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Unveiling the ripple effects of agro-ecotourism on Karnataka's rural hearth

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Abstract

Agro-ecotourism is the latest concept in Indian tourism industry normally occurs on farms which can be defined as the symbiotic association of farming sector, tourism industry and farm business along with ecosystem services and also the economic activity. This study highlights the need for comprehensive strategies to promote sustainable agro-ecotourism in Karnataka. While acknowledging its potential economic benefits, it emphasizes the importance of addressing negative environmental impacts. Proactive measures such as sustainable land management and waste management are essential to safeguard ecosystems. Inclusive approaches that benefit local communities and marginalized groups are crucial, along with strategies to ensure equitable distribution of benefits and promote cultural preservation. Effective land use planning regulations are necessary to prevent agricultural land conversion, while encouraging sustainable agricultural practices can enhance productivity and minimize environmental impacts. Public awareness campaigns and monitoring mechanisms are vital to promote responsible tourism and assess impacts. Integrating these considerations into agro-ecotourism planning can optimize benefits and minimize drawbacks, fostering a sustainable and inclusive development pathway in Karnataka.

Keywords: Ripple effects, agro-ecotourism, rural hearth

Introduction

Agro-ecotourism represents a burgeoning trend within the Indian tourism industry, embodying a symbiotic relationship between the farming sector, tourism industry, and agricultural businesses, while leveraging ecosystem services (Barbuddhe and Singh, 2014) ^[4]. This concept entails visitors immersing themselves in the activities of operational farms, agricultural ventures, or horticultural enterprises for leisure, educational, or participatory purposes. Offering a respite from the frenetic pace of urban life, agro-ecotourism provides individuals with an opportunity to engage in rural experiences, sample local cuisine, and gain insights into various farming practices.

Within the state of Karnataka, renowned for its diverse ecological landscapes, destinations such as Chikkamagaluru, Madikeri, Dakshina Kannada, Karwar, Sirsi, and Mysuru serve as focal points for eco-tourism enthusiasts. By focusing on agro-ecotourism, there emerges a unique opportunity to bolster employment prospects within both the agriculture and tourism sectors, fostering local hiring practices and cultivating tourism offerings centered around indigenous culture and the natural environment.

In particular, the sub-sector of agro-ecotourism holds promise for enhancing the socioeconomic fabric of local communities, including marginalized populations, by integrating them into the tourism value chain. This integration extends to the provision of local goods, labor, and tourism services, thereby stimulating economic development at the grassroots level. Moreover, paramount importance is placed on the preservation of the natural

ecosystems integral to these locales, which not only enriches the livelihoods of farmers through supplementary income and increased employment opportunities but also contributes to the overall well-being of the community.

However, the proliferation of agro-ecotourism is not without its challenges, as it may inadvertently lead to environmental degradation, pollution, and other adverse consequences stemming from human intervention. Recognizing the imperative of environmental conservation, it becomes imperative to mitigate these negative impacts while harnessing the socio-economic benefits of agro-ecotourism. Thus, the primary focus of this study is to investigate the ramifications of agro-ecotourism on farm households, shedding light on its multifaceted effects on both the environment and local communities.

Methodology

The study was carried out in Chikkamagaluru and Kodagu districts of Karnataka during the year of 2020-21. Purposive proportionate sampling technique was employed for selection of farm households. Data was collected from 40 farmers using pre-tested well-structured schedule through personal interview method.

Tabular method of presentation was employed to compile the socio-economic characteristics, impact of agro-ecotourism, and benefits of agro-ecotourism. In order to assist the interpretation of findings, descriptive statistical measures like percentages, averages and ratios were worked out wherever necessary.

Directed Acyclic Graph (DAG) is a conceptual representation of a series of activities. The order of the activities is depicted by a graph, which is visually presented as a set of circles. Each circle is known as a “vertex” and each line is known as an “edge.” “Directed” means that each edge has a defined direction. “Acyclic” means that there are no loops (*i.e.*, “cycles”) in the graph. In DAGs, each node represents a random variable, and directed causal paths are represented by arrows. The causal graph structure thus

provides qualitative information about the conditional independencies of the variables of interest. This can be employed on the data to study casual inference of particular independent variable on dependent variable (impact evaluation). In this study DAG is used to map the impact of agro-ecotourism on agro-ecosystem based on the literature review.

