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Results from Online Survey in Japan

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Abstract

Even after Fukushima accident, siting of final disposal facilities of high-level radioactive waste (HLW) remained to be solved in Japan. Why wasn't the agenda on nuclear waste disposal set in Japan even after Fukushima? People's attitudes called NIMBY (not-in-my-backyard) is considered to be one of the important factors that make the social agreement difficult. To see geographical differences in peoples' attitudes toward HLW disposal siting, we conducted online questionnaires to 1700 people to see the attitudes (1) in situations where the siting of HLW disposal facilities near their residents is realistic and unrealistic (inland or coastal), and (2) in several scenarios of the places future HLW disposal facilities site. Through the analysis of these differences in attitudes, we found that people's attitudes at the moment do not reflect the reality in terms of scientific possibility of siting HLW disposal (in this paper inland or coastal municipalities) and that administrative units are important components of "neighbors" when we consider NIMBY concept.

Keywords: high-level radioactive waste (HLW), NIMBY, disposal site selection, agenda setting

Introduction

While social recognition and awareness of nuclear management should be increased after Fukushima, political debates on nuclear management policies remain inactivated. Among them, issues on radioactive waste management have not been invoked in political discussion in Japan. Siting of final disposal facilities of high-level radioactive waste (HLW) is one of such issues which remained to be solved. This contrasts with situations in other countries like France and South Korea, where increase in social awareness of nuclear waste disposal pushed forward relevant political agenda (Komatsuzaki 2014). Why wasn't the agenda on nuclear waste disposal set in Japan even after critical incidents like the earthquake and the nuclear accident?

People's attitudes called NIMBY (not-in-my-backyard) is considered to be one of the important factors that make the social agreement difficult. In order to move this agenda forward with involving all the nations into discussion of HLW disposal, the Japanese government launched a new selection process of HLW disposal sites in 2015. The process categorizes ALL the regions in the country into three types depending on the scientific possibilities of siting final disposal facilities. Is their new attempt of involvement of all the nations into the discussion effective in pushing the agenda forward? As the first step to answer this question, we investigated geographical differences in peoples' attitudes toward HLW disposal siting from our online survey. We found that people's attitudes at the moment do not reflect the reality in terms of scientific possibility of siting facilities (in this paper inland or coastal municipalities) and that administrative units are important components of "neighbors" in NIMBY concept.

Our paper is structured as follows. Section 1 reviews the previous studies which see geographical aspects of NIMBY. Section 2 describes the context of our target case, HLW disposal site selection in Japan followed by stating our research questions in Section 3. In Section 4, we show the results of our online survey and Section 5 concludes.

1. Literature Review

While relationship between proximities and public opinion is getting more and more attention among scholars of policies and politics in general (e.g. Gravelle and Lachapelle 2015), the literature which study NIMBY syndrome has mentioned geographical distribution of different attitudes toward public facility siting for decades (Dear 1992; Kraft and Clary 1989). However, since early 2000s, together with waning of NIMBY concepts in urban social geography (DeVerteuil 2013), research focus has been moved to controversy between positive and negative interpretation of NIMBY concepts especially in the context of environment and renewable energy issues. Among them, some studies pointed out the importance of non-linear relationship between distance and public perceptions. (See Warren et al. 2005; Devine-Wright 2005; van der Horst 2007 for wind power plants.) Although it is not on renewable energies, most recently by using event history analysis Dokshin (2016) showed that hazard of passing an anti-fracking ordinance shows the inverse-U shape to the miles to nearest well of the shale gas.

