

# **The Debris Flow in Hachimantai, 1997 and Dissemination of Disaster Information**

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On May 11, 1997, a large mud flow occurred in the national forest of Hachimantai Kumazawa, Kazuno City, Akita Prefecture. It became a large-scale disaster. The sediment of 2.5 million cubic meters fell: 16 households in Sumigawa hot springs and Akagawa hot springs were totally destroyed, and Route 341, the trunk road of this area, was cut. Fortunately, however, there were no victims.

Sediment disasters such as debris flow happens every year in Japan. Often there is not enough time for people to evacuate, and casualties occur, especially in the case of debris flow. Therefore, the debris flow in Hachimantai, Kazuno City attracted much attention because there were no victims. Then, how could they save inhabitants? Even if there were no victims, were there any problems in the countermeasures of the inhabitants and the disaster prevention organization against the disaster?

The purpose of this report is to clarify these point by our interviews with the local people and records about the disaster and so on. The following chapters describe the discovery of the disaster warning signs, the countermeasures of the inhabitants and the disaster prevention

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organization against the disaster, evacuation warnings for disaster and evacuation activities, dissemination of the information and so on in this debris flow disaster.

## **1. Outline of the area character and the disaster**

First, we will describe the outline of the character of the stricken area and the disaster.

The debris flow occurred in a hot spring zone among the mountains in the prefectural border of Akita Prefecture and Iwate Prefecture, about 200 kilometers south from the center of Kazuno City, Akita Prefecture. There are many hot spring Japanese inns in this area and usually many people visit there. It is always crowded with many tourists in the winter season, especially the skiing grounds of Hachimantai.

The debris flow occurred in the national forest of Hachimantai Kumazawa, south of Sumigawa hot spring between Route 341 from Kazuno to Lake Tazawa and the trunk road "Aspite Line" from Kazuno to Iwate. Zenigawa hot spring and "Shibari hot spring Motoyu" are located along the Akagawa River (Kumazawa River), and three hamlets - Shinisawa hamlet, Kumazawa hamlet and Mizusawa hamlet - are located along the lower reach of the river in this zone ( Figure 1). Akagawa River (Kumazawa River) was specified as a "dangerous stream of debris flow", and some points around Sumigawa hot spring were specified as "dangerous points of landslide".

Actually there were some disasters in Kazuno City. For example, there was a landslide disaster in May, 1973 in "Hachimantai Fukuoyu hot spring," far from the stricken area at this time. And there was a flood after WWII when the dam of the Okozawa Mine in north of Kazuno City collapsed. But a large scale debris flow disaster hadn't occurred for a long time, and it was said that there were no stories of landslides and debris flow disasters. Therefore, there were no public relations for disaster prevention by the municipal authorities. Most inhabitants seemed to have no knowledge, concern, and apprehension of the disaster mentioned above.

Next we will think about the dissemination of information of this area. Regarding mass communication, only NHK can be received in the hot spring area. Most TV stations can be received in the Shinisawa hamlet and other areas. The main communication media was telephone and there was no radio communication.

About inhabitant's character, most of the inhabitants are engaged in agriculture, some are engaged in Japanese inn in the hot spring, while others are engaged in local businesses and so on in the area.

The following is the main damage caused by the debris disaster.