Results

Table 1: Socio-economic characteristics of farmers practicing agro-ecotourism

Particulars	Chikkamagaluru (n=20)	Kodagu (n=20)	Total (n=40)	Test Value
I. Age group (No.)				
a. Below 35 years	2 (10)	3 (15)	5 (12.50)	$\chi^2=5.08^{NS}$
b. 35-50 years	7 (35)	7 (35)	14 (70)	
c. Above 50 years	11 (55)	10 (50)	21 (30)	
Average age (Years)	50.90	49.30	46.80	F=0.73 ^{NS}
II. Education level (No.)				
a. Degree	16 (80)	14 (70)	30 (75)	$\chi^2=5.85^{NS}$
b. Masters	4 (20)	6 (30)	10 (25)	
Average education (Years)	15.40	15.60	15.50	F=0.64 ^{NS}
III. Family size (No.)				
a. Small (<4)	6 (30)	3 (15)	9 (22.50)	$\chi^2=3.13^{NS}$
b. Medium (4-6)	14 (70)	16 (80)	30 (75)	
c. Large (>6)	0 (0)	1 (5)	1 (2.50)	
Average family size	3.95	4.40	4.17	F=1.42 ^{NS}
IV. Land holdings (ha)				
Rainfed land	4.2	2.7	3.45	$\chi^2=2.51^{NS}$
Irrigated land	16.1	15.45	15.77	
Average land holding	20.30	18.00	19.40	F=0.45 ^{NS}
V. Gender of the respondent (No.)				
Male	17 (85)	18 (90)	35 (87.50)	$\chi^2=0.24^{NS}$
Female	3 (15)	2 (10)	5 (12.50)	F=1.07 ^{NS}
VI. Marital status of the respondent (No.)				
Married	17 (85)	18 (90)	35 (87.50)	$\chi^2=0.24^{NS}$
Single	3 (15)	2 (10)	5 (12.50)	F=1.07 ^{NS}

Note: 1. Figures in () indicate percentage to total sample.
 2. NS- Non-significant

The data related to socio-economic characteristics are tabulated using the data collected from primary survey are presented in Table 1. The data indicated that, majority of farmers in both the two districts belonged to the age group of above 50 years *i.e.*, 11 and 10 from Chikkamagaluru and Kodagu respectively. The percentage of farmers in the 35-50 years age group was the second highest (35% of farmers in each district) with 14 farmers (7 farmers from Chikkamagaluru and 7 farmers from Kodagu district). Whereas, the percentage of farmers belonging to below 35 years age group was comparatively less in both the districts. The average age of the farmers in Chikkamagaluru district was 50.90 years while, it was 49.30 years in Kodagu

district. The mean difference in age was found statistically non-significant indicating the homogeneity of the sample. Almost all the farm respondents who adopted agro-ecotourism in the area were literate. Most of them had completed their degree with an average of 15-16 years of education. About 80 per cent of farmers from Chikkamagaluru and 70 per cent from Kodagu district had degree education. There was no significant difference with respect to mean education level. This is similar to the study conducted by Dimitrovski *et al.* (2012) [6] where predominantly male, from 40 to 60 years old had carried out the agro-ecotourism and they hold secondary school diplomas.

Table 2: Employment and income pattern among farmers

Sl. No.	Sources	Chikkamagaluru (n=20)		Kodagu (n=20)		Total (n=40)	
		No. of hrs.	Annual income (₹ in lakhs)	No. of hrs.	Annual income (₹ in lakhs)	No. of hrs.	Annual income (₹ in lakhs)
1	Agriculture	752	17,10,873	722	15,76,400	737	16,43,637
2	Agro-ecotourism	480	19,63,720	725	17,81,920	602.50	18,72,820
3	Non-farm activities	2440	9,10,000	2240	7,33,333.30	2340	8,21,666.70
4	Total	3672	45,84,593	3687	40,91,653.30	3679.50	43,38,123.15

