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The Influence of Affiliations with Agricultural Collectives on Attitudes of Fisherman towards Conservation and Perceptions of the Local Environment

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【abstract】
The association between fishermen and agricultural organizations has not been fully explored. In this study, "fishermen" refers to the workforce belonging to the Japan Fisheries Cooperative (JF), a cooperative association of fisherman. We examined the affiliation of these fishermen with the Japan Agricultural Cooperatives (JA), an agricultural organization, in order to better understand agriculture-fishery relationships within and across communities. In addition, we examined what motivated the workers to affiliate with the JA. The interviewees were fishermen from communities in the Noto region in Japan, a designated cultural landscape area, or Satoyama and Satoumi in Japanese. The results revealed that a significant number of fishermen, 46% of the interviewees, were affiliated with the JA. Furthermore, even fishermen whose jobs were exclusively associated with the fishery were affiliated with the JA with a ratio of 35%. These findings indicate the different make-up of the two cooperatives; the JF primarily consisted of professionals in fisheries, whereas the JA involved a number of non-farmers. Among the motivations for being part of the JA, reasons related to economics were frequently indicated by the fishermen (who were not involved in agriculture) because they depended on the JA for foods, daily goods, and cooperative insurance. Fishermen affiliated with the JA more strongly preferred leaving fishing grounds in their natural states as opposed to those with no JA affiliation. These results form the foundation for understanding the link between fishermen and agricultural activities and the behavior of fishermen belonging to plural organizations.

【keywords】
affiliation, agricultural cooperatives, fishermen's cooperatives, conservation, community

1. Introduction

To date, the intersection of Japanese fishermen and agricultural activities has

received little academic attention. Given the involvement of fishermen with agricultural matters, understanding this association is important, especially considering that there is a well-known Japanese term symbolizing the interaction of the two–*Hanno-Hangyo*. The term *Hanno-Hangyo* literally means "half agriculture and half fishery," and in practical terms, indicates that the "incomes of the households are gained from both agriculture and fisheries." An example of this interaction can be seen in the Noto region of Japan(1).

Satoyama and Satoumi both encompass human–nature interactions and are comprised of similar concepts, including human interactions, multiple use of land- or seascapes, and a mosaic characterization of nature (cf. Japan Satoyama Satoumi Assessment [JSSA 2010] for conceptual discussion and examples). We use a definition of Satoyama and Satoumi proposed by JSSA in order to analyze fishermen in the whole Noto region. Yanagi (2005) and Yanagi (2012) proposed another definition of Satoumi; he defined it as "the coastal sea with high productivity and high biodiversity under mankind's interaction." JSSA proposed the definition of Satoumi in a broad sense compared with Yanagi's definition; their definition does not include the specific condition of productivity and biodiversity. In the analysis of the whole Noto, the definition of Satoumi is feasible in a broad sense. Similar to the division of farmers and fishermen, the empirical analysis of Satoyama and Satoumi is also discussed in separate forums. This division is understandable because of the structure of disciplines and the epistemology of agriculture, forestry, and fishery sciences. Examinations of hypotheses in scientific contexts frequently require focusing on particular elements within certain conditions, as integrated assessments have a tendency to complicate the process.

However, the need for integration of different ecosystems or biomes has been repeatedly expressed (Portman (2013)), including terrestrial and marine environments (JSSP). Studies have evaluated the river basin approach, or Integrated River Basin Management (IRBM), coupled with terrestrial and inland water issues, but the marine component was not necessarily the focus. Furthermore, the social perspectives of fishermen were not sufficiently considered. Recently, the concept of integrated coastal management (ICM) has been discussed for the management of Satoumi and its surrounding areas. However, issues including bureaucratic sectionalism need to be overcome to implement ICM. The activities of citizens and NGOs/NPOs are expected to play an important role in its implementation (Matsuda (2012)).

Satoyama and Satoumi have deteriorated because of aging, migration, and

globalization (Saito and Ichikawa (2014)). In academic fields, traditional knowledge (Cetinkaya (2009), Dayuan (2011), Berque and Matsuda (2013), Indrawan *et al.* (2014)), social capitals (Henocque (2013)), and participatory approaches (Rosalejos-Edpalina *et al.* (2013), Dublin and Tanaka (2014)) are regarded as significant factors in the preservation of Satoyama and Satoumi and the implementation of sustainable maintenance. These factors depend on local community attributes such as age groups, religions, and industries. In particular, the daily activities of industrial communities largely influence the landscape of Satoyama and Satoumi. Residents in such communities, who depend on the mosaic of ecosystems (Takeuchi (2010), Kohsaka *et al.* (2013)) and their various ecosystem services (Hashimoto *et al.* (2015)) in Satoyama and Satoumi have opportunities to engage in several industries, including fisheries, agriculture, and forestry. In fact, some workers have jobs in more than two industries, consistent with the Hanno-Hangyo style. Investigating the social associations of stakeholders, who participate in the local industrial communities, can lead to an understanding of the social factors that are essential to the sustainable management of Satoyama and Satoumi. In this way, identifying social connections is a fundamental step in implementing the integrated evaluation and management of Satoyama and Satoumi.

The aims of this paper are: (i) to examine the link between fisheries and agriculture by investigating whether fishermen participate in agricultural organizations, with a focus on potential social and economic motivations; and (ii) to determine if there is a relationship between these associations and the awareness of fishermen to environmental conservation.

Officially, fishermen are defined as the workforce affiliated with the Japan Fisheries Cooperative (JF), a fishermen's cooperative. In this study, we focus on the association of fishermen with the Japan Agricultural Cooperatives (JA), including an assessment of the social meaning of this association and reasons for joining it. For example, are the motivations for becoming a member social factors, such as connections with neighbors, or is there an economic incentive to this relationship? In this paper, the affiliation with the JF or JA means becoming an official member of the two organizations (including associate members in case of the JA). The members of the JF are generally engaged in fishery; on the other hand, those of the JA are not necessarily engaged in agriculture. A person who wants to become a member of the JA needs to make an investment in the JA; his or her occupation is not necessarily that of a farmer.

