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Disaster Governance in Disaster Management Planning —Analysis of the Evacuation Planning Process for Kuchinoerabujima Volcano Eruption—

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ABSTRACT

This study analyzes the effectiveness of a disaster management plan and the problems encountered in its implementation, focusing on patterns of interaction between government and society in terms of disaster governance. Scholars in socio-political science point out that there has been a shift in the balance between government and society, from the public sector to the private sector as different sectors interact to solve problems. This study analyzes patterns of interaction and illustrates factors that influence the shift by examining the formulation and implementation process of an evacuation plan in the case of a volcanic eruption of Mount Shindake on Kuchinoerabujima Island, Japan. Mount Shindake explosively erupted on May 29, 2015. Immediately after observing the eruption, Japan Meteorological Agency (JMA) issued a volcanic alert “level five (evacuate),” the highest level. It was the first time that evacuation operations have been performed under such a high warning level. Although there were no official short-term warnings prior to the eruption, all people on the island evacuated safely. As a result of the study, we found that disaster governance had shifted from government-led to government and community collaboration after the volcanic eruption on August 3, 2014, which made the evacuation plan more effective.

Keywords: disaster governance, volcano, evacuation, Kuchinoerabujima

1. Eruption at Mount Shindake, Kuchinoerabujima

An explosive eruption occurred at Mount Shindake at 09:59 on May 29, 2015. Kuchinoerabujima is a small, volcanic island located in the Pacific Ocean, 12 km from Yakushima Island, Kagoshima Prefecture, southwest of Japan (Fig.1). Kuchinoerabujima is under the jurisdiction of Yakushima Town Government (YTG).

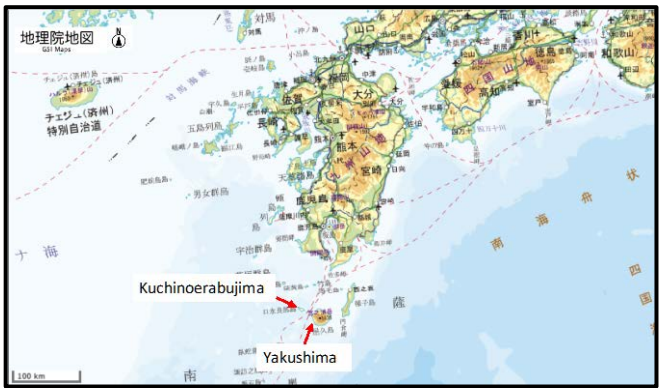

Figure1. Location of Kuchinoerabujima
(Based on GIS map by Geospatial Authority of Japan)

Japan Meteorological Agency (JMA) issued a “emergency warning” at 10:07, raising the volcanic alert level from level three (do not approach the volcano) to level five (evacuate), the highest on its scale. The volcanic alert level is a volcanic warning system that expresses the situation of volcanic activity and recommends action to be taken by residents. There are five levels, as shown in Table 1(JMA, 2016): level one (potential for increased activity), level two (do not approach the crater), level three (do not approach the volcano), level four (prepare to evacuate), and level five (evacuate). It was the first time that JMA had issued a level five alert since the establishment of the volcanic alert level system in 2007. Immediately after receiving the volcanic alert from JMA, both YTG and Kagoshima Prefectural Government (KPG) quickly established the Disaster Management Headquarters. YTG issued an evacuation order to all residents of Kuchinoerabujima at 10:20 (Cabinet Office, 2015).

The volcanic alert level was level three when the eruption occurred and it was raised to level five after observing the eruption. Residents of the island evacuated immediately after witnessing the eruption. Although no official emergency warnings were provided prior to the eruption, 137 persons on the island (118 residents and 19 tourists) evacuated safely, except for one person who was injured by a small pyroclastic surge and another who felt sick during the evacuation.

Prior to the May 29, 2015 eruption, Mount Shindake had erupted on August 3, 2014. The eruption before that was 30 years ago in September 1980. The eruption of August 3, 2014 was a sudden eruption, and JMA raised the volcanic alert level from level one to level three after observing the eruption. Fortunately, there was no severe damage, however, the experience of facing a sudden volcanic eruption raised the disaster awareness of residents and encouraged them to prepare for further eruptions.

Table 1. Volcanic Alert Levels by JMA(JMA, 2016)

Classification	Level	Keywords	Expected volcanic activity	Action to be taken by residents
Emergency Warning	5	Evacuate	Eruption or imminent eruption that may cause serious damage in residential areas and non-residential areas nearer the crater.	Evacuate from the danger zone (Target areas and evacuation measures are determined in line with current volcanic activity.)
	4	Prepare to evacuate	Possibility or increasing possibility of eruption that may cause serious damage in residential areas and non-residential areas nearer the crater.	Prepare to evacuate from alert areas. Have disabled people evacuate. (Target areas and evacuation measures are determined in line with current volcanic activity.)
Warning	3	Do not approach the volcano	Eruption or possiblity of eruption that may severely affect places near residential areas (possible threat to life in such areas.)	Stand by and pay attention to change in volcanic activity. Have disabled people prepare to evacuate in line with current volcanic activity.
	2	Do not approach the crater	Eruption or possibility of eruption that may affect areas near the crater (possible threat to life in such areas.)	No action required.
Forecast	1	Potential for increased activity	Calm: Possibility of volcanic ash emissions or other related phenomena in the crater (possible threat to life in the crater.)	