Employment and income pattern generated through different activities among sample farm households is depicted in Table 2. The number of days employed and income generated from different activities was similar across two districts. This was due to the existence of similar cropping pattern in the study area. The number of hours employed in different activities was 3672 with income of Rs. 45,84,593 in Chikkamagaluru district whereas it was 3687 days and Rs. 40,91,653.30 in Kodagu district. The income from agriculture, agro-ecotourism and non-farm activities was about Rs. 17,10,873, Rs. 19,63,720 and Rs. 9,10,000,

respectively in Chikkamagaluru. Whereas, in Kodagu the income from agriculture, agro-ecotourism and non-farm activities was Rs. 15,76,400, Rs. 17,81,920 and Rs. 7,33,333.30 respectively. From this we can infer that income from agro-ecotourism was comparatively higher than income from agriculture. This is in line with the results of Ahire (2018) [1] the farmers were able to get net income of Rs.1,30,000 in a year whereas the income from agriculture was only Rs.50,000 showing higher income from agro-ecotourism.

Table 3: Impact of agro-eco-tourism activity on services of agro-ecosystem

Sl. No.	Category	Same	Decreased	Increased	Percentage decrease/ increase
Provisioning services					
1	Food	10 (25)	-	30 (75)	76
2	Fibre and fuel	26 (65)	-	14 (35)	32
3	Fresh water	40 (100)	-		-
Regulating services					
4	Air-quality regulation	32 (80)	8 (20)	-	-
5	Climate regulation	-	40 (100)	-	68
6	Water regulation	19 (47.5)	-	21 (52.5)	42.5
7	Natural hazard regulation	13 (32.5)	-	27 (67.5)	32.5
8	Pest and disease regulation	34 (85)	-	6 (15)	-
9	Erosion regulation	36 (90)	-	4 (10)	-
10	Water purification and waste treatment	30 (75)	-	10 (25)	-
Cultural services					
11	Cultural heritage	4 (10)	-	36 (90)	73
12	Recreation	-	-	40 (100)	95
13	Aesthetic value	-	-	40 (100)	80
Supporting services					
14	Soil formation	40 (100)	-	-	-
15	Primary production	4 (10)	-	36 (90)	25
16	Supplementary income	-	-	40 (100)	80
17	Additional Employment	-	-	40 (100)	70

Note: Figures in () indicate percentage to total sample.

Ecosystem services are many and varied benefits to humans provided by the natural environment and from healthy ecosystems. Such ecosystems include, for example, agro-ecosystems, forest ecosystems, grassland ecosystems and aquatic ecosystems. These ecosystems, functioning in healthy relationship, offer such things like natural pollination of crops, clean air, extreme weather mitigation, and human mental and physical well-being. There are mainly four types of services from agro-ecosystem *i.e.*, provisioning, regulating, cultural and supporting services. The impact of agro-ecotourism on these services of agro-ecosystem is summarized in Table 3. According to the responses drawn by the farmers, there was 76 per cent increase in food service followed by increase in fibre and fuel up to 32 per cent. But the fresh water service remained unchanged even with the agro-ecotourism which was approved by cent per cent of the respondents. About 45 per cent farmers believed that there was no change in fibre and fuel which was contrary to the 14 per cent of farmers who responded positively. Among regulating services, 80 per cent of farmers responded that the air quality remained same whereas cent per cent of farmers believed that there was decrease in the

climate regulation to the extent of 68 per cent. About 52.50 per cent of farmers adhered that there was increase in climate regulation up to 42.50 per cent followed by natural hazard regulation (32.50%). 85, 90 and 75 per cent of farmers answered that there was no change observed in pest and disease regulation, erosion regulation and water purification and waste treatment, respectively. Cent per cent of farmers observed that there was growth in recreation and aesthetic value to the tune of 95 and 80 per cent, respectively. Ninety per cent of respondents observed the upsurge in preservation of cultural heritage to the extent of 73 per cent. Ninety per cent of farmer respondents conceived that there was an increase in primary production due to agro-ecotourism. Cent per cent of farmers believed in the rise of supplementary income and additional employment through agro-ecotourism. On the other side, they didn't feel any improvement or reduction in soil formation. Generally, they agreed that the programme had opened the door to more income-generating activities, as there had been an increase in the demand for local products and job opportunities which is similar to the current study.