Radioactive waste disposal has some features different from environmental or renewable energy issues. Scholars working on radioactive waste disposal have put more emphasis on risks in the context of risk communication of new technologies. Here, the roles

of trust (Pijawka and Mushkatel 1991), public participation (Krutli et al. 2010) or financial transfer to the local municipalities (Paydar et al. 2016a; 2016b) on public perceptions and attitudes toward nuclear power and its waste disposal have been emphasized (For historical advance of the research, see Solomon et al. (2010).). Although we do not deny the significance of these aspects, we think that the "geographic context of opposition" by answering to the question "How large is a backyard?" (Kraft and Clary 1989) is also an important and missing building block to understand the NIMBY syndrome in radioactive waste disposal (In recent studies, we found Jenkins-Smith (2011) and Rechard (2012) for exception). The new selection strategy the Japanese government took to involve all the nations to the discussion (details are explained below) gives us a good opportunity to supplement our understanding of NIMBY in this context.

2. Disposal Site Selection in Japan: Toyo-town Experience and New Strategy

Based on the accumulated scientific reports which said that geological repository was the most feasible way to dispose HLW in Japan, Designated Radioactive Waste Final Disposal Act was enacted in 2010. The act specifies the three-step repository site selection process, which consists of (1) the literature survey, (2) the preliminary investigation, and (3) the detailed investigation. The process adopted the "application-based" (voluntary) policy for site selection, and application for the first step, the literature survey was open in 2002. 2 billion JPY will be paid for applying municipalities during two years of the literature survey,

and further financial transfer will be offered for candidate municipalities of the preliminary and detailed investigations (Komatsuzaki et al. 2010).

Several towns and villages were said to consider the application for the literature survey, but finally only one municipality, Toyo town in Kochi prefecture applied for the study in 2007. However, they finally withdrew its application after political conflicts and resign of the town mayor in the same year (Komatsuzaki 2014; Wada et al. 2009). Since then, the Japanese government had faced difficulty in finding candidate municipalities for final disposal facilities of HLW.

In order to move this agenda forward with involving all the nations into discussion of HLW disposal, the government proposed a new selection process of HLW disposal sites in 2015. Considering the previous process only attract municipalities with limited resources, which can lead to indifference among most of the people, the new process categorizes ALL the regions in the country into three types depending on the scientific possibilities of siting final disposal facilities. Specialists have been working on categorization of the regions into the three levels of possibilities, and the results was expected to be published in map by early 2017. Although it is said that the work has been almost finished by this April, the publication has not been done as of June.

Evaluation of scientific possibilities of siting disposal facilities has two stages. First, geo-environmental characteristics and long-term stability of the area and safety concerns in construction and operation are investigated. If the area has at least one unfavorable characteristic like locations near volcanos or active faults, the area is categorized as “low adequacy”, and is suggested to be excluded from the long list for further survey. If the area has no such characteristics, the areas are suggested to be included in the long list. Second,

the areas which will be included in the long list are further divided by safety concerns in transportation of HLW to the areas. Specifically, this is related to the distance from the sea, since HLW will be carried by sea route and necessity of additional inland transportation leads to higher risks. If the distance is short from ports, the area is categorized as “higher adequacy”, and otherwise “moderate adequacy”.

The areas which will be in the long list for the survey (i.e. categorized in “higher adequacy” or “higher adequacy” in the first stage) were previously called “scientifically promising” areas. While the choice of words are important in deciding public views on new technologies and facilities (Stoutenborough et al. 2016) and recently the government decided not to use this terms when they publish the map, from the terms we can observe that its intention to involve the public into the discussion. By the new selection process including the evaluation of scientific possibility of siting HLW repository, they have wanted to show that scientific possibility of siting disposal facilities are high enough in many areas in Japan, and that not just waiting for peripheral municipalities applying for the site selection but making decisions involving the whole public is needed.

3. Research Questions

Is their new attempt of involvement of all the nations into the discussion described above effective in pushing forward the agenda of HLW disposal? To answer this question, we need to investigate peoples’ attitudes toward HLW disposal siting depending on the geographical distribution of possibilities of siting disposal facilities. In particular, we consider

two aspects are important when geographical distribution of possibilities of siting disposal facilities is published.