2. Disaster Governance and Disaster Management

This study aims to analyze the patterns of interaction between government and civil society (including private sector, voluntary organizations and citizens) for disaster management policy in terms of disaster governance. As disaster is a social phenomenon in social time, and it is disruptive to social intercourse (Perry, 2005), policies for reducing disaster risks should be considered in the social context.

Scholars in socio-political studies have started to discuss governance, considering that the government is the main actor for policy planning and implementation. The United Nations Development Programme (UNDP) defines governance as "the government focusing on the process of how public policy decisions are made and implemented (UNDP, 2009)." However, the rapid globalization, advancement in Internet technology and the development of the civil sector have made the role of government smaller and fragmented; Rhodes referred to this process as the 'hollowing of the state' (Rhodes, 1996). Kooiman defines governing as "the totality of interactions, in which public as well as private actors participate, aimed at solving societal problems or creating societal opportunities" and governance as "the totality of theoretical conceptions on governing" (Kooiman, 2003). He distinguishes the process of "governing" and "governance," and considers governance to be a result of socio-political-administrative interventions and interactions (Kooiman, 2003). There has been a shift in the balance between government and society, from the public to the private sector, but there are also efforts to shift the balance to share responsibilities for solving problems.

Similar discussions are made in disaster management studies. In her comparative study on disaster governance, Tierney (Tierney, 2012) defines disaster governance as "an inclusive concept in that disaster management and risk-reduction activities take place in the context of, and are enabled by, both societal-and disaster-specific governance frameworks." Governance does not mean only government or public-sector activity, rather it arises from the recognition that functions that may formerly have been performed by public entities are now frequently dispersed between diverse sets of actors that include not only governmental institutions but also private-sector and civil society entities (Tierney, 2012). Disaster management policy is also an outcome of different sectors' interactions. Thus, here we define disaster governance as "interactions, relationships, and networks between different sectors (the government, public sector, private sector, and civil society) to formulate and implement disaster management policies, plans or activities."

In Japan, the disaster management system is enacted based on the Disaster Countermeasures Basic Act (Act No.223, November 15, 1961). The Act defines government responsibility in formulating and implementing, with the cooperation of the agencies concerned and other local governments, a disaster prevention plan relating to its area, as prescribed by law, and at the same time, how it should assist in the performance of business or operations related to disaster prevention. Based on the Act, national government formulates and promotes implementation of the Basic Disaster Management Plan and local

governments (Prefectural Government and Municipal Government) formulate and promote implementation of the Local Disaster Management Plan. Government is a central actor for disaster prevention and risk reduction policy planning, legislation, regulations and its implementation, and there is very little opportunity for people to participate in the policy formulating processes. The study by Nagamatsu (Nagamatsu, et al., 2005) on the disaster management planning processes of Japan points out that local government often organizes a disaster prevention council to ask their opinion on the plan, but the members of the council are mostly fixed with no participation of the public or NPOs. After preparing a draft plan, the government opens it to the public to ask for questions or comments, but very few people pay attention. Disaster governance in Japan is government-led with less participation of civil society. We discuss the effect of this government-led disaster governance in detail more through a case study of the evacuation plan formulation process for Kuchinoerabujima volcanic eruption.

3. Study Methodology

In order to analyze the effectiveness/problems of the current disaster management plan more precisely, we analyzed the evacuation plan formulating process of Kuchinoerabujima Volcano. We analyzed the activities of the government (YTG) and civil society (residents) and the interaction between them, focusing on three different phases as follows:

1) Evacuation based on a government prepared evacuation plan (eruption of August 3, 2014)
2) Evacuation plan revision process (after eruption of August 3, 2014)
3) Evacuation based on revised evacuation plan (eruption of May 29, 2015)

The field study was conducted with observation, in-depth interview with government officials, community organizations and residents. Detailed interview information is presented in Table 2.

