Explaining the Role of Geographical and Socioeconomic Factors in Shaping Perceptions and Conservation Orientation Toward Bamboo Forest Ecosystem Services: A Case Study in a Newly Industrialized Economy

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Abstract

This study explored perceptions and conservation orientations related to bamboo forest ecosystem services, and highlighted the influence of geographical and socioeconomic factors on respondents' subjective opinions. Unlike previous research focused on small-scale rural areas in developing countries, we expanded the scope to encompass an entire Nantou County, including cities, towns, and townships in a newly industrialized economy. The results indicate that respondents gave the highest ratings to several cultural services, which have been less emphasized in previous studies. Significant differences in perceptions among respondents from different backgrounds were observed for only a few specific ecosystem services. Moreover, while respondents recognized the importance of conservation, only a third expressed willingness to pay for ecosystem services. We emphasize that local residents' perceptions in the context of urbanization and industrialization represent a research gap that warrants thorough investigation. We also revealed a preference among respondents for supporting government-led bamboo forest protection through voluntary payments, offering valuable insights for decision-makers in designing fiscally sustainable development measures.

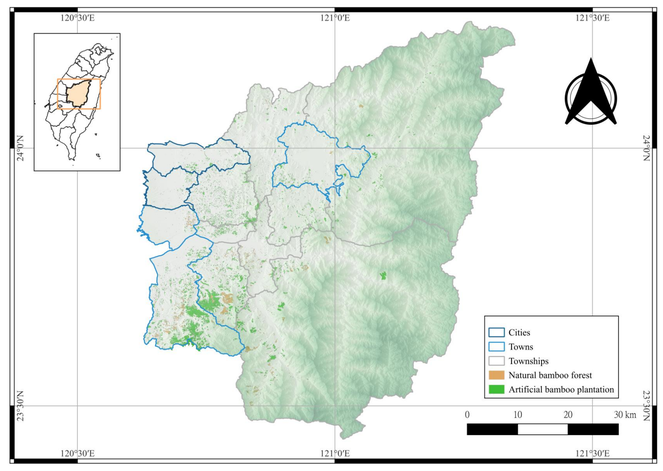

Fig 1. Study area

Methods

Research framework

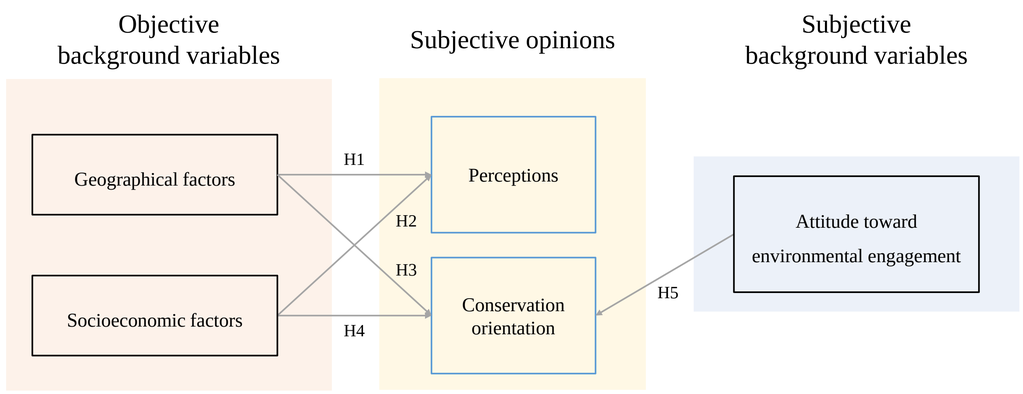

Fig 2. Research framework

The survey results were calculated using SPSS. We conducted descriptive statistics on respondents' perceptions and conservation orientation, followed by five hypothesis tests to provide inferential results regarding the relationships between their responses and geographical factors, socioeconomic factors, and attitudes toward environmental engagement.