Table 4: Impact of agro-eco-tourism activity on agro-ecosystem

Sl. No.	Statements	SA	A	N	D	SD
Environmental impact						
1.	Increase in environmental pollution	10 (25.00)	23 (57.50)	7 (17.50)	-	-
2	Leads to landslides and soil erosion	-	5 (12.50)	24 (60.00)	9 (22.50)	2 (5.00)
3	More solid waste generation	14 (35.00)	22 (55.00)	4 (10.00)	-	-
4	Rise in conversion forest land into agricultural land	23 (57.50)	17 (42.50)	-	-	-
Economic impact						
5	Increase in cost of living of local and poor people	10 (25.00)	22 (55.00)	8 (20.00)	-	-
6	Provides additional employment opportunities	27 (67.50)	13 (32.50)	-	-	-
7	Increase in household income and revenue	33 (82.50)	7 (17.50)	-	-	-
8	Increase in land price and other commodities	28 (70.00)	12 (30.00)	-	-	-
9	Increase in demand for local food and crafts	17 (42.50)	10 (25.00)	8 (20.00)	5 (12.50)	-
Social impact						
10	Increase in infrastructure development	23 (57.50)	9 (22.50)	8 (20.00)	-	-
11	Increases illegal activities like crime, alcoholism, and drug addiction	-	-	14 (35.00)	17 (42.50)	9 (22.5)
12	Interchange of culture between hosts and guests	20 (50.00)	12 (30.00)	8 (20.00)	-	-

Note: 1. SA-Strongly agree, A-Agree, N-Neutral, DA- Disagree, SD- Strongly Disagree
 2. Figures in () indicate percentage of sample farmers

The impact of agro-ecotourism activity on agro-ecosystem can be studied under three different categories *i.e.*, environmental impact, economic impact and social impact. Effect of agro-ecotourism on agro-ecosystem is given in table 4. The results showed that, 57.50 per cent of farmers agreed on increase in environmental pollution due to agro-ecotourism through the excess generation of waste and use of plastics. 60 per cent of farmers opined that there was no effect of agro-ecotourism on landslides and soil erosion. 57.50 per cent of farmers believed that there was rise in conversion of forest land into agricultural land to build infrastructure facilities for the agro-ecotourism units. The economic impact of agro-ecotourism on agro-ecosystem showed that 82.50 per cent increase of household income and revenue followed by 70 per cent increase in land price and commodities due to increase in demand for the products. 67.50 per cent of farmers strongly agreed that

it provide additional employment opportunities for farmers and local people followed by 55 per cent of farmers who agreed for the increase in cost of living of local and poor people due to agro-ecotourism, whereas 42.50 per cent of farmers agreed for the increase in demand for local food and crafts. This is similar to the results of Hunt *et al.* (2015) [9] indicating that ecotourism offered the best currently available employment opportunities, double the earnings of other livelihoods, and other linked benefits. Under social impact, 57.50 per cent of farmers agreed that there was increase in infrastructural development due to agro-ecotourism through construction of roads, pathways and buildings. On the other hand 42.50 per cent farmers disagreed on increase in illegal activities like crime, alcoholism, and drug addiction in the area. About half of the respondents felt that there existed an interchange of culture among hosts and guests.

Table 5: Status of farm household

Sl. No.	Particulars	Before agro-eco-tourism	After agro-eco-tourism
1	Area under crops (acres)	20.25	19.40
2	Production (q/acre)	11.50	11.50
3	Production of value added agri-products (q)	-	0.20
4	Income from agriculture/ acre	1,50,000	3,57,000
5	Expenditure on agriculture/acre	52,500	55,000
8	Wage / salary to workers per month	18,600	46,500
9	Total returns	10,54,200	18,72,820
10	Persons employed (No.)	2	5

The status of farm household before and after the start of agro-ecotourism is defined in Table 5. As per the results, it was observed that there was considerable decrease in the area under crops from 20.25 to 19.40 acres. On the contrary, there was substantial increase in income and expenditure on agriculture to Rs. 3,57,000 and Rs. 55,000, respectively. The results support the acceptance of hypothesis that, returns generated was more in the case of agro-ecotourism. Similarly, there was an ample amount of rise in total returns to Rs. 18,72,820, wage/ salary of workers to Rs. 46,500, increase in number of persons employed to five per unit.