Table 2 List of Interviewees

No	Interviewees	Interview dates
1	Disaster Management Section, Kagoshima Prefectural Government	June 6th, 2015
2	General Affair Section (Disaster Management), Yakushima Town Governmet	June 5th, 2015
3	Financial Section, Yakushima Town Governmet	October 16th, 2015, March 21st, 2016
4	Head, Kuchinoerabujima Branch Office, Yakushima Town Government	October 16th, 2015, March 21st, 2016
5	Staff, Japan Meteolorogical Agency	July 3rd, 2015
6	Director, Sakurajima Volcano Research Center, DPRI, Kyoto University	March 24th, 2016
7	Head, Honmura Neighborhood Association	June 6th, July 5th 2015
8	General Affairs Division, Honmura Neighborhood Association	October 15th, 2015, March 22nd, 2016
9	Chief, Fire Brigade Kuchinoerabujima Branch	July 5th, 2015
10	Deputy Chief, Fire Brigade Kuchinoerabujima Branch	October 15th, 2015
11	Member, Fire Brigade Kuchinoerabujima Branch	March 22nd, 2016
12	School Principal, Kanagadake Elementary-Junior High School	July 6th, 2015
13	Resident, Honmura District	July 6th, 2015
14	Resident, Honmura District	March 22nd, 2016
15	Resident, Maeda District	March 22nd, 2016
16	Resident, Yumugi District	March 22nd, 2016

As for the local government, we collected and analyzed official documents prepared by YTG, KPG and the national government. We also interviewed YTG officers who were in charge of disaster management face-to-face, asking how they responded during eruptions and what improvements they made to the plan after the eruption. Interviews were conducted on June 5, October 16, 2015 and March 21, 2016 in YTG Office.

It was more difficult to understand the activities of civil society than those of the government. There were few researches on community characteristics, their culture and history. Thus, we decided to observe residents' lives and human relations directly. We visited residents' evacuation shelters and temporary housing on Yakushima Island (June 4-6, July 3-6, October 15-16 in 2015) and Kuchinoerabujima (March 20-22, November 21-23 in 2016), attending community meetings and interviewing face-to-face. As a result of our field research, we found that there are three main groups within residents who played important roles in evacuation planning: neighborhood association, fire brigade and school.

There are six districts in Kuchinoerabujima (Fig.2); Honmura, Maeda, Mukaehama, Shinmura, Tashiro and Yumugi, and two neighborhood associations; Honmura (consists of residents in Honmura, Maeda, Mukaehama, Shinmura and Tashiro) and Yumugi. The biggest neighborhood association is Honmura.

The fire brigade is a volunteer organization. There is no fire department or police station in Kuchinoerabujima. The fire brigade is the only and primary rescue organization in Kuchinoerabujima. There are 22 members and all are young males, except for the school students living on the island are assigned as members. In the following chapters, we summarize the facts based on the information obtained through our field research.

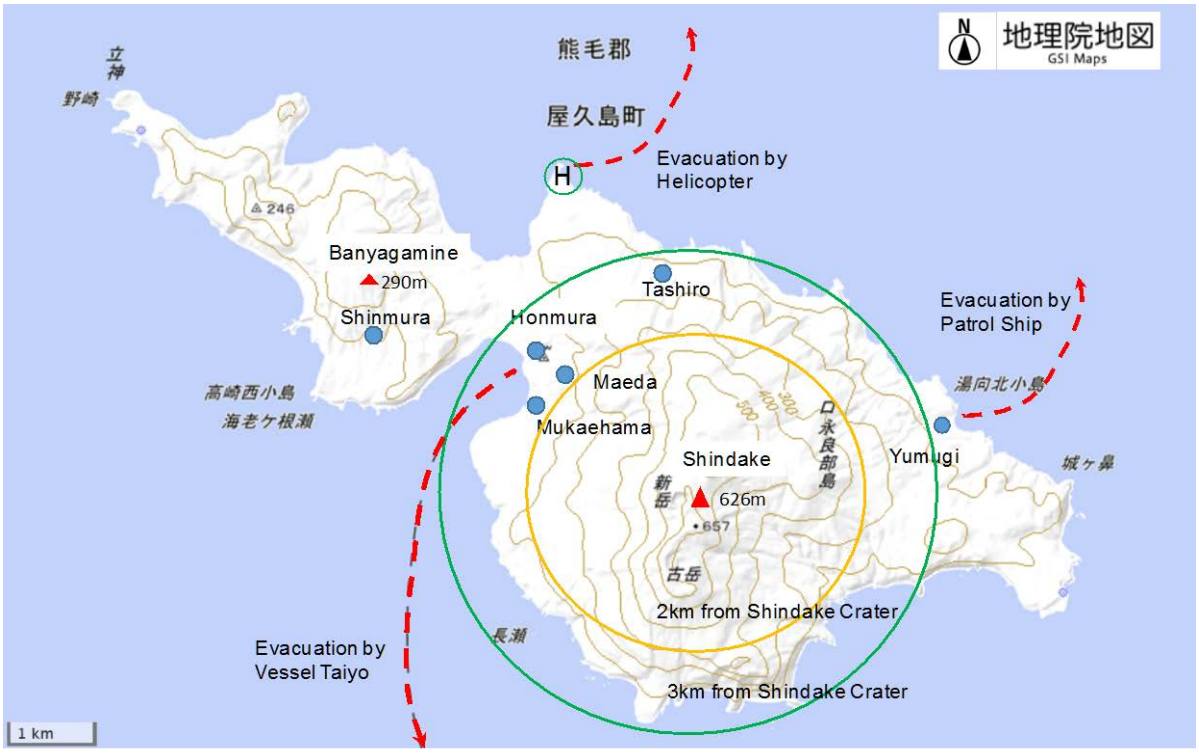

Figure 2. Kuchinoerabujima
(Based on GIS map by Geospatial Authority of Japan)

