

WHAT AFFECTS PUBLIC WILLINGNESS TO CONSERVE COASTAL AREAS?

Ryo Sakurai, Ritsumeikan University, Japan

Takahiro Ota, Nagasaki University, Japan

Takuro Uehara, Ritsumeikan University, Japan

Kenichi Nakagami, Ritsumeikan University, Japan

ryo223sak@gmail.com

Public involvement in conservation and management of coastal areas is important especially in those countries, such as Japan, where fishermen are decreasing. Both local residents living adjacent to the ocean and urban residents could contribute to sustainable management of coastal areas through various activities. In order to effectively foster public participation in sustainable management of coastal areas, factors that affect people's behavioral intentions for coastal conservation need to be identified. We conducted studies to understand cognitive factors affecting residents' 1) willingness to invest in time and efforts to make a coastal area a better place, and 2) willingness to make financial sacrifices for the sake of the coastal area. Questionnaire survey was distributed around Hinase Bay (western part of Japan). Total of 2,851 responses were collected. Multiple regression analysis revealed that residents' willingness to know more about wildlife of the coastal area had the strongest effect on their behavioral intentions for conservation of the coastal area. Our findings followed the findings of the previous study conducted in northern part of Japan and revealed that residents living in different regions showed similar cognitive mechanism regarding their intentions for conserving coastal areas. Suggestions for fostering public participation in coastal conservation included promoting wildlife and biodiversity of coastal ecosystems to residents. These outreach programs could increase residents' interests and curiosity toward wildlife which would consequently raise their willingness to contribute to coastal conservation.

Key words: behavioral intentions, coastal management, conservation, Japan, residents

I. INTRODUCTION

In order to sustainably and effectively manage coastal areas, participation of not only fishermen but also local residents is important. Local residents could contribute to sustainable management of coastal areas through volunteer activities, recreation, donation, consumption (of fishery) and/or actively participating to decision making process. Especially, in such countries like Japan, where fishermen are decreasing rapidly and population of rural areas including fishing hamlets are shrinking [1], encouraging citizen to get involved in coastal management has become critical.

While participation of local residents could be important for sustainable management of coastal areas, historically, research regarding fishery management were dominated by natural

science; such as understanding number and dynamics of fish [2]. Accumulating studies based on social scientific approach regarding sustainable and participatory management of coastal areas would be important to understand and predict success of effective coastal conservation.

In this study, we conducted a questionnaire survey to understand cognitive factors that influence residents' willingness to protect a coastal area. Based on our previous study conducted in Shizugawa Bay, northern part of Japan [3], we examined residents' perceptions in a different study site; Hinase Bay, western part of Japan. We aimed to understand factors that affect residents' willingness to conserve coastal areas and if they are similar throughout the region.

II. STUDY SITE

Hinase town is located in western parts of Japan, Okayama prefecture, in the coast of Setonaikai (Figure 1). Hinase is located in Bizen city and has a population of about 7,700 in 35.91 km². Fishery had been a thriving industry in Hinase and in 1800s, almost all the households were involved in fishery [4]. Although number of fishermen has decreased, fishery is still active around the Hinase bay.

Japan is famous for having many *Satoumi* sites (*Sato* means village and *umi* means ocean in Japanese) where people have been maintaining or improving the level of biodiversity and productivity through positive interaction of people and natural environment [5]. When water was once polluted by industrial wastes, the fish harvest decreased around Hinase region. In order to solve this issue, local fishermen in Hinase collaborated and started to sow eelgrass seeds which consequently succeeded in increasing the fish harvest [5]. Hinase is famous as a *Satoumi* site because of these efforts by fishermen, and for this reason, we selected Hinase as our study site.