Existing literature analyzing fishermen's cooperatives has been limited to

fishery-related activities, and has not explored social and economic features such as community involvement (Ünal *et al.* (2009), Ünal *et al.* (2011)). There is neither scientific analysis nor any statistics that analyze the affiliation of fisheries and agricultural cooperatives in Japan; hence, the motivating factors and dynamic behaviors of these associations have largely been overlooked.

The focus of this study is the Noto area, which was the first of two areas to be designated as a Globally Important Agricultural Heritage Systems (GIAHS) site by the Food and Agriculture Organization (FAO) in Japan, the second being Sado Island. The GIAHS is the certificate that focuses on the regions effectively managed by regional and traditional knowledge (Min and He (2014)). The Noto area was specifically designated as a GIAHS site because of the Satoyama and Satoumi systems. For example, the activities of the fishermen are maintained at a relatively small scale and are embedded in the social context of the larger community, which is in contrast to the commercial large-scale fisheries that are distanced from local contexts. For these reasons, the Noto area is an appropriate location to analyze how affiliations with different organizations may have an influence on ecological consequences.

2. Data and Methodology

With the consent and collaboration of the JF, questionnaires were sent by the authors to the different JF branches in the Noto area. Personal information including names and detailed address was not collected in this survey. All of the respondents were informed that their answers would be used for research. They consented to the usage of their answers for this research when they joined the survey. We confirmed the consent orally when each JF branch in the Noto area sent back the result of the survey to us. Questionnaires were distributed in proportion to the membership numbers of each JF branch (i.e., the branch with the larger number of JF members received a larger number of questionnaires). We distributed 200 questionnaires through JF Ishikawa headquarters in Kanazawa and obtained 107 responses. Minors (below the age of 18) did not participate in this survey. Telephone calls, face-to-face visits, and requests through headquarters were conducted to increase the number of responses. The questionnaire asked for the views of respondents on revitalizing the fisheries, as well as their affiliation with agricultural cooperatives.

The items in the questionnaire were as follows:

Profile: information pertaining to age, frequency of visiting marine areas, place of residence, occupation

Community: affiliation with agricultural cooperatives, jobs other than those in the fisheries

Perception of conservation: preferred types of conservation for fishing grounds (shore, coastal, open sea), the priority of actions for improving fishing grounds and promoting the local fishing industry

Responses came from the JF branches located in six municipalities; Suzu, Wajima, Noto, Anamizu, Shika, and Nanao (Fig. 1). All of these municipalities are experiencing depopulation and most of them are below 40,000 inhabitants according to the census of Japan, with the largest municipality being Nanao City (Fig. 2 and 3).

The profile of age groups of the respondents is shown in Fig. 4. The age range of respondents was diverse, ranging from the 20s to over 70. Only in Anamizu were all respondents older than 50.

To elaborate the questionnaire, we referred to the work of Shoji *et al.* (2005), which provides the results of managing national parks. Shoji *et al.* asked for a detailed degree of preferences on environmental practices. However, in our survey, the degree of preference toward actions for improving fishing grounds and promoting local fishing industry was answered by either a “yes” or “no.” In this regard, we simplified the questionnaire, because the respondents were not experts on academic research, and our main focus was to identify general trends.

In their precedent research, Kohsaka *et al.* (2015) conducted a questionnaire survey in Suzu, one of the research sites of this survey. Answers from 15 residents were obtained by face-to-face interviews and analyzed. Kohsaka *et al.* determined that the respondents did not prefer artificial interventions in the maintenance of fishing grounds, and they recognized an association between terrestrial and coastal environments. The artificial interventions meant installing stone walls and blocks in the seabed. Considering the various occupations of the respondents, this research showed that mutual interactions among terrestrial and coastal environments were recognized by residents in Suzu. In the current study, the focus is on residents who participated in JF as fishermen. We attempted to identify the rate and reasons for their affiliation with the JA, as well as how this association has affected their preferences for environmental conservation practices and promotion of the local fishing industry.

