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SOCIOLOGY | RESEARCH ARTICLE

Comparison of perceptions regarding the reintroduction of river otters and oriental storks in Japan

Ryo Sakurai^{1*}, Richard C. Stedman², Hiroshi Tsunoda³, Hiroto Enari⁴ and Takuro Uehara¹

Abstract: While reintroducing extirpated species is an important approach for restoring self-regulating biodiverse ecosystems, previous studies have shown that public support and understanding are indispensable for the success of such projects. In this study, the attitudes of university students toward species that have already been reintroduced in Japan (oriental storks) and those that have not yet been reintroduced (river otters) were compared. A questionnaire survey was conducted in a private university in Japan, and the results (n = 360) revealed that the students more likely supported the reintroduction of oriental storks than that of river otters. A majority did not know the reasons accounting for the extirpation of these species, and a text mining analysis revealed that those who saw the news about reintroduction of oriental stork showed a higher likelihood to support the project. Thus, the participants' attitudes toward species reintroduction were not necessarily affected by their knowledge regarding the concerned species, but by the transient experiences, such as watching news about the project.

Subjects: Environmental Communication; Sociology Social Policy; Higher Education

Keywords: species reintroduction; attitudes; extirpation; river otters; oriental storks

1. Introduction

1.1. Species reintroduction and human dimensions

The reintroduction of once exterminated species has been implemented globally (Hayward & Somers, 2009; Seddon et al., 2005; Soorae, 2018). In the field of restoration ecology, the impacts of such reintroduction projects have been investigated from an ecological perspective (Falk et al., 2006). Additionally, the idea of reviving ecosystems, while decreasing human interference, which is also known as “rewilding,” has been a major focus of both academics and practitioners (Carver et al., 2021; Jepson & Blythe, 2020).

PUBLIC INTEREST STATEMENT

While reintroducing extirpated species is an important approach for restoring self-regulating biodiverse ecosystems, previous studies have shown that public support and understanding are indispensable for the success of such projects. In this study, the attitudes of university students toward species that have already been reintroduced in Japan (oriental storks) and those that have not yet been reintroduced (river otters) were compared. A questionnaire survey was conducted in a private university in Japan, and the results revealed that the students more likely supported the reintroduction of oriental storks than that of river otters. A text mining analysis revealed that those who saw the news about reintroduction of oriental stork showed a higher likelihood to support the project. Thus, the participants' attitudes toward species reintroduction were not necessarily affected by their knowledge regarding the concerned species, but by the transient experiences, such as watching news about the project.

Success cannot be realized in species reintroduction projects if the human dimensions of the projects are neglected (Drouilly & O'Riain, 2021). For example, in Michigan, US, wolves were reintroduced in 1974 without assessing the social feasibility and the project failed as all released wolves were killed, either shot or hit by cars soon after the reintroduction (Decker et al., 2001, p. 312). A public survey conducted afterwards revealed that the majority of local residents were against the reintroduction project (Decker et al., 2001, p. 312). Therefore, human dimension studies on public perceptions regarding species reintroduction have been conducted globally, and the results have been used to facilitate decision making in species reintroduction projects (Decker et al., 2012; Enck & Brown, 2002; Jacobson, 1999; Ma et al., 2016; Slotow & Hunter, 2009). For example, prior to wolf reintroduction in Yellowstone National Park, multiple surveys were conducted with local stakeholders (Bath, 1989; Bath & Buchanan, 1989), which could identify the stakeholders (e.g., ranchers) who more likely had negative attitudes toward the project. These results and information were used by project managers to set up a series of meetings and public hearings, inviting those who particularly held negative perceptions, to raise mutual understanding about the project (Jacobson, 1999).

The goal of rewilding is to restore the whole ecosystem and therefore reintroduction should be ultimately attempted for all species that originally inhabited the region (Carver et al., 2021; Jepson & Blythe, 2020). However, public perceptions of different species have affected the decision making regarding the animals that could be reintroduced (Seddon et al., 2005) resulting in only certain species being reintroduced while others were ignored.

The above principles are demonstrated in Japan in the cases of oriental storks (*Ciconia boyciana*) and river otters (*Lutra lutra*). While species such as oriental storks and crested ibis (*Nipponia nippon*) were reintroduced in the country, river otters have never been officially considered for reintroduction by the government. Especially in a democratic country like Japan, public perceptions on a certain theme affect the decision making process (Murayama, 2009).