Characteristics of respondents

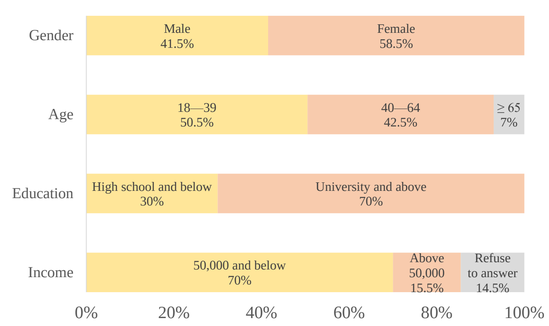

Fig 3. Socioeconomic factors of respondents

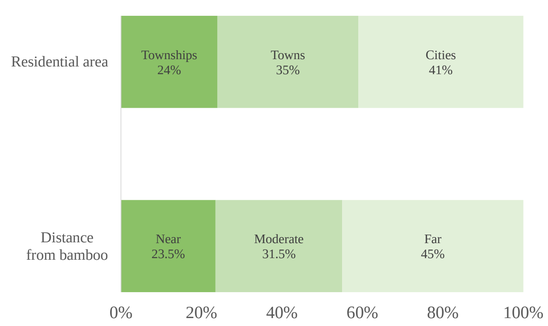

Fig 4. Geographical factors of respondents

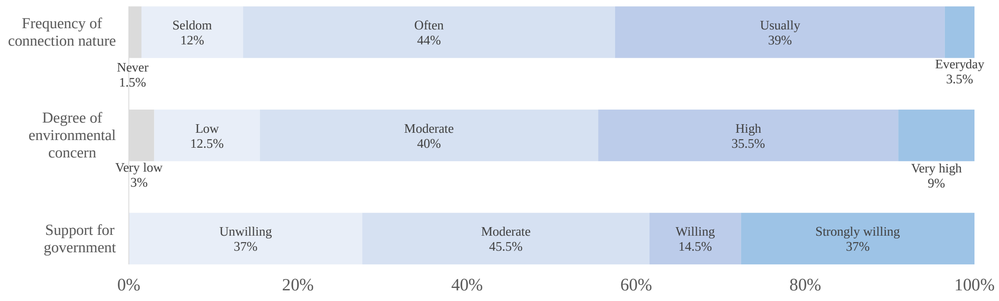

Fig 5. Attitude toward environmental engagement of respondents

Results

Perceptions

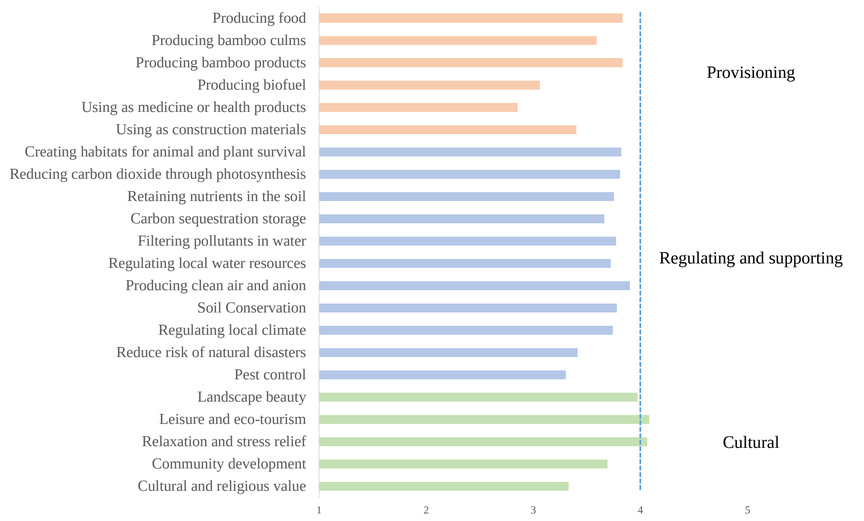

Fig 6. The average value of each item of ecosystem services

Producing food	3.83 ± 1.03	Regulating local water resources	3.72 ± 1.05
Producing bamboo culms	3.59 ± 1.07	Producing clean air and anion	3.90 ± 1.01
Producing bamboo products	3.83 ± 1.05	Soil Conservation	3.78 ± 1.08
Producing biofuel	3.06 ± 1.18	Regulating local climate	3.74 ± 1.14
Using as medicine or health products	2.85 ± 1.15	Reduce risk of natural disasters	3.41 ± 1.25* ※1
Using as construction materials	3.40 ± 1.17	Pest control	3.30 ± 1.17
Creating habitats for animal and plant survival	3.82 ± 1.04	Landscape beauty	3.97 ± 1.00
Reducing carbon dioxide through photosynthesis	3.812 ± 1.07	Leisure and eco-tourism	4.08 ± 0.97
Retaining nutrients in the soil	3.75 ± 1.01	Relaxation and stress relief	4.06 ± 1.00* ※2
Carbon sequestration storage	3.66 ± 1.12	Community development	3.69 ± 1.03
Filtering pollutants in water	3.77 ± 1.10	Cultural and religious value	3.33 ± 1.25