4. Evacuation based on Government Prepared Plan

4.1 Disaster Management System for Volcanic Eruption in Kuchinoerabujima

The first Local Disaster Management Plan for Yakushima town was implemented in November 1978 by YTG (Kamiyakucho Kyodoshi Henshu Iinkai, 1984) and revised repeatedly. The Local Disaster

Management Plan at the time of 2014 eruption was the one that was prepared in 2011. Chapter Four of the plan describes the volcanic hazard mitigation strategy, and it consists of the following four sections:
1) Disaster Prevention of Kuchinoerabujima
2) Disaster Preparedness
3) Disaster Response
4) Disaster Recovery and Reconstruction.

According to the plan, in the case that Shindake crater erupts, YTG Disaster Management Headquarters will be established in Yakushima, and an on-site Disaster Management Headquarters in Kuchinoerabujima, and its representatives should assist to evacuate residents taking necessary measures to mitigate possible damage caused by the eruption.

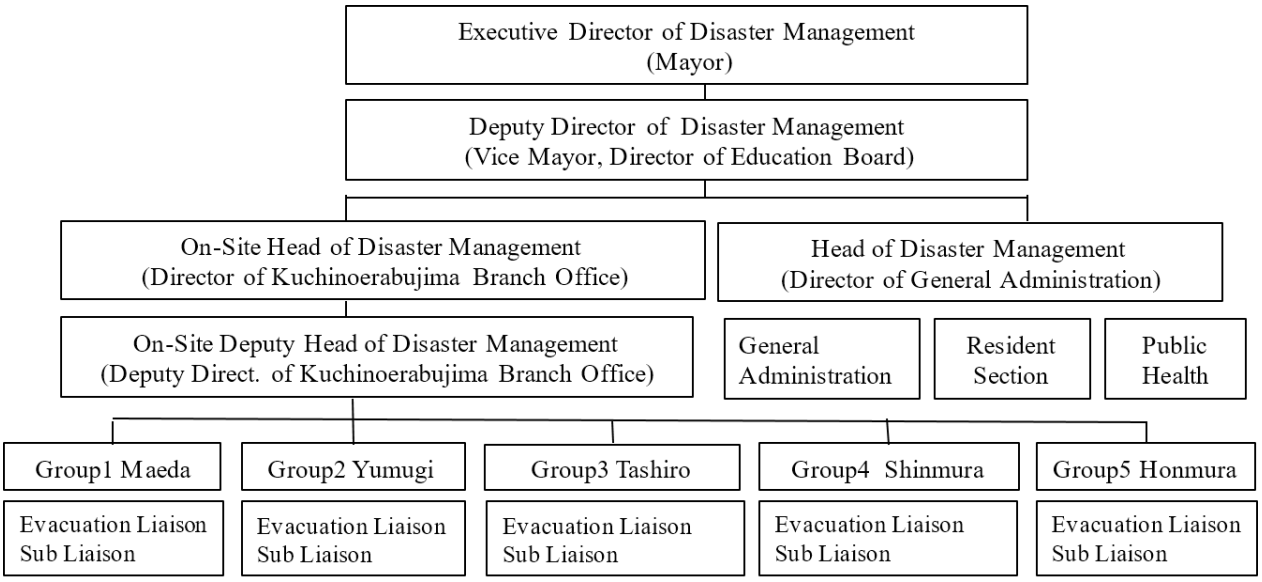

Figure 3. Disaster Management Organization Structure for Kuchinoerabujima
(Based on Information by Kuchinoerabujima Branch Office, Yakushima Town)

Figure 3 shows the disaster management organization structure of the Kuchinoerabujima. The on-site headquarters consists of the Director of YTG Kuchinoerabujima Branch Office, Yakushima Fire Brigade, Kuchinoerabujima branch, and heads of the neighborhood associations (Honmura and Yumugi). The heads of the neighborhood associations are expected to coordinate the evacuation and check the safety of the residents in their district. Community disaster management maps were attached to the plan as an annex. According to the map for Honmura District, three places were designated as formal evacuation sites: the Kuchinoerabujima Branch Office of YTG, the community center and Kanagadake Elementary-Junior High School (Fig. 4).