Japan went through a rapid economic growth during 1950s–70s, and around this time, species such as river otters and oriental storks were extirpated. These species can cause conflicts with local residents. For example, river otters depredate stocked fishes (e.g., cyprinids and salmonids) in natural water systems, and sometimes also intrude into fish ponds (Adámek et al., 2003; Ando & Sasaki, 2001; Ludwig et al., 2002) and oriental storks frequently walk in paddy fields to feed on aquatic organisms, stamping on rice (Kikuchi, 2006). These species play significant roles in their respective ecosystem as top-predators and are also recognized as symbols of ecological restoration and/or rewilding (Naito et al., 2011; Nathan et al., 2018). Therefore, considering feasibility as well as significance of reintroducing river otters and oriental storks in Japan is important both from global and local perspectives.

We conducted a survey for university students in Japan to understand how their attitudes toward reintroduced and non-reintroduced species differ and what factors affect such attitudes, and to gain insights on what hinders the progress of full-scale ecosystem restoration in the country.

2. Literature review

2.1. Human dimension studies regarding species reintroduction all over the world

Globally, previous reintroduction projects have focused on the reintroduction of large mammals (Seddon et al., 2005). Example cases include the reintroduction of black rhinoceros in Kenya (Soorae, 2018, pp. 150–154), African lion in Zambia and Zimbabwe (Soorae, 2016, pp. 153–156), and Pere David's deer in China (Sills, 2021). Various human dimension studies have been conducted to clarify public perceptions regarding the reintroduction of species, however they have tended to focus on large species such as wolves (Bath, 1989; Nilsen et al., 2007; Williams et al., 2002). A study on public support to the reintroduction of another large mammal species, giant

panda (*Ailuropoda melanoleuca*), revealed that local residents in China strongly supported the project, and those who liked wildlife and had higher levels of education tended to have positive attitude toward the project (Ma et al., 2016). A study in Poland revealed that residents living in areas where European bison (*Bison bonasus*) reintroduction was planned expressed more negative attitudes—associated with public concerns such as crop damage—toward this species than those living close to forests, where the bison already lived (Klich et al., 2018). Additionally, in Australia, the public seemed to approve the reintroduction of the dingo (*C. dingo*) into certain areas to suppress native kangaroos (e.g., *Macropus spp*) and nonindigenous red foxes (*Vulpes vulpes*; Van Eeden et al., 2019).

Limited literature is available on the public attitudes toward the reintroduction of smaller species such as river otters and/or birds. Studies on these species are also important as the goal of ecosystem restoration as well as rewilding is to restore the full range of species at all trophic levels, and it is necessary that the public recognizes intrinsic value of these species and desire to coexist with them (Carver et al., 2021). In addition, comparative studies on public perceptions regarding the reintroduction of several different species, including those that have already been reintroduced and those that are yet to be reintroduced, are limited. It is also important to assess public attitude toward already reintroduced species as they could potentially cause certain conflicts with people (such as reintroduced oriental storks making nests on the utility pole in a private property [Kobe Shimbun, 2021], released beavers flooding private properties by making dams [Pollock et al., 2015]).

2.2. Previous human dimension studies regarding targeted species in Japan

Japanese river otters used to be widely distributed across the country, from Kyushu to Hokkaido. However, owing to hunting and poaching, as well as habitat destruction and water pollution, there has been a steady decline in their population all over the country since the Meiji period, i.e., c.a. 1900s (Sasaki, 2015). The last river otter in the country was observed in Kouchi Prefecture in 1979 (Sasaki, 2015). There have been discussions about the possibility of their reintroduction (Ishigaki, 2005; Ishigaki & Nakagawa, 2005); however, no official projects have been considered by the government till date. In 2017, several river otters were found in the Tsushima Islands, which are located in western Japan, and it was concluded that the otters migrated/dispersed from the Korean peninsula into the island (Nakanishi & Izawa, 2019). This incidence brought attention to the necessity of conserving these otters (Ministry of the Environment, 2018).

