 doi:10.20944/preprints202109.0433.v1

*Article*

# Leveraging Japanese Sado Island Farmers' GIAHS Inclusivity by Understanding Their Perceived Involvement

**Keshav Lall Maharjan [1,*], Clarisse Gonzalvo [1] and Wilson Jr. Aala [2]**

[1] Graduate School of Humanities and Social Sciences, Hiroshima University, 1-1-1 Kagamiyama, Higashi-Hiroshima City 739-8524, Hiroshima, Japan; gonzalvo.clarisse@gmail.com
[2] Institute of Clinical Medicine, National Cheng Kung University, No. 1 University Road, Tainan 701, Taiwan; s98107020@gs.ncku.edu.tw
* Correspondence: mkeshav@hiroshima-u.ac.jp

**Abstract:** Sado island in Niigata prefecture is among the first GIAHS designated sites in Japan and among developed countries worldwide. Recent studies have pointed out the need to incorporate culture and farmer opinions to further strengthen GIAHS inclusivity in rural farming. In connection to this, the study explored whether farmer visibility, which is highlighted by GIAHS designation, actually translates to farmers' actual perception of GIAHS involvement. A survey was conducted among Sado island farmers to determine their knowledge and perception of their GIAHS involvement, in connection to their perspectives on youth involvement, Sado island branding, and tourism management. Results showed that 56.3% of Sado island farmers feel uninvolved or unsure towards GIAHS, which is in stark contrast with the prevalent farming method in the area which is special farming (complies with GIAHS regulations). Further analyses revealed that farmers who feel that GIAHS does not promote youth involvement, Sado island branding, and tourism management have higher predisposition to perceive themselves as uninvolved towards GIAHS. This study highlights the need for careful reevaluation and integration of farmer insights and needs to the current GIAHS implementation in Sado island and in other GIAHS as well.

**Keywords:** GIAHS, farmer involvement, youth inclusivity, tourism management, *Tokimai* branding

## 1. Introduction

In 2002, the Food and Agriculture Organization of the United Nations (FAO) first launched the Globally Important Agriculture Heritage Systems (GIAHS) during the World Summit on Sustainable Development in Johannesburg, South Africa. This is part of the Global Partnership Initiative which aims to tackle issues such as sustainable development, agriculture, and traditional farming practices. In 2015, it became a corporate program of FAO which was further developed to protect traditional agricultural systems of global importance and enhance the harmonious relationship between people and nature. Specifically, FAO defines GIAHS in 2002 as "remarkable land use systems and landscapes which are rich in globally significant biological diversity evolving from the co-adaptation of a community with its environment and its needs and aspirations for sustainable development". The selection criteria to be designated as a GIAHS are: 1) food and livelihood security; 2) agro-biodiversity; 3) traditional knowledge; 4) cultures and social values; and 5) landscape features. Overall, the object of designation is an agricultural system composed of traditional knowledge and practices, landscapes, culture, and biodiversity [1]. Since 2005, FAO has designated 62 systems in 22 countries and is currently reviewing 15 new proposals from nine new countries. These selected sites worldwide provide food and livelihood security for millions of small-scale farmers as well as sustainably produced goods and services.

The overall objective of designating a GIAHS site is to highlight unique knowledge, practices, and landscapes as well as dynamic conservation of a site. The conservation of GIAHS sites is also highly advocated, which entail several development interventions

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such as agritourism activities, adding value to GIAHS food products, technology transfer measures, awareness-raising campaigns, and supportive national policies [1]. It is important to note that designating different sites as GIAHS can also increase awareness and visibility for farmers who are working in these areas and emphasize the critical role they play in global issues. This is essential most especially in this modern era when the field of agriculture faces issues on youth's declining interest, outmigration from rural to urban areas, farmland abandonment, transfer of indigenous and traditional knowledge, prioritization of modernization movements in conflict with agricultural land decline and environmental degradation, among others. These issues can be addressed by improving the image of agriculture and highlighting the visibility of farmers in traditional agricultural systems, which in turn can boost the status of agriculture worldwide. While increasing farmer visibility is important, it is also crucial to know if the importance of GIAHS principles actually translates to the ground level, particularly the farmers' perceptions on their GIAHS involvement. This paper will focus on this aspect by analyzing Japanese farmers' GIAHS inclusivity and how this may affect the GIAHS development in Sado Island. This paper particularly aims to answer the question: Does farmer visibility, which is highlighted by GIAHS designation, translates to farmers' actual perception of GIAHS involvement?

