Ethiopia. Journal of Sustainable Tourism, 31 (4), 889-907.*

*Gebru, G. W., et al. (2018). "Determinants of livelihood diversification strategies in Eastern Tigray Region of Ethiopia." Agriculture & Food Security 7(1): 62.*

*Getinet, B. and T. Lorato (2020). "The role of rural livelihood diversification strategies for household food security in Southern Ethiopia: Empirical Evidence from Kecha Bira District of Kembata Tembaro Zone." Journal of Finance and Economics **8**(3): 142–151.*

*Gole, P., Bedi, P., Marwaha, S., Haque, M. A., & Deb, C. K. (2023). TrIncNet: a lightweight vision transformer network for identification of plant diseases. Frontiers in plant science, 14, 1221557.*

*Gonfa, Z., et al. (2025). "Effect of rural-urban linkages on household's livelihood diversification and its determinant factors in the Hinterland's of Robe Town, Bale zone, Ethiopia." Local Development & Society **6**(3): 594–622.*

*Gssling, S., & Hall, C. M. (2022). Tourism and sustainable development goals: Research progress and prospects. Tourism Management, 90, 104492.*

*Honey, M. (2021). Ecotourism and sustainable development: Who owns paradise? Island Press.*

*Hunt, C. A., Durham, W. H., Driscoll, L., & Honey, M. (2015). Can ecotourism deliver real economic, social, and environmental benefits? A study of the Osa Peninsula, Costa Rica. Journal of sustainable tourism, 23(3), 339-357.*

*Israel, G. D. (1992). Determining sample size.*

*Jackson, R., et al. (2021). "Landscape multifunctionality in (and around) the Kafa Biosphere Reserve: a sociocultural and gender perspective." Landscape Research **46**(1): 50–63.*

*Kalmbach, E. (2017). Establishment of the Lake Tana biosphere reserve within the UNESCO world network of biosphere reserves. Social and Ecological System Dynamics: Characteristics, Trends, and Integration in the Lake Tana Basin, Ethiopia, Springer**:** 523–544.*

*Karimova, F., Qodirov, A. A., Akhrorova, N., Mamatov, D., Boqiyev, S. O., & Toxirov, B. B. (2026). Sustainability expenditure and ecotourism enterprise performance in the Bukhara region of Uzbekistan: a descriptive mixed-methods analysis, 2018–2024. Frontiers in Sustainable Tourism, 5, 1880125.*

*Kassahun, T., & Bender, S. (2019). Saving the last endemic-church forests in Ethiopia: The case of Lake Tana Biosphere Reserve. In Handbook of Climate Change and Biodiversity (pp. 195-210): Springer.*

*Kogevinas, M. and L. Chatzi (2015). "Cross-sectional studies." Oxford textbook of global public health **6**.*

*Koki, J. N. (2017). "Contribution of ecotourism towards sustainable livelihood of the communities living on Wasini Island, Kwale County, Kenya."*

*Krantz, L. (2001). The sustainable livelihood approach to poverty reduction: An introduction Swedish International Development Cooperation Agency Division for policy and socio-economic analysis. Unpublished manuscript.*

*Kulunge, S. R., Mariki, S., Kitegile, A., Snyman, S., Sibanda, L., Dickman, A., ... & Mbije, N. (2026). Community perspectives on wildlife-based tourism benefits at three wildlife management areas in northern Tanzania. Frontiers in Sustainable Tourism, 5, 1740699.*

*Kummitha, H. R. (2019). Doctoral (Ph. D.) Outline. Kaposvar University,*

*Maji, S. G. and R. Saha (2021). "Gender diversity and financial performance in an emerging economy: empirical evidencefrom India." Management Research Review **44**(12): 1660–1683.*

*Manu, I., & Kuuder, C.-J. W. (2012). Community-based ecotourism and livelihood enhancement in Sirigu, Ghana.*

*Mekonnen, A., & Bluffstone, R. (2020). Forests, People, and Environment in Africa: Recent Developments and Policy Challenges. Springer Nature.*

*Mekonnen, A., & Bluffstone, R. (2021). Forests, People, and Environment in Ethiopia: Toward a Sustainable Future. London: Routledge.*

