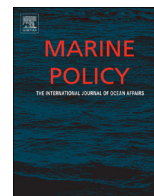




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# Factors affecting residents' behavioral intentions for coastal conservation: Case study at Shizugawa Bay, Miyagi, Japan



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## ABSTRACT

Stakeholders in coastal areas including fishermen and local residents could manage coastal ecosystems sustainably. However, in Japan, a majority of rural areas including mountainous villages and fishing hamlets are encountering depopulation and aging because of urbanization and an overall decrease of the country's population. This study's objective was to identify factors that affect local residents' behavioral intentions for coastal conservation. A questionnaire survey was conducted of residents living around Shizugawa Bay in Miyagi prefecture in northeast Japan. The findings revealed eleven variables that affected respondents' behavioral intentions to conserve the coastal area; furthermore, there were fourteen variables that affected their behavioral intention to make financial sacrifices. The respondents' willingness to know more regarding wildlife had the strongest influence on both of their behavioral intentions. Those who were willing to pay for coastal conservation were likely female, younger, had a higher annual household income, and lived farther from Shizugawa Bay. This study proposed that local stakeholders living adjacent to the coastal area could establish a funding system for conservation and sustainable management to which residents primarily living in cities could contribute.

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## 1. Introduction

Coastal ecosystems could be managed sustainably by stakeholders who include fishermen and local residents who have an understanding of and motivation to take care of these stocks [7,15]. Fishermen and fishing industries are directly involved in harvesting marine resources such as fish and shellfish. Fishermen play the important role of guardians and watch and conserve the coastal area [47]; without fishermen, the coastal sea could be used in a disorderly manner and consequently, could be destroyed. For instance, one case study in Hinase Bay of Okayama prefecture, in the western portion of Japan, revealed that local fishermen succeeded in increasing the fish harvest through sowing eelgrass seeds, which was once depleted by pollution [46]. Furthermore, local residents who utilize coastal ecosystem services through recreation, consumption, employment and other opportunities are also stakeholders in a coastal management; their behaviors and perceptions affect the decision making process ([26], p. 245). Previous studies revealed that both the biodiversity and the productivity (such as fish harvest) of the coastal area could be increased through active human engagement [46], Field Science

Education and Research Center of Kyoto University 2011). These coastal areas in which the level of biodiversity and productivity improved through positive interaction of people and the natural environment are called Sato-umi [46]. "Sato" means community, and "umi" means sea in Japanese. The Japanese government has been supporting the concept of Sato-umi and has declared the importance of appropriately protecting these socially and ecologically valuable areas [15].

In Japan, a majority of rural areas including mountainous villages and fishing hamlets are encountering depopulation and aging because of urbanization and an overall decrease of the country's population [20]. In addition, globalization fostered consumers to choose cheaper products including the imported fish making it challenging for local fishermen to compete with foreign counterparts [26].

A decline in the number of fishermen and a lack of successors as well as depopulation and aging of the overall society are the largest issues that fishing hamlets in most of the coastal areas in Japan encounter [33]. For example, in the Seto inland sea, rich in fishery products located in the western part of Japan, 0.1% of people living in the coastal area were fishermen (approximately 30,000 people), whereas 99.9%, nearly all 30 million people, were non-fishermen [46]. As this example tells, fishermen compose a very limited number of the local community in many parts of the coastal areas in Japan. In addition, a previous study revealed that

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urbanization led to public indifference toward fishing hamlets and fishing itself, resulting in a psychological distance between local fishermen (producers in fishing hamlets) and consumers in urban area [11]. Depopulation, aging, and lack of successors of rural fishing villages could eventually result in a loss of the traditional culture, which includes festivals and the local food culture [33].

In this study site, the Sanriku Coast located in the east northern region of Japan, fishery business stagnated with aging of fishermen and a lack of succession [29]. The situation worsened after the Great East Earthquake of March 11th, 2011. Nearly all fishermen in the area had damage to fishing boats and other equipment caused by the tsunami that occurred after the earthquake [29].

As depopulation and aging continue in fishing hamlets, the role of local residents living both near the coast and farther from the coast becomes greater in managing the coastal area and in keeping the positive human-nature relationship [40]. Local residents could both directly and indirectly affect the quality of the Sato-umi as those who are interested in fishing including the younger generation could become the potential successors in the fishing industry, those who use the coastal area for recreation could start volunteer activities for cleaning beaches, and those who do not necessarily visit the coastal area could make financial sacrifices for sustainable coastal management. To understand the possibilities of involving residents in marine conservation, first, it is critical to understand their perceptions and behavioral intentions toward conservation activities.