### *Globally Important Agricultural Heritage Systems (GIAHS) in Japan*

In Japan, sustainable agriculture has been promoted for several years and high importance is given in preserving traditional farming, agro-culture, and biodiversity. This led to the application and acceptance of different sites in Japan as GIAHS. Aside from FAO's initial five selection criteria, Japan added three additional criteria in 2015 to have a more holistic and comprehensive assessment of GIAHS, which are: 1) enhanced resilience (ecological); 2) establishing the new commons (social); and 3) creating new business models (economic) [2]. At present, there are 11 sites designated as GIAHS in Japan. These are located in *Shizuoka* (terraced *wasabi* [Japanese horseradish: *Wasabia japonica*] fields), *Nisi-Awa* (cultivation of multiple crops in steep slopes), *Osaki* (utilization of various coping mechanisms to protect rice paddies), *Takachihogo-Shiibayama* (establishment of a composite management system of agriculture and forestry), *Minabe-Tanabe* (preservation of forest and Trees of *ume* [Japanese apricot: *Prunus mume*]), *Nagara River* (active inland water fisheries and fishing of *ayu* [Japanese sweetfish: *Plecoglossus altivelis altivelis*]), *Usa* (linkage of small irrigation ponds that stabilizes agricultural water supply), *Aso* (vast grasslands used to raise cows and horses), *Kakegawa* (tea production and cultivation), *Noto peninsula* (terraced rice-fields that represent the farming, fishing, and mountain villages indigenous to Japan), and *Sado island* (biodiversity conservation in paddy fields, particularly *Toki* [Japanese crested ibises: *Nipponia nippon*] birds [3]. All these sites have demonstrated remarkable use of land systems and landscapes, a good interplay between nature and its surrounding communities, rich biological diversities, which all contribute to sustainable development.

This paper particularly focused on Sado island in Niigata prefecture, which is one of the first GIAHS sites designated in a developed country. It is widely known as a natural habitat of endangered Japanese crested ibises (locally called *Toki* in Japanese) because of its *satoyama* and *satoumi* landscapes. The Japan *Satoyama Satoumi* Assessment (JASS) defines the former term as "landscapes that comprise a mosaic of different ecosystem types including secondary forests, agricultural lands, irrigation ponds and grasslands, along with human settlements" and the latter as "Japan's coastal areas where human interaction over time has resulted in a high degree of productivity and biodiversity" [4]. Sado island is also famous for its rice produce with *Toki* branding, which supports the revival of the *Toki* birds. Other agricultural crops are also grown such as persimmons, apples, pears, cherries, oranges, strawberries, watermelons, shiitake mushrooms, among others. Since the island provides suitable habitats for the endangered *Toki* birds, public

 doi:10.20944/preprints202109.0433.v1

and private sectors poured in efforts to support Sado island's biodiversity preservation through environmental conservation agriculture (ECA), which is a huge factor in its designation as a GIAHS.

***Understanding Agricultural Heritage Systems and its Impacts on Farmer Involvement***

FAO's initiative to designate GIAHS sites worldwide is essential to address various issues in the field of agriculture. Ever since it was launched in 2002, various studies have been done to analyze its sustainability, characterization, vulnerability of sites, tourism management, biodiversity conservation, among others [5-9]. Most studies focused more on the macro perspectives of GIAHS and its potential environmental impacts, which thereby established a wide-ranging knowledge on GIAHS, in supplement to what FAO annually provides. With an expansive bank of research findings, it is ideal to think that this knowledge can actually be absorbed by one of the main caretakers of GIAHS sites (i.e., the farmers); however, there are limited studies that can support this. There is still limited literature focusing on micro perspectives, such as farmer participation and perceived GIAHS involvement.