## 2. Particulars of the debris flow disaster and the refuge.

### 2.1 Warning signs of the disaster.

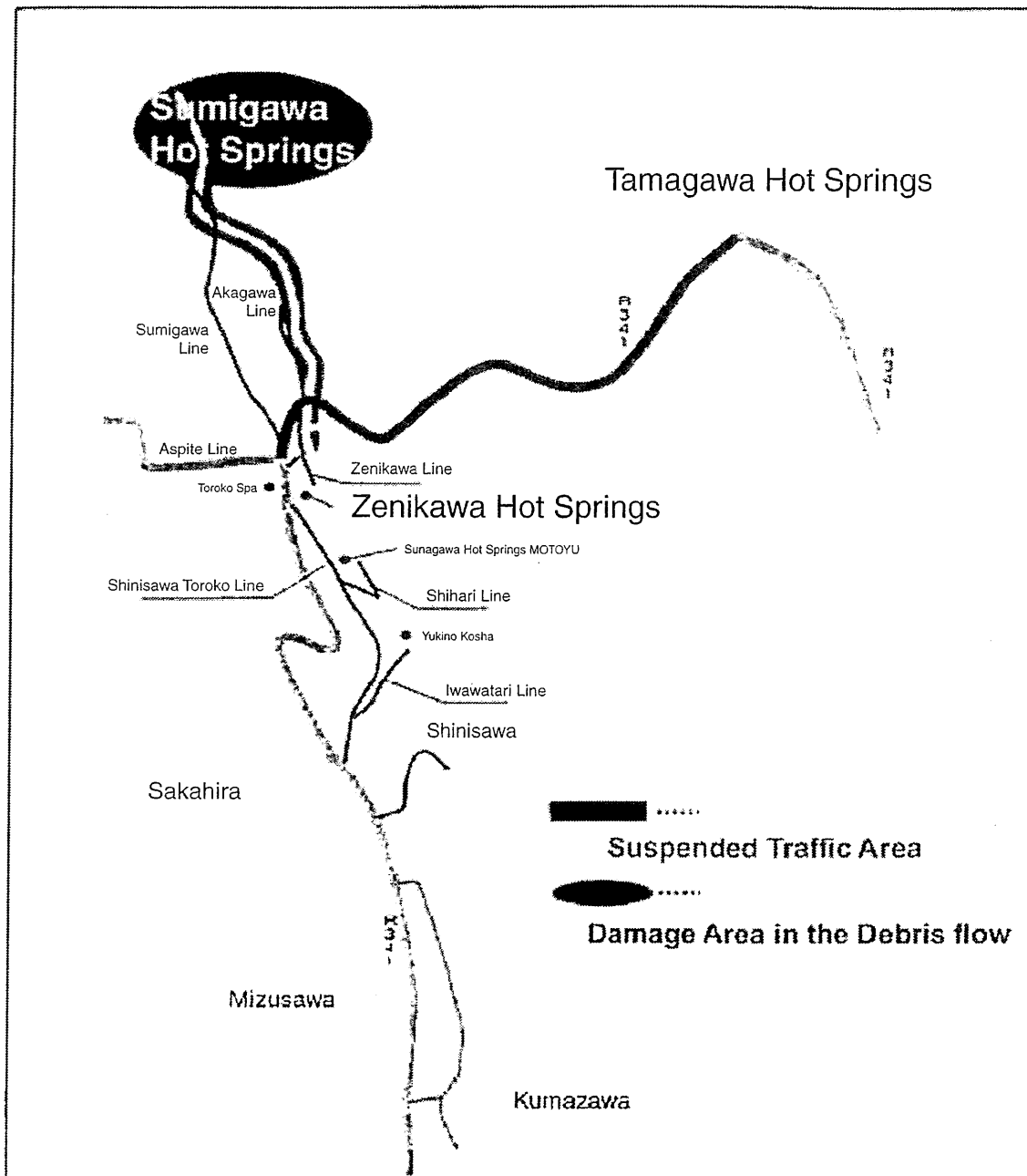


Figure 1 Map of Hachimantai Kumazawa, the City of Kazuno, Akita Prefecture.

(May 16, 1997 issue of the public relations paper Kazuno)

Table 1 Inhabitants' Senses in the Debris Flow Occurrence

Damage		
Injuries to people	0 people (No Victims)	
Damage of Structure	16 households	Totally Destroyed
	(9 in Sumigawa hot spring and 7 in Akagawa hot spring )	
Damage of Road	Route 341 / near Akagawa bridge	Partly Buried
	City Road of Sumigawa line	Partly Destroyed
	City Road of Akagawa line	Totally Buried
Damage of Bridge	Akagawa Bridge in Route 341	Buried
	Sumigawa No.2 Bridge (for Sumigawa hot spring)	Totally Destroyed
	Akagawa-ko Bridge (for Akagawa hot spring)	Totally Destroyed
Damage of Electricity	783 Households in Hachimantai area	Power Failure
	(Power lines were cut: restored after 47 minutes)	
Damage of Telephone	Toroko, Onuma, Goshōgake, Fukeno-Yu	Suspension
	(Telephone cables were cut: restored on May 15)	
Damage of Paddy Fields	234 ha area of Sediment inflow	

Source: Data of Kazuno City

On May 10, the day before the disaster, there were 53 guests and employees in 2 Japanese inns which would be buried by debris flow the next day.

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#### **Upper Reaches Sumigawa hot spring Japanese inn (27 guests; 9 Employees )**

#### **Lower Reaches Akagawa hot spring Japanese inn (8 guests; 9 Employees)**

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All 53 people escaped from the debris disaster, so there were no casualties in this disaster. Then, why weren't there any victims in the debris flow disaster? We would like to investigate the reason.

First, we can say one of the factors that there were no victims in the debris flow disaster was that a resident discovered the disaster warning signs and he reported it accurately.