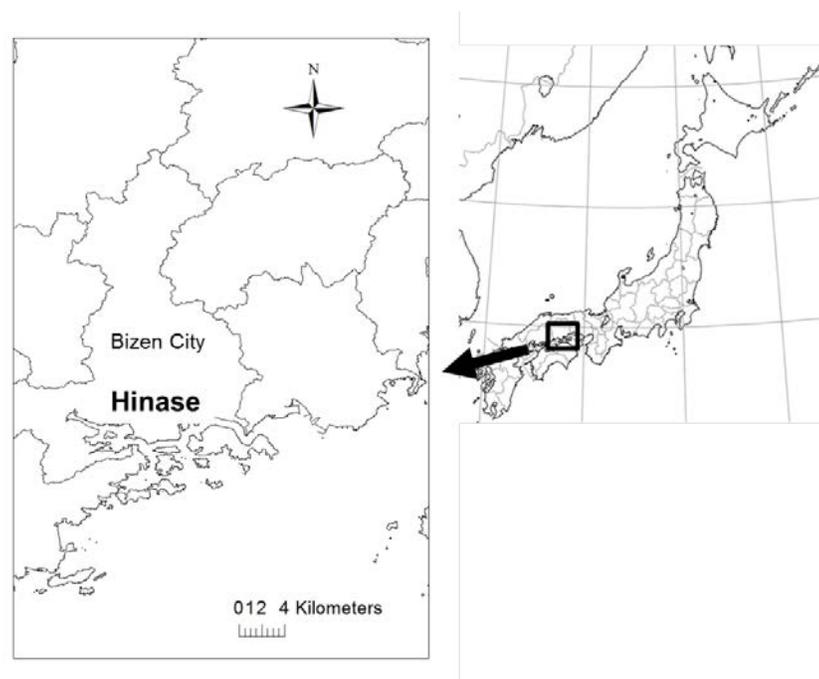


Fig. 1. Location of Hinase town, Okayama Prefecture.

III. METHODS

We asked a research company to distribute a web-based questionnaire to residents who were registered in the monitoring service of Yahoo!. Questionnaire was distributed to residents living 100km within the Hinase bay from February to March of 2015. We asked the research company to gain as many samples as possible within our budget limit reflecting the average distribution of the country gender-wise and age-wise.

As for questionnaire items, we prepared 41 variables including cognitive factors and socio-demographics (Table 1 and 2). We assumed that people's sense of place could affect their willingness to conserve the coastal area and utilized a scale developed by Arodin et al. (2012) [6] which have twenty three items consisted of biophysical, psychological, sociocultural, and political-economic variables. We also included four items measuring time-related factors; attitudes toward past and future generations. This is because previous studies revealed these time-related factors could influence people's willingness to conserve the area [7]. Other thirteen variables included socio-demographics, residents' experiences, and other cognitive factors.

Table 1. Questionnaire items prepared based on Arodin et al. (2012) and Sakurai et al. (2016).

Category	Items	Response scale
Biophysical variables	I think the nature of the coastal area is beautiful	1=Agree, 2=Slightly agree, 3=Neither option, 4=Slightly disagree, 5=Disagree
	I think it is good to have the coastal area's biodiversity (e.g. plants, animals, seaweed, fish, shellfish)	
	I think the wildlife of the coastal area is fascinating	
	I identify with the natural landscape of this place	
	I want to know more about the wildlife of the coastal area	
	I go on a hike to go bird-watching, look at wildflowers, or observe nature at the coastal area	
	I am strongly connected to the land and natural features that make up the coastal area	
	I like various outdoor activities that are available at the coastal area	
Political-economic variables	I am willing to invest my time and effort to make the coastal area a better place*	1=Agree, 2=Slightly agree, 3=Neither option, 4=Slightly disagree, 5=Disagree
	I am willing to make financial sacrifices for the sake of the coastal area*	
	I have a good job at the coastal area	
Socio-cultural variables	A lot of my friends connected to my life live in the coastal area	1=Agree, 2=Slightly agree, 3=Neither option, 4=Slightly disagree, 5=Disagree
	I am strongly connected to the culture of the coastal area	
	I have an extensive network of family and/or friends here	
Psychological variables	I get more satisfaction out of living in the coastal area than living anywhere else	1=Agree, 2=Slightly agree, 3=Neither option, 4=Slightly disagree, 5=Disagree
	The lifestyle in the coastal area generally reflects my beliefs and values	
	The coastal area is the best place for what I like to do	
	I am very attached to the coastal area	
	Living in the coastal area says a lot about who I am	
	Because of my lifestyle, the coastal area is important to me	
	I feel like the coastal area is a part of me	
	I would rather live in the coastal area than somewhere else	
Attitudes toward the past and future generation	I identify strongly with the coastal area	1=Agree, 2=Slightly agree, 3=Neither option, 4=Slightly disagree, 5=Disagree
	I hope that the future generation will feel attached to the coastal area	
	I want to preserve the coastal area in a good condition for the future generation	
	The current condition of the coastal area is preserved because of efforts made by the past generation	
	I can enjoy the service of the coastal area because the past generation preserved it	