In terms of socio-economics aspects, it was observed that livelihood endowments and strategies directly affect GIAHS farmers' participation in eco-compensation policies [10]. Particularly, the study found that comprehensiveness of eco-compensation programs, land capital, and material capital are positive factors towards farmers' initiatives to participate in GIAHS conservation and agricultural production, whereas human capital was seen as a negative factor. With regards to socio-cultural aspects, Kajihara *et al*. (2018) discussed the importance of understanding the relationship of culture and agriculture and highlighted the need for GIAHS to incorporate culture for more effective management strategies [11]. It is important to note the interplay between farmers' cultural perspectives and their interaction towards their immediate environment, which thereby affects their involvement and mindset towards GIAHS initiatives. This, in turn, contributes in honing the overall cultural development of GIAHS sites and its sustainability. When magnified in a global scale, Sun *et al*. (2019) concludes that more efforts are needed to understand agricultural heritage systems by combining traditional practices and international experiences [12].

Farmer involvement and decision-making can be influenced by a lot of internal and external factors [13-15]. The perception of being involved towards a bigger cause is being shaped by farmers' individual differences and environmental influences. In order to gauge the perceived involvement of farmers, it would be vital to know their opinions towards important issues related to GIAHS. Opinions have the capacity to shape perceptions, whether in an individual or community scale. In this study, three main factors were specifically studied, and they revolved on farmers' opinions towards GIAHS' effects to youth involvement, capability to enhance agricultural products, and tourism management.

## 2. Materials and Methods

The study was conducted in Sado island which is located west of the Niigata prefecture shoreline (Figure 1). It is the sixth largest island of Japan which has a complex ecosystem, with interdependent *satoyama* and *satoumi* landscapes. Survey method was employed to collect data from ECA farmers in Sado island. After prior discussion about the survey with key persons, the research objectives and questionnaire were explained in the annual meeting of the Board of Directors of the Council for Promotion of "*Toki-to-kurasu-satozukuri*" (community development living in harmony with *Toki*), in cooperation with the Sado Municipality Agriculture Policy Division, in February 2020. The board made the resolution to allow the survey and 415 questionnaires were handed to *Toki-to-*

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*kurasu-satozukuri* council members during the annual general meeting. A total of 279 (67%) responses were received by the end of April 2020.

GIAHS-related factors were incorporated in the questionnaire using a three-point ordinal scale (1-strongly yes, 2-unsure, 3-strongly no). Socio-demographic factors were also gathered from the questionnaire to obtain baseline data for the farmers. Data was analyzed using ordinal logistic regression and general linear model in SPSS v.27. Test of parallel lines and model fit were conducted to determine whether statistical assumptions were met. Lastly, qualitative questions were also gathered about the farmers' opinions regarding the impact of GIAHS to youth involvement, Sado island branding, and tourism management. The narratives in local Japanese were translated to English by the authors.

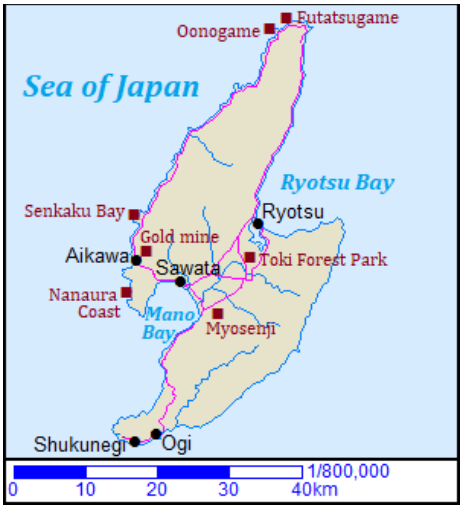


Figure 1. Sado island map. (Source: Authors' construct with base map adopted from www.travel-around-japan.com, 2010)