However, research regarding fishery management has been, for many years, dominated by natural scientists whose goals were primarily to understand the number and dynamics of fish and not how humans could manage marine resources [7]. The literature and research concerning the human dimensions of natural resource management of coastal areas, which include studies on understanding public perceptions and behaviors regarding marine conservation, are limited [7,45].

The objective of this study was to identify factors that affect local residents' behavioral intentions to conserve coastal areas and to suggest policies and environmental education for sustainable community-based management. Although a portion of this study was based on the framework of place connection (discussed in following chapters), other various variables that are important in a Japanese cultural setting were also included, which makes the analysis original and in contrast to previous studies. The findings of this study should reveal suggestions for effective participatory and sustainable coastal management, particularly in those areas that are encountering depopulation and aging. Managers could also use this knowledge to foster residents' pro-environmental behavior to help conserve coastal areas.

## 2. Previous studies and theoretical background

An adequate number of research studies have been conducted over the years all over the world to understand local residents' behaviors and behavioral intentions for coastal conservation and management. Tonge et al. [42] conducted a questionnaire survey of visitors of the natural coastal area in Australia and found that visitors' sense of place attachment directly affected their willingness to protect the area. Wynveen et al. [45] tested the usefulness of the value-belief-norm theory to predict stakeholders' intentions to engage in pro-environmental behavior in marine contexts in several countries including the US, and they suggested that increasing stakeholders' knowledge and awareness regarding their impact on the coast is necessary to foster positive behaviors. Another study in Australia revealed that various internal and external constraints such as doubt regarding the impact of individual effort and concern with financial costs exist as they relate the

behavioral engagement of conservation by residents of coastal communities [27].

In Japan, sociological and anthropological studies have been conducted to understand the culture and tradition regarding the relation between residents' lives and coastal management. A study in the northern area of Okinawa revealed that social norms and social relationships among local residents and fishermen generated the sense of responsibility to limit the harvest of marine resources, which enabled sustainable management [13]. Takasaki [38] studied the decision making process regarding the harvest of the sea urchin in the local society and found that local people's attitudes regarding learning from failure (e.g., taking an excessive quantity of urchins in one year) enabled continuous and resilient sea urchin fishery. Although these studies identified unique interactions between local residents and marine resources in certain traditional villages, to understand the feasibility of sustainable and participatory management in a broader coastal area, studies that target a larger population that allow a generalization of results are necessary. However, in Japan, a limited number of studies have been conducted to understand the perceptions and behaviors of a large number of local residents (e.g.,  $n > 500$ ) regarding coastal management. Therefore, few practical suggestions have been made for environmental education and policies to foster residents' participation in coastal management based on the scientific research to date.

One of the few studies implemented to understand the public behavioral intentions for marine conservation in Japan was conducted by Wankita et al. [44]; they found that people's awareness of cultural benefits, including the religious and recreational value that the sea provided, had the strongest effect on their willingness to engage in conservation. This study was conducted with people from all over the country including the metropolitan city of Tokyo, and the results potentially demonstrated, to an extent, the trend of the country's public perceptions. Furthermore, whether local residents who live relatively close to the coast have a different attitude and behavioral intention were not revealed by this study. According to previous studies, people's sense of place (place connection) is one of the strongest factors that affect whether they take action regarding conservation [3]. A portion of this study was based on this framework of place connection; research that focuses on a region in which the majority of residents potentially feel the sense of connectedness to the same coastal area was conducted. This study's research question was as follows: "What factors affect local residents' behavioral intentions to conserve coastal areas?"

## 3. Research design

### 3.1. Study site and data collection

A questionnaire survey was conducted of residents who live around Shizugawa Bay in Miyagi prefecture in northern Japan (Fig. 1). Sustainable fishery management has been implemented in Shizugawa Bay; the place is known as one of the famous Sato-umi sites in Japan [25]. This bay is located in the Sanriku region. Cold and warm currents meet in the Sanriku region, and the area is said to be one of the world's three greatest fishery sites [35]. Minamisanriku town, where the Shizugawa Bay is located, has approximately 14,000 residents (with approximately 4700 households) and is approximately 164 km<sup>2</sup> [17]. When the Great East Earthquake occurred in 2011, more than 3000 houses, which consisted of nearly 60% of all of the houses in the town, were washed away, and more than 800 people either died as a result of the tsunami [18]. Previous studies revealed that all fishermen had damage to their fishing vessels that was caused by the tsunami [29]. Although

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