* p <= 0.05、** p <= 0.01 ※1 ※2 Geographical factors are significant

Table 1. The average value of each item of ecosystem services

Conservation orientation

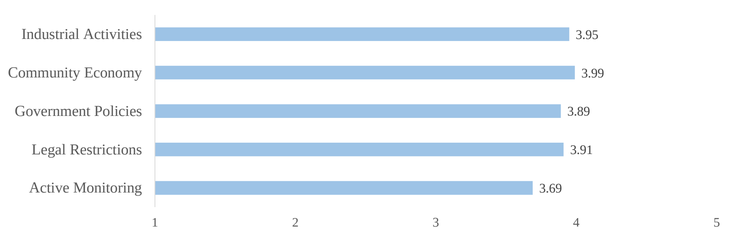

Fig 7. Conservation orientations mean

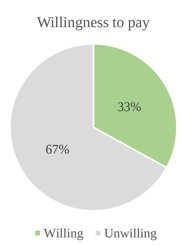

Fig 8. Percentage of willingness to pay

Fig 9. Price

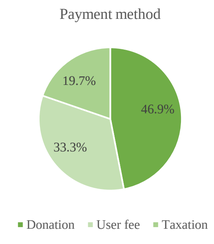

Fig 10. Payment method

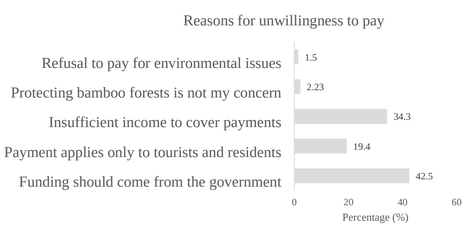

Fig 11. Reasons for unwillingness to pay

Variables		Model 1	Model 2	Model 3
Frequency of connection nature	Never			
	Seldom			
	Often	-0.23	-0.28	-0.183
	Usually			
	Everyday			
Degree of environmental concern	Very low			
	Low			
	Moderate	0.67**	.079**	0.70
	High			
	Very High			
Support for government	Strongly unwilling			
	Unwilling			
	Moderate	0.63*	0.58*	0.95*
	Willing			
	Strongly willing			
Residential category	Townships		Ref.	Ref.
	Towns		0.98*	0.76
	Cities		0.90	0.77
Distance from bamboo	Near		Ref.	Ref.
	Moderate		-.062	-0.36
	Far		-1.31**	-0.83
Education	High school and below			Ref.
	University and above			0.51
Income	50,000 or below			Ref.
	Above 50,000			-0.51
Age	18—39			Ref.
	40—64			0.28
	≥ 65			-1.27
Gender	Female			Ref.
	Male			0.85

* p <= 0.05、** p <= 0.01

Table 2. Comparison of willingness to pay for attitude toward environmental engagement, geography factors, and socioeconomic factors

Discussion

- Residents' evaluations of different ecosystem services are consistent and balanced.
- Residents in the study area gave higher ratings to cultural services.
- For the residents, the significance of bamboo lies not in subsistence but in enhancing comfort.
- Residents showed greater support for concrete and direct conservation strategies.
- Most residents believe that environmental protection should be government-led, with the associated conservation costs covered by the government.
- Establishing agencies may increase public willingness to pay, contributing to the sustainable management of bamboo forest ecosystems.

Conclusions

- Future policies should consider raising public awareness of bamboo forest ecosystem services and strengthening the government's leading role in supporting the sustainable management of bamboo forest ecosystems.
- In terms of policy formulation, respondents' inclination towards voluntary payment to support bamboo forest conservation can serve as a reference for designing fiscally sustainable development measures in the future.

References