*Items used as dependent variables (behavioral intentions) for the multiple regression analysis.

Table 2. Questionnaire items regarding socio-demographics factors and residents' experiences and cognitive factors prepared based on Sakurai et al. (2016).

Category	Items	Response scale
Socio-demographic variables	Gender	1=Male, 2=Female
	Age	Free answer
	Household annual income (yen)	1=Less than 2,000,000, 2=2,000,000~4,000,000, 3=4,000,000~6,000,000, 4=6,000,000~8,000,000, 5=8,000,000~10,000,000, 6=10,000,000~12,000,000
	Personal annual income (yen)	, 7=12,000,000~15,000,000
	Education level	1=Junior high school, 2=High school, 3=Technical college, 4=College, 5=University, 6=Graduate school
	Distance of residency from the coastal area (the Shizugawa Bay)	1=0~20km, 2=21~40km, 3=41~60km, 4=61~80km, 5=81~100km
	Years of residency	Free answer
	The coastal area is familiar to me	1=Agree, 2=Slightly agree, 3=Neither option,
	I know about the coastal area	4=Slightly disagree, 5=Disagree
	I have been to the coastal area	1=Yes, 2=No
Experiences and cognitive variables	I have participated in volunteer activities related to the ocean (e.g. beach, seaside, at sea) before	1=I heard about it and know what it is, 2=I heard about it but do not know the meaning, 3=I never heard about it
	I heard about "Sato-umi" before	1=Once a week, 2=Once a month, 3=Once in half a year, 4=Once a year, 5=Once in a few years, 6=Once in five years, 7=Less than once in five years, 8=Never been

IV. ANALYSIS

In order to understand which factors affect residents' willingness to conserve the coastal area, we used two items; "I am willing to invest my item and effort to make the coastal area a better place", and "I am willing to make financial sacrifices for the sake of the coastal area" as dependent variables. We conducted a multiple regression analysis and used all thirty eight items as independent

variables to understand which of them affect residents' behavioral intentions. We used a stepwise method to identify the best-fit model that had 5% significance level in F-value. In addition, we used VIF (Variance Inflation Factor) to test intercorrelation among independent variables. For all analyses, we used SPSS 18 (IBM) and set statistically significant level as $p < 0.05$.

V. RESULTS

We received 2,851 replies and among them, 51.5% were male and 48.9% were female and average age was 45.9 years old. Among respondents, 16.1% lived within 20km of Hinase Bay, 19.9% between 21 and 40km, 21.2% between 41 and 60km, 21.2% between 61 and 80km, and 21.6% between 81 and 100km.

The stepwise multiple regression analysis identified a model with twelve independent variables explaining residents' behavioral intention to invest time and effort to conserve the coastal area had the best-fit (Table 3). VIF scores for three variables were more than 3 which implied that these items had potential of multicollinearity. The model had a high explanatory power (Adjusted $R^2=0.673$) and majority of dependent variable was explained by these twelve factors. The best-fit model identified by the stepwise multiple regression analysis to explain residents' behavioral intention to make financial sacrifices to conserve the coastal area included twelve variables that significantly influenced the dependent variable (Table 4). One variable had VIF score of more than 3 implying a potential of multicollinearity. This model also had a high explanatory power (Adjusted $R^2=0.598$) and majority of dependent variable was explained.

Table 3. Multiple regression analysis with residents' willingness to invest their time and efforts for conservation of the coastal area as a dependent variable and socio-demographic and cognitive factors as independent variables. *B*=standardized coefficient. n=2,581.