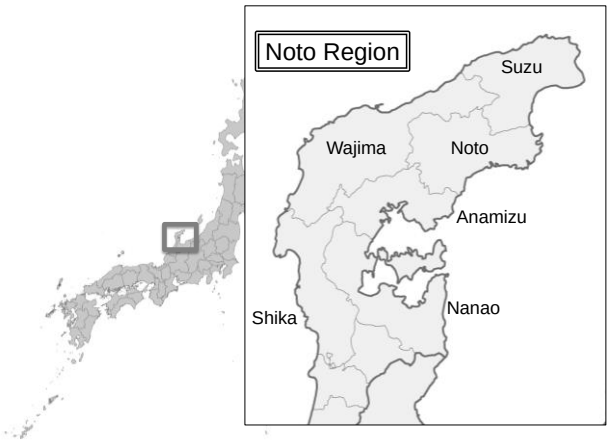

Figure 1 Map of the Noto region

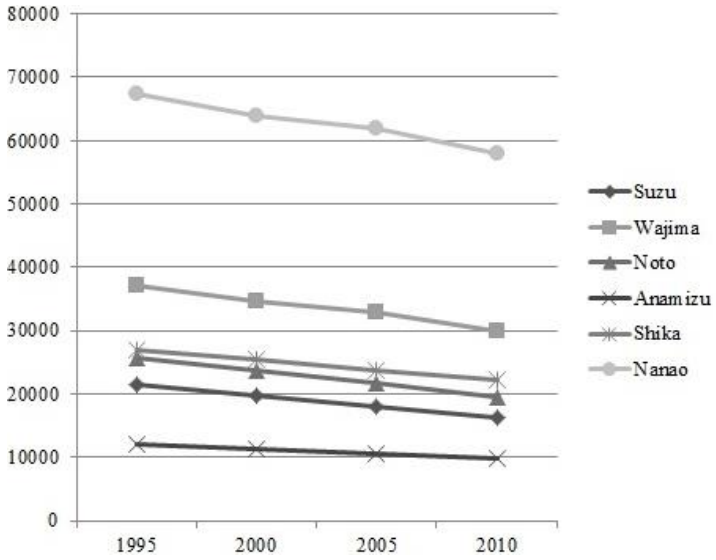

Figure 2 Population of the municipalities

Source: Census of Japan

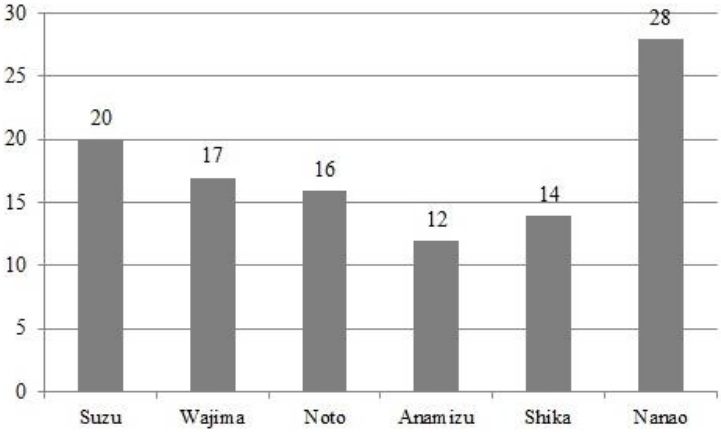

Figure 3 Number of respondents in each JF municipality branch

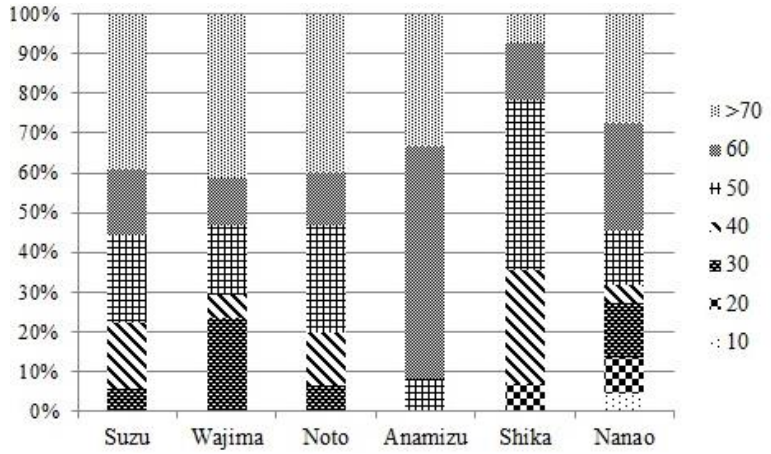

Figure 4 Rates of respondents' age groups in each JF municipality branch

3. Overall Trends and Characteristics of Each Municipality

3-1. Overall trends: Affiliations with the JA and occupations other than fishing

The affiliation with the JA and occupations of its members, as reported in the questionnaires, is provided in Table 1. A significant number of fishermen, 46% of the respondents, were affiliated with the JA. Furthermore, even fishermen whose jobs were exclusively with the fishery were affiliated with the JA in a ratio of 35%. The chi-square test was implemented and the results showed that the affiliation with the JA and occupations besides the fishery were not independent variables ($p<0.05$). Approximately 70 percent of respondents (N=16) who were occupied in the fishery and other work (N=23) provided details on the other types of work, which is not fishery related. Half of those respondents were involved with agriculture, implying that the other half performed work that was not agriculturally related. Furthermore, there are residents who are engaged in both the fishery and agriculture who were included as respondents. Most Japanese farmers are affiliated with the JA, and several people may be involved with both fishery and agriculture in the Noto region. This background is the reason why affiliation with the JA and occupations other than the fishery were not independent.

There were 18 workers with the JA affiliation who actually worked exclusively in the fishery. The number of these respondents was larger than the number of people who were affiliated with the JA and had non-fisheries work. What are the motivation behind this? In other words, why were the fishery workers willing to be members of agricultural organizations? One possible reason for this trend was that some respondents (who were not involved with agriculture) were affiliated with the JA to buy commodities or insurance (Fig. 5). In this survey, commodities mean food, household

goods, and appliances used in everyday life, and insurance is the cooperative insurance of the JA. In other cases, people who were affiliated with the JA without working in agriculture had relatives or friends who were involved with agriculture. In one example, a woman whose family worked in agriculture married a fisherman and discontinued her agricultural work, but remained affiliated with the JA. Therefore, it can be suggested that the fishermen of JA may have a connection with agriculture based on their social networks. Excluding the respondents who did not answer whether they are affiliated with the JA or not, more than 45 percent of respondents affiliated with the JA, approximately half had relationships with agricultural communities. Some respondents may not have answered the question regarding an affiliation with the JA because the question may be sensitive in their local communities.

Table 1 Status of affiliation with the Japan Agricultural Cooperatives (JA) and occupations other than the fishery

		Affiliation to the JA			
		Yes	No	N/A	Total
Exclusive work in fisheries	Yes	18	33	15	23
	No	14	8	1	66
	N/A	7	5	6	18
	Total	39	46	22	107

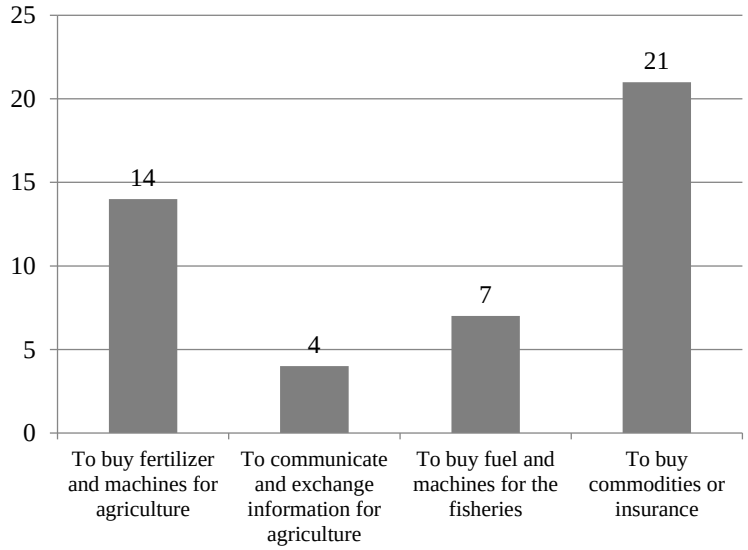

Figure 5 Reasons for affiliating with the Japan Agricultural Cooperatives

Note: Multiple answers allowed.