## 3. Results and Discussion

To understand the current situation of farmer involvement towards GIAHS in Sado island, their perceived level of involvement was determined using a three-point scale, which revealed that only 43.7% (122 of 279) of the sampled farmers feel that they are involved in GIAHS, while 56.3% (157 of 279) feel uninvolved or unsure towards GIAHS (Table 1). Similarly, only 38.7%, 59.1%, and 49.8% of the farmers feel that GIAHS gives pride and confidence to youths, enhance agricultural products/brand, and promote tourism, respectively. When viewed at the perspective of their current farming method which is predominantly special farming (77.3%) (complies with GIAHS regulations) and organic farming (10.8%), the farming method and high frequency of farmers who feel unsure or uninvolved towards GIAHS do not appear to agree with each other.

Table 1. Frequency distribution table for GIAHS-related and socio-demographic factors among Sado Island farmers.

| VARIABLE | FREQUENCY | PERCENTAGE (%) |
|---|---|---|
| **GIAHS involvement** | | |

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| | | |
|---|---|---|
| Strongly yes | 122 | 43.7 |
| Strongly no | 28 | 10.0 |
| Not sure | 129 | 46.2 |
| **TOTAL:** | **279** | **100.0** |
| **Opinion on GIAHS giving pride and confidence to youths** | | |
| Strongly yes | 108 | 38.7 |
| Strongly no | 33 | 11.8 |
| Not sure | 138 | 49.5 |
| **TOTAL:** | **279** | **100.0** |
| **Opinion on GIAHS enhancing agricultural products/brand** | | |
| Strongly yes | 165 | 59.1 |
| Strongly no | 24 | 8.6 |
| Not sure | 90 | 32.3 |
| **TOTAL:** | **279** | **100.0** |
| **Opinion on GIAHS promoting tourism** | | |
| Strongly yes | 139 | 49.8 |
| Strongly no | 42 | 15.1 |
| Not sure | 98 | 35.1 |
| **TOTAL:** | **279** | **100.0** |
| **Farming method** | | |
| Special farming[a] | 215 | 77.3 |
| Organic farming[b] | 30 | 10.8 |
| Eco-farming or related[c] | 26 | 9.4 |
| Conventional farming[d] | 7 | 2.5 |
| **TOTAL:** | **279** | **100.0** |
| **Environment conservation agriculture (ECA) effect on climate change** | | |
| As an adaptation | 121 | 43.5 |
| Reducing the effect | 71 | 25.5 |
| No effect | 64 | 23.0 |
| Others | 9 | 3.2 |
| **TOTAL:** | **279** | **100.0** |
| **Selling place for products*** | | |
| Agricultural cooperatives | 260 | 93.5 |
| Direct to consumers | 60 | 21.6 |
| *Michi-no-eki* (roadside farmers' market) | 11 | 4.0 |
| Supermarket | 4 | 1.4 |
| Restaurant | 2 | 0.7 |
| Internet | 2 | 0.7 |
| Central market | 1 | 0.4 |
| Food processors | 1 | 0.4 |

* Multiple answer. [a] Special farming: uses 50%-80% less fertilizers and pesticides from the conventional farming practice of the locality; complies with GIAHS regulations. [b] Organic farming: certified as organic by Japanese Agricultural Standards (JAS), or no JAS certification but do not use chemical fertilizers and synthetic pesticides.

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[c] Eco-farming or related: environment-friendly methods based on other standards. [d] Conventional farming: uses chemical fertilizers and pesticides prescribed and practiced in the region.

### *Relationship of GIAHS involvement with youth involvement, tourism, and branding*

To provide an explanation for this observation, various socio-demographic and GIAHS-related factors of Sado island farmers were used as predictors against their level of perceived involvement towards GIAHS. The three GIAHS factors evaluated in this study were the common themes of Japanese rural farming, namely: youth involvement, brand promotion, and tourism enhancement [16-18]. All three variables were found to be positively related with GIAHS involvement score such that farmers who feel that GIAHS does not promote youth involvement, promote Sado island brand, and enhance tourism are 17.4%, 38.8%, and 49.4% more likely to feel uninvolved towards GIAHS (Table 2).

