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Can Low-Carbon Tourism Awareness Promote Rural and Ecological Development, Create Safe Leisure Spaces, and Increase Public Happiness? A Discussion from the Perspective of Different Stakeholders

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Abstract: This study analyzed the effects of low-carbon tourism awareness, attitudes, and behaviors on the development of villages in the catchment area of Erhai Lake in China. We quantitatively analyzed data from 828 valid questionnaires in IBM SPSS 26.0 using Pearson correlation analysis. Thereafter, we interviewed nine respondents, including scholars, seniors, tour guides, and local businessmen, about the results. Finally, we summarized the data and subjected them to multivariate analysis. The results revealed that low-carbon tourism education and promotion increased public recognition of the need to protect the environment by using low-pollution transportation, staying close to home, and buying minimally packaged goods to create a safe leisure environment. However, many tourists are not willing to accept having to increase their budgets for accommodations, food, and living to engage in low-carbon tourism. Therefore, we suggest that increasing incentives to encourage the public to engage in low-carbon tourism and other consumption behaviors may help reduce the damage to the ecological environments of catchment areas, improve the village's economic development, and promote the sustainable development of the catchment area.

Keywords: water catchment area; low-carbon tourism; countryside; natural ecology; sustainability

Citation: Lin, H.-H.; Ling, Y.; Chen, I.-S.; Wu, P.-Y.; Hsu, I.-C.; Hsu, C.-H.; Zhang, S.-F. Can Low-Carbon Tourism Awareness Promote Rural and Ecological Development, Create Safe Leisure Spaces, and Increase Public Happiness? A Discussion from the Perspective of Different Stakeholders. *Water* **2022**, *14*, 3557. https://doi.org/10.3390/w14213557

Academic Editor: Dedi Liu

Received: 12 August 2022
Accepted: 3 November 2022
Published: 5 November 2022

1. Introduction

Most lakes are located on plateaus or in hilly terrain, surrounded by mountains, with a wide catchment area home to abundant forests, ecosystems, and water resources, serving as the main source of fresh water and the lifeblood of human civilization [1]. Because of the abundant forests and water resources around the lake, the climates of catchment areas are often mild and suitable for various types of ecological development [2], and humans use technology and construction to concentrate and collect water resources. In addition to playing key roles in water harvesting, flood control, domestic water intake, irrigation, fishing, and hunting [3], lakes also serve as sources of hydroelectric power and play key roles in recreation and tourism [4]. Governments rely on lakes to provide sufficient freshwater resources and use lakes and surrounding natural ecological resources to promote the tourism industry, enhance the quality of public life, and support sustainable village development [5].

Erhai Lake, located in Dali City, Yunnan Province, is the seventh-largest freshwater lake in China and is situated within a national nature reserve and a national scenic area

(Figure 1) [6]. Because of the abundant water resources and ecological diversity in the Erhai scenic area, Erhai Lake can provide fish and water for agriculture, industry, and domestic use. The government actively invests in maintaining the lake's water quality as well as renovating public facilities, protecting the nearby national forest park, and promoting rural development in the area [7]. The rich leisure and tourism resources available in the area help promote local development [6,7]. Erhai Lake generates US$20.19 billion in output value, increases local GDP growth by 9.5%, and has created 35,000 jobs [8]. Dali City has a population of 652,708 and attracts up to 13.8952 million tourists [6]. The city and its surrounding areas therefore serve not only as a popular tourist destination but also as a major source of water resources and the site of many job opportunities and leisure and entertainment venues [6–8].

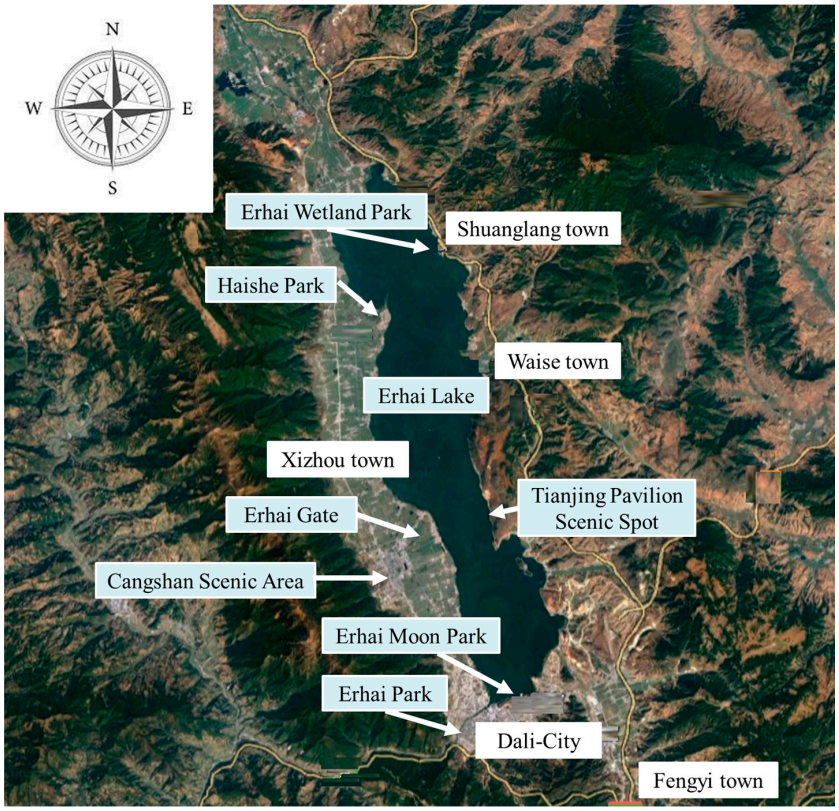

Figure 1. Erhai Lake catchment area and surrounding villages.