3−2. Characteristics of each municipality

The characteristics of each municipality are different in terms of the rates of affiliation with the JA (Fig. 6), rates of workers involved with work that did not include the fishery (Fig. 7), and rates of workers in agriculture, forestry and the fishery among all workers in primary industries (Fig. 8 and 9). Through understanding the different characteristics of the municipalities, we could efficiently analyze general socio-ecological contexts of fishermen in the Noto region. For example, the rates of affiliation with the JA in Wajima and Noto are relatively low, and the rates of fishery workers in both municipalities are relatively high. The former indicator may reflect the trend of the latter indicator. The detailed relationships of the indicators are not analyzed in this paper, however, future research that focuses on the characteristics of the municipalities and the whole Noto region will need to implement an analysis on the relationships among the indicators.

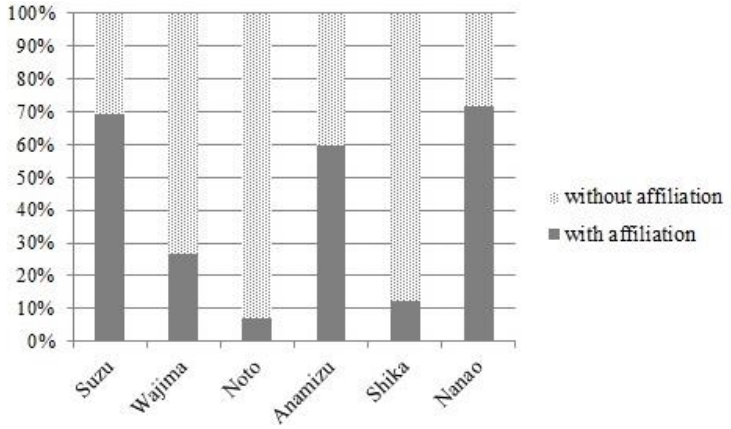

Figure 6 Rate of affiliation (or non-affiliation) with the Japan Agricultural Cooperatives by JF municipality branch

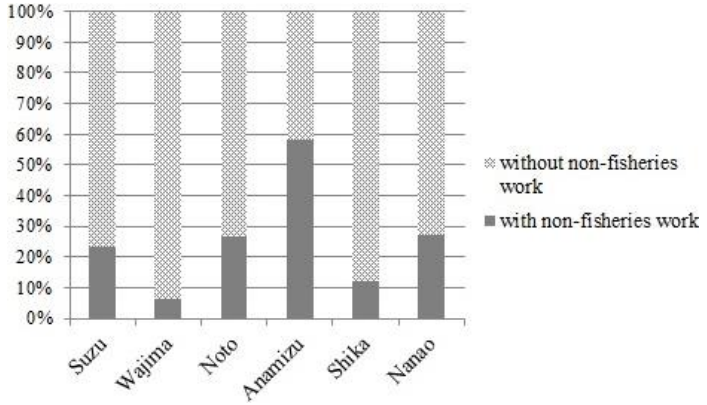

Figure 7 Rate of engaging in non-fishery work by JF municipality branch

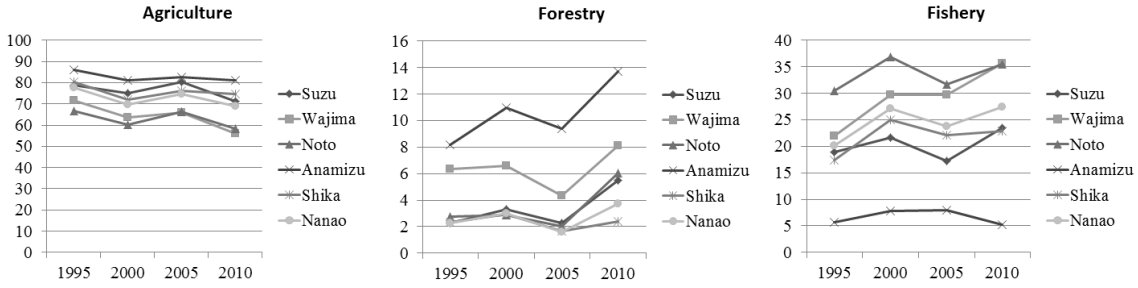

Figure 8 Rate of workers in agriculture, forestry, and fisheries in municipalities of Noto

Source: Census of Japan

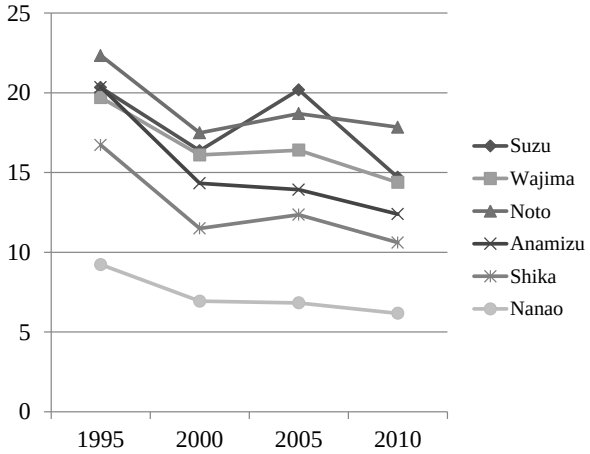

Figure 9 Rate of workers in primary industries (agriculture, forestry, and fisheries) in municipalities of Noto

Source: Census of Japan

4. Influence of respondent attributes on attitudes toward artificial intervention

In the questionnaire, the degree of preference for artificial intervention was evaluated on a scale of 1–5, with 1 indicating that the respondent did not endorse artificial intervention, and 5 meaning the respondent fully supported this intervention. The respondents were asked their preferences for intervention on fishing grounds as a whole, as well as specific fishing grounds including those at the shore, coast, and open sea. These questions are based on Kohsaka *et al.* (2015) but geographical scope is extended and we added examination the correspondence with the JA affiliation in this paper. We first examine the influence of age and frequencies of visits to marine areas on perceptions of conservation, and then we will discuss the associations between affiliation with the JA and preferences for intervention.