Table 2. Relationship of various GIAHS variables with the farmers' perceived level of GIAHS involvement using ordinal logistic regression[a].

| **Predictor[b]** | **Estimate** | **Odds Ratio** | **Significance** |
|---|---|---|---|
| GIAHS giving pride and confidence to youth in Sado Island | 1.747 | 17.43% | 0.000** |
| GIAHS enhancing agricultural products and brand of Sado Island | 0.946 | 38.83% | 0.005** |
| GIAHS promoting tourism in Sado Island | 0.706 | 49.36% | 0.004** |

[a] Link function: Cauchit: $\tan(\pi(F_k(x_i)-0.5))$. [b] Test of parallel lines: Chi-square=1.750, df=3, sig=0.626. Model fit: Chi-square=117.612, df=3, sig=<0.001. **significant at p<0.01.

### *GIAHS involvement and youth inclusivity*

Eight socio-demographic factors were used as predictors of the Sado island farmers' perceived level of GIAHS involvement (Table 3). The effect of age, farm/paddy area, yield, climate change effect perception, and farming method were found to have no significant effect towards perceived GIAHS involvement. On the other hand, farmers who reported to be participating in exchange programs either voluntarily or with subsidy are more likely to feel involved towards GIAHS.

Table 3. Relationship of various socio-demographic variables with the farmers' perceived level of GIAHS involvement using general linear model[a].

| **Response variable: GIAHS involvement** | | |
|---|---|---|
| **Predictor** | **Estimate** | **Significance** |
| Age | 3.519 | 0.111 |
| Farming experience | -0.077 | 0.119 |
| Farmland size | 0.058 | 0.110 |
| Paddy land size | 0.119 | 0.057 |
| Paddy yield | -0.143 | 0.371 |
| Perceived intensity of climate change effect | -0.042 | 0.499 |
| Farming method | 0.045 | 0.749 |
| 1) Organic farming | -0.012 | 0.393 |
| 2) Special farming | -1.03 | 0.322 |

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| | | |
|---|---|---|
| 3) Eco-farming or related | -1.166 | 0.984 |
| 4) Traditional farming | 0.019 | . |
| Exchange program(s) participation/promotion | - | 0.238 |
| 1) Not participating | -1.514 | 0.167 |
| 2) Participating with subsidy | -1.838 | 0.036* |
| 3) Participating voluntarily | -2.199 | 0.028* |
| 4) Participating with pay | -2.311 | 0.617 |
| 5) Others | -0.238 | . |

*Significant at $p<0.05$. [a]$y= B_0 + B_1X$. White test for heteroskedasticity: Chi-square=117.264, df=107, sig=0.234. Lack of fit test: F=1.051, sig=0.486.

In terms of age, 80.3% (224/279) of the sampled Sado island farmers are 60 years old and above. Of the 15 farmers who are 49 years old or younger, only one third (5/15) reported being involved in GIAHS. This underrepresentation of youth in GIAHS activities appears to have contributed to the dilution of the effect of age on GIAHS involvement. Recent papers such as by Reyes *et al*. (2020) have indeed highlighted the negative effects of farmland abandonment and underuse of farming resources resulting from Japan's decreasing and aging rural population [5]. This same sentiment has been observed among the submitted testimonials of the interviewed farmers, such as by Respondent 269 who mentioned the following:

> *"There are many abandoned lands due to lack of successors. Lands are overgrown by various weeds, such as Solidago canadensis var. Scabra, Ambrosia artemisiifolia which flowers yellow during autumn and winter, making it look ugly or not cared for, which is far from the image of GIAHS. First, such land should be managed properly and brought under proper cultivation."*

Sado farmers also recognize the alarming issue of farmer shortage in the future because of the increasing trend of youth exodus; hence, they are also voicing their opinions on how to attract people to farm in Sado. The narrative of Respondent 131 clearly shows this:

> *"There will be a shortage of people who will continue farming in the near future. Attract the people who are fed up of city life and loves the countryside to create a natural living environment. People with allergies, retired life, and kids can come to live in Sado. This will create circulatory connectivity in different aspects between Sado and the cities, which will eventually attract the youths to Sado, increase their movements to and fro, making the livelihood more active and connected with the cities as well."*

This highly agrees with the findings of Usman *et al*. (2021) which highlights the desperate need of rural areas for agricultural workers in connection with Japan's aging farmers' population, in order to mitigate the increase in Japan's dependency for international food products and high import expenses [19].