Oriental storks, which use agricultural-forest mosaic landscapes for foraging aquatic organisms in wetlands and rice paddy fields, and use surrounding forests for nesting (Yamada et al., 2019), were once found broadly across Japan. The decline in their populations could be attributed to hunting during the Meiji period as well as habitat loss, especially owing to deforestation during the Second World War given that they use big trees for nesting (Kikuchi, 2006). The last wild oriental stork was captured in the Toyooka area in the northern part of Hyogo Prefecture (West Japan) in 1971. However, unlike river otters, storks had already been reintroduced. In 1985, six storks were translocated from the former Soviet Union, for the purpose of captive breeding. As a result of the successful breeding activities, their numbers in captivity increased to more than 100 by 2002 (Hyogo Park of the Oriental White Stork, 2020). In 2005, five storks were then reintroduced into the wild area of Toyooka, and more than 200 wild oriental storks currently live there and have dispersed into other regions in Japan (Hyogo Park of the Oriental White Stork, 2020).

To our knowledge, no studies have been conducted to determine and compare respondents' attitudes toward the reintroduction of different species. Such studies are scarce worldwide as most of the studies have only focused on one species and the comparison of public attitudes toward different species was hardly considered. Further, based on existing literature, no study has considered public attitudes toward the reintroduction of already restored species and species that are yet to be reintroduced. Results of such species comparison research would not only reveal potential factors that hinder restoration of whole ecosystems but also provide insights on how

to create social acceptance and support for large-scale ecological restoration through education and communication programs.

Regarding oriental storks, previous studies that were conducted after the reintroduction have revealed that in most cases, local residents supported their reintroduction (Honda, 2008; Takahashi & Honda, 2016). With respect to river otters, while there is a study in which the feasibility of their reintroduction from an ecological perspective was evaluated (Kim, 2015), there seems to be few, if not, no previous studies regarding public attitudes toward reintroduction of these species in Japan.

2.3. Theoretical background and hypotheses of this study

Oriental storks have been successfully reintroduced in Japan, and even at the time when wild storks were absent (since 1971 till 2005 when they were reintroduced) in the country, there were oriental storks in captivity for the purpose of breeding and increasing their numbers, and local residents never completely lost their relationship with this species. Therefore, as storks were somewhat familiar, it was assumed that students' attitudes toward reintroduction of oriental storks were more positive than that for the river otters which are categorized as extinct species and absent from Japanese landscapes for decades and may be perceived as not belonging in Japan. Therefore, our hypotheses were (1) students have more positive attitude toward reintroduction of oriental storks than that for river otters, and (2) students who know that oriental storks were already reintroduced would have more positive attitude toward their reintroduction. These hypotheses were developed based on the theory of mere-exposure effect which explains how people develop preferences for things that they feel familiar with (Harmon-Jones & Allen, 2001; Stafford & Grimes, 2012). Based on this theory, it could be speculated that people generally associate more positive images to species that are already reintroduced than those that are not, and being familiar with oriental storks and knowing about their reintroduction will affect public attitudes towards it.

3. Methods

3.1. Research questions

In this study, given that university students are said to be “future decision-makers” (Freed & Wong, 2019; Hermann et al., 2013), we conducted a survey at the College of Policy Science of Ritsumeikan University. It is one of the biggest universities in Japan with more than 40,000 undergraduate students. The college of Policy Science has approximately 1,600 undergraduate students. It was chosen because the university gives students the opportunity to study interdisciplinary subjects related to policy and not specialize in certain academic fields, such as ecology. Thus, the students in this college could therefore represent general university students better than those who are already studying specialized and related subjects, such as wildlife management.

The survey was conducted under the framework of the course entitled, “Introduction to Social Survey”, which is mandatory for all first year students. Therefore, it was a complete enumeration of the first year students at the college as a sampling technique. The survey was conducted on 9 May 2019.

3.2. Analysis

To gain a better understanding of respondents' basic information, descriptive data on socio-demographics, knowledge levels, and attitudes toward the reintroduction of the two species were analyzed. Five-point scale responses (1. Disagree, 2. Slightly disagree, 3. Neither agree nor disagree, 4. Slightly agree, and 5. Agree) were used to collect data on the attitudes of respondents toward the reintroduction of different species. To test our first hypothesis regarding if there are significant differences in respondents' attitudes toward the reintroduction of these two species, a Mann-Whitney U test was conducted as normal distribution was not assumed for our samples. To test if the knowledge affects respondents' attitudes toward the reintroduction of each species,