4–1. Age and frequencies of visits to marine areas

The age and the frequencies of visits to marine areas are both basic attributes of the respondents. In total, 78 respondents answered the questions regarding their affiliation with the JA and their age. We categorized the 78 respondents based on their answers to the questions asking for their degree of preference for artificial intervention on a scale of 1 to 5, and then we calculated the average age of each respondent group (Fig. 10). The average age of the groups was compared, and there was a statistically significant difference between the average age of the group with respondents answering 1, and that of the group that answered 3 ($p<0.10$). The average age of the former group was relatively higher than that of the latter group, although this difference was only identified when preferences for artificial intervention in overall fishing grounds were considered; there was no significant difference between groups based on preferences for artificial intervention in specific fishing grounds. The results suggest that, as a general trend, the average age of the group that chose the neutral answer (3), was lower than that of the group that included the respondents answering 1, who strongly preferred natural conditions to any kind of artificial intervention.

We then divided the 78 respondents who answered the questions regarding their affiliation with the JA and age into two groups. One group was composed of the respondents affiliated with the JA and the other comprised those with no affiliation to the JA. We categorized the respondents in each group based on their answer to the question regarding their opinion on artificial intervention, and we did not find any statistically significant differences in average ages among respondents with different preferences. Therefore, the results suggest that the influence of the age of respondents on conservation preferences was small.

We categorized the 81 respondents who answered the questions regarding their affiliation with the JA and the frequencies of their visits to marine areas based on their answer to the question pertaining to their opinion of artificial intervention (Fig. 11). The Kruskal-Wallis test was performed to identify differences in frequencies of marine visits among the groups with contrasting preferences on artificial intervention. We found that either pair from the groups with different preferences on overall fishing grounds had significant differences ($p<0.10$). However, we did not find any differences in the frequencies of visiting marine areas among the groups that had preferences for other fishing grounds.

The majority, or 33 of the 39 respondents who strongly preferred artificial intervention who chose 5 in the questionnaire, visited marine areas more than once a

week. Respondents who preferred and had an interest in artificial intervention visited marine areas more frequently. If the frequencies of visiting marine areas are correlated with the frequencies of having a first-hand perspective on the condition of the fishing grounds, respondents who did not visit the marine areas as often may not have had enough time to have a first-hand perspective on the fishing grounds in order to formulate a strong opinion on artificial intervention, and therefore they choose a more neutral answer.

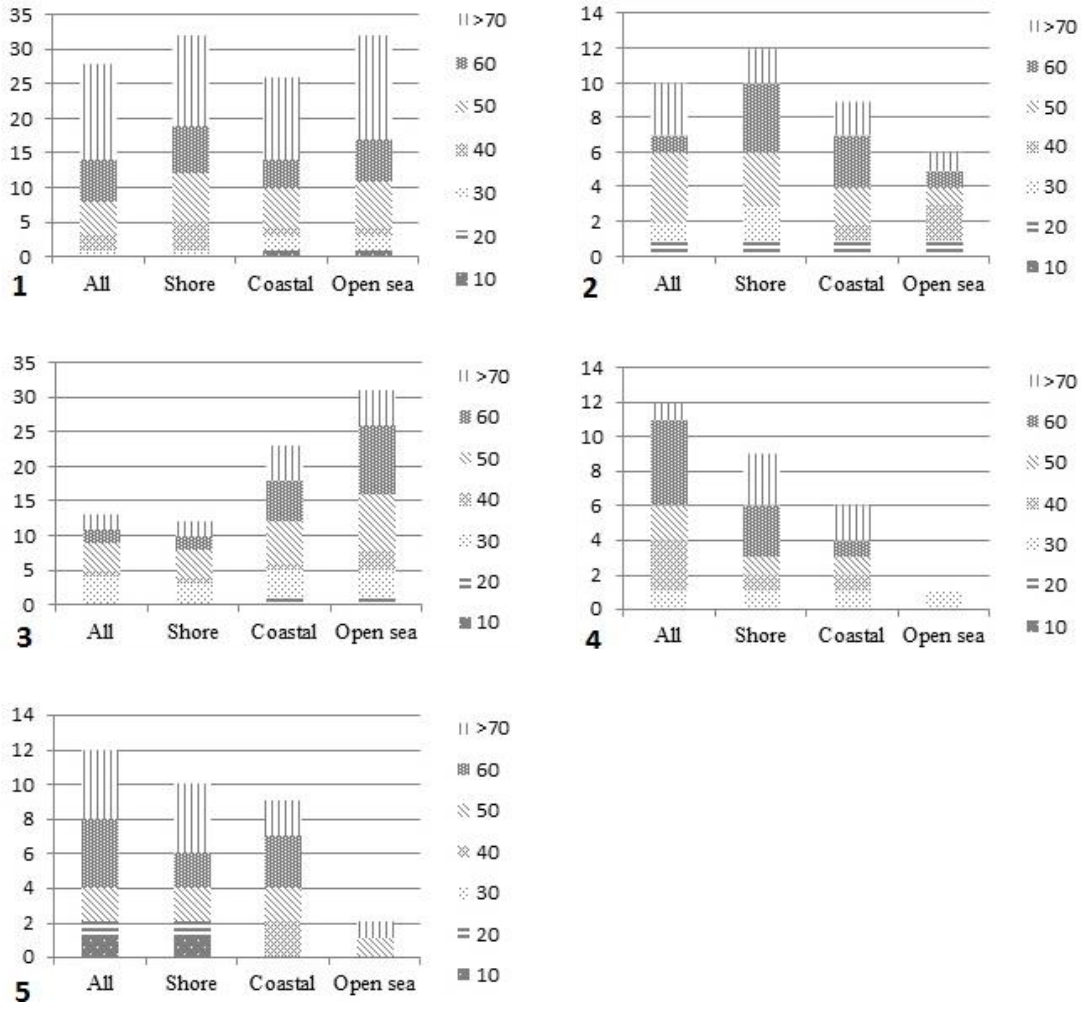

Figure 10 Preferences for artificial intervention overall as well as for specific locations in fishing grounds

Note: 1 indicates that the respondents did not prefer artificial intervention, and 5 denotes respondents who were strongly in favor of intervention, and the number of respondents in each age group.