Technological advancements have brought tremendous cultural changes worldwide, as well as improvements in public infrastructure, medical facilities, and living standards, increased awareness of leisure and tourism, and social and economic development [9]. However, the excessive use of nonrenewable energy, especially for construction, industrial development, and leisure and tourism activities, has brought about a crisis of resource scarcity [10]. Although tourists bring income and economic opportunity to villages [11], they also contribute to pollution in the villages and their environs, especially through littering and increased carbon emissions [12]. This pollution negatively affects local water and air quality and damages natural ecological and living environments [13,14]. As of 2021, China remains the world's leading carbon emitter, accounting for 31% of the world's carbon emissions [15]. In addition, the world is inundated with plastic waste: from 1950 to 2017, 9.2 billion tons of plastic were produced, and researchers have predicted that 34 billion tons of plastic waste will have been produced by 2050 [16]. As of 2022, the population of China uses 46 kg of plastic per capita per year, generating 110 million tons of plastic waste [17]. In the Erhai Lake catchment area specifically, tourism development has resulted in overuse of lake water, river pollution, reductions in the number of species, changes

in industrial technology, and gaps between urban and rural development, which have caused problems [18]. If these problems go unaddressed, they will negatively affect the lake and its surrounding villages, damaging the environment and individual ecosystems therein, destroying ecological habitats, and reducing the quality of life in and hindering the sustainable development of the villages in the area [19,20]. Therefore, although sustainable tourism development can benefit the local economic, social, environmental, and ecological development of villages [21], it may still have negative effects, such as the shrinkage of arable land and the destruction of vegetation [22,23]. Finding a suitable balance between the preservation of lake water resources and economic development is crucial to the sustainability of development in catchment areas.

Low-carbon tourism refers to tourism with a low carbon footprint [24]. The low-carbon economy resulting from low-carbon tourism awareness is conducive to low energy consumption, low emissions, and low pollution [25]. Promoting low-carbon tourism awareness helps promote general environmental awareness [26] and encourages members of the public to prioritize minimal environmental pollution when consuming goods and services [27]. Changing the behaviors of residents and tourists can effectively reduce environmental and ecological damage in communities [23], thus facilitating the construction of safe recreational spaces in villages, helping residents maintain their quality of life [28] and achieve a sense of well-being [29], and promoting sustainable development [30]. However, the goals and practical outcomes of decisions related to sustainable development are often misaligned [31]. These misalignments may be caused by human or other factors and may ultimately produce positive or negative effects [11,12]. Furthermore, some scholars have argued that the optimal solutions to problems require time to determine [13,14] and may depend on the perceptions of actual stakeholders [23,30,31]. Residents of an area can provide insight into their perspectives on the local development and changes in the local status quo [32], whereas tourists can provide insight into their perspectives on the effectiveness of certain decisions and developments [33]. After collecting data from residents and tourists, we compiled, categorized, and compared [34] the data using a multiperspective methodology [35,36] to obtain practical insights and develop suggestions for different stakeholders [37,38]. Most studies on lakes in highly polluted environments have focused on heavy-metal and wastewater pollution [39,40], and most studies on low-carbon tourism awareness, attitudes, and behaviors have focused on topics such as resident identity [41], consumption strategies [42], cultural tourism [43], the social responsibility of travel enterprises [44], and the experiences of tourists [45]. However, few studies have explored these topics in relation to Erhai Lake [23].

To address this gap in the literature, in the present study, we investigated the effects of low-carbon tourism awareness, attitudes, and behaviors on the economic and ecological development of villages in the Erhai Lake catchment area by employing a mixed methodology. The results of the present study may serve as a reference in efforts to reduce the negative effects of tourism development on the ecological environment of the Erhai Lake catchment area and to achieve a balance between sustainability and economic benefits in the local tourism industry.

2. Literature Review

2.1. Effects of Low-Carbon Tourism Awareness, Attitudes, and Behaviors on the Development of Water Catchment Areas

Low-carbon tourism is a form of tourism that focuses on minimizing environmental damage and carbon emissions through the selection of low-carbon activities and the establishment of carbon budgets [28,46]. Scholars have argued that if people are aware of low-carbon tourism, they can establish more environmentally friendly attitudes and habits [47]. When people have sufficient knowledge of carbon reduction strategies or low-carbon activities, they tend to invest in tourism activities with minimal carbon emissions [48]. Being aware of the need to minimize carbon emissions and prioritizing accordingly can influence an individual's actual consumption decisions, motivating them to purchase low-carbon

goods and partake in low-carbon tourism [47,49]. Therefore, we speculated that analyses of the low-carbon tourism awareness, attitudes, and behaviors of residents and tourists can provide insights into local public life and tourism and consumption patterns as to their effects on the development of villages and the surrounding ecological environments.