The first one is whether and how the siting of HLW disposal facilities is realistic or unrealistic for the residence of our respondents, and the relationship between objective reality of siting the facilities and subjective perceptions of the residents. Here, our first question is: Do peoples' attitudes toward HLW disposal siting in situations where the siting of HLW disposal facilities near their residents is realistic and unrealistic? To observe objective reality of siting HLW disposal facilities for each area, we took advantage of known criteria of dividing "higher adequacy" and "moderate adequacy" categories as we explained above. The decision criteria of dividing these two categories are whether the areas are near to ports or not. This means that siting HLW disposal facilities is more realistic in coastal municipalities than inland ones. We expect that there should be difference in perceptions, namely expectations of their residence city being categorized as "higher adequacy" in this study, between residents in inland municipalities and ones in coastal municipalities.

The second aspect is how far people are concerned with the possibilities of siting disposal facilities. In other words, we are interested in how far the neighborhood is when we say 'NIMBY'. Scientifically, the risks of accidents in HLW disposal facilities should be related with geographical distances or terrains between facilities and areas of residents. It is often reported that public acceptance of new facilities depends on how far the people are living from them. (Interestingly, residents near candidate sites are often more realistic in terms of balancing the benefits and possible risks than residents living just outside that area. See Dokshin (2016).) Meanwhile, previous cases tell us administrative boarders also play some roles in deciding final distribution of public opinions on siting facilities. This can be because

local identities are reflected in administrative boarders (often geographical landmarks like rivers play an important role) and people sharing the same identities are easily formulate similar positions to the issue. Conversely, the administrative boarders themselves sometimes help to emerge identities along both sides of the borders although historically these sides are similar in customs and identities. Our second question is: How do the peoples' attitudes toward HLW disposal siting differ when we show several scenarios of the places of future HLW disposal facilities? We showed the several scenarios differing the distances from areas with "higher adequacy" and investigate the relationship between the shown scenarios and their attitudes toward HLW disposal siting.

4. Results

In January 2017, we conducted an online survey with samples of 1700 residents, randomly selected from monitors of Cross Marketing Inc. As we explained above, inland areas will be the least for being categorized in "higher adequacy", and it will be potentially interesting to investigate the changes in perceptions before and after the recognition of living in areas with "higher adequacy" when the map is published near future. Therefore we decided to collect as many and varying samples from coastal "cities" as keeping future comparison between coastal municipalities and inland ones possible. As a result, we stratified based on their residential areas (300 for inland or 1400 for coastal), and we limited inland samples to residents of six inland cities, each of which was taken from the six regions in Japan (Hokkaido, East Honshu, Central Honshu, West Honshu, Shikoku, and Kyushu) and 50 samples are allocated for each inland city. For the coastal samples, we prepared the list of coastal cities which are comparable to the six inland cities we selected, and the samples

were taken from the cities on the list. This resulted in having samples from a variety of 336 coastal cities. Among our sample, 668 (39.3%) are females, and 1032 (60.7%) are males, and they are 48.3 years old on average.

4.1 Comparison between inland cities and coastal cities

Are peoples' attitudes toward HLW disposal siting different in situations where the siting of HLW disposal facilities near their residents is realistic and unrealistic? To answer this question, we took advantage of known criteria of dividing "higher adequacy" and "moderate adequacy" categories as we explained above. Given that inland municipalities have higher expectations of being categorized as "higher adequacy" than coastal ones, people in these areas should have different perceptions on HLW disposal.

After the explanations about new scheme of site selection process and three categories, we asked our respondents how much they expect the probability of your city of residence falling in to each category, where the sum of the three probabilities must be 100%. Figure 1 shows the distribution of expected probability that residence city falls in each category. The darkest grey shows the proportion of the respondents who evaluated the probability of their area of residence being fell in each category "0%", and the brightest grey shows the proportion of the ones who evaluated it "100%".

