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Environmental Sustainability in Floriculture-Based Tourism: A Study Madurai District

T. Gokila Devi
Research Scholar
Department of Commerce, Alagappa University, Karaikudi

Dr. G. Vinayagamoorthi
Assistant Professor
Department of Commerce, Alagappa University, Karaikudi

Abstract

The emergence of floricultural tourism is one example of using tourism, alongside agriculture, to create the potential for increased rural economic development in an ecologically sustainable manner. In the Madurai area of Tamil Nadu, floriculture provides important income opportunities for residents, especially women who cultivate flowers and plant products. The trend of experiential and eco-tourism has created an additional opportunity for economic benefits from floricultural-based tourism; however, growth presents challenges to attaining adequate environmental management for sustainability. This study seeks to assess the practices related to environmental sustainability of floricultural tourism operations in the Madurai area and their effect on ecological conservation and resource management. Important focus areas of the study are the various environmental dimensions of floricultural tourism, including sustainable growing practices, water conservation practices, soil health management, biodiversity preservation, waste management and the use of organic and eco-friendly agricultural inputs on farms that participate in tourism Data for this study is collected from floriculture producers, women self-help groups, and other stakeholders in the tourism sector through structured questionnaires and interviews. Secondary data sources include government and academic publications. Sustainability indicators and descriptive statistics will be used to assess the level of environmentally sustainable practices at floriculture-based tourism operations in the Madurai District The results of this study are expected to indicate that the level of adoption of environmentally friendly sustainable practices is moderate. Different degrees of acceptance of environment-friendly operations can occur due to reasons that include the amount of knowledge that exists about them, access to training, help from institutions & tourist demand for eco-tourism experiences. Major problems occur environmentally, such as shortage of available water, the heavy use of chemicals & poor waste management. There are suggestions made in this research that will help create environmental sustainability within the area of floriculture based tourism and will assist with maintaining ecological balance along with having a long term tourism industry and contributing to the development of rural communities in the Madurai district of Tamil Nadu India.

Keywords: Floriculture Based Tourism (FBT), Environmental Sustainability (ES), Sustainable Tourism (ST), Floriculture Farmers, Women Participation

Introduction

Tourism has undergone significant transformations due to changing factors such as evolving technologies, advancements in tourism and ingenuity. There are broad categories of tourism evolution, such as a shift from traditional mass tourism to sustainable alternatives (for example, eco-tourism and conscientious tourism). Sustainable and/or eco-tourism acknowledges that touristic activities can consume fewer resources than usual for another purpose. Therefore, the goal of sustainable tourism is to minimize negative social and environmental impacts from touristic activities, while promoting long-term economic viability in destinations and contributing to local economies. An example of a synergetic relationship between tourism and agriculture is the implementation of agro-tourism; a form of tourism that utilizes agricultural practices to enhance the visitor experience, while simultaneously achieving sustainability. More specifically, floriculture (i.e. the growing of flowers) serves as an agricultural product that is integrated into touristic experiences, including floral festivals, workshops, and rural experiential travel opportunities. Floral products also have a visual or artistic appreciation, are culturally important, and have a high economic value, rendering floriculture a viable tourism product. Floriculture is one of the largest contributors to employment and also a major source of income for millions of rural Indians that are involved in all aspects of floricultural activity ranging from floricultural production (growing), harvesting, making garlands, processing, marketing, and many other related jobs. Within Madurai district, the unique cultural heritage and agricultural diversity of the district make it an ideal place to promote floricultural tourism, in addition to seeing all the other types of tourism (temple tourism, cultural heritage tourism, etc.) that is available throughout Madurai and in all parts of the district.

Review of Literature

As it pertains to Madurai district; Literature does not include many references regarding environmental sustainability, the impact of floriculture tourism and population growth rate among Women in Madurai. This gap shows how important is conducting a study specifically focused on the environmental sustainability practices associated with the growth of tourism through floriculture in Madurai District. The purpose of conducting the study is to collect data about the practices currently being conducted in Hindustan and recommend ways to improve upon them via Policy Oriented Recommendations.