Some scholars believe that low-carbon tourism is based on an awareness of tourist resources and the need to minimize carbon emissions [46] and on tourists' prioritization of environmental conservation, experiences, and affordability [47] and subconscious consumption behaviors rooted in brand loyalty, consumption attitudes, and emotional preferences [47–49]. The establishment of carbon awareness and low-carbon consumption behaviors among residents and tourists in the Erhai Lake catchment area might be expected to positively affect ecological and environmental conservation in the area; however, the environmental awareness and decisions of people of different backgrounds, particularly as they relate to their personal lives and tourism-related needs, vary widely [33]. Therefore, the low-carbon tourism model is not acceptable to all tourists [49]. We hypothesized that the low-carbon tourism awareness (H1), attitudes (H2), and behaviors (H3) of different members of the public would vary.

2.2. Effect of Tourism Development on Public Perceptions of the Development of Catchment Areas

Tourism impact awareness refers to public perceptions of changes in the state of economic, social, environmental, and ecological development in an area after local resources such as culture, industry, natural environments, and wildlife are used to promote tourism and local development [12,13]. Some scholars believe that tourism impact awareness can mediate the effect of tourism development on villages and the surrounding ecological environments [33]. This is because sustainable tourism development can promote the economic development of villages, enhance residents' quality of life (e.g., by facilitating community building and increasing the scale of public works), satisfy the consumption demands of tourists, and encourage the preservation of local culture and historical sites [12,13,30]. Sustainable tourism development in catchment areas can also minimize the environmental damage caused by tourists to such areas and enhance residents' awareness of ecological and environmental conservation [33].

Sustainable tourism development influences village economies in terms of common values, industry, construction, and overall development [50]. It is conducive to community building, the cultivation of positive recreational atmospheres, and cultural preservation [28]; drives improvements in tourism facilities and recreational environments [13]; and can reduce air and water pollution and habitat destruction [30]. Analyzing the impact of tourism from the perspectives of residents and tourists can elucidate the impact of catchment areas on the economic and ecological development of the villages therein [33,50]. However, because of the differences in the personal lives and tourism-related demands and decisions among people of different backgrounds [33], not everyone can benefit from the economic and ecological development of villages [13]. In our study, we assumed that public perceptions of villages' current economic, social, environmental, and ecological statuses would vary. Therefore, we hypothesized that low-carbon tourism (H1), attitudes (H2), and behaviors (H3), as well as perceptions of village economic (H4), social (H5), environmental (H6), and ecological development (H7), would vary accordingly among different stakeholders.

2.3. Effects of Low-Carbon Tourism Awareness, Attitudes, and Behaviors on the Economic, Social, Environmental, and Ecological Development of Villages

Some scholars have argued that increasing public awareness of low-carbon tourism and encouraging the public to engage in relevant behaviors can minimize the negative effects of tourism development [46]. The higher an individual's awareness of low-carbon consumption, the more they will strive to minimize their consumption of high-carbon goods and services [51], and the more likely they are to prioritize minimizing their personal carbon consumption and patronize low-carbon enterprises [52]. The more frequently people prioritize minimizing their carbon footprint during travel, the more negative effects

of tourism development can be mitigated [53]. Ultimately, sustainability is conducive to the economic and ecological development of villages because sustainable development (and, in turn, low-carbon tourism) is not limited by its own ecological consequences [54].

The predicted and actual outcomes of decisions are often misaligned [55]. Some researchers have argued that even low-carbon tourism awareness, attitudes, and behaviors cannot influence the economic, social, environmental, and ecological development of villages. Therefore, we hypothesized that low-carbon tourism awareness, attitudes, and behaviors would have no significant impact on the economic (H8-1), social (H8-2), environmental (H8-3), and ecological (H8-4) development of villages.

3. Methods

3.1. Framework and Hypotheses

In this study, we investigated whether promoting low-carbon tourism awareness could help cultivate safe leisure environments in catchment areas and promote the sustainable development of villages and the preservation of natural ecological environments in such areas. We first evaluated the participants' perceptions of public low-carbon tourism awareness, attitudes, and behaviors [46–48] and subsequently evaluated their perceptions of economic, social, environmental, and ecological development in villages [12,13,30,33,50]. Thereafter, we analyzed the effect of low-carbon tourism awareness, attitudes, and behaviors on the economic, social, environmental, and ecological development of villages in a catchment area [46,51–55]. Finally, we determined the effects of low-carbon tourism awareness, attitudes, and behaviors on the sustainable development of the economies and ecological environments of villages. The research framework is illustrated in Figure 2.