		<i>B</i>	p	VIF	R ²	Adjusted R ²
Biophysical variables	I want to know more about wildlife of the coastal area	0.208	<0.001	2.476	0.674	0.673
	I am strongly connected to the land and natural features that make up the coastal area	0.128	<0.001	2.482		
	I go on a hike to go bird-watching, look at wildflowers, or observe nature at the coastal area	0.061	<0.001	2.267		
	I like various outdoor activities that are available at the coastal area	0.196	<0.001	2.389		
	I think the wildlife of the coastal area is fascinating	0.076	<0.05	2.345		
Psychological variables	Because of my lifestyle, the coastal area is important to me	0.063	<0.01	3.586		
	The lifestyle in the coastal area generally reflects my beliefs and values	0.070	<0.01	2.961		
	The coastal area is the best place for what I like to do	0.071	<0.01	3.120		
	I identify strongly with the coastal area	0.083	<0.01	3.074		
Political-economic variables	I have a good job at the coastal area	0.059	<0.01	1.811		
Attitudes toward the future generation	I want to preserve the coastal area in a good condition for the future generation	0.045	<0.01	1.863		
Experiences	I have been to the coastal area	-0.043	<0.01	1.281		

Table 4. Multiple regression analysis with residents' willingness to make financial sacrifices for conservation of the coastal area as a dependent variable and socio-demographic and cognitive factors as independent variables. *B*=standardized coefficient. n=2,581.

		<i>B</i>	p	VIF	R ²	Adjusted R ²
Biophysical variables	I want to know more about wildlife of the coastal area	0.232	<0.001	2.146	0.600	0.598
	I am strongly connected to the land and natural features that make up the coastal area	0.107	<0.001	2.490		
	I go on a hike to go bird-watching, look at wildflowers, or observe nature at the coastal area	0.074	<0.001	2.261		
	I like various outdoor activities that are available at the coastal area	0.174	<0.001	2.461		
	I identify with the natural landscape of this place	0.050	<0.05	2.584		
	I feel like the coastal area is part of me	0.048	<0.05	3.228		
Psychological variables	The lifestyle in the coastal area generally reflects my beliefs and values	0.067	<0.01	2.951		
	I would rather live in the coastal area than somewhere else	0.059	<0.01	2.829		
Political-economic variables	I have a good job at the coastal area	0.088	<0.01	1.867		
Attitudes toward the future generation	I want to preserve the coastal area in a good condition for the future generation	0.064	<0.01	2.063		
Socio-demographic and cognitive variables	I know about the coastal area	0.056	<0.01	1.509		
	Age	0.036	<0.01	1.107		

VI. DISCUSSION

Results of the stepwise multiple regression analysis revealed that two independent variables that had the strongest influence on residents' willingness to conserve the coastal area (two dependent variables) were same; "I want to know more about the wildlife of the coastal area" and "I like various outdoor activities that are available at the coastal area". These imply that in order to foster residents' willingness to get involved in coastal conservation, it is effective to promote significance and attractiveness of wildlife and outdoor activities at the coastal area. Government officials and/or managers of coastal area could conduct outreach (such as distributing leaflets) to educate local residents regarding wildlife and to increase their curiosity toward nature of the coast. In addition, organizing participatory outdoor activities such as cleaning up the beaches and bird-watching would affect people's conservation intentions.

Our findings followed results of the previous study [3] conducted in different region of Japan (Shizugawa, norther part) which revealed that multiple biophysical variables had influence on residents' willingness to conserve the coastal area, and especially their intentions to know more about wildlife had the strongest effect. These imply that cognitive factors that influence residents' willingness to participate in coastal conservation have similar trend and people have similar cognitive mechanism throughout the region. Meanwhile, there were certain variables that affected residents' behavioral intentions for conservation which had no significant effect in the previous study. One of these variables was "I have a good job at the coastal area" which affected two behavioral intentions in this study. This implies that in Hinase and surrounding area, whether people area satisfied with the job they have at the coastal area affect their willingness to coastal conservation. When organizing outreach programs and/or participatory activities targeting residents, it would be important to consider the common factors that affect people's behaviors throughout regions and also specific factors that have particular effects at a certain region.

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