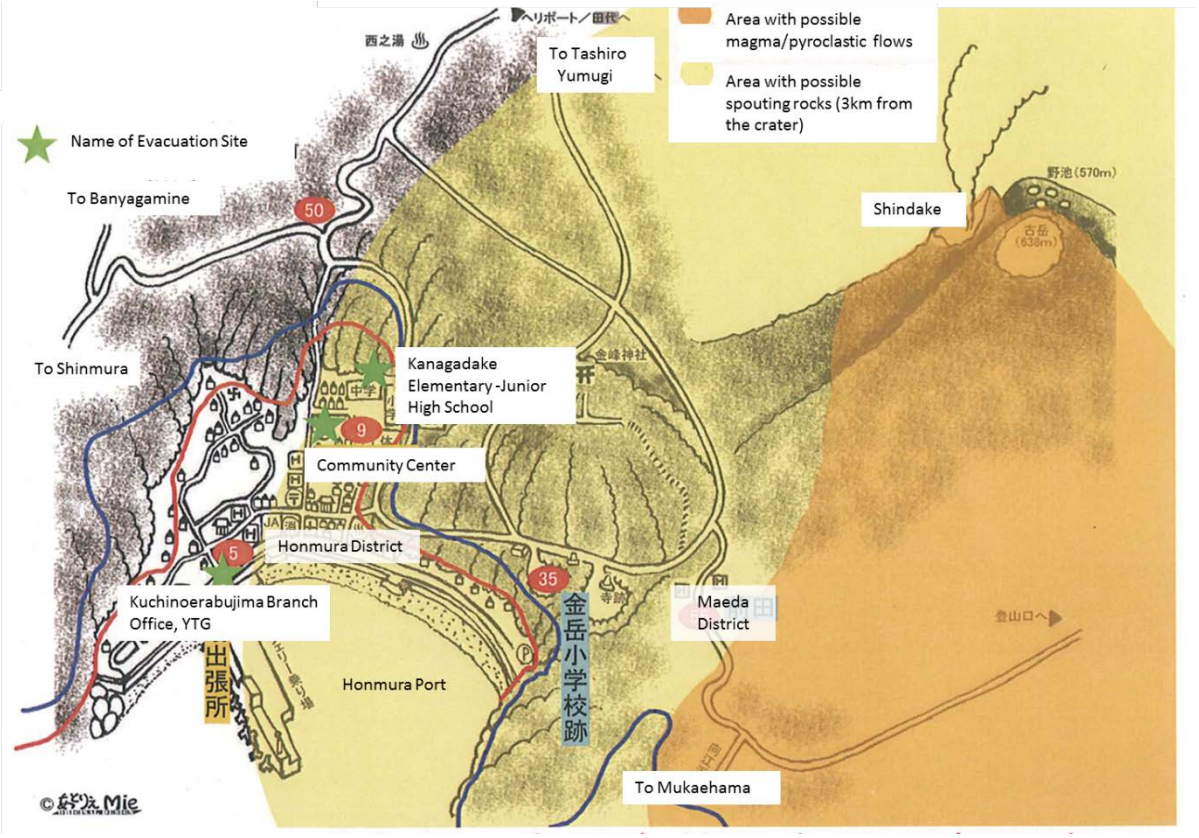

Figure 4. Yakushima Town Community Disaster Preparedness Map (Honmura District) (Published by General Affairs Division, Yakushima Town, 2012)

The plan emphasizes the role of residents. According to the plan, if residents notice possible volcanic unrest, they should inform the local authorities: YTG, the fire brigade, Kuchinoerabujima Branch. Evacuation orders issued by YTG will be transmitted through these local authorities. Kuchinoerabujima is a small island with 118 residents, and there are few public institutions: YTG Kuchinoerabujima Branch Office and a school. Only one public officer(Director) works in YTG Kuchinoerabujima Branch Office, and there are no fire department staff or police officers. Thus, the role of the residents themselves is extremely important for emergency management.

4.2 Evacuation Operation for August 3, 2014 eruption

The evacuation operation for the August 3, 2014 eruption was performed following the Local Disaster Management Plan. On August 3, 12:50, Shindake Crater suddenly erupted after 30 years dormancy since the September 1980 eruptions. In an interview, the YTG officer mentioned that “no precursory information of the eruption was observed prior to the eruption.” Only after observing the eruption of August 3, JMA raised the volcanic alert level from level one to level three at 12:50 and informed it to YTG. YTG received the information of eruptions from JMA and established the Disaster Management Headquarters at 13:00 and issued evacuation information “to prepare for evacuation” to residents through disaster radios. At 14:00, they were able to ensure the 135 persons in Kuchinoerabujima were safe. Of 135 persons, 91 persons evacuated to Banyagamine and seven persons living in Yumugi remained in their houses in the eastern area. The following day, YTG prepared a temporary evacuation shelter in Yakushima for residents who were worried about more serious eruptions. According to the YTG officer, “disaster response operation was mainly done by residents in Kuchinoerabujima. Nothing could be done from Yakushima.”