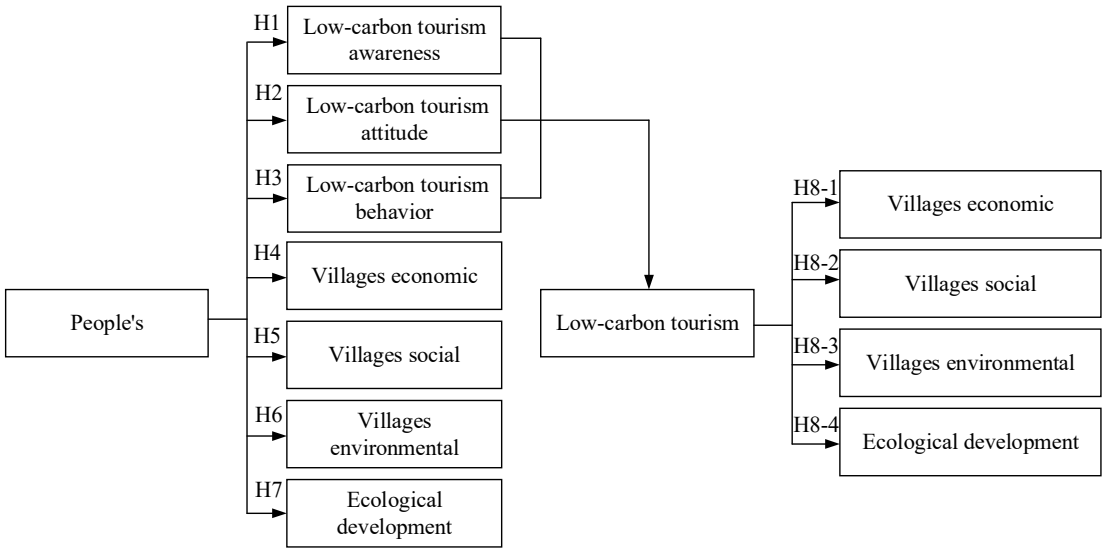

Figure 2. Study framework.

On the basis of our literature review, we established eight hypotheses.

Hypothesis 1 (H1). *Different stakeholders' understandings of low-carbon tourism would not differ significantly.*

Hypothesis 2 (H2). *Different stakeholders' attitudes toward low-carbon tourism would not differ significantly.*

Hypothesis 3 (H3). *Different stakeholders' low-carbon tourism behaviors would not differ significantly.*

Hypothesis 4 (H4). *Different stakeholders' understandings of village economic development would not differ significantly.*

Hypothesis 5 (H5). *Different stakeholders' understandings of village social development would not differ significantly.*

Hypothesis 6 (H6). *Different stakeholders' understandings of village environmental development would not differ significantly.*

Hypothesis 7 (H7). *Different stakeholders' perceptions of ecological development in the catchment area would not differ significantly.*

Hypothesis 8 (H8). *The effects of different stakeholders' low-carbon tourism awareness, attitudes, and behaviors on their perspectives on village economic (H8-1), social (H8-2), environmental (H8-3), and ecological (H8-4) development would not differ significantly.*

3.2. Process, Methods, and Limitations

In this study, we employed a mixed methodology [54] to address the theoretical or methodological deficiencies of previous studies [56,57]. The questionnaire used to assess low-carbon tourism awareness, attitudes, behaviors, and perspectives on the economic, social, environmental, and ecological development of villages was developed with reference to the literature on low-carbon tourism awareness [46–48] and tourism development [12,13,30,33,50]. Four scholars with expertise in tourism management, consumer behavior, environmental management, and decision analysis were invited to review the content of the questionnaire. After developing the preliminary questionnaire, we collected 100 questionnaires and analyzed the reliability of the questionnaire by using SPSS 26.0. The alpha coefficients of the total scale and its structural components were over 0.8 and 0.7, respectively, indicating good internal consistency and reliability [58]. After the official questionnaire was established, we tasked a research assistant with conducting an on-site and online survey of 1000 participants from January to March 2022. After excluding inappropriate samples, we obtained 828 valid questionnaires (for an 82.8% valid response rate) and the collected data were subjected to basic statistical validation and Pearson's correlation analysis. We interviewed 12 respondents, including academics, tour guides, travel agents, seniors, hoteliers, restaurant owners, residents, and tourists, to gather their opinions on the results of the analysis. Finally, we summarized, categorized, compiled, and compared the data [36] and subsequently subjected them to multivariate analysis [37,38].

Because the COVID-19 pandemic was ongoing in China at the time of the survey and the team's access to human and material resources and funding was limited, the present study may have been limited in terms of location, depth, and breadth, which may have resulted in an inadequate sample size or inaccurate findings.

3.3. Tools

The questionnaire was used to gather the respondents' background information and to assess their low-carbon tourism awareness, attitudes, and behaviors and their awareness of village economic, social, environmental, and ecological development. The background information was divided into two parts, namely gender and identity. Some scholars have suggested that regional studies should employ at least 500 samples [57]; others have proposed a minimum of 300 valid samples [58,59]. Of the 828 respondents, 44.9% (n = 372) were residents, and the remaining 55.1% (n = 456) were tourists; 54.3% were women, and the remaining 45.7% were men. Therefore, we determined that the sample of our study was sufficiently large.

The respondents' low-carbon tourism awareness of, attitudes toward, and behaviors in relation to economic, social, environmental, and ecological development were rated on a 5-point Likert scale. Responses of strongly disagree and strongly agree corresponded to 1 and 5 points, respectively. The respondents' characteristics and the questionnaire's reliability are summarized in Table 1.

Table 1. Overview of experts' and respondents' backgrounds and questionnaire reliability analysis.