Against our expectation, we cannot find difference in perceptions of expected probability of residence city falling into each category. Figure 2 shows the average perception on the expected probability merging respondents living in inland municipalities and ones living in coastal municipalities. More than half of people think that their city of

residence will fall in the category of “low adequacy”, while the criteria only allows limited areas with high geo-environmental danger or safety concerns in construction and operation. This result suggests that publication of map on the scientific possibilities of siting final disposal facilities will be certainly unexpected for people, who are “optimistic” in that they think their city of residence will NOT fall in “scientifically promising” cities (with either moderate or higher adequacy). In this sense, publication of the map in the near future has a potential to stimulate the discussion on HLW disposal, while careful public relation about the rationales of the categorization is needed so as not to invoke the (further) doubt and distrust to the government or the science communities.

4.2 Comparison among scenarios different in distances to areas with “higher adequacy”

Are peoples’ attitudes toward HLW disposal siting different in several scenarios of the places of future HLW disposal facilities? To see the administrative boarders are important drivers that decide peoples’ attitudes toward HLW disposal siting, we prepared scenarios with or without the respondent’s city of residence being categorized as area with “higher adequacy”. Within the “your city of residence is categorized as area with ‘higher adequacy’” scenario, we further prepared three scenarios in which (1-A) the respondent’s house is in the area with “higher adequacy”, (1-B) the respondent’s house is not in the area with “higher adequacy”, but it is near the area with “higher adequacy”, and (1-C) the area with “higher adequacy” is far from his/her house. Within the “your city of residence is not categorized as area with ‘higher adequacy’” scenario, we prepared two scenarios in which (2) the resident’

next city is categorized as area with “higher adequacy”, and in which (3) the resident’ next prefecture (broader administrative unit in Japan) is categorized as area with “higher adequacy”.

As the peoples’ attitudes toward HLW disposal siting, we measured two types of attitudes in five-point scales. One is (i) support for the application to the literature survey (the first step of feasibility study) and the other is (ii) acceptance for construction of the final disposal site of the city, in the respondent’s residence for scenarios (1-A) to (1-C), of the city next to the city of the respondent’s residence for scenario (2), and a city in the prefecture next to the respondent’s residence for scenario (3).

Figure 3 shows the distribution of (i) support for application to the literature survey, and Figure 4 shows the distribution of (ii) acceptance in construction of the final disposal site. Both figures show similar tendency of difference among scenarios. More unsupportive attitudes are observed in scenarios where the area with “high adequacy” is near to their houses, while supportive attitudes do not differ among scenarios.

From these results, we can derive important implications contributing to our further understanding of the “NIMBY” concept. Most importantly, administrative units are one of the building blocks of “neighbors”. Although the administrative units, which are tightly related with people’s identities, are relevant to people’s attitudes toward HLW disposal siting is highly understandable, it can be showing the limitation of persuasion through scientific evidence. In practice, publication of the map of scientific possibilities of siting HLW disposal facilities could help to set the agenda among citizens, but in next steps of establishing social agreement issues “outside science” will emerge again.

Furthermore, our results imply that “NIMBY” is literally “not-in-my-backyard”, and it does NOT mean that NIMBYs think facilities should be “in others’ backyard” at least in this context. It means that the solution cannot be made through just putting what people do not want to a next prefecture to their houses. At least, this can be one supportive evidence for the overall direction of the Japanese government to involve the public into the discussion of HLW disposal.

5. Conclusion and Future Study

Not only in Japan, people’s attitudes called NIMBY is considered to be one of the important factors that make the social agreement difficult on siting nuclear waste disposal. Most recently regarding HLW disposals, the words appear frequently in newspapers, where they report Trump administration’s attempts to restart licensing operations for the Yucca Mountain Nuclear Waste Repository. After Fukushima accident, the Japanese government launched a new selection process of disposal sites in 2015, aiming to involve all the nations into the discussion of this issue. Will it work to push the agenda forward? As the first step to answer this question, we studied the geographical difference in people’s attitude toward HLW disposal facilities siting, (1) in situations where the siting of HLW disposal facilities near their residents is realistic and unrealistic, and (2) in several scenarios of the places of future HLW disposal facilities.