In Kuchinoerabujima, “no information of the eruption was provided before the eruption,” mentioned the chief of the fire brigade, Kuchinoerabujima Branch. On witnessing the sudden eruption, as the chief of the fire brigade branch, he hurried to patrol settlements in the fire truck telling residents to evacuate. Then, he saw a pyroclastic surge -like ash cloud moving down toward Honmura. All three evacuation sites were located in Honmura around 3 km from Shindake Crater, where rocks caused by the eruption might land. For this reason, he decided not to evacuate to the evacuation sites in Honmura, instead choosing the western isolated hill top called Banyagamine. He had experience of evacuating to Banyagamine during the previous 1980 eruption. He discussed with the deputy chief of the fire brigade regarding changing the evacuation sites, and decided to evacuate Banyagamine telling other members to guide residents to evacuate to there. Following his instruction, members of the fire brigade guided residents to evacuate to Banyagamine.

5. Revision of the Evacuation Plan

5.1 Revision of the Plan by the Community

(1) Honmura Neighborhood Association

After the August 3, 2014 eruption, members of Honmura neighborhood association gathered to evaluate the district disaster response operation based on their experience. According to the head of the neighborhood association, they discussed problems that they faced during the evacuation operation and prepared a document with recommendations for improvement of the disaster management system. The document was titled “The Review Report of the on Explosive Eruption at Shindake of 12:24, August 3, 2014” and handed to YTG (Honmura Neighborhood Association, 2014).

The document describes in detail about the eruption, how they decided to evacuate, why they decided to evacuate to Banyagamine, and their lives at Banyagamine. The report evaluated the disaster response from different viewpoints as follows: climate and volcanic activity, ash fall, medical support, evacuation site at Banyagamine and disaster preparedness.

Residents decided to evacuate to Banyagamine following the fire brigade’s instructions. Some residents did not want to evacuate, but members of the fire brigade tried hard to persuade them, which is why it took almost two hours to complete the evacuation to Banyagamine. At the top of Banyagamine, there is a small building that belonged to Nippon Telegraph and Telephone Corporation (NTT). However, they found that the facility was closed, and there was no place to stay, no emergency supplies such as food, water, blankets or toilets. The eruption occurred just after the typhoon subsided, and because of the stormy winds caused by the typhoon a ferry service to the island was stopped, which meant no rescue could reach the island. They concluded that it is better to relocate the evacuation sites to a much safer place far from the Honmura settlement and requested YTG to negotiate with NTT for use of the building at Banyagamine as an emergency shelter, while concurrently they asked to prepare necessary items for evacuations.

Not only preparing documents and presenting it to YTG, residents also discussed necessary measures that they should take by themselves. Residents decided to clear the road toward Banyagamine by cutting the grass and trees.

(2) Fire Brigade

The experience of facing a sudden eruption encouraged fire brigade members to revise their disaster management plan. According to the interview with fire brigade members, they conducted the following activities after the eruption.

Firstly, they gathered and discussed the rescue operation procedures. After the eruption, all brigade members started to gather every morning at seven exchanging and sharing the updated information on the volcanic conditions. They checked evacuation operation procedures.

Secondly, they prepared a list of residents with detailed data on family members, contact information, and information on persons with disabilities in order to secure their safety in case of a disaster. Tourist information is also included. This list is revised and updated every two months.

Thirdly, to make the evacuation more practical, disaster evacuation drills based on the scenario of a sudden eruption were prepared and practiced on the residents’ initiative. The basic scenario was prepared

by fire brigade members, and after discussion with YTG, the drill was exercised in November 2014. There was an announcement that an exercise drill would be conducted on that day, however, no detailed information on the contents of the drill was given. At the drill, an alert siren with the message that the volcano was suddenly erupting was transmitted. Residents began to evacuate, and they found that several residents were evacuating toward the former evacuation site. This was a good opportunity to ensure that residents should be aware of the revised disaster evacuation plan, and in case the eruption occurs, they would have to evacuate to Banyagamine.

(3) Kanagadake Elementary-Junior High School

The principal of Kanagadake Elementary School mentioned that the experience of August 3, 2014 was a turning point for revising the school disaster management plan. The eruption of August 3, 2014 was on Sunday during the summer vacation, so there were no students at the school. Soon after the eruption, a meeting was organized by teachers, and they discussed further improvements of the school evacuation plan. They prepared two different scenarios: the case when an eruption suddenly occurs, and another with consideration for protection from falling rocks.

The school began conducting evacuation drills every two months based on different scenarios. For example, in September there was an evacuation for a sudden eruption, in November an evacuation for falling rocks, and in April an explanation of a detailed scenario to newly joined students and teachers.

The school prepares for sudden eruptions not only through exercise drills, but also in daily life. Students must wear a helmet whenever they go outside of the building. Teachers living close to the school must commute using their cars and must park the cars facing head to an exit so that they can evacuate immediately with students (Photo 1). For school excursions, such as hiking, some teachers follow the students in their cars in order to be prepared for an evacuation.

Photo 1 Cars are parked facing exit.
(Photo taken by author on March 22, 2015)

5.2 Revision of the Plan by YTG

Based on recommendations from Honmura Neighborhood Association, YTG organized a meeting with residents to discuss revising the evacuation plan. Based on the discussion, the following points were improved.