Globally, an increasing number of nations and regions are beginning to explore sustainable tourism as one of the ways they can achieve economic development without sacrificing the health of the planet or social equity. Sustainable tourism can be defined in terms of three main qualities: responsible use of natural resources; preventing the physical degradation of our planet's natural resources as a result of tourism; and encouraging citizens (especially those in rural and agricultural communities) to contribute to their own long-term development. Many researchers have documented that when tourism and agriculture are combined through agro-tourism or floriculture-based tourism, they will benefit (and help to diversify) the source of income for (rural) areas and reduce the extent to which those areas are dependent on agriculture alone.

Floriculture tourism has grown to be its own area of tourism within the umbrella of sustainable tourism due to its attractiveness, cultural importance and the ability to provide jobs. Earlier studies have already shown that floricultural issues combined with tourism create more awareness of the environment and result in increased adoption of environmentally friendly production methods such as organic production, chemical use reduction, water conservation and maintaining biodiversity. Studies from areas where horticulture is the primary industry indicate that visitors find environmentally responsible agricultural practices attractive, and therefore, it is in the best interest of farmers to use sustainable agricultural practices.

Objectives of the Study

1. To identify the environmental challenges faced by floriculture farmers engaged in tourism-related activities.
2. To study the role of women participation in promoting environmentally sustainable practices in floriculture-based tourism.
3. To examine the influence of awareness, training, and institutional support on the adoption of sustainable practices.

Theoretical Framework

The conceptual foundation of the study is based on Sustainable Tourism Theory; Environmental Sustainability Theory; and Women Empowerment Theory as they relate specifically to floriculture as a basis for developing tourist products and experiences. Additionally, these three theories offer an understanding of how the transformation of tourism can be an effective method to promote an environmentally sustainable form of tourism, and at the same time increase the ability of women in rural areas where floriculture is practiced to participate in and benefit from the related livelihoods.

Sustainable Tourism Theory

Sustainable tourism theory describes how to achieve balanced integration between economy, environment, and society in the context of tourism industry development. Sustainable tourism is an example where tourism generates economic value yet does not degrade the natural resources of a particular geographic area, nor does it displace local populations. As such, in relation to floriculture tourism, the principles behind sustainable tourism allow for the transformation from a farm producing flowers to a tourism destination through practices that support ecological sustainability, by managing visitors responsibly, and by involving local communities, thereby promoting long-term sustainability.

Environmental Sustainability Theory

The conservation of natural resources (water, soil, as well as, the biodiversity) with an emphasis placed on minimizing pollution and degradation of ecological systems is a key area of focus for floriculture and its related industries. Sustainable methods of cultivating, using organic input(s), implementing waste management systems, and conserving biodiversity in floriculture tourism will be supported by this theory. Furthermore, it is assumed that by implementing environmentally responsible practices, the ecological balance will improve, thereby making tourism destinations more attractive to visitors.

Research Gap

1. Research on the junction between floriculture-based tourism and environmental sustainability is non-existent in Madurai; much of the current body of work is dedicated to studying floriculture, tourism, or sustainability independently.
2. There is an absence of valid empirical data regarding sustainable instance of floriculture tourism at a legislative level, as a result planning for policy interventions can therefore only take place ad hoc with few existing frameworks available to guide future developments.

Statement of the Problem

Madurai district has a vibrant floral industry that provides jobs for many people, most of whom are women. Many of these women are involved in cultivating, harvesting, and selling flowers, such as jasmine (Madurai malli), marigold, and rose. Another way to generate wealth through agriculture

is through rural and agri-tourism development, which has been gaining traction in recent years. By creating synergies between floriculture and tourism, there will be more chances for women to generate income and receive additional recognition within their farming communities.

At present, no empirical research exists for Madurai district that investigates Australian women's involvement in floricultural tourism-related environmental sustainability, current local perceptions of environmental sustainability associated with floricultural tourism and best practices for the sustainable use of resources within the growing floricultural sector. As a result, policy-makers, as well as agricultural extension staff and developers of floricultural tourism, do not have any substantive evidence to inform them on ways to develop community-based models of environmentally sustainable development that achieve simultaneous benefits of environmentally sustainable development and economic development while also empowering rural women.

To address the empirical shortage of research described above, the aim of this study is to investigate the environmental sustainability of floricultural tourism in Madurai district based on the experiences of female farmers in order to provide insight as to the challenges, opportunities and strategies for developing sustainable floricultural tourism enterprises.