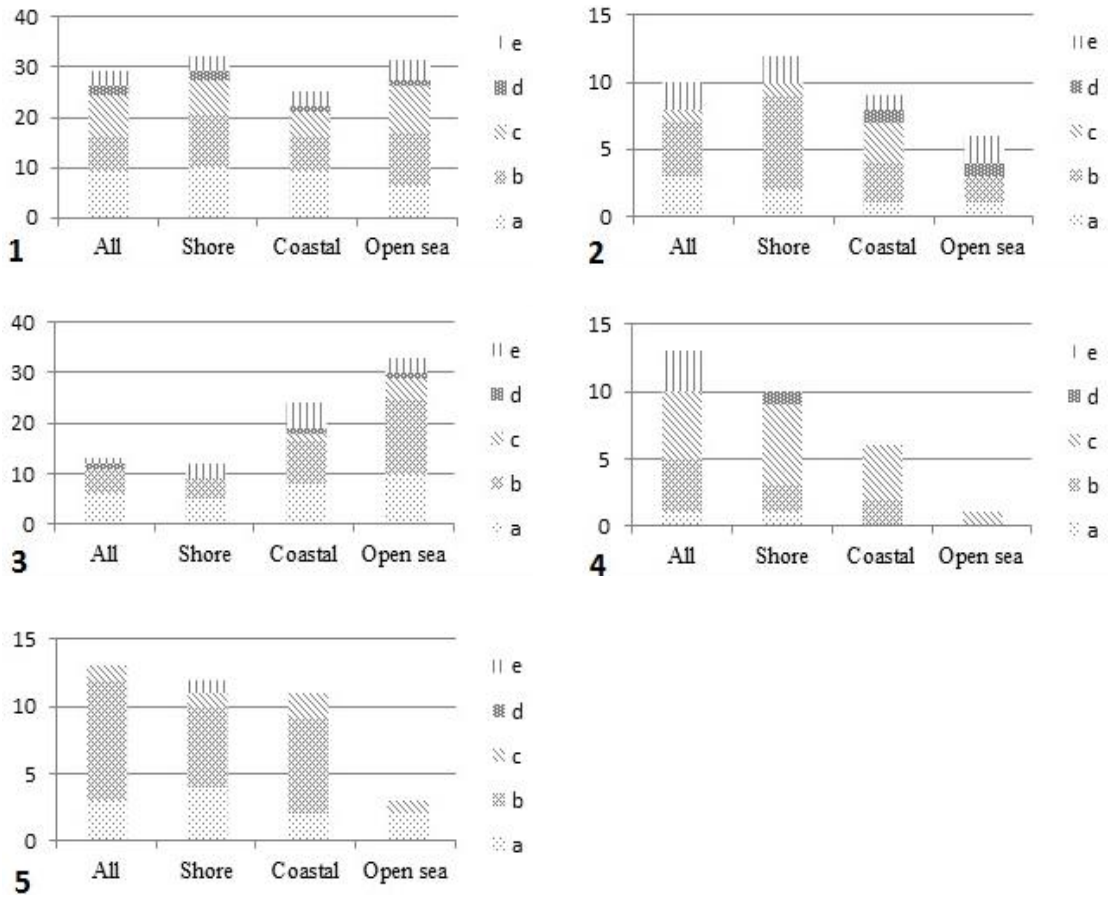

Figure 11 Preference for artificial intervention in overall as well as specific fishing grounds

Note: A score of 1 indicates that the respondents did not prefer artificial intervention, and a score of 5 denotes respondents who supported such intervention. The number of respondents in each category of frequency of visit to marine areas (a. every day, b. several times a week, c. several times a month, d. several times a year, e. a few times in a year).

We then divided the 81 respondents by their status of affiliation with the JA and examined the differences in frequencies of visits to marine areas with varying intervention preferences using the Kruskal-Wallis test. However, we did not identify any pair in the groups with significantly different preferences on artificial intervention in particular fishing grounds. The results suggest that the influence of frequencies of visits to marine areas on conservation preferences was small and could be ignored, similar to the age of respondents.

4-2. Preference on artificial intervention and prioritized actions

We have presented the analysis of the differences in perception of conservation

between respondents who were affiliated with the JA and those who were not (Fig. 12). The largest difference was identified in the preference for artificial intervention pertaining to overall fishing grounds. The respondents who were affiliated with the JA preferred natural conditions, and more than half of them chose 1 (the answer indicating the strongest feeling against intervention). In contrast, most of the respondents with no affiliation to the JA chose 1, 2, or 3. The number of respondents who chose 1 was smaller than the number of respondents choosing the other options. In this way, the respondents who were not members of the JA preferred natural conditions, but their preferences were not as strong as those of the respondents with an affiliation to the JA. In addition, the rate of the number of respondents who chose 3 or 4 with no affiliation to the JA was higher than those who were affiliated with the JA. These results suggest that respondents with an affiliation to the JA strongly preferred natural conditions in overall fishing grounds.

We provide a hypothesis related to the context of those results in the following. It is difficult to choose to install artificial means including blocks and stone walls as interventions without understanding the detailed effects of artificial interventions. Respondents who have no affiliation to the JA, and are specialized in the fishery, may have considerable time to work at the fishery, and have opportunities to connect to wider knowledge network concerning fisheries. They are considered to be in a position where they could easily accumulate experience and information on artificial interventions. On the other hand, respondents with an affiliation to the JA could have some connections in agricultural communities, and they may spend relatively more time on non-fishery works. In that case, respondents affiliated with the JA would not have enough time to obtain the knowledge related to the artificial interventions and, as a result, respondents with an affiliation to the JA tended to prefer natural conditions in the overall fishing grounds.