Whereas, the production remained constant but production of value added products initiated with 0.20 quintals. The increase in value added products was in line with the results of Cepal (2005) [7] where they mentioned the increase in value added products due to agro-ecotourism. Whereas the study conducted by Timms (2006) [13] revealed that there was potential to stimulate local agricultural production. On the contrary, to these studies, the work done by Brscic (2006) [5] revealed that the agro-tourism activities had not significant influence on the increase of agricultural production within agro-tourism households.

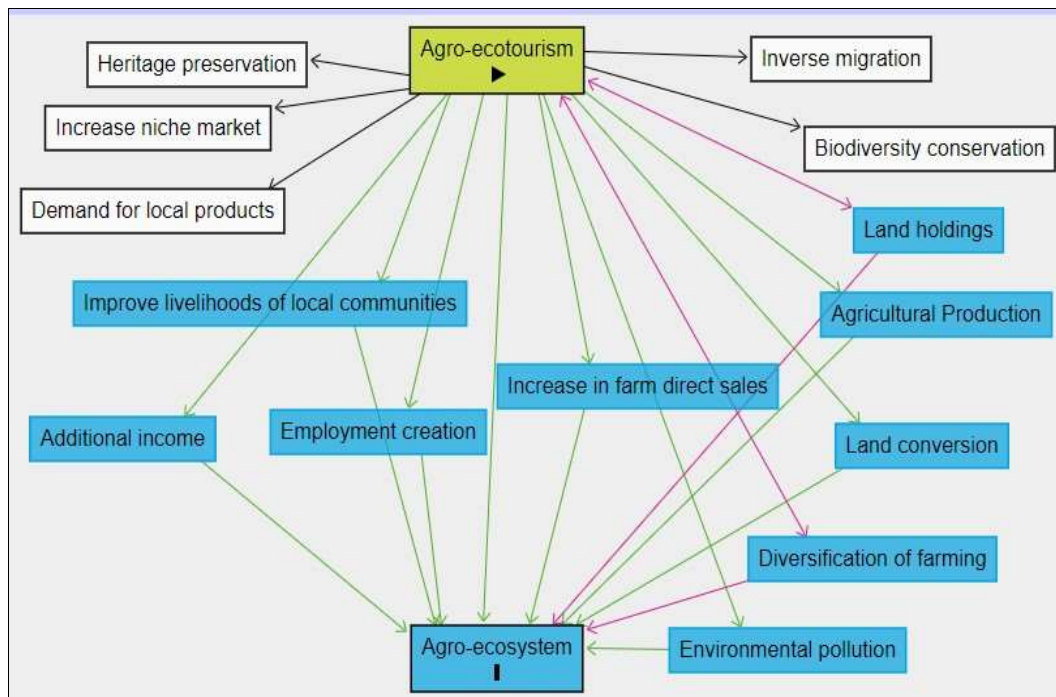


Fig 1: Directed Acyclic Graph depicting the impact of Agro-ecotourism on agro-ecosystem

An agro-ecosystem is a cultivated ecosystem, generally corresponding to the spatial unit of a farm and whose ecosystem functions are valued by humans in the form of agricultural goods and services. It is thus co-produced by nature and humans.

Agro-ecosystems are ecosystems composed of both abiotic and biotic elements that interact with each other and the surrounding environment. Agro-ecosystem is always integrated in a social, economic and ecological environment, and is part of flows (energy, water) and mechanisms (nutrient cycles, pests and diseases biological control, pollen transfer, etc.). Hence, they are characterized by a structural and dynamic complexity arising from interactions between socio-economic processes (interactions between social and economic factors) and ecological ones (functional links between organisms and their environment) in which they are embedded.

Management of agro-ecosystems hence seeks for agricultural production systems that reproduce as much as possible natural mechanisms of ecosystems (such as ecological balance between pests and their natural enemies), so that they are moving forward towards agro-ecological

transition.