we conducted a multiple regression analysis. Species specific knowledge questions (for river otters: whether students knew (1) this species lived in Japan, (2) this species became extinct in Japan, and (3) reasons for this species extinction; for oriental storks: whether students knew (1) this species once had gone extinct in Japan, (2) reasons of this species extinction, and (3) the fact that this species was reintroduced in Japan [scored 1 for “Do not know”, 2 for “Know a little bit”, 3 for “Know well”]) and one general biology/ecology score (total score of five questions) were used as independent variables while attitudes toward the reintroduction of each species were set as dependent variables. Thereafter, we presented the results of the open-ended questions regarding respondents’ reasons for supporting or opposing species reintroduction. To quantitatively summarize these results, a text mining analysis was conducted and words that were frequently used/written for each attitude category (disagree, neutral, and agree) and for each species were identified. Text mining was used as it is an appropriate method to analyze massive amount of text data and draw implications. For our study, specifically, words with high Jaccard coefficients (degree of co-occurrence of the words and specific attitudes) for each species were presented in a table. We also showed examples of actual sentences that students of each attitude category wrote for open-ended questions using those words.

All statistical analyses were performed using SPSS version 22.0 (IBM, Tokyo). Additionally, all text mining analyses were performed using KH Coder software (Higuchi, *n.d.*).

4. Results

4.1. Socio-demographic characteristics and knowledge

All the students who were present for the class, “Introduction to Social Survey” on 9 May 2019 ($n = 360$) participated in this study. Among them, 56.8 and 43.2 % were male and female, respectively. Most of them (65.0 %) were 18 years old, 27.1 % were 19 years old, and the remainder, approximately 10 %, were above 20 years old. Additionally, a greater portion of these students majored in liberal art (88.5 %) in high school, while just 11.5 % of them majored in sciences. Further, it was observed that a majority of them currently live in urban areas (69.1 %) and a significant number of them grew up in urban areas (56.6 %).

Students’ knowledge about the considered species was relatively low. About 20 % of the respondents knew river otters once lived in Japan while more than half of the respondents (54.7 %) had no idea that this species was already extinct in Japan (Table 1). Among all respondents, over 80 % of respondents did not know why river otters and oriental stork became extirpated in Japan. A majority of students (61.8 %) were also unaware of the fact that the oriental stork, presently in Japan was reintroduced after extirpation.

4.2. Attitudes, reasons, and perceptions of reintroduction

Regarding attitudes toward species reintroduction, more respondents (30.6 %) disagreed to the reintroduction of river otters than those who agreed (26.2 %) while over 40 % neither agreed nor disagreed to it (Table 2). On the other hand, the number who agreed (35.5 %) to the reintroduction of oriental storks was much higher than those who disagreed (13.7 %) while over half neither agreed nor disagreed to it. The Mann-Whitney U test revealed that significantly more number of students agreed with the reintroduction of oriental storks than those who agreed to the reintroduction of river otters (effect size $r = 0.186$, $p < 0.01$).

Multiple regression revealed that none of knowledge related items significantly affected respondents’ attitudes toward reintroduction of oriental storks. On the other hand, one item; whether respondents knew the reasons of river otter extinction, affected their perceptions toward the reintroduction. The more respondents knew why river otters got extinct in Japan, the less likely they supported reintroduction of this species ($B = -0.193$, $p < 0.01$).

Table 1. Respondents' knowledge level regarding river otters and oriental storks

	Do not know (%)	Know a little bit (%)	Know well (%)
Did you know that wild river otters once lived in Japan? (n = 350)	27.1	52.3	20.6
Do you know that the river otters once lived in Japan went extinct? (n = 353)	54.7	29.7	15.6
Do you know that the oriental storks that once lived in Japan once went extinct? (n = 353)	39.9	42.2	17.8
Do you know why river otters went extinct in Japan? (n = 356)	84.3	10.1	5.6
Do you know why oriental storks went extinct in Japan? (n = 354)	82.2	11.3	6.5
Do you know that, in Japan, once extirpated oriental storks have been reintroduced from other country? (n = 356)	61.8	23.6	14.6

Table 2. Respondents' attitudes toward the reintroduction of river otters and oriental storks