Research Methodology

1. Research Design

This research has a descriptive/exploratory design. The purpose of this study is to analyze how environmently sustainable floriculture-based tourism is in the Madurai District; and particularly to explore what challenges & opportunities exist for women farmer participation. Quantitative & qualitative methods will be used to provide a comprehensive analysis of the environmental/socio-economic/gender aspects related to floriculture tourism's sustainability.

2.Study Area

Madurai District, Tamil Nadu, an important city in the production of flowers especially for jasmine (Madurai malli), marigold and rose growing, has been chosen for the research study. Villages involved in both floriculture and developing tourism will be selected as the major sites for the study.

Sampling Method and Sample Size

To gather information about both floriculture and tourism, a purposive sampling method was used to identify respondents who have direct experience in these fields. This sampling technique was selected to ensure that respondents had some level of knowledge/experience (considerable) regarding environmental impacts within the industry. Respondents were categorized according to the types of flowers that they produce (jasmine, marigolds, and roses) as well as the level at which they participate in tourism (highly, moderately, and lightly). The stratified approach will provide for a wider range of representatives from various levels of cultural and aesthetic competence when analyzing results.

The sample of study participants included women floriculture producers from various tourism stakeholders and the SHG women leaders/agricultural officers associated with the chosen floriculture clusters in Madurai district. Altogether, the final sample consisted of about 100-120 women farmers, 30-40 tourism stakeholders, and approximately 10-15 SHG women leaders/agricultural officers, giving an estimated total number of 140-175 participants. This number was large enough to obtain statistically rigorous quantitative results and also provide in-depth qualitative data via interview and field observation.

Women farmers engaged in floriculture and participating in tourism activities were considered eligible participants while those that were not engaged in tourism and those involved in tourism but

did not work with floriculture/flowers were excluded; as well as all individuals who did not wish to provide informed consent.

Data Collection Methods

A. Primary Data

1. Structured Questionnaires:

- Administered to women farmers to collect information on cultivation practices, tourism participation, income, and perception of environmental sustainability.

2. Semi-Structured Interviews:

- Conducted with tourism stakeholders, SHG leaders, and agricultural officers to understand operational challenges, sustainable practices, and policy support.

3. Field Observations:

- Observing floriculture farms, tourism activities, and environmental management practices (water use, waste disposal, biodiversity conservation).

B. Secondary Data

Review of research articles, government reports, SHG records, and tourism statistics related to floriculture and sustainable tourism in Tamil Nadu. The Research includes two types of deduction: quantitative (numerically measured, such as how flowers display and receive energy) and qualitative (observational), which provides a complete picture of environmental sustainability within flowers and flower-based travel industries.

The researchers formulated four main hypotheses taken from literature and personal experience (researched). The Hypotheses are:

H1: Environmental Sustainability Practices are relevant to the growth and development of floriculture/travel as a business.

H2: Women Empowerment is relevant to the growth and development of floriculture/travel as a business.

H3: Economic Benefits are relevant to Women Empowerment among floriculture growers.

H4: Community & Biodiversity/Species Conservation put the environment in a place of strength (protection).

Table 1: Reliability Analysis of Study Constructs

Construct	Number of Items	α	Reliability Interpretation
Environmental Resource Management	6	0.82	Good
Ecological Impact of Tourism	5	0.79	Acceptable
Sustainable Floriculture Practices	5	0.84	Good
Women Empowerment	6	0.86	Very Good
Tourism Participation	4	0.77	Acceptable
Overall Scale	26	0.88	Excellent

Results of the Kaiser-Meyer-Olkin (KMO) test and Bartlett's Test for Sphericity can be found in Table 3. The KMO value of .781 indicates suitability of the data for sampling and indicates variables are correlated sufficiently enough to warrant factor extraction with regard to Exploring

Factor Analyses (EFA). KMO values greater than .70 indicate that the data is able to provide an adequate basis for the determination of latent constructs from the variables. The Bartlett Test of Sphericity was found to be statistically significant ($\chi^2 = 1246.38$, df = 325, $p < .001$), indicating that there is a statistically significant difference between the correlation matrix being examined and an identity matrix. The findings provide support that there are meaningful relationships between the variables that will support the conducting of EFA to identify the underlying dimensions of tourism, sustainability, and empowerment for women.