For the difference in situations where the siting of HLW disposal facilities near their residents is realistic and unrealistic, we take an advantage of existing criteria of distance to ports, which divides “higher adequacy” and “moderate adequacy” categories. Our result

shows that on the contrary to our expectation, we cannot find difference in perceptions of expected probability of residence city falling into each category. Regardless of living in inland cities or coastal cities, people are “optimistic” in that they think their city of residence will NOT fall in “scientifically promising” cities (with either moderate or higher adequacy).

For the difference in several scenarios of the places of future HLW disposal facilities, the distributions of support for application to the literature survey and of acceptance in construction of the final disposal site in several scenarios show that more unsupportive attitudes are observed in scenarios where the area with “high adequacy” is near to their houses, while supportive attitudes do not differ among scenarios. We confirmed that administrative units are one of the building blocks of “neighbors” and we cannot escape from issues “outside science” in next steps of establishing social agreement even if the new selection process succeed in setting the agenda among citizens.

For future study, making use of the new selection process and its forthcoming publication of the worked results explained above, another survey in the near future will enable us to analyze the difference in attitudes toward HLW disposal sites before and after their residential areas are actually focused as candidates for the future disposal sites. The issue should be studied once the map is published.

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Figure 1 Distribution of expected probability that the city of residence falls in each category

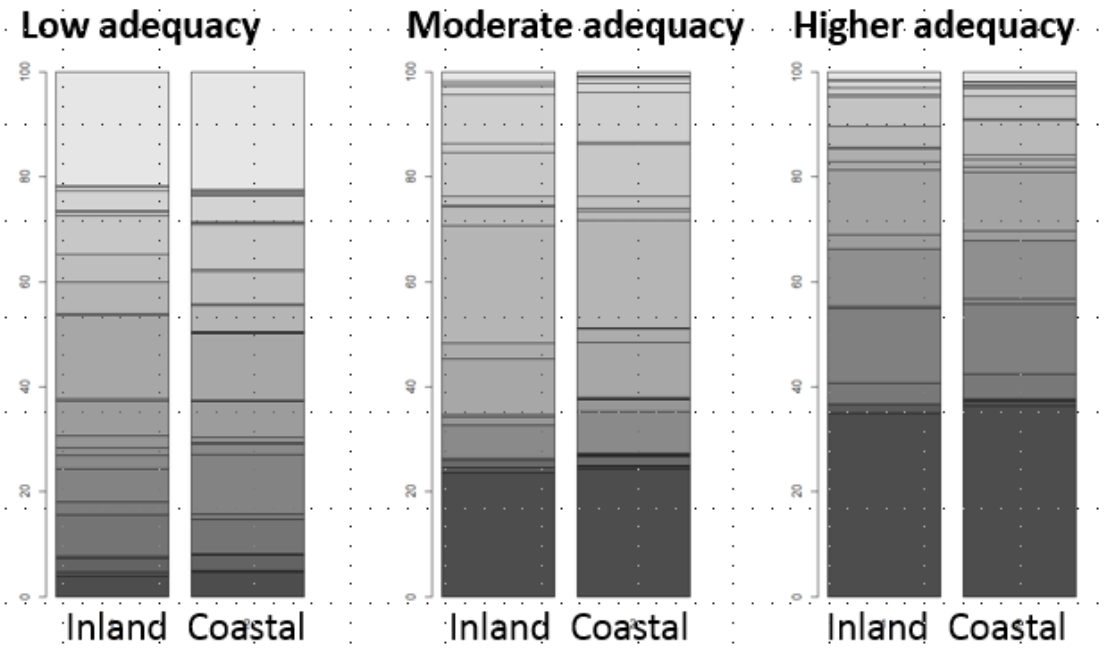

Figure 2 Average perception on expected probability that the city of residence falls in each category