To this end, participation in exchange programs may thus play a key role in not only encouraging the younger generations of famers, but also enhance the transfer of intangible farming inputs such as techniques and managerial skills [18]. This was also shared by Respondent 276 who stated that:

> *"There is a need to secure people to continue GIAHS. All the GIAHS sites in Japan should come together to promote and enhance it through PRs in universities and colleges and make it part of lectures to get the interest of students who would work on it in the future. First, orient them about GIAHS in general and different GIAHS in Japan, and let them*

*participate in field studies and internships in a GIAHS of their choice for them to interact and learn the local culture, as well as experience the local livelihoods. Afterwards, let them reflect about it and how they can be involved in it in the future to improve.*"

This theme was also explored by Yamashita (2021) which focused on how Japanese traditions can be saved by analyzing urban university students' participation in rural festivals [20]. Interestingly, the case site of the study is also a GIAHS in Japan, particularly the Noto region in Ishikawa prefecture. The study recommended that better collaborations should be established between urban youths and their participation in rural festivals, which means that more focus should be given in the management of festivals and how outside support can further increase. These can help alleviate the discontinuation of rural festivals and loss of cultural values. This is also in connection with what Sado farmers are voicing out in this study, which is the need to attract youths in Sado island, thereby implying that they are also well aware of the negative consequences if common trends of youth exodus and rural disinterest will continue.

The narratives of Sado farmers and various literature that established the interlinked issues of farmland abandonment, aging population, youth exodus, and farmer shortage clearly show the need for more policies that would cater to the strengthening of Japan's agriculture. Based on this paper's findings, participation in exchange programs may increase the chances of attracting people, especially the youth, in exploring rural areas and be more involved in addressing issues in the field of agriculture. With the increase in youth participation, modern solutions can also be applied as rural areas struggle to adapt in the changing world.

***GIAHS involvement in tourism and branding***

Sado island has become known for their *Tokimai* brand of rice. This integration of conserving the local *Toki* bird population with local farming has contributed to the 0.6% growth rate of tourism in Niigata Prefecture amounting to roughly 400,000 accumulated number of guests at accommodations (Japan National Tourism Organization, https://statistics.jnto.go.jp/en, accessed March 11, 2021). In this study, the effects of farmer expectations on ECA and selling location on perceived GIAHS involvement were also tested. In terms of selling location, farmers who sell directly to consumers were more likely to perceive themselves to be involved towards GIAHS than those who sell at other locations (Table 4). Looking at the frequency distribution, selling to agricultural cooperatives was the most predominant choice among the farmers (93.5%). This inconsistency was elaborated in the testimonials of the farmers with many entries commenting on the poor uptake of the *Tokimai* brand across other industries/markets, such as restaurants and supermarkets. This was clearly shown in the response of Respondent 121, who stated that:

"*Last year, I participated in the PR sale of rice in Tokyo station, along with the city officers. Nearly 100% of the passers-by did not know about GIAHS, which is so unfortunate.*"

A similar sentiment has been shared by Respondent 141:

"*GIAHS alone will not enhance the tourism to brand the hotels, other facilities and services using the branded products of the island.*"

Respondent 162 also shared some sentiments on how GIAHS should complement agriculture:

"*It is good to make use of GIAHS for tourism development in the island. However, it is not clear how it helps in enhancing the island's farming and primary industry. If there is no clear picture/explanation how GIAHS and tourism development can enhance farming, the*