Firstly, the evacuation site was changed to Banyagamine from Honmura District. YTG negotiated with NTT to acquire permission to use the building at Banyagamine as an emergency shelter. They furnished the facility with necessary equipment such as toilets, an electric generator, water and food to support the evacuees (Photo 2).

Photo 2 Evacuation site at Banyagamine
(Photo taken by author on March 22, 2015)

Secondly, a detailed rescue operation procedure was confirmed with consideration of the geographic location of each district (Fig.2). For residents of Honmura, they decided to use the vessel "Taiyo," a daily passenger ferry service operated by Yakushima Town. They increased the seating capacity of the vessel from 100 to 150 seats so that all residents in Honmura could board. They prepared additional life jackets, and applied to the Ministry of Land and Transportation for authorization for increasing the capacity, which was approved on May 25, 2015, four days prior to the eruption.

6. Evacuation Operation based on Revised-Plan

6.1 Earthquake on May 23, 2015

This chapter summarizes the activities that were done before and during May 29, 2015 eruption based on interviews with officers of KPG and YTG and residents. On May 23, 2015, JMA observed that the number of volcanic earthquakes had increased in Kuchinoerabujima, and an earthquake of intensity three (JMA scale) was observed. It was the first time since January 24 that an earthquake stronger than intensity one had been observed. At 10:45 JMA issued "Explanatory Information on Volcano Activity No.42," warning that there may be the possibility of large rock falls caused by eruption into the area within a 2-km radius from Shindake Crater. People living in Maeda and Mukaehama Districts, southeast of Shindake were also informed to be careful of possible pyroclastic surges if an eruption occurs.

Based on JMA information, at 16:00 KPG organized a "Disaster Information Coordination Meeting on Volcanic Eruptions on Kuchinoerabujima." The meeting consisted of organizations that engage in Kuchinoerabujima's disaster response: Kagoshima Prefecture's Disaster Management Division, Yakushima Town, JMA Kagoshima's meteorological office, Kyoto University, and the 10th Regional Coast Guard Headquarters of the Marine Safety Agency. This coordination meeting was first established in 2010 for effective emergency operation by the person in charge. During the meeting, detailed evacuation operation procedures were confirmed. The prefectural government dispatched officers to Kuchinoerabujima to confirm the evacuation procedures in the field. YTG checked the condition of the vessel Taiyo and prepared it for an evacuation. A coast guard patrol ship navigated the area. JMA organized a meeting with residents to explain the updated situation of the volcano activity. They told residents about the possibility of an eruption, and that if volcanic activity were to further intensify, they should evacuate immediately on witnessing an eruption, and not wait for official warnings, without returning home for their personal belongings. The fire brigade prepared for a possible sudden eruption, wearing their uniforms every time, checking the evacuation process of residents, including people who need special assistance for evacuation.

6.2 Evacuation Operation of May 29, 2015 Eruption

At 09:59, May 29, Shindake erupted explosively. JMA issued a Volcanic Warning at 10:07 and raised the volcano alert level to five, the highest level. KPG and YTG set up the Disaster Management Headquarters at 10:07. According to the official report of the Cabinet Office (Cabinet Office, 2015), YTG issued an evacuation order to residents of Kuchinoerabujima at 10:20. At 10:30, a helicopter of the prefectural government headed for Kuchinoerabujima from Kagoshima City, picking up the mayor at Yakushima and arriving at Kuchinoerabujima at 12:30. A helicopter from the coast guard landed at Banyagamine at 12:15. A patrol ship from the coast guard arrived at Yumugi District at 12:52 and residents boarded the ship. The vessel Taiyo sailing to Tanegashima Island, changed route and sailed to Kuchinoerabujima, arriving at 14:35 in Honmura Port of the island. Although the evacuation operation was conducted quickly as planned, it took several hours for rescuers to arrive on the island.

Meanwhile in the island, the fire brigade commanded the evacuation operations. The deputy chief of the fire brigade recorded their evacuation operations in detail. As soon as the volcanic eruption was witnessed, they assigned several members to support the evacuation of residents. They checked the village at 10:23, quickly confirming that no residents remained, except for one missing man in Mukaehama. They could not reach Mukaehama, because a pyroclastic surge prevented approach on land by the fire truck. So, they quickly contacted fishermen and asked them to approach Mukaehama by fishing boat. They reached the man at 10:47 and rescued him at 11:19. He was slightly burnt by a pyroclastic surge, but was not in a critical condition.