Facet (α)	Low-carbon tourism (0.952)					
	Topic	α	KMO	Bartlett (χ^2)	DF	*p*
Low-carbon tourism awareness (0.878)	Bringing your own ecofriendly tableware	0.861	0.869	1753.102	15	***
	Refraining from littering	0.855				
	Bringing your own toiletries	0.834				
	Selecting low-carbon accommodations and restaurants	0.865				
	Using public transportation	0.872				
	Purchasing minimally packaged goods	0.870				
Low-carbon tourism attitudes (0.880)	Using low-pollution transportation	0.869	0.774	594.377	6	***
	Bringing your own shopping bags	0.872				
	Destroying the environment	0.874				
	Purchasing seasonal food or products	0.872				
Low-carbon tourism behaviors (0.953)	Bringing your own ecofriendly tableware	0.870	0.869	1859.101	15	***
	Purchasing ecofriendly products	0.872				
	Bringing your own toiletries	0.875				
	Selecting a hotel close to the travel destination	0.915				
	Using less fuel-efficient transportation	0.938				
	Purchasing locally produced products	0.942				
	Awareness of village ecological and environmental development (0.950)					
	Topic	α	KMO	Bartlett (χ^2)	DF	*p*
Village economic development (0.906)	Increases in employment opportunities	0.891	0.859	1543.662	15	***
	Effective integration of local characteristics and industries	0.886				
	Increases in tourism and construction	0.883				
	Increases in leisure and entertainment opportunities	0.888				
	Increases in standards of medical and health care	0.893				
	Development of protective policies	0.894				
Village social development (0.921)	Increases in tourism exposure	0.903	0.862	1795.092	15	***
	Improvements in the quality of tourism services	0.906				
	Increases in young people's willingness to return to their hometowns to promote development	0.911				
	Contributions of industries to local development	0.910				
	Development of traditional cultural activities	0.904				
	Enhancement of community self-governance	0.907				

Table 1. *Cont.*

Village environmental development (0.895)	Community environmental cleanliness	0.893	0.892	1269.512	15	***		
	Increases in public environmental literacy	0.863						
	Complete scenic trails	0.853						
	Increases in facility construction areas	0.852						
	Sufficient parking and rest facilities	0.844						
	Environment affected by tourists	0.848						
Village environmental and ecological development (0.800)	Polluted water sources	0.743	0.757	975.111	3	***		
	Polluted air	0.740						
	Overexploitation of vegetation and woodlands	0.708						
	Code	Gender	Specialty	Age	Code	Gender	Specialty	Age
Professionals or interviewees	P1	Male	Travel decisions	41	R3	Female	Restaurant business	50
	P2	Male	Tourism management	46	R4	Female	Tour guide	52
	P3	Male	Environmental management	45	R5	Male	Older adult	66
	P4	Male	Consumption behavior	49	T1	Female	Older adult	62
	R1	Female	Travel agency	53	T2	Female	Tourist	68
	R2	Male	Hotelier	58	T3	Male	Tourist	66

*** $p < 0.001$.

3.4. Ethical Considerations

The survey was conducted anonymously. We developed the questionnaire according to our review and analysis of the relevant literature and used content checking and reliability analysis to evaluate and refine the content of the questionnaire. During the sample collection process, the research assistant identified themself and stated to the respondent that the data would be presented anonymously; after the respondent's willingness to be interviewed was confirmed, the interview started. After the interview was completed, the research assistant reconfirmed the respondent's willingness to participate and have their data used in the study and reiterated that the data would be presented anonymously. Finally, all data were summarized, categorized, compared, and analyzed using a multiperspective research methodology [60]. Therefore, we followed [61,62]. The design of this study complies with the administrative Circular No. 1010265075 of the Department of Health of Taiwan's Executive Yuan [63] as well as Article 1004 and the main points of Article 1009 of the Civil Code of the People's Republic of China [64].

4. Analysis

4.1. Low-Carbon Tourism Awareness, Attitudes, and Behaviors

With regard to low-carbon tourism awareness, the respondents' highest and lowest average scores corresponded to the items regarding the purchase of minimally packaged goods (3.82) and the selection of low-carbon accommodations and restaurants (3.34), respectively. With regard to low-carbon tourism attitudes, the respondents' highest and lowest scores corresponded to the items regarding low-pollution transportation (3.78) and environmental damage (3.47), respectively. With regard to low-carbon tourism behaviors, the respondents' highest and lowest scores corresponded to the items regarding willingness to select a hotel close to the travel destination (3.85) and willingness to purchase ecofriendly packages (3.63), respectively. The respondents' perspectives on the selection of low-carbon accommodations and restaurants, damage to the environment, and the purchase of products with ecofriendly packaging differed significantly ($p < 0.05$), with the average score of the residents being the highest. Willingness to use public transportation and to bring reusable shopping bags differed significantly between the male and female respondents ($p < 0.05$); the women were more willing to use public transportation, and the men were more willing to bring reusable shopping bags. As shown in Table 2.