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*farmers and youth may not be interested (e.g., How will hotels use rice, vegetables, and fish produced in the island to serve the tourists with a delicious and attractive dish?). It is said that bigger hotels don't have repeaters (supposedly the food they provide is not delicious) while the homestay pensions serving local food have repeaters. City dwellers visit Sado not only for its nature but also for its food, as well as its hospitable people with warm personalities (heard that the cooks in bigger hotels are dispatched from Kansai (western part of Japan) or foreigners). The concept should be not agriculture for tourism but tourism for developing agriculture."*

These narratives are in line with the point raised by Ohe (2013) which highlights the generation gap between younger and senior generations in recognizing the value of rural tourism, as well as the urban-rural mismatch with regards to rural tourism desires and expectations [17].

Table 4. Relationship of various selling locations with the farmers' perceived level of GIAHS involvement using general linear model[a].

| **Response variable: GIAHS involvement** | | |
|---|---|---|
| **Predictor** | **Estimate** | **Significance** |
| Direct to consumers | -0.201 | 0.050* |
| Supermarket | 0.199 | 0.552 |
| Restaurant | 0.679 | 0.216 |
| Agricultural cooperatives | 0.019 | 0.907 |
| Central market | 0.257 | 0.709 |
| *Michi-no-eki* (roadside farmers market) | 0.041 | 0.85 |
| Food processors | -0.501 | 0.449 |
| Internet | -0.34 | 0.53 |

*Significant at $p<0.05$. [a] $y= B_0 + B_1X$. White test for heteroskedasticity: Chi-square=10.344, df=13, sig=0.666. Lack of fit test: F=1.402, sig=0.224.

In addition to micro-level predictors, the effect of farmer expectations from ECA on GIAHS involvement was also tested (Table 5). In line with the theme of GIAHS which is ecological conservation, farmers who are doing ECA for *carbon sequestration* and *conservation of biodiversity* were more likely to feel involved towards GIAHS which agrees with previous studies [2,5]. In addition, farmers who are doing ECA to promote the local industry are also more predisposed to feel involved towards GIAHS, which also agrees with other studies such as in Vafadari (2013) that identifies tourism as a key stimulant of local industry by opening new jobs and enhancing local attraction of rural lifestyles in GIAHS communities [21]. Indeed, the Sado island tourism webpage (https://www.visitsado.com/en/, accessed March 11, 2021) features *Toki* museum tours, sightseeing, and forest parks.

Table 5. Relationship of farmer expectation on ECA with the farmers' perceived level of GIAHS involvement using general linear model[a].

| **Response variable: GIAHS involvement** | | |
|---|---|---|
| **Predictor** | **Estimate** | **Significance** |
| Carbon sequestration | -0.304 | 0.012* |
| Conservation of biodiversity | -0.252 | 0.005** |
| Conservation of water quality | -0.005 | 0.956 |
| Underground water terrain improvement | -0.333 | 0.070 |

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| | | |
|---|---|---|
| Add value in quality of products | 0.063 | 0.455 |
| Decrease effect of weather hazards | 0.09 | 0.518 |
| Increase farm related income | 0.121 | 0.152 |
| Promote local industry | -0.224 | 0.019* |
| Retain residents in rural area | -0.014 | 0.942 |
| Others | -0.275 | 0.226 |

*Significant at p<0.05; **significant at p<0.01. [a] $y = B_0 + B_1X$. Breush-Pagan test for heteroskedasticity: Chi-square=2.820, df=1, sig=0.093. Lack of fit test: F=1.087, sig=0.323.