Regarding the specific fishing grounds of shore, coastal, and open sea zones, the rate of the number of people affiliated with the JA who chose 1 (indicating a strong preference for natural conditions) was higher than the number of respondents who did not have an affiliation with the JA (Fig. 12). However, when only the fishing grounds in shore and coastal zones were considered, the rate of the number of people affiliated with the JA who chose 5 was higher, indicating that this group did not always prefer natural conditions. Respondents who preferred artificial intervention in the fishing grounds near coastlines tended to be those who were affiliated with the JA. We did not find any obvious differences in opinions on artificial intervention in the open sea fishing ground

between respondents who were or were not affiliated with the JA. Overall, the results suggest that the preferences for intervention depended on the affiliation status of an individual, particularly in fishing grounds near coastlines.

The respondents with an affiliation to the JA had direct or indirect connections with agriculture. We examined the influence of being involved with agriculture on preferences for conservation by comparing and statistically testing the average preference score of 1 to 5. However, there was no significant difference in the conservation preferences among the respondents with an affiliation to the JA and an association with agriculture, or lack thereof. This result suggests that direct involvement with agriculture and the preference for artificial intervention was not clear.

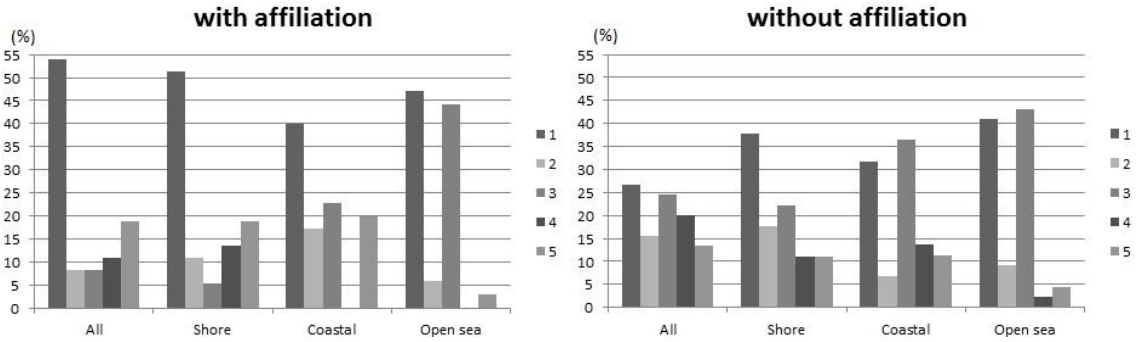

Figure 12 Preference for artificial intervention in overall fishing grounds and specific fishing grounds

Note: Respondents who did not support artificial intervention are designated as 1, while 5 denotes those who do support it.

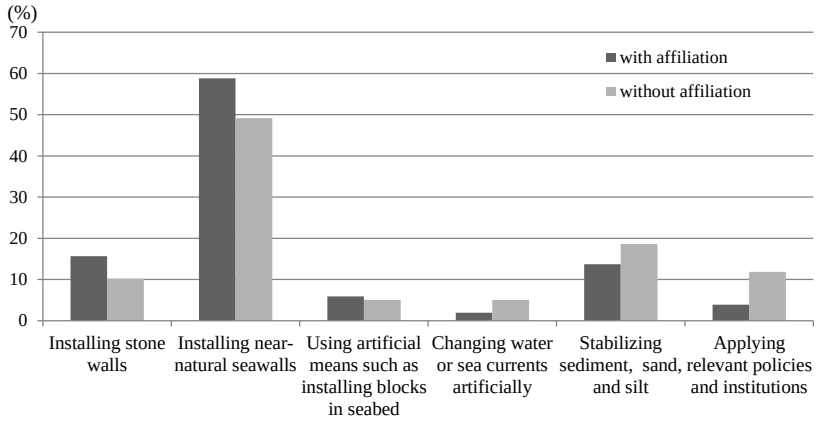

Figure 13 Comparison of prioritized actions to improve fishing grounds based on affiliation status with the Japan Agricultural Cooperatives

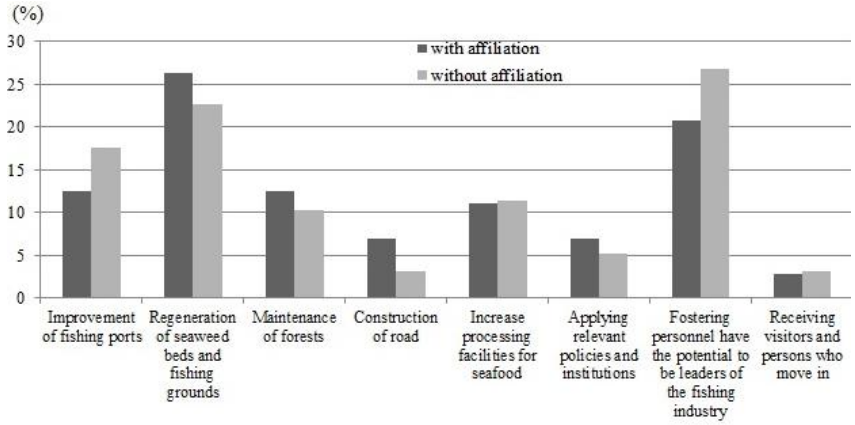

Figure 14 Comparison of prioritized actions to promote local fishing industry based on affiliation status with the Japan Agricultural Cooperatives

The answers of respondents with and without affiliations to the JA regarding prioritized actions for improving fishing grounds and promoting the local fishing industry are shown in Fig. 13 and 14. In the question pertaining to choice of prioritized actions for improving fishing grounds, the rate of the number of people who chose "installing near natural sea-walls" was the highest in both respondent groups. The rate of this preference in the group of respondents with an affiliation to the JA was higher by 10 percent. In addition, in the question regarding the choice of prioritized actions for promoting the local fishing industry, the rate of the number of people who chose "regeneration of seaweed beds and fishing grounds" and "maintenance of forests" was higher among the respondents with an affiliation to the JA. However, the differences between the two groups are not statistically significant.