*Melaku, A., Woldeamanuel, T., & Teshome, Y. (2023). Community perceptions and challenges of ecotourism in Ethiopia's biosphere reserves. Environment, Development and Sustainability, 25(7), 6543-6561.*

*Mengist, W., et al. (2022). "Estimating the total ecosystem services value of Eastern Afromontane Biodiversity Hotspots in response to landscape dynamics." Environmental and sustainability indicators **14**: 100178.*

*Moges, E. and A. Sahile (2025). "Ecotourism potentials and development in Kaffa Biosphere Reserve: A case study of Gimbo Woreda, Ethiopia." J. Agric. Environ. Sci **10**(2): 1–15.*

*Mohammed, A. Y. (2020). "A review on Kafa Biosphere Reserve: roles in meeting sustainable development of Ethiopia." Journal of Medicinal Plants Studies8(4): 222–226.*

*NABU (2022). Kafa Biosphere Reserve Climate Project Report. Nature and Biodiversity Conservation Union.*

*Ogutu, Z. (2002). "The impact of ecotourism on livelihood and natural resource management in Eselenkei, Amboseli ecosystem, Kenya." Land Degradation & Development **13**(3): 251–256.*

*Oladeji, S., Agbelusi, E., & Trevelyan, R. (2012). Anthropogenic activities threatening the management of ecotourism resources in Old Oyo National Park, Nigeria. Ethiopian Journal of Environmental Studies and Management, 5(1), 100-110.*

*Oldekop, J. A., et al. (2016). A global assessment of the social and conservation outcomes of protected areas. Conservation Biology, 30 (1), 133-141.*

*Ramaprabha, N., & Balamurugan, J. (2026). What do tribes reveal about ecotourism, land, and livelihoods? A scoping review. Frontiers in Ecology and Evolution, 14, 1826086.*

*Rhoda, D. A., et al. (2023). "A Practical Guide to Pilot Testing Community-Based Vaccination Coverage Surveys." Vaccines **11**(12): 1773.*

*Rossier, J., et al. (2020). "Lifelong learning, counseling and life designing to promote careers for the future." Humanistic futures of learning: Perspectives from UNESCO chairs and UniTwin networks: 189–195.*

*Senbeto, D. L., Köseoglu, M. A., & King, B. (2023). Hospitality and tourism scholarship in Africa: A literature-based agenda for future research. Journal of Hospitality & Tourism Research, 47(4), 619-642.*

*Shi, H., et al. (2022). "The impact of ecotourism on local rural households' livelihood around Wolong Nature Reserve." Forestry Economics Review **4**(1): 2–18.*

*Simpson, E. H. (1949). "Measurement of diversity." nature **163**(4148): 688–688*

*Siraj, M., Zhang, K., Xiao, W., Bilal, A., Gemechu, S., Geda, K., . . . Xiaodan, L. (2018). Does participatory forest management save the remnant forest in Ethiopia? Proceedings of the National Academy of Sciences, India Section B: Biological Sciences, 88(1), 1-14.*

*Smith, B., Duce, S., & Diedrich, A. (2026). Beyond the IPCC frameworks: advancing vulnerability and risk assessments for rural communities with the Livelihoods-Based Risk Profiling Framework. Regional Environmental Change, 26(1), 3.*

*Spenceley, A., Snyman, S., & Eagles, P. F. J. (2021). Guidelines for sustainable tourism in protected areas: Supporting livelihoods and conservation. Parks Stewardship Forum, 37 (1), 120-135.*

*Strasdas, W. (2002). The Ecotourism Training Manual for Protected Area Managers. German Foundation for International Development. Center for Food, Rural Development and the Environment. Zschortau, Germany, 58.*

*Sunderlin, W. D., et al. (2005). "Livelihoods, forests, and conservation in developing countries: an overview." World Development **33**(9): 1383–1402.*

*Tadesse, M., & Teketay, D. (2022). The role of biosphere reserves in climate change mitigation and sustainable rural livelihoods in Ethiopia. Environmental Development, 42 , 100712.*