4.2. Awareness of the Economic, Social, Environmental, and Ecological Development of Villages

With regard to an awareness of village economic development, the respondents' highest and lowest scores corresponded to the items regarding the development of conservation policies (3.78) and improvement (3.69), respectively. With regard to an awareness of village social development, the respondents' highest and lowest scores corresponded to the items regarding the development of traditional cultural activities (3.88) and industries contributing to local development (3.69), respectively. With regard to an awareness of environmental development, the respondents' highest and lowest scores corresponded to the items regarding cleanliness in the community (3.91) and the adequacy of parking and rest facilities (3.65), respectively. With regard to an awareness of ecological development, the respondents' highest and lowest scores corresponded to the items regarding the contamination of water sources (3.78) and the overexploitation of vegetation and woodlands (3.76), respectively. The respondents' perspectives on improvements in the quality of tourism services, the promotion of public environmental literacy, and the contamination of water sources differed significantly ($p < 0.05$), with the average score of the residents being the highest. Perspectives on increasing employment opportunities, increasing tourism industry and construction, supporting young people's willingness to return to their hometowns, improving community self-governance, increasing public environmental quality, and overexploiting vegetation and forests differed significantly between the male and female respondents ($p < 0.05$), with the men feeling more strongly. As shown in Table 3.

Table 2. Analysis of low-carbon tourism awareness, attitudes, and behaviors.

			SD	Rank	Residents	Tourists	*p*	Male	Female	*p*
Low-carbon tourism awareness	Bringing your own ecofriendly tableware	1.048	3.74	4	3.79	3.71	0.888	3.75	3.74	0.542
	Refraining from littering	1.064	3.79	2	3.95	3.68	0.229	3.75	3.84	0.355
	Bringing your own toiletries	1.097	3.68	5	3.78	3.61	0.703	3.75	3.62	0.085
	Selecting low-carbon accommodations and restaurants	1.069	3.64	6	3.68	3.61	0.050 *	3.64	3.63	0.780
	Using public transportation	1.049	3.75	3	3.77	3.73	0.044	3.73	3.77	0.042 *
	Purchasing minimally packaged goods	1.022	3.82	1	3.83	3.81	0.507	3.79	3.84	0.507
Low-carbon tourism attitudes	Using low-pollution transportation	1.074	3.78	1	3.87	3.71	0.902	3.84	3.72	0.052
	Bringing your own shopping bags	1.004	3.67	2	3.81	3.56	0.721	3.70	3.64	0.003 *
	Destroying the environment	1.270	3.47	4	3.38	3.54	0.036 *	3.55	3.40	0.110
	Purchasing seasonal food or products	1.121	3.59	3	3.64	3.56	0.508	3.64	3.55	0.902
Low-carbon tourism behaviors	Bringing your own ecofriendly tableware	1.138	3.68	4	3.70	3.67	0.59	3.61	3.74	0.107
	Purchasing ecofriendly products	1.043	3.63	6	3.75	3.54	0.023 *	3.64	3.63	0.315
	Bringing your own toiletries	1.153	3.73	3	3.67	3.77	0.148	3.73	3.72	0.787
	Selecting a hotel close to the travel destination	1.042	3.85	1	3.87	3.84	0.813	3.91	3.79	0.225
	Selecting less fuel-efficient transportation	1.037	3.67	5	3.75	3.62	0.744	3.66	3.68	0.776
	Purchasing locally produced products	1.007	3.83	2	3.91	3.77	0.295	3.85	3.81	0.446

* $p < 0.05$

Table 3. Analysis of perceptions of village economic, social, environmental, ecological, and environmental development.

Facet	Topic	SD	M	Rank	Residents	Tourists	*p*	Male	Female	*p*
Village economic development	Increases in employment opportunities	1.039	3.76	2	3.69	3.82	0.061	3.80	3.72	0.043 *
	Effective integration of local characteristics and industries	1.112	3.69	5	3.62	3.75	0.736	3.72	3.66	0.847
	Increases in tourism and construction	1.036	3.70	4	3.78	3.63	0.850	3.75	3.65	0.045 *
	Increases in leisure and entertainment opportunities	1.006	3.74	3	3.78	3.71	0.589	3.77	3.71	0.293
	Increases in standards of medical and health care	1.087	3.65	6	3.74	3.58	0.894	3.73	3.59	0.077
	Development of protective policies	0.977	3.78	1	3.88	3.71	0.79	3.84	3.73	0.083

Table 3. *Cont.*

Facet	Topic	SD	M	Rank	Residents	Tourists	*p*	Male	Female	*p*
Village social development	Increases in tourism exposure	1.083	3.87	2	3.89	3.86	0.409	3.95	3.8	0.668
	Improvements in the quality of tourism services	1.041	3.75	4	3.92	3.61	0.020 *	3.81	3.7	0.063
	Increases in young people's willingness to return to their hometowns to promote development	1.019	3.78	3	3.75	3.81	0.995	3.92	3.67	0.005 **
	Contributions of industries to local development	1.054	3.69	6	3.77	3.61	0.393	3.75	3.64	0.371
	Development of traditional cultural activities	1.071	3.88	1	3.92	3.85	0.086	3.99	3.79	0.114
	Enhancement of community self-governance	1.035	3.71	5	3.83	3.62	0.617	3.78	3.65	0.007 **
Village environmental development	Community environmental cleanliness	1.014	3.91	1	3.92	3.90	0.969	4.06	3.79	0.129
	Increases in public environmental literacy	0.999	3.69	5	3.72	3.67	0.49 *	3.81	3.59	0.021 *
	Complete scenic trails	0.992	3.88	3	3.90	3.86	0.348	3.97	3.8	0.282
	Increases in facility construction areas	0.991	3.79	4	3.91	3.68	0.004	3.85	3.73	0.85
	Sufficient parking and rest facilities	1.018	3.65	6	3.80	3.54	0.907	3.74	3.58	0.208
	Environment affected by tourists	0.925	3.83	3	3.93	3.75	0.631	3.92	3.76	0.001
Village ecological development	Polluted water sources	1.019	3.78	1	3.84	3.73	0.18 *	3.92	3.66	0.135
	Polluted air	0.933	3.77	2	3.89	3.68	0.873	3.89	3.67	0.072
	Overexploitation of vegetation and woodlands	1.008	3.76	3	3.79	3.74	0.104	3.93	3.62	0.000 **

* $p < 0.05$; ** $p < 0.01$.