In this study, an attempt was made to find out the impact of agro-ecotourism on agro-ecosystem in Karnataka. Agro-ecotourism has affected the agro-ecosystem through employment creation, additional income, increase in farm direct sales, improvement in livelihood of local communities, land holdings, agricultural production, land conversion, diversification in farming and environmental pollution. The results of the study performed by Ammirato and Felicetti (2013) [2] and Baebieri and Tew (2010) aptly supported the findings of the present study which gave farmers important revenues being an alternative way for selling farms' products and services. It also affected heritage preservation, increase migration, biodiversity conservation, increase niche market and demand for local products. The study conducted by Lapan and Barbieri (2014) [10] showed that agro-tourism farmers were preserving tangible heritage in their farmlands, mainly driven by intrinsic motives which was similar to the results obtained. Also the study performed by Olya *et al.* (2014) [12] revealed that agro-tourism projects had potential for job creation, reverse migration, sustainability, and land conservation.

Table 6: Benefits of agro-ecotourism on local community

Sl. No.	Statements	No.	Per cent
Direct benefits			
1	Additional revenue for local business services from tourists	36	90.00
2	Supplementary employment for the local people	37	92.50
3	Exchange of cultural knowledge	20	50.00
4	Supports local arts and handicrafts	20	20.00
5	Promotes direct sale of products	34	34.00
Indirect benefits			
6	Poverty reduction	20	50.00
7	Provides sustainable livelihood	20	50.00
8	Welfare of the rural society	20	50.00
9	Provides energetic business environment	30	75.00
10	Protection of rural landscape and natural environment	20	50.00

The benefits of agro-ecotourism on local community expressed by farm respondents are represented in Table 6 which can be classified into direct benefits and indirect benefits. The results depicted that 92.50 per cent of farmers responded that agro-ecotourism provided supplementary employment for the local people followed by 90 per cent farmers revealed that there was additional revenue for local business services from tourists, 75 per cent of farmers opined that agro-ecotourism provides energetic business environment, 50 per cent of respondents approved that exchange of cultural knowledge, poverty reduction, provision of sustainable livelihood, welfare of the society and protection of rural landscape and natural environment. 34 per cent of them believed that, it promotes direct sale of products and 20 per cent of them assured that agro-ecotourism supports local arts and handicrafts. This is similar to the study conducted by Liu (2006) ^[11] and Hamzah *et al.* (2012) ^[8] in which agro-tourism had not only provided a supplementary income and new employment opportunities to the rural community but also increased the conservation of the environment, appreciation of minority culture and rural lifestyle.

Conclusion

The study emphasizes the importance of adopting multifaceted strategies to promote sustainable agro-ecotourism development in Karnataka. While acknowledging the potential economic benefits and opportunities for community growth, it is imperative to recognize and address the following key aspects as well. Given the observed negative impacts on ecosystems, including land degradation and pollution, proactive measures such as sustainable land management practices, waste management systems, and biodiversity conservation initiatives are essential to safeguard the natural environment. Agro-ecotourism should be inclusive and beneficial for all stakeholders, including local communities and marginalized groups.

Strategies to ensure equitable distribution of benefits, promote cultural preservation, and enhance community participation in decision-making processes are critical for fostering social cohesion and empowerment. Effective land use planning regulations are necessary to prevent the indiscriminate conversion of agricultural land into tourist infrastructure. Zoning policies, land use restrictions, and environmental impact assessments can help mitigate land-use conflicts and preserve agricultural landscapes while supporting tourism development. Encouraging farmers to adopt sustainable agricultural practices, such as organic farming methods, agroforestry, and water conservation techniques, can enhance agricultural productivity while minimizing negative environmental impacts associated with agro-ecotourism activities.

Public awareness campaigns and educational programs aimed at both tourists and local communities can promote responsible tourism practices, environmental stewardship, and cultural appreciation. Empowering visitors with knowledge about the ecological and social significance of agro-ecotourism can foster a sense of responsibility and respect towards the environment and local cultures. Regular monitoring and evaluation mechanisms should be established to assess the ecological, social, and economic

impacts of agro-ecotourism initiatives. Data-driven insights can inform adaptive management strategies and policy adjustments to optimize the benefits and minimize the drawbacks of agro-ecotourism development. By integrating these additional considerations into agro-ecotourism planning and management, policymakers, practitioners, and local communities can work together to harness the full potential of agro-ecotourism as a sustainable and inclusive development pathway in Karnataka.

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