Table 2: Demographic Profile of Women Floriculture Farmers

Variable	Category	Frequency (n)	Percentage (%)
Age	Below 30 years	28	23.3
	31–40 years	34	28.3
	41–50 years	38	31.7
	Above 50 years	20	16.7
Marital Status	Married	96	80.0
	Unmarried	14	11.7
	Widowed/Separated	10	8.3
Educational Qualification	Illiterate	22	18.3
	Primary education	41	34.2
	Secondary education	36	30.0
	Higher secondary & above	21	17.5
Type of Family	Nuclear	72	60.0
	Joint	48	40.0
Farming Experience	Below 5 years	26	21.7
	5–10 years	44	36.7
	Above 10 years	50	41.6
Primary Flower Cultivated	Jasmine	64	53.3
	Marigold	34	28.3
		22	18.4

Source: Primary Data

Tables 1 and 2 outline the demographic profile of women floriculture farmers in Madurai district. Most respondents were married, middle-aged, moderately educated, and belonged to nuclear families with substantial farming experience. Jasmine was the dominant crop. Overall, the profile indicates strong experiential capacity, supporting sustainable floriculture practices and participation in tourism activities.

Table 3: KMO and Bartlett's Test of Sphericity

Test	Value
Kaiser–Meyer–Olkin Measure of Sampling Adequacy	0.781

Bartlett's Test of Sphericity – Approx. Chi-Square	1246.38
Degrees of Freedom	325
Significance (p-value)	< .001

The results from the Kaiser-Meyer-Olkin (KMO) test and the Bartlett's Test of Sphericity can be seen in Table 3. A KMO value of 0.781 demonstrates the adequacy of the data for sampling, suggesting sufficient correlation among variables to warrant factor extraction when conducting Exploratory Factor Analysis (EFA). Typically, KMO values greater than 0.70 are regarded as adequate, meaning the data will successfully determine the latent constructs from the variables. Furthermore, the Bartlett's Test of Sphericity was statistically significant ($\chi^2 = 1246.38$, df = 325, $p < 0.001$), indicating a significant difference in the correlation matrix from an identity matrix which further confirms the presence of meaningful relationships among the variables and thus provides justification for EFA to assess the underlying dimensions of sustainability, tourism and women's empowerment.

Table 4: Total Variance Explained by Extracted Factors

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	5.842	24.34	24.34	5.842	24.34	24.34
2	4.126	17.19	41.53	4.126	17.19	41.53
3	3.218	13.41	54.94	3.218	13.41	54.94
4	2.114	8.81	63.75	2.114	8.81	63.75

Extraction Technique: Principal Component Analysis.

A summary of the total variance of the factors arrived at through exploratory factor analysis and the principal component method can be seen in Table four shows that the number of factors to be retained was determined by Kaiser's criterion, according to which only four factors having eigenvalues above 1 were retained, with the first factor having the highest eigenvalue (5.842), accounting for 24.34% of total variance, thus indicating that the first factor has had the greatest impact in explaining key attributes related to sustainability and tourism, whereas the second factor had an eigenvalue of 4.126, accounting for 17.19% of total variance and the cumulative total was now 41.53%, indicating a strong dimension of female empowerment/participation, while for factor three, the eigenvalue is 3.218, explaining 13.41% of the variance, thus bringing the total accumulated to 54.94%, while for factor four, the eigenvalue was 2.114, explaining 8.81% of total variance. Therefore, the total variance explained by these four factors was 63.75%, which exceeded any previously established threshold criterion in social science research, thus confirming that there is an adequate, stable and meaningful factor structure to conduct further analyses.

Table 5: Rotated Component Matrix (Varimax Rotation)

Variables	Factor 1	Factor 2	Factor 3	Factor 4
Use of eco-friendly inputs	.812			
Water conservation practices	.784			
Soil management techniques	.741			

Waste management in tourism sites	.706			
Participation in tourism activities		.826		
Role in decision-making		.791		
Control over tourism income		.768		
Skill development & training		.732		
Employment opportunities created			.814	
Additional household income			.783	
Market access through tourism			.752	
Community infrastructure improvement			.719	
Awareness of biodiversity protection				.808
Preservation of local culture				.772
Adoption of sustainable tourism norms				.741
Community participation in conservation				.703