4.3. Analysis of Low-Carbon Tourism Awareness, Attitudes, and Behaviors in Relation to the Economic, Social, Environmental, and Ecological Development of Villages

The respondents' low-carbon tourism awareness, attitudes, and behaviors were significantly and positively correlated with their awareness of village economic, social, environmental, ecological, and environmental development ($p < 0.01$). Low-carbon tourism awareness, attitudes, and behaviors exerted the strongest effect on village economic development, and bringing ecofriendly tableware and toiletries, not littering, using public transportation, and spending money at ecofriendly restaurants and hotels exerted the strongest effect on village economic development. As shown in Table 4.

Table 4. Analysis of low-carbon tourism awareness, attitudes, and behaviors in relation to village economic, social, environmental, ecological, and environmental development.

Facet	Village Economic Development	Village Social Development	Village Environmental Development	Village Ecological Development
Low-carbon tourism awareness	0.471 **	0.415 **	0.423 **	0.337 **
Low-carbon tourism attitudes	0.487 **	0.428 **	0.447 **	0.357 **
Low-carbon tourism behaviors	0.506 **	0.440 **	0.469 **	0.356 **
Bringing your own ecofriendly tableware	0.402 **	0.365 **	0.376 **	0.281 **
Refraining from littering	0.411 **	0.357 **	0.384 **	0.234 **
Bringing your own toiletries	0.382 **	0.327 **	0.324 **	0.241 **
Selecting low-carbon accommodations and restaurants	0.425 **	0.356 **	0.400 **	0.318 **
Using public transportation	0.431 **	0.382 **	0.419 **	0.375 **

** $p < 0.01$.

4.4. Discussion

4.4.1. Perceptions of Low-Carbon Tourism Awareness, Attitudes, and Behaviors of People in the Catchment Area

Water catchment areas have various functions, such as water storage, irrigation, and power generation, that are crucial to human survival and development. Local governments implement carbon reduction initiatives [12] and draw on the advantages of the diverse ecological characteristics of catchment areas to provide tourists with high-quality tourism experiences [33], thereby improving residents' quality of life [32]. In the Erhai Lake scenic area, the government has established tourist attractions (P1) around the lake and corresponding transportation plans (P2). Local businesses have also established accommodations and tourism activities in the vicinity (P3, R1, and R2) to enhance the convenience and diversity of tourists' travel experiences and promote consumption (T1 and T2). We concluded that such efforts may help increase the willingness of people to remain and spend money at nearby tourist destinations, buy minimally packaged goods, and use low-pollution transportation to minimize ecological and environmental damage in the water catchment area.

To support low-carbon tourism and environmental protection efforts, many hotels have simplified the equipment they provide and reduced their use of disposable tableware and plastic bags, which has made travel less convenient. However, during the COVID-19 pandemic, concerns about the hygiene and safety of shared meals (T1–T3) and the public's awareness of bringing their own toiletries (T1, R4) were low. Ecofriendly packaging was not considered durable enough (T1), and the products' appearances were not recognizable or attractive (T2 and T3). Therefore, we concluded that such factors would not help encourage people to spend money at low-carbon hotels and restaurants.

The women in our study exhibited strong purchasing power, a high willingness to consume, and high consumption frequency (R1, T1); purchased various types of goods; and appreciated high-density public transportation, which could minimize additional trans-

portation spending (T1 and T2). However, they reported being less physically active and less mobile when traveling, and the absence of an additional packaging service for products made traveling less convenient for them and reduced their willingness to consume (R4). The residents expressed that they preferred that visitors purchase ecofriendly products, stay in ecofriendly hotels, and spend money at low-carbon restaurants to minimize environmental damage. The residents were more concerned with consumption at low-carbon accommodations and restaurants and the purchase of environmentally friendly products to minimize environmental damage than the tourists. In addition, relative to the men, the women were less concerned about bringing their own shopping bags when shopping but more willing to use public transportation during their shopping trips.

4.4.2. Cognitive Analysis of the Economic, Social, Environmental, Ecological, and Environmental Development of Villages in the Catchment Area

Most tourism development is beneficial to the economic development of catchment areas and the surrounding villages [13,14,28]; it can enhance local governments' investment in, construction in, and economic development of such villages (P1 and P2) and help residents understand and appreciate the culture and the characteristics of local products (P4). Therefore, establishing a sound policy based on developing and protecting village tourism, enhancing the public's understanding of the importance of traditional cultural activities, and improving the cleanliness of the community and environment is crucial.