	Disagree (%)	Slightly disagree (%)	Neither agree nor disagree (%)	Slightly agree (%)	Agree (%)	Mean score	Standard deviation
Attitude toward the reintroduction of river otters in Japan. (n = 359)	13.1	17.5	43.2	18.1	8.1	2.91	1.10
Attitude toward the reintroduction of the oriental storks that were released in Toyooka, Hyogo in 2005. (n = 358)	3.9	9.8	50.8	22.1	13.4	3.31	0.96

We used the open-ended questions to further understand why respondents supported or opposed reintroduction. A total of 746 words with 388 sentences were extracted from responses (n = 329, 91.4 % of all students) regarding respondents' reasons for supporting or opposing the reintroduction of river otters. Those who opposed the reintroduction of this species frequently used words, such as "ecosystem" and "exotic," while those who supported its reintroduction frequently used words, such as "human" and "back" (Table 3). The actual sentences students who disagreed wrote include "if we release river otters which are exotic species, the ecosystem will collapse" while those who agreed wrote sentences such as "river otters were extirpated by human, and therefore, we have responsibility to bring them back to Japan" for those who agreed. Those who neither disagreed nor agreed used words, such as "impact" and "knowledge." The actual sentences included "I do not have enough knowledge about river otters to judge" and "I do not know what actual impact river otters will bring to the ecosystem."

Table 3. Frequently used words among respondents with different attitudes toward the reintroduction of river otters and oriental storks

Ranking	Those who disagreed to reintroduction of river otters			Those who were neither disagreed nor agreed to reintroduction of river otters			Those who agreed to reintroduction of river otters		
	Extracted Words	Frequencies	Jaccard	Extracted Words	Frequencies	Jaccard	Extracted Words	Frequencies	Jaccard
1	ecosystem	42	0.209	river otter	85	0.336	think	43	0.259
2	reintroduction	35	0.195	ecosystem	54	0.227	negative impact	14	0.122
3	exotic	17	0.133	know	31	0.179	human	13	0.111
4	extinct	18	0.127	impact	19	0.112	good	13	0.099
5	Japan	16	0.114	can be said	17	0.101	animal	10	0.081
6	creature	14	0.108	extinct	19	0.100	agree	9	0.077
7	possible	12	0.096	knowledge	14	0.083	environment	8	0.067
8	bring	11	0.090	merit	12	0.070	problem	7	0.063
9	good	12	0.083	wolf	11	0.062	wolf	7	0.058
10	other	10	0.078	consider	9	0.051	back	6	0.053
	Those who disagreed to reintroduction of oriental storks			Those who were neither disagreed nor agreed to reintroduction of oriental storks			Those who agreed to reintroduction of oriental storks		
1	extinct	11	0.155	oriental stork	78	0.344	think	56	0.298
2	think	17	0.121	reintroduction	62	0.282	good	19	0.114
3	nature	6	0.103	know	42	0.227	Japan	16	0.104
4	human	5	0.076	ecosystem	31	0.150	negative impact	15	0.103
5	hand	4	0.076	impact	20	0.110	agree	15	0.100
6	exotic	4	0.066	can be said	18	0.102	human	13	0.092
7	creature	4	0.064	knowledge	10	0.057	tourism	11	0.077
8	once	3	0.055	opposite	9	0.050	hear	10	0.070
9	again	3	0.055	occur	8	0.045	see	10	0.069
10	consider	3	0.048	now	8	0.045	increase	8	0.056

Additionally, a total of 713 words were extracted from 368 sentences corresponding to the responses ($n = 323$, 89.7 % of all students) regarding their reasons for supporting or opposing the reintroduction of oriental storks. Those who opposed the reintroduction of this species frequently used words, such as “extinct” and “exotic,” while those who were in support frequently used words, such as “hear” and “see.” The actual sentences students who disagreed wrote include “reintroduced oriental storks would become exotic species and other native species would go extinct.” On the other hand, students who agreed wrote sentences such as “I did not know about oriental storks before but after seeing news about them, I felt attached to these birds,” “I see news on how oriental storks came back and feel good about it,” “I hear a lot that oriental storks are beautiful birds,” and “by seeing the news about reintroduction of oriental storks, it seems like the project was a success.” Further, those who neither disagreed nor agreed to the reintroduction of this species frequently used words, such as “ecosystem” and “impact.” The actual sentences included “I cannot judge because I do not know if it had certain impacts to the ecosystem.”