To determine if the farmer' global perspective on ECA activities influences their perceived involvement towards GIAHS, their answer to the effect of ECA on climate change was used as predictors for their level of perceived involvement towards GIAHS. Here, farmers who expressed that ECA is an adaptation to climate change were twice as likely to feel involved towards GIAHS than those who do not (Table 6). This agrees with the earlier observation on farmer expectations regarding ECA. Testimonials such as by Respondent 153 reflects this trend in a farmer's point of view:

> *"Produce food that suits climate change. Sell them fresh with safety and good taste. This should be managed through institutional strategy under good leadership. Hotels should use the branded rice produced in Sado."*

Table 6. Relationship of farmer-perceived effect of ECA on climate change with the farmers' perceived level of GIAHS involvement using ordinal logistic regression[a].

| **Response variable: GIAHS involvement** | | | |
|---|---|---|---|
| **Predictor[b]** | **Estimate** | **Odds Ratio** | **Significance** |
| ECA as an adaptation to climate change | -1.09 | 297.43% | 0.002** |
| ECA reduces the effect of climate change | -0.665 | 194.45% | 0.068 |
| ECA has no impact on climate change | -0.184 | 120.20% | 0.618 |
| Others | -0.027 | 102.74% | 0.971 |

[a]Link function: Cauchit: $\tan(\pi(F_k(x_i)-0.5))$. [b]Test of parallel lines: Chi-square=0.168, df=4, sig=0.997. Model fit: Chi-square=22.906, df=4, sig=<0.001; **significant at p<0.01.

## 5. Conclusions

Results from the survey in this study have shown higher incidence of reduced farmer involvement towards GIAHS. While it is one of the direct goals of GIAHS designation to promote awareness and visibility for the farmers working in these sites, results from this study does not support the notion of a direct relationship between farmer visibility and farmer involvement as previously hypothesized. To further understand this observation, the effects of various socio-demographic and GIAHS factors on farmers' perception towards GIAHS involvement were tested. Reduced perception towards promotion of youth involvement, Sado island branding, and tourism management has an enhancing effect on reduced farmer perception towards GIAHS involvement. Further evidence presented through the various farmer narratives corroborate this observation prompting for integration of farmer-level input towards community level implementation of GIAHS.

Upon evaluation of the effects of farmer expectations with their perceived GIAHS involvement, it was found that promotion of local industry has an enhancing effect on farmer involvement. This observation hints at the need for better diffusion of resulting branding (*Tokimai*) from the GIAHS initiative to other local industries in Sado island, as well as to target consumers who may not know about *Tokimai*. Based on farmer narratives, there is a need for better uptake of the *Tokimai* branding across different local industries, such as restaurants, hotels, and supermarkets, for the continuous development of farmer communities and GIAHS sites.

The enhancing effect of carbon sequestration and biodiversity conservation towards farmer perception on GIAHS involvement was also shown, as expected of an environment-conscious community. This is in alignment with the observation that farmers who feel that ECA is an adaptation to climate change has higher likelihood to feel involved towards GIAHS. A study focusing on the effects of various farmer-related factors towards ECA continuation may also provide additional insights on the holistic view of the integration between farmer activities with biodiversity conservation.

The data gathered from this study can serve as a framework for local government officials, and policy makers on strengthening and developing the GIAHS efforts across Japan, and other countries as well. When magnified in a global scale, the themes explored in this study can lead to a deeper interplay of farmers' knowledge and perception with GIAHS objectives.

**Author Contributions:** Conceptualization, K.L.M., C.M.G., and W.J.F.A.; methodology, K.L.M., C.M.G., and W.J.F.A.; software, K.L.M., C.M.G., and W.J.F.A.; validation, K.L.M., C.M.G., and W.J.F.A.; formal analysis, K.L.M., C.M.G., and W.J.F.A.; investigation, K.L.M.; resources, K.L.M.; data curation, K.L.M., C.M.G., and W.J.F.A.; writing—original draft preparation, K.L.M., C.M.G., and W.J.F.A.; writing—review and editing, K.L.M., C.M.G., and W.J.F.A.; visualization, K.L.M., C.M.G., and W.J.F.A.; supervision, K.L.M.; project administration, K.L.M.; funding acquisition, K.L.M. All authors have read and agreed to the published version of the manuscript.

**Funding:** This research was funded by Japan Society for Promotion of Sciences (JSPS); JP JSBP 120197904. Authors and funding agency have no conflicts of interest.

**Acknowledgments:**

**Conflicts of Interest:** The authors declare no conflicts of interest.

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