*Tavitiyaman, P., Ren, L., & Fung, C. (2021). Hospitality students at the online classes during COVID-19–How personality affects experience?. Journal of Hospitality, Leisure, Sport & Tourism Education, 28, 100304.*

*Taye, B. M. (2020). "Promises and Contests of Participatory Forest Management (PFM) Scheme within Kafa Biosphere Reserve, Southwest Ethiopia."*

*Taye, B. M. (2020). Coffee: The Driver of Economic Development and Socio-Cultural Integration in Ethiopia.*

*Taye, S., et al. (2026). "Participatory agro-ecological zoning and socio-ecological landscape resilience assessment in the Yayo Coffee Forest Biosphere Reserve, Ethiopia." Discover Environment **4**(1): 295.*

*Thomsen, J. K., et al. (2025). "Applying the ecosystem services framework in UNESCO's World Network of Biosphere Reserves: lessons learned and ways forward." Current Opinion in Environmental Sustainability **75**: 101539.*

*Tiki, M. D. (2025). "The challenge of matching biodiversity conservation and community's livelihoods: historical trends and participatory interventions in the Kafa biosphere reserve, Ethiopia." Revista española de desarrollo y cooperación **52**(1): 55–65.*

*Tolessa, T., Senbeta, F., & Abebe, T. (2023). Ecosystem services and local livelihoods in the Kafa Coffee Forest Biosphere Reserve, Southwestern Ethiopia. Forest Policy and Economics, 148 , 102905.Discussion: Community Perception on Ecotourism in the Kafa Biosphere Reserve Discussion (Assessment)*

*Van Eeuwijk, P. and Z. Angehrn (2017). "How to… conduct a focus group discussion (FGD)." Methodological manual **10**.*

*Vasseur, L., & Siron, R. (2019). Assessing Ecosystem Services in UNESCO Biosphere Reserves. In: Canadian Commission for UNESCO, Ottawa.*

*Wang, W., Wang, H., Kuang, Y., & Lu, Y. Tourism Transition and Green Productivity in China's Ethnic Minority Regions: Nonlinear Evidence on the Digital Economy's Dual Environmental Role. Frontiers in Sustainable Tourism, 5, 1952023.*

*Wannemo, F. (2026). "12 AI in the Development of Tourism." Tourism and Place Design: Designing Places to Live, Operate and Visit.*

*Woldyes, T. A. (2025). "Ecotourism's role in conservation, socio-economic development, and climate adaptation in Wanchi-Dandi, Ethiopia." Eco-Tourism and Sustainable Development **1**(2): 119–134.*

*Wondirad, A., et al. (2020). "Stakeholder collaboration as a major factor for sustainable ecotourism development in developing countries." Tourism management **78**: 104024.*

*Yang, L. (2024). "An overview of community livelihoods in Biosphere Reserves: based on the sustainable livelihoods framework for the 21st century." Frontiers in Forests and Global Change **7**: 1375051.*

*Zelelew, S. A., et al. (2024). "Influence of Seasonal Variations and Vegetation on Bird Composition and Foraging Guilds in the Selected Church Forests of the Southwestern Lake Tana Watershed." Available at SSRN 5130908.*

*Zhao, Y., & Jaafar, M. (2025). Integrated Delphi-entropy framework for sustainable rural tourism: Evidence from Shaanxi Province, China (2018–2023). Frontiers in Sustainable Tourism, 4, 1733705.*