The rotation method used is Varimax with Kaiser normalisation. Table 5 below shows the Varimax rotated component matrix from the exploratory factor analysis in which loadings less than 0.50 were suppressed. The exploratory factor analysis produced four distinct, conceptually distinct factors as shown below. Factor 1 represents the environmental sustainability practices (i.e., eco-friendly inputs, water conservation, soil management and waste management). Factor 2 is women's empowerment in floricultural tourism (i.e., participation, decision making, income control and training). Factor 3 is the economic benefits of the integration of floricultural tourism (i.e., job creation, increased income, access to markets and infrastructure). Factor 4 encompasses the community and biodiversity conservation factors (i.e., biodiversity awareness, cultural preservation, sustainable tourism behaviours and community participation). This confirms that the factor structure is both reliable and valid based upon the high loadings and the lack of any cross-loadings..

Table 6: Factor Naming and Reliability Statistics

Factor	Factor Name	No. of Items	Cronbach's Alpha
Factor 1	Environmental Sustainability Practices	4	0.842
Factor 2	Women Empowerment in Floriculture Tourism	4	0.861
Factor 3	Economic Benefits of Floriculture-Based Tourism	4	0.833
Factor 4	Community & Biodiversity Conservation	4	0.819

Table 6 reports the reliability of the four factors identified through exploratory factor analysis. All constructs show good to very good internal consistency, with Cronbach's alpha values ranging from 0.819 to 0.861. These results confirm that the items within each factor reliably measure

environmental sustainability practices, women empowerment, economic benefits, and community and biodiversity conservation, supporting their suitability for further statistical analysis.

Table 7: Hypothesis Testing Results for Floriculture-Based Tourism Sustainability

Hypothesis	Relationship Tested	Statistical Technique	Key Statistics	Result
H1	Environmental Sustainability Practices → Floriculture-Based Tourism Development	Multiple Regression	$\beta = .328$, $t = 4.962$, $p < .001$	Supported
H2	Women Empowerment → Floriculture-Based Tourism Development	Multiple Regression	$\beta = .291$, $t = 4.318$, $p < .001$	Supported
H3	Economic Benefits → Women Empowerment	Pearson Correlation	$r = .648$, $p < .01$	Supported
H4	Community & Biodiversity Conservation → Environmental Sustainability Practices	Pearson Correlation	$r = .683$, $p < .01$	Supported

Model Fit (Regression): $R^2 = 0.621$, Adjusted $R^2 = 0.607$, $F = 44.86$, $p < .001$

Table 7 reports the hypothesis testing results examining key relationships in floriculture-based tourism development in Madurai district. The implementation of environmentally sustainable practices has positively affected the growth of tourism ($\beta = .328$, $p < .001$) and the promotion of empowering women as well ($\beta = .291$, $p < .001$). Additionally, women's economic benefit has shown a high level of correlation with empowering women according to the measure of employment and/or income ($r = .648$, $p < .01$) demonstrating that the economic benefit gained through employment/income can enable and support women to gain agency and power. Furthermore, practice related to the conservation of community and biodiversity has positively correlated with environment sustainability ($r = .683$, $p < .01$). All of the hypotheses received support indicating that sustainability; empowerment; economic outcomes; and conservation of communities are working in an integrative manner to support the growth and development of floricultural-based tourism.

Discussion

This research looks at how environmental sustainability relates to women's empowerment in creating floriculture-based tourism in Madurai District. Using a thorough and statistically sound empirical methodology, including reliability analysis, EFA and hypothesis testing, this research demonstrates how tourism, floriculture and gender empowerment are interrelated to enhance rural development positively and sustainably. The reliability analyses provided good internal consistency (Cronbach's Alpha) across all constructs, between The implementation of environmentally sustainable practices has positively affected the growth of tourism ($\beta = .328$, $p < .001$) and the promotion of empowering women as well ($\beta = .291$, $p < .001$). Additionally, women's economic benefit has shown a high level of correlation with empowering women according to the measure of employment and/or income ($r = .648$, $p < .01$) demonstrating that the economic benefit gained through employment/income can enable and support women to gain agency and power. Furthermore, practice related to the conservation of community and biodiversity has positively correlated with