Whereas we found relatively clear differences between the two respondent groups with different JA affiliation statuses on their preferences for artificial intervention, we did not identify such obvious differences between the two groups when the preferences for prioritized actions of improving fishing grounds and promoting local fishing industry were considered.

5. Discussion: Potential for Satoumi management in the Noto region

In this section, we discuss the relationships between perceptions of conservation and the socio-ecological backgrounds of the fishermen.

According to our survey, in the Noto region there were more than a few fishermen with connections to agriculture. Those fishermen associated with both fishery and

agriculture cooperatives may have social connections in agricultural communities. These connections have the potential to facilitate communications beyond the territories of the fishery and agriculture communities.

The results suggest that the fishermen affiliated with the JA more strongly preferred leaving fishing grounds in their natural state as compared to fishermen with no affiliation to the JA. In the context of the results, there may be a difference in the amounts of time required to accumulate the knowledge related to the artificial interventions between the respondents with affiliation to the JA and those without the affiliation. This hypothesis needs to be verified in future research, but the results still can be referred to in the regional consensus building on the management of fishing grounds. The rates of affiliation with the JA were relatively low in Wajima, Noto, and Shika, and fishermen in these regions had less connections to agriculture. Particularly in Wajima and Noto, the share of farmers was decreasing and that of workers in forestry and fisheries was increasing among workers in primary industries (Fig. 7 and 8). Whereas the decrease in the total catch of fish was relatively large in both municipalities, these regions maintained high productivity in comparison to the other municipalities in the Noto region (Fig. 15). In contrast, the decreasing rates in the total yield of paddy rice were relatively high (Fig. 15). In this respect, Wajima and Noto could become the municipalities specialized in fisheries. However, even if fisheries become the dominant primary industry in the municipalities, and if these areas possess an awareness of the crisis in Satoyama-Satoumi management, they may have the potential to overcome the management issues related to the trade-off on working hours required to manage fishing grounds and agricultural lands.

In the management of Satoumi, both maintaining a natural state and installing artificial interventions can be effective approaches, but neither may be ideal. Involving various stakeholders with different preferences in conservation methods can lead to conflict, but considering a variety of opinions can also create more alternatives for management. Combining relevant and complementary methods can lead to flexible and strategic management that respects the different backgrounds of the municipalities.

Taking the organizational choices and affiliations of residents into account is an important basis for effective policymaking. The incentives and policies for agricultural and fisheries organizations are often separately conducted, but we suggest that policy overlap is useful in certain areas, given that the same person may belong to both organizations.

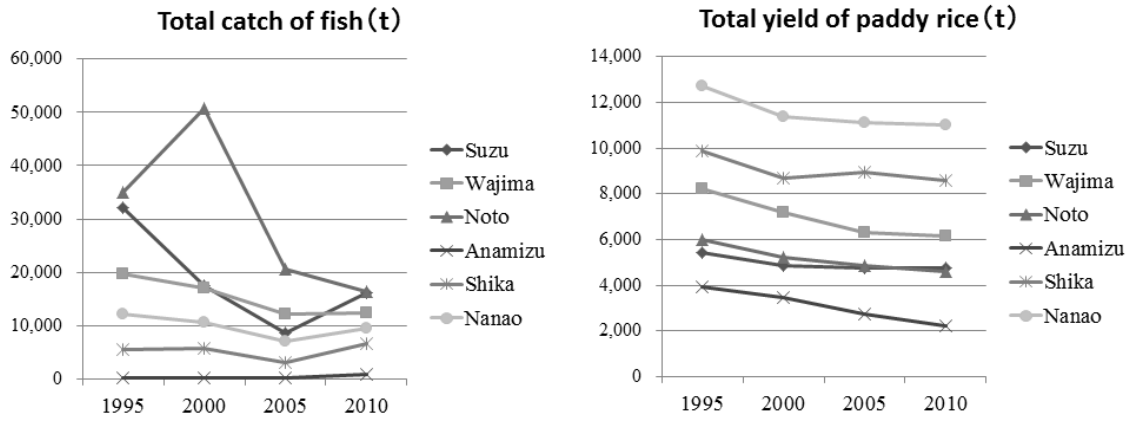

Figure 15 Total catch of fish and yield of paddy rice according to municipality

Sources: Sea fishery statistics of Ishikawa prefecture (total catch of fish); agricultural product statistics by Ministry of Agriculture, Forestry and Fisheries (total yield of paddy rice).

In conclusion, understanding the awareness of and preference for different types of conservation intervention among fishermen is an important preliminary step in utilizing the potential of Satoumi management in the Noto region. In the integrated management of Satoyama and Satoumi as a socio-ecological system that depends on local networks, strategies must consider the characteristics of the communities and socio-ecological backgrounds of each municipality so that there is a balanced approach to environmental conservation.

In future research, considering the different awareness of fishermen, which depends on the communities they belong to, factors that are related to the awareness of fishermen need to be explored. Adequate supervision can be implemented based on social capital (Henocque (2013)). In addition, participatory approaches are needed to utilize traditional knowledge for the sustainable maintenance of Satoumi (Berque and Matsuda (2013)). In the consensus building and social implementation phase of the management of Satoyama and Satoumi, social capital and participatory approaches need to be considered and analyzed in terms of the change in awareness of the fishermen.

Note

(1) FAO (2011) “Noto’s Satoyama and Satoumi”, http://www.fao.org/giahs/giahs-sites/asia-and-the-pacific/notos-satoyama-and-satoumi-japan/detailed-information/jp/

(2) We conducted surveys without asking for personal names and no individuals are

identifiable from the aggregated results. The focus of the study is not the biological, chemical or physical aspects of human bodies but is exclusively based on the written responses of the interviewees.

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