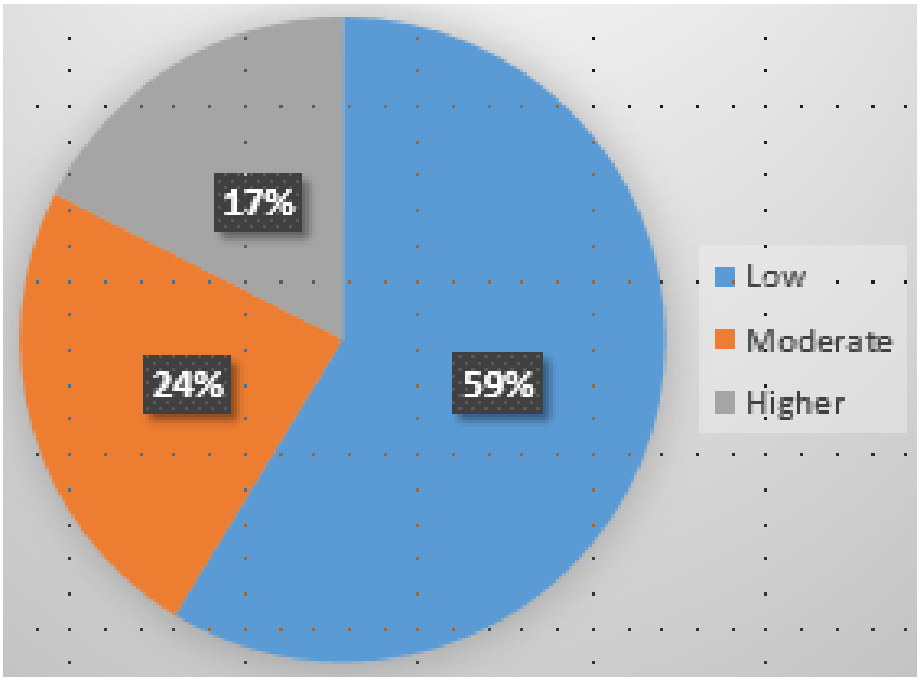

Figure 3 Distribution of support for application to the literature survey

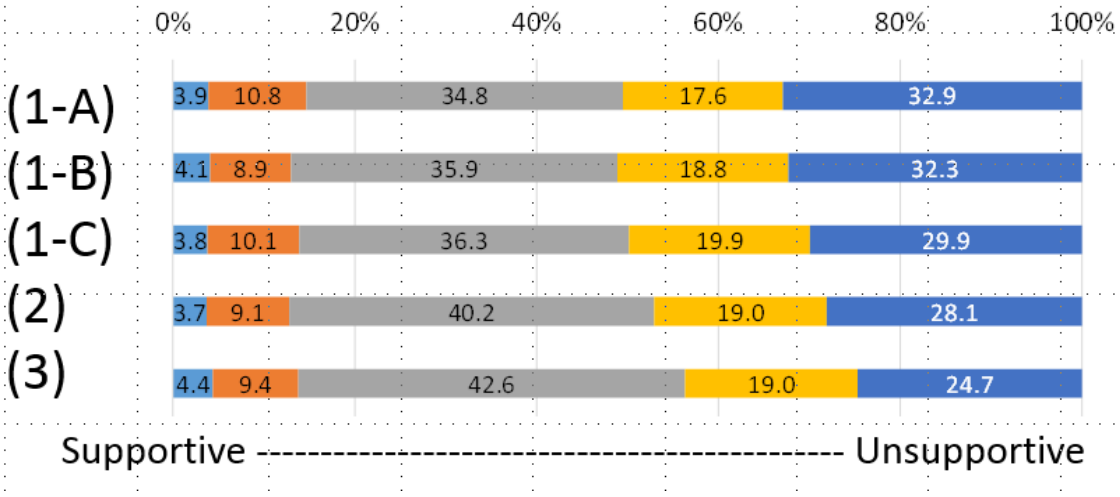

Figure 4 Distribution of Acceptance in construction of the final disposal site