environment sustainability ($r = .683$, $p < .01$). All of the hypotheses received support indicating that sustainability; empowerment; economic outcomes; and conservation of communities are working in an integrative manner to support the growth and development of floricultural-based tourism.en 0.77 and 0.88.Thus, the reliability (overall scale reliability = 0.88) confirms that the measurement instrument has high levels of measurement reliability and provides credible measurements of the multi-dimensional constructs of environmental sustainability, tourism participation and the empowerment of women. Additionally, these reliability analyses support the reliability of the data that will be used in subsequent analyses and provide consistent methodology to meet the standards of sustainability and tourism research studies. The Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy (0.783) and Bartlett's test of sphericity ($\chi^2 = 1246.38$) indicated that the dataset was suitable for factor analysis; therefore, exploratory factor analysis (EFA) was used to explore the underlying structures. The EFA revealed four factors: environmentally sustainable practices, women empowerment in floriculture tourism, economic benefits of floriculture-based tourism and community and biodiversity conservation. The four factors account for 63.75% of the variance in the data, which is greater than the acceptable minimum in social science research, indicating a significant and reliable factor structure.

Additionally, the factor analysis revealed that environmentally sustainable practices were the most significant factor, accounting for the largest amount of variance (24.34%). The factor loadings for eco-friendly inputs, water conservation, soil management and waste management showed that using resources efficiently is critical to the sustainability of floriculture-based tourism. This suggests that floriculture systems in the Madurai district are ecologically sensitive and that environmental stewardship is a fundamental aspect of sustainable tourism. Empowering women is one of the most significant dimensions that affect tourism development. According to results from the regression analysis, women empowerment positively and statistically significantly influence floriculture-based tourism development ($\beta = .291$; $p < .001$). Therefore, women's participation in tourism activities, involvement in decision-making, control over income, and access to training contribute significantly to the development and sustainability of tourism initiatives. This indicates support for gender inclusive development theories that emphasize the importance of women's agency as a key driver for the sustainable transformation of rural areas.

Practices of environmental sustainability were found to be the strongest predictor of the floriculture-based tourism development ($\beta = .328$; $p < .001$). This indicates that environmentally friendly practices improve the attractiveness and long-term viability of tourism activities by protecting natural resources and maintaining an ecological balance. The degree of these statistic relationships demonstrates that sustainability is more about being ethical, but necessity, for the development of tourism in an agricultural area. Results indicate that the strong association between economic benefits and women's empowerment ($r = .648$, $p < .01$) supports the premise that the provision of income generation and job creation and market access improves individual and household socio-economic status of women. The economic benefits from the floral tourism industry enhance the financial independence and decision-making abilities of women by improving women's social and economic empowerment. This supports a livelihood-based perspective of empowerment and the argument that having access to an adequate income and/or stable source of income is necessary for women to have social and psychological empowerment.

Additionally, the strong correlation between community participation and biodiversity preservation and practising safe environmental practices ($r = .683$, $p < .01$) indicates that there is a reciprocal relationship between community and ecological stewardship. Communities with higher levels of awareness about biodiversity, cultural, and sustainable tourism are more likely to engage in effective environmental management and conservation practices. Therefore, there is

strong evidence to support the idea that community-based conservation approaches must be used to support sustained development of floral tourism systems. The combination of the findings illustrates a synergistic relationship among; Environmental Sustainability, Women Empowerment, Economic Benefits, and Community Conservation. The integration of the Hypothesis Test Results confirms that the floricultural tourism sustainability in Madurai district does not occur in isolation. Rather, it occurs within an interconnected system where environmental practice, gender inclusion, and economic incentives work to support each other. In addition, the High Explanatory Power of the Regression Model ($R^2 = 0.621$), indicates that the proposed framework provides a comprehensive understanding of the outcomes of Tourism Sustainability.

This study also contributes to the current research literature by providing regionally specific empirical evidence from Madurai district and by highlighting women farmers as the main players in making floriculture based tourism sustainable. The Study Highlights that both Government and Other Development Initiatives, designed to promote Rural Tourism, must simultaneously both Promote Environmental Protection, Women's Empowerment, and Community Participation to attain Long Term Sustainability.

Integration of Quantitative and Qualitative Findings This research employed a convergent mixed-methods approach using both quantitative and qualitative data as sources for analyses. Quantitative data provided measurable outcomes regarding the sustainability practices and levels of participation while qualitative findings presented a more in-depth perspective on participants' perceptions, obstacles, and possibilities. The integration of quantitative and qualitative data facilitated a comprehensive understanding of environmental sustainability in floriculture tourism in Madurai District.