# 8. Appendex

Discrptive statstics by educational leve

| | | Mean | Std. Deviation | Minimum | Maximum |
|---|---|---|---|---|---|
| What potential attraction areas of eco- tourism are there in your locality | no formal education | 3.24 | .935 | 1 | 4 |
| | primery education | 3.97 | .169 | 3 | 4 |
| | secondary education | 3.30 | .750 | 2 | 4 |
| | Higher and above education | 3.57 | .760 | 1 | 4 |
| Eco-tourism provides employment opportunities | no formal education | 1.85 | .775 | 1 | 4 |
| | primery education | 1.49 | .562 | 1 | 3 |
| | secondary education | 1.63 | .556 | 1 | 3 |
| | Higher and above education | 1.87 | .773 | 1 | 4 |
| Eco-tourism generates incomes for local community livelihoods | no formal education | 2.08 | .511 | 1 | 4 |
| | primery education | 2.26 | .780 | 1 | 4 |
| | secondary education | 2.23 | .568 | 1 | 3 |
| | Higher and above education | 2.14 | .546 | 1 | 4 |
| Eco-tourism encourages cultural activities on the local population | no formal education | 1.38 | .485 | 1 | 2 |
| | primery education | 1.46 | .505 | 1 | 2 |
| | secondary education | 1.47 | .507 | 1 | 2 |
| | Higher and above education | 1.41 | .495 | 1 | 2 |

Discrptive statstics by household number

| | | Mean | Std. Deviation | Minimum | Maximum |
|---|---|---|---|---|---|
| What potential attraction areas of eco- tourism are there in your locality | 2 | 3.47 | .856 | 1 | 4 |
| | 3 | 3.39 | .865 | 1 | 4 |
| | 4 | 3.59 | .726 | 1 | 4 |
| | 5 | 3.41 | .855 | 1 | 4 |
| | 6 | 3.24 | .936 | 1 | 4 |
| | 7 | 3.40 | .894 | 2 | 4 |
| | 8 | 3.31 | .947 | 1 | 4 |
| | 9 | 3.57 | .787 | 2 | 4 |
| | Total | 3.40 | .858 | 1 | 4 |
| Eco-tourism provides employment opportunities | 2 | 1.72 | .498 | 1 | 3 |
| | 3 | 1.85 | .799 | 1 | 4 |
| | 4 | 1.81 | .760 | 1 | 4 |
| | 5 | 1.76 | .706 | 1 | 4 |
| | 6 | 1.80 | .817 | 1 | 4 |
| | 7 | 2.00 | 1.225 | 1 | 4 |
| | 8 | 1.69 | .630 | 1 | 3 |
| | 9 | 2.14 | 1.069 | 1 | 4 |
| | Total | 1.80 | .747 | 1 | 4 |
| Eco-tourism generates incomes for local community livelihoods | 2 | 2.23 | .560 | 1 | 3 |
| | 3 | 2.13 | .604 | 1 | 4 |
| | 4 | 2.05 | .475 | 1 | 3 |
| | 5 | 2.10 | .589 | 1 | 4 |
| | 6 | 2.08 | .536 | 1 | 3 |
| | 7 | 2.40 | .548 | 2 | 3 |
| | 8 | 2.31 | .480 | 2 | 3 |
| | 9 | 2.29 | .756 | 2 | 4 |
| | Total | 2.13 | .558 | 1 | 4 |
| Eco-tourism encourages cultural activities on the local population | 2 | 1.45 | .503 | 1 | 2 |
| | 3 | 1.36 | .484 | 1 | 2 |
| | 4 | 1.38 | .489 | 1 | 2 |
| | 5 | 1.37 | .485 | 1 | 2 |

| | | | | | |
|---|---|---|---|---|---|
| | 6 | 1.37 | .486 | 1 | 2 |
| | 7 | 1.60 | .548 | 1 | 2 |
| | 8 | 1.69 | .480 | 1 | 2 |
| | 9 | 1.71 | .488 | 1 | 2 |
| | Total | 1.40 | .491 | 1 | 2 |

**ANOVA**

| | | Sum of Squares | df | Mean Square | F | Sig. |
|---|---|---|---|---|---|---|
| What potential attraction areas of eco-tourism are there in your locality | B/n Groups | 4.577 | 7 | .654 | .887 | .517 |
| | Within Groups | 251.457 | 341 | .737 | | |
| Eco-tourism provides employment opportunities | B/n Groups | 1.727 | 7 | .247 | .438 | .878 |
| | Within Groups | 192.233 | 341 | .564 | | |
| Eco-tourism generates incomes for local community livelihoods | B/n Groups | 2.073 | 7 | .296 | .949 | .468 |
| | Within Groups | 106.379 | 341 | .312 | | |
| Eco-tourism encourages cultural activities on the local population | B/n Groups | 2.395 | 7 | .342 | 1.433 | .191 |
| | Within Groups | 81.444 | 341 | .239 | | |