5. Discussion

5.1. Potential reasons for students to support or oppose reintroduction

Most respondents were unaware of the reasons behind the extirpation of river otters and oriental storks in Japan. Moreover, a majority of them were not aware of the fact that oriental storks had been reintroduced in the country, even though the reintroduction site (Hyogo prefecture) is located next to Osaka, where the university campus is located. In Japan, there are currently high school biology textbooks that discuss the extinction of river otters and wolves and provide the reasons for their extinction, (e.g., habitat loss; Asajima et al., 2018, p. 304). The textbooks (Asajima et al., 2018, p. 360) also provide explanations regarding the extinction as well as the reintroduction of the crested ibis in Japan, but do not mention the reintroduction of the oriental storks. Even though junior high school science textbooks provide explanations regarding the importance of conserving the natural environment, nothing is mentioned about the specific species that are extinct in Japan (Okamura & Fujishima, 2016). This lack of knowledge might be attributed to the fact that the explanations provided in the textbooks are limited or even when these students learn about this in high or junior high school, such knowledge does not sufficiently take root in their minds.

Our first hypothesis of this research; “more respondents have more positive attitudes toward the reintroduction of oriental storks than river otters” was verified. This difference between oriental storks and river otters might follow the theory of mere-exposure effects; potentially explaining that people have positive attitudes toward species that they feel familiar to. This was clear from results of open-ended questions where several students wrote “because I heard about oriental storks and am familiar with this species” as the reason for supporting their reintroduction while there was no such answer for river otters.

The second hypothesis; “knowing about reintroduction of oriental stork increase support” was not verified based on the multiple regression analysis but was partially supported by the text mining analysis results. The text mining analysis suggested that knowing oriental stork reintroduction through media could increase support to this project as those who supported the reintroduction frequently used words, such as “see” and “hear,” and their actual sentences included “I support the reintroduction of oriental stork because I saw news on how its reintroduction took place in Japan.” These observations imply that watching news regarding the reintroduction of oriental stork or hearing the story about the steps taken to increase their population could enhance feelings of support. Another word that was frequently used was “tourism,” implying that respondents who thought the reintroduction of oriental storks could boost tourism were more likely to show support in this regard. These findings suggest that attitudes toward the reintroduction of oriental stork are not necessarily affected by respondents’ level of knowledge regarding the historical background of the species in the country, but was possibly affected by media (e.g., watching news reports on the local economic benefits of the reintroduction of oriental

storks). This suggests that the efforts made by governments to promote oriental storks as the symbol of biodiversity conservation (e.g., Toyooka city [Evaluation Committee of Oriental Stork Reintroduction Project, 2014; Kikuchi, 2017]) have been successful in terms of nurturing people's positive attitude toward reintroduction.

On one hand, the regression analysis failed to demonstrate any significant relationship between students' knowledge and their attitudes toward stork reintroduction, and on the other hand, the text mining analysis demonstrated that certain students have positive attitude toward the project because they saw news about it. This implied that the association of knowledge toward attitude was not so obvious to generate significant outcome, and further research is necessary to understand which factors affect people's attitudes toward already reintroduced species.

The finding that knowledge about reasons for river otter extinction negatively affected respondents' attitudes toward reintroduction, implied the possibility that those who knew the actual reasons (such as habitat loss) for extirpation might have thought that the natural environment of the country is still not livable for this species. However, such words as "habitat loss" were not extracted from the open-ended questions as frequently used words for those who disagreed with the reintroduction of river otters, and further research would be necessary to explore why this specific knowledge negatively affected respondents' attitudes toward river otters reintroduction.

Even though the data cannot be generalized to students in other universities nor Japanese citizens, our results indicate how people perceive the reintroduction of once extirpated species, particularly smaller mammals or bird species. Contrary to previous studies that found people with more knowledge of the species (e.g., wolves) more likely to have supported the reintroduction of that species (Enck & Brown, 2002; Gosling et al., 2019), knowledge was not associated with attitude for reintroduction of oriental storks. For river otters, more knowledge reduced students' support toward reintroduction. In other words, people's attitudes toward the reintroduction of smaller mammals or birds as well as already reintroduced species are not necessarily affected by knowledge, nor show a positive linear relationship. As factors affecting attitude toward reintroduction of such species could be different from what has been studied in terms of public attitude toward larger species, we recommend future studies to investigate a different set of factors to test how they could explain people's attitudes toward the reintroduction of those less studied species.