Expectations and Implications

The research findings regarding the environmental sustainability of floriculture tourism in Madurai District are expected to result in practical, social and academic implications.

Practical Implications

Policymakers, Local Governmental Agencies, and Agricultural Extension Service Providers will have access to evidence-based research results that they can use to create strategies for improving sustainable practices in Floriculture and integration with Tourism. Additionally, the findings from this research will assist Tourism Planners and Operators in creating environmentally sound ways to operate their businesses in order to reduce the negative impact to the environment, such as: excessive use of water, soil degradation, and loss of species diversity. Furthermore, the research includes examples of best management practices for resource management that will allow Floriculture Farmers to implement environmentally sustainable methods without compromising their productivity.

Social and Economic Implications

The study highlights the critical role of female farmers in both floriculture and tourism sectors, providing evidence for developing programs and policy initiatives to empower and afford women enhanced decision-making and income opportunities.

Academic Implications

This study covers a current research gap by researching the intersection of agricultural floriculture with tourism and environmental sustainability in the Madurai District and provides an example of what future studies could look like in similar agrotourism contexts. Given the

methodology and sustainability assessment developed as part of the research effort, they can also be adapted/adapted to other floriculture clusters/rural tourism destinations. In addition, the results further contribute to the interdisciplinary literature on sustainable tourism, gender issues, and environmental management studies.

In summary, this research provides a framework for sustainable rural development and shows that floriculture-based tourism can achieve multiple objectives, i.e., economic, ecological/ environmental, and empowerment of women simultaneously.

Conclusion

This document discusses the socio-economic benefits of floriculture for women farmers within the Madurai District, who may benefit from the creation of jobs for themselves through floriculture and the development of incomes, culture and communities as a convergence of floriculture, rural tourism and agri-tourism. The current study has determined that unplanned or unsustainable tourist practices may have placed additional burdens on the environment, such as water availability, soil fertility and biodiversity resulting in threatened long-term environmental sustainability and availability of economic livelihood; thus limiting the empowerment of women farmers active within the floriculture industry.

The evidence from this research can assist policymakers, tourism developers and agricultural extension services in developing sustainable, community-centred models for floriculture and assist in addressing environmental sustainability, women's involvement and community practices. Therefore, when certain sustainability-based criteria have been achieved floral tourism has the potential to be environmentally sustainable and economically sustainable. Overall, findings from this research indicate the need to incorporate eco-friendly practices, empower women, involve local communities in order to have a long-term sustainable model of floricultural tourism within the Madurai District.

There are a number of recommendations of ways to sustain the synergistic relationship between florist and tourism in Madurai District based on study results to consider.

Promote Sustainable Floriculture - Farmers can be encouraged to use organic farming practices, conserve water, improve soil health and consider biodiversity as it relates to floral production to reduce their negative impacts to the environment, while maintaining long-term p Empowering Women through Skills Development and Leadership. Women farmers must be given greater access through established training and skills development programs that will create the capacity for their full participation in planning, managing, and making decisions in tourism and therefore enhance their economic independence and social empowerment.

1. Sustainable Tourism Development. Farm visits, floral workshops, and cultural experiences should all be conducted with a low impact on the environment, while increasing visitors' participation and awareness of these aspects of tourism.
2. Working Together and Cooperating as a Community. By developing new cooperative (or producer) models and self-help groups (SHGs), agricultural tourism, floriculture, and local culture can be integrated and promote community ownership, shared benefits, and social connections.
3. Government Policy Support and Institutional Linkages. Government policies, including some type of financial assistance and access to technical resources, should be used to create new guidelines, support and funding mechanisms for sustainable floriculture and tourism operations.
4. Sustainability Monitoring and Evaluation. New sustainability assessment tools must be developed to help guide environmental, economic, and social performance, which can then be

used to improve and adapt to the changing needs of the tourism industry while providing for sustainable tourism development.

5. These strategies can help transform the Madurai district into an exemplary model of sustainable floricultural tourism, thereby providing a basis for environmental stewardship, economic development, and empowerment of women. productivity from their farm.

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