descriptive statistics demonstrate age-group

| What potential attraction areas of eco- tourism are there in your locality | | Mean | Std. Deviation | Minimum | Maximum |
|---|---|---|---|---|---|
| | Early working age(15-24) | 2.01 | .712 | 1 | 3 |
| | prime working age(25-54) | 3.60 | .491 | 3 | 4 |
| | mature and elderly age( 55 and above) | 4.00 | .000 | 4 | 4 |
| Eco-tourism provides employment opportunities | Early working age(15-24) | 2.03 | .963 | 1 | 4 |
| | prime working age(25-54) | 1.78 | .679 | 1 | 4 |
| | mature and elderly age( 55 and above) | 1.68 | .658 | 1 | 4 |

| | | | | | |
|---|---|---|---|---|---|
| Eco-tourism generates incomes for local community livelihoods | Early working age(15-24) | 2.00 | .417 | 1 | 4 |
| | prime working age(25-54) | 2.09 | .514 | 1 | 4 |
| | mature and elderly age( 55 and above) | 2.28 | .672 | 1 | 4 |
| Eco-tourism encourages cultural activities on the local population | Early working age(15-24) | 1.17 | .380 | 1 | 2 |
| | prime working age(25-54) | 1.41 | .494 | 1 | 2 |
| | mature and elderly age( 55 and above) | 1.53 | .501 | 1 | 2 |

**ANOVA**

| | | Sum of Squares | df | Mean Square | F | Sig. |
|---|---|---|---|---|---|---|
| What potential attraction areas of eco-tourism are there in your locality | B/n Groups | 179.411 | 2 | 89.705 | 405.072 | .000 |
| | Within Groups | 76.624 | 346 | .221 | | |
| Eco-tourism provides employment opportunities | B/n Groups | 5.325 | 2 | 2.663 | 4.884 | .008 |
| | Within Groups | 188.634 | 346 | .545 | | |
| Eco-tourism generates incomes for local community livelihoods | B/n Groups | 3.755 | 2 | 1.878 | 6.205 | .002 |
| | Within Groups | 104.697 | 346 | .303 | | |
| Eco-tourism encourages cultural activities on the local population | B/n Groups | 5.556 | 2 | 2.778 | 12.279 | .000 |
| | Within Groups | 78.283 | 346 | .226 | | |

Discriptive statstices of household sex

| | | Mean | Std. Deviation | Minimum | Maximum |
|---|---|---|---|---|---|
| What potential attraction areas of eco- tourism are there in your locality | male | 3.39 | .889 | 1 | 4 |
| | female | 3.50 | .507 | 3 | 4 |
| Eco-tourism provides employment opportunities | male | 1.80 | .746 | 1 | 4 |
| | female | 1.78 | .760 | 1 | 4 |
| Eco-tourism generates incomes for local community livelihoods | male | 2.12 | .548 | 1 | 4 |
| | female | 2.22 | .637 | 1 | 3 |
| Eco-tourism encourages cultural activities on the local population | male | 1.37 | .484 | 1 | 2 |
| | female | 1.67 | .478 | 1 | 2 |

**ANOVA**

| | | Sum of Squares | df | Mean Square | F | Sig. |
|---|---|---|---|---|---|---|
| What potential attraction areas of eco-tourism are there in your locality | B/n Groups | .370 | 1 | .370 | .502 | .479 |
| | Within Groups | 255.665 | 347 | .737 | | |
| Eco-tourism provides employment opportunities | B/n Groups | .019 | 1 | .019 | .034 | .855 |
| | Within Groups | 193.941 | 347 | .559 | | |
| Eco-tourism generates incomes for local community livelihoods | B/n Groups | .371 | 1 | .371 | 1.191 | .276 |
| | Within Groups | 108.082 | 347 | .311 | | |
| Eco-tourism encourages cultural activities on the local population | Between Groups | 2.830 | 1 | 2.830 | 12.122 | .001 |
| | Within Groups | 81.010 | 347 | .233 | | |