5.2. Implication for accepting "new normal"

Two implications could be considered from our results. First, the respondents seemed to have limited knowledge regarding the topic of this study, and their attitudes toward the topic could be shaped based on their misperceptions and unscientific knowledge. One of the words that had high association with the attitudes of disagreement to reintroduce oriental storks was "exotic" implying that they seemed to be unaware of the fact that the reintroduced oriental stork is the same species as those that originally lived in Japan (Naito et al., 2011).

Second, our results imply that whether people agree (or disagree) to the reintroduction of oriental storks is not necessarily only influenced by knowledge but is possibly affected to a greater extent by transient episodes or experiences such as whether they watched the news or not. Alternatively, as long as people's attitudes are potentially only influenced by media, their attitudes toward reintroduction could become negative once they watch media reports related to the negative impacts of the reintroduced species (e.g., agricultural, fisheries, or property damage).

In Toyooka, where oriental storks were reintroduced, "Furusato Kyoiku" (i.e., education about the local area) was implemented in all elementary and junior high schools in the city since 2017, in which students study oriental storks (Honda, 2019). Taking such studies deepens students' understanding regarding living with oriental storks. It also boosts their willingness to encourage the coexistence of people and oriental storks (Honda, 2019). Further, the reintroduction of oriental storks has not been limited only to Toyooka, but has been realized all over Japan (e.g., Noda city in

Chiba Prefecture as well as Echizen city in Fukui Prefecture; Ezaki & Ohsako, 2019), and similar effects are expected (e.g., more locally-based educational curriculum related to oriental storks is implemented and local people increase their support for the coexistence of oriental storks with people).

These observations imply that “living with once exterminated oriental storks” is now becoming a “new-normal” in many areas of Japan including urban residents (such as the respondents in this survey). Even though most of these city dwellers have probably not seen oriental storks in the wild, they are even beginning to accept this fact and are showing positive attitude toward it, owing to the effect of media and other sources. Further, species reintroduction does not necessarily imply the replication of past conditions. Considering climate change, dynamic nature of ecological systems, and changing human societies (e.g., depopulation in Japan), it is impossible to replicate the exact relationship that previously existed between wildlife and humans (Seddon & van Heezik, 2013). The relationship that current local citizens have with the reintroduced oriental storks is different from how people used to live with this species more than half a century ago (Kikuchi, 2006).

Wild river otters were observed in Tsushima in 2017 and given that they have the potential to increase their population in the near future (Nakanishi & Izawa, 2019), living with them could become a new-normal for the residents of this island. As river otters have been absent from the country for nearly half a century, these wild river otters could be seen as “new species” by local residents. However, given that the replication of past conditions is not feasible, the establishment of a closely related taxon for the restoration of ecological functions could become a pathway for realistic environmental management in the future (Seddon & van Heezik, 2013).

6. Conclusion

Species reintroduction has been implemented globally. However, studies on people’s understanding regarding the overall impacts and significance of such projects as well as how their attitudes change (or remain unchanged) after the reintroduction are lacking (Drouilly & O’Riain, 2021). People’s perceptions and attitudes toward a certain topic could change over time as seen from the cases where public attitudes toward species (e.g., bears, wolves) became negative once they started to flourish within landscapes (Eriksson et al., 2015; Majic et al., 2011). These studies demonstrate the importance of monitoring public attitudes toward the species even after the reintroduction (like the case of human dimension studies on oriental storks in Japan).

Meanwhile, by comparing students’ attitudes toward the reintroduction of already reintroduced species and species that have not yet been reintroduced, we were able to demonstrate how public attitudes could become positive by being exposed to the media surrounding a project while attitudes toward other extirpated species (river otters) remained negative despite the fact that they seemed to cause less conflicts with humans compared to other larger species such as wolves. In addition, our results implied that misunderstandings concerning species in this study (e.g., reintroduced species being exotic species) could stop people from supporting species reintroduction. Educational resources might need to include explanations regarding the meaning of species reintroduction and restoration as well as identity (e.g., reintroduced species being the same species as those that lived in the country before). As public perceptions will remain important for the success of species reintroduction in the future, more social studies are necessary to understand what affects such attitudes.

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