Seeing the erupting volcano, residents quickly evacuated to Banyagamine, the revised new evacuation site. The building required repairs, but functioned well. At school, immediately after hearing an explosive sound from the volcano, students ran out quickly from their classrooms. Teachers quickly announced “the volcano has erupted, evacuate immediately” through the school broadcasting system. Teachers, bringing a list of students and wearing helmets, told students to ride on their cars and hurried to the new evacuation site, Banyagamine, where they confirmed that the students and teachers were all safe.
An on-site disaster management headquarters was quickly established at Banyagamine, consisting of the head of YTG Kuchinoerabujima Branch Office, the head of the fire brigade, and the head of Honmura Neighborhood Association. They confirmed the safety of all residents and tourists. While they were waiting at Banyagamine, the mayor arrived by helicopter and issued an “evacuation order for all residents” to Yakushima from the island. The vessel Taiyo, which came to rescue residents, arrived at Honmura Port at 14:35 and all the evacuees left the island at 15:45, leaving the island uninhabited.

7. Shift of Governance from Government-led to Government and Community Collaboration

This chapter discusses the evacuation policymaking processes in terms of disaster governance. The experience of the August 3, 2014 eruption revealed problems with the disaster response operation (based on the Local Disaster Management system). The designated evacuation sites were not safe at the time of an eruption. The emergency supplies prepared for residents were insufficient. No public assistance was provided due to bad weather conditions. The experience showed a ‘hollowing of the state’ during the disaster response process.

The Local Disaster Management Plan was prepared by YTG, based on scientific analysis on possible hazard risks, simulating possible damage, but the experience demonstrated that it was not practical.

Firstly, the plan did not consider hazard risks properly. Knowing the risks of rocks falling by eruption, YTG designated public facilities in hazardous areas as evacuation sites. They designated those facilities as there were no other public facilities in safer areas that could be used as an emergency shelter. The Local Disaster Management Plan stated what the government can do but not what they should do.

Secondly, it did not take into account the use of the community resources of Kuchinoerabujima. The emergency operation stated in the plan focused on how to provide public assistance from outside; local government, self-defense force, fire brigade and the Disaster Medical Team (DMAT). However, it lacked ideas on how to use community resources. The experience of the sudden eruption showed the difficulties in

providing outside assistance immediately after the eruption. It took hours for the assistance to reach the island and transport is affected by the weather conditions. Community resources such as personnel or materials are critical resource for the people on the island to survive.

In Kuchinoerabujima, the experience of facing a sudden eruption on August 3, 2014 became an opportunity to shift the governance from government-led to government and community collaboration. Close interactions were observed after the event. The evacuation plan was revised carefully by both the government and residents. YTG listened carefully to recommendations from the residents and tried to integrate their recommendations into the disaster management system. The evacuation site was changed from Honmura to the safer Banyagamine. YTG negotiated with NTT to utilize the building as a temporally shelter. The building was examined carefully to ensure it was a suitable evacuation shelter, and it was furnished with necessary emergency supplies. Residents and YTG worked jointly to improve the evacuation route; residents cleared trees and grass along the evacuation route to Banyagamine, and YTG placing reflectors and road signs.

The experience encouraged residents to assure their responsibility for emergency operations. People started to evaluate the situation and prepared carefully for further eruptions by themselves. Honmura Neighborhood Association, fire-brigade and a school were key actors to make changes. There were also mutual collaborations and interactions within them. Close communication between scientists also contributed to understanding the situation of volcanic activity and raised the awareness of residents. JMA dispatched their staff to Kuchinoerabujima to explain to people the situation of the volcano. JMA organized meetings with people once a month and they told residents to evacuate immediately after witnessing an eruption. In interviews with residents, all people mentioned that they had realized that it is difficult for scientists to know when an eruption will occur, so not to wait for information, and instead evacuate immediately after witnessing an eruption.

The critical situation facing the volcano eruption shifted the governance structure from government-led to government and community collaboration. Before, the August 3, 2014 eruption, the government was considered as the central actor in formulating and implementing plans and creating incentives to ensure that residents act in line with the government plans. Different organizations within the community tried to improve their disaster management plans and collaborated mutually. YTG also revised its Local Disaster Management Plan in 2015, integrating the revision that they made through discussion with residents into a new plan. The case shows the importance of community participation in the disaster management plan formulating process. In particular, a community that participates actively in the decision-making process influences rational policymaking of the government.

8. Towards Community Collaborated Disaster Management Planning

This study analyzed the effectiveness and problems of the disaster management system in Japan focusing on the evacuation plan formulating process in the case of an eruption of Kuchinoerabujima Volcano. The process for implementation- revision and formulation- reimplementation of the evacuation plan for Kuchinoerabujima Volcano showed that disaster governance shifted from government-led to government and community collaboration after the August 3, 2014 volcanic eruption.

However, there are very few cases like Kuchinoerabujima where government and community collaborate. Disaster management plan formulation processes are mainly government-led, which makes the plan removed from practice. The Government of Japan amended the Disaster Countermeasures Basic Act in 2013, and added new articles regarding the Community-based Disaster Management Plan to emphasize the planning process, to obtain community participation for preparing and implementing the disaster management plan. We found that interactions, relationships, and networks between different sectors contribute to practical and effective formulation and implementation of management plans.

(End)

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