Because of differences in environmental literacy and awareness among tourists [13,21] and the unwillingness of residents to participate in village tourism projects (R1–R3), excessive tourism development in a catchment area can lead to rapid decreases in arable land, forests, and vegetation [22,23]. In addition, the oil pollution, noise, and waste generated by consumption can easily damage the environments and ecological habitats of villages and the surrounding areas (P1–P3, R3–R5). We concluded that most people feel that tourism development in villages not only fails to improve medical facilities and hygiene but also accelerates the disappearance of existing vegetation and forest areas. In addition, it may cause water pollution and may not increase the profitability of tourism in such villages.

As the area of land available for development or use in a catchment area decreases, less space is available for investment and new construction (P2 and P3), which negatively affects the willingness of enterprises to invest in the area and is not conducive to the development of green tourism products or industries (P4). In addition, because of decreases in vegetation and forest land, safe and comfortable leisure spaces are gradually replaced by noisy tourist environments, which are not conducive to making female consumers feel safe and comfortable (R1, R3, and R4). This also reduces the opportunities for residents to start their own businesses (R1–R4) and is not conducive to improvements in the quality of public life or tourism (T1–T3), thereby conflicting with the principles of low-carbon tourism policies and development and failing to promote low-carbon tourism (P1 and P2). Therefore, although low-carbon tourism can improve the quality of tourism services, increase public environmental literacy, and help cultivate safe leisure and living environments, it may only deceive residents into thinking that the quality of village tourism services has improved and that public environmental literacy has increased and may not help truly change tourists' awareness of the need to minimize carbon emissions. Therefore, it may not address the problems of poor tourism services and facilities, few employment opportunities, insufficient community security, the unwillingness of young people to return to their hometowns, and water pollution.

4.4.3. Analysis of Low-Carbon Tourism Awareness, Attitudes, and Behaviors and the Economic, Social, Environmental, Ecological, and Environmental Development of Villages

The main purpose of the government's promotion of low-carbon tourism is to raise the public's awareness of the need to minimize carbon emissions [46–48] and willingness to adjust their consumption behaviors accordingly (P1–P4). The accessibility of low-carbon tourism can increase the attractiveness of tourism as well as tourists' willingness to consume and promote economic development. Ultimately, low-carbon tourism awareness, attitudes,

and behaviors significantly and positively affect the economic, social, environmental, and ecological development of villages.

When people are more aware of low-carbon tourism, they engage in low-carbon tourism behaviors, such as reducing their use of disposable tableware and toiletries and using public transportation and reusable shopping bags. Such behaviors minimize the waste, pollutants, and carbon emissions generated by tourism development, thus minimizing ecological and environmental damage to the area. This helps preserve ecological diversity, which enhances the attractiveness of the area as a tourist destination; the resulting increase in visitors can help locals reap the benefits of sustainable economic and ecological development. Therefore, low-carbon tourism awareness, attitudes, and behaviors exert a positive effect on the economic development of villages.

5. Conclusions and Suggestions

In this study, we discovered that when people are urged to bring their own toiletries and shopping bags, buy ecofriendly goods, minimize their production of waste and pollution emissions, and increase their awareness of low-carbon tourism, their resulting actions can contribute to the economic, social, environmental, and ecological development of the villages in a catchment area. However, the quality of environmentally friendly hotels, restaurants, and related products, as well as the designs and appearance of low-carbon products and packaging, must be further improved. The careful development of existing vegetation and forests will be conducive to sustainable tourism development and the establishment of new tourist attractions. Increasing public environmental literacy, reducing tourism waste, reducing sewage discharge, encouraging investment, creating new tourist attractions and industries, increasing employment, replenishing manpower in the security and industrial sectors, and increasing the willingness of young people to invest in developments in their hometowns can help contribute to the construction of safe leisure spaces in catchment areas and the villages therein and promote sustainable development. On the basis of the results and limitations of the present study, we developed the following recommendations for governments and institutions, enterprises and the public, and researchers.

5.1. Governments and Institutions

The government must improve existing public infrastructure and tourism facilities and plan to develop more tourist attractions. Thereafter, the government should focus on attracting foreign investment, diversifying local industries, and protecting job opportunities for residents. In addition, the government should continue to promote low-carbon tourism awareness and strengthen relevant policies.

5.2. Enterprises and the Public

Enterprises must increase the diversity of the tourism products available and improve the quality of the services they offer to make tourism more attractive. They should also collaborate with residents to develop new tourism activities and business opportunities by using existing industrial products or cultural characteristics. Members of the public should actively participate in tourism development, learn and apply new skills, develop low-carbon tourism activities and products, and expand their personal wealth and business opportunities.

5.3. Directions for Future Research

In the future, researchers should explore the results of the present study in relation to other countries and regions. Our questionnaire can also be applied in future studies with larger sample sizes to analyze differences in awareness, attitudes, and behaviors among individuals of different backgrounds, including different ages and occupations.

Author Contributions: Conceptualization, H.-H.L. and I.-C.H.; methodology, Y.L.; software, I.-S.C.; validation, H.-H.L., I.-C.H. and C.-H.H.; formal analysis, H.-H.L.; investigation, H.-H.L.; resources, P.-Y.W.; data curation, S.-F.Z.; writing—original draft preparation, I.-C.H.; writing—review and editing, C.-H.H.; visualization, H.-H.L. All authors have read and agreed to the published version of the manuscript.

Funding: This research received no external funding.

Conflicts of Interest: The authors declare no conflict of interest.

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