It was Mr. Akihiro Abe, president of Sumigawa hot spring Japanese inn which was buried by debris flow, who discovered the warning sign of debris flow. The parents of Mr. Abe managed Sumigawa hot spring for about 50 years, and he manages it at present. Mr. Abe runs not only the Sumigawa hot spring but also a general construction company, a fresh concrete business, a petroleum business, an automobile repair shop and so on. Mr. Abe is, as it were, a celebrity of this area. He is also a friend of the municipal staff. He is familiar with the geography of this area, and with sediment and structures because he is a building constructor. The character of Mr. Abe played an important role for the prevention of victims in the disaster.

Then, how did the warning signs of this debris flow disaster occur? How did Mr. Abe discover those signs, and how did he judge them? This progress is explained at Table 1. Mr. Abe, who lived in an area far from Sumigawa hot spring Japanese inn, didn't usually stay there. But sometimes he began to stay at Sumigawa hot spring from the end of January, 1997 to repair equipment there.

It was May 3, about one week before the debris flow occurred that he began to feel the threat of the disaster. First, on the night of May 3, the drinking water became muddy. For 50 years, this water had never been muddy, and he said that he had never heard such a thing from his parents. Mr. Abe began to feel strange from those days, and he began to pay more attention to the surroundings.

On May 4 the water became more and more muddy. But, this was the only thing that was unusual. There was nothing else that seemed strange. So, he thought the muddiness of the water might be due to a broken water pipe. The water pipe was repaired on May 5, but the water was still muddy. On the 7th a crack ran in the concrete pavement inside the hot spring, and it began to rain at night. On the 8th, the next day, it kept raining, and became a heavy rain of 114mm in 2 days. The side block of the open-air bath crumbled on the same day. At this stage Mr. Abe said that he thought it was only small-scale washout. Since that day, the amount of hot water in the hot spring had been increasing more than usual. Then, the electricity inside the hot spring was cut off at about 9 p.m. That was because the power line was cut. The power line is provided by Tohoku Electric Power Co., Inc. through the mountain behind the hot spring. Probably we can think this accident is also one of the warning signs of the landslide.

On May 9 the scale of these signs began to increase. At 5 a.m. cracks began to run in the mountain. A crack ran also in the side slope of Sumigawa, and the foundation of the open-air bath was destroyed by the sediment. Moreover, some bubbles and hot water spouted from "mud volcano" of about 5m width, which was unusual.

Because of these series of unusual accidents, Mr. Abe felt a sense of crisis. He called the staff members of the geology consultant company in the evening on 9th, and asked for various investigations. At about 5 a.m. on May 10 the members of the geology consultant company went into the mountain to investigate. It was proved that it was large-scale landslide. The landslide occurred at about 2:30 a.m. on May 10th. After that, he explained to the guests, and asked them to return home.

The 6 points mentioned above describe the warning signs of the debris flow disaster.

These warning signs developed comparatively slowly and in a scale which was easy to see.

It can be said that these things brought a fortunate result.

It was also fortunate that it was Mr. Abe who discovered these signs. Mr. Abe is the manager of Sumigawa hot spring and the president of a construction company. He knew the

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**The warning signs**

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- 1) Drinking water became muddy. (May 3)
  - 2) A crack ran in the concrete pavement. (May 7)
  - 3) The amount of hot water in the hot spring increased. (May 8)
  - 4) Because of the landslide a power failure occurred in the hot spring. (May 8)
  - 5) Cracks began to run in the mountain (May 9).
  - 6) Some bubbles and hot water spouted from "mud volcano" which usually didn't spout. (May 9)
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mountain, sediment and nature well, was always careful, and paid much attention. This is the reason that the signs were discovered early. He himself didn't have experience of a debris flow disaster. However, he acquired some knowledge about the debris flow disaster through the report about the debris flow disaster when it occurred several times over that period (in such cases as Kotani village, Kitaagumo district, Nagano Prefecture, in December, 1996), from television, newspapers and so on. And he was sensitive about such sediment disasters.

## **2.2 The dissemination of the disaster information in the report to the related organizations.**

By the process mentioned above Mr. Abe knew that the cause of the phenomena were warning signs of a large-scale landslide. Soon at about 6:30 a.m. May 10 he called the home of Director General of Fire Headquarters of Kazuno integrated municipality and the home of Director of Urban Construction Division of Kazuno City. The municipal office was closed because May 10 was Saturday. And, it was too early to call at 6:30 a.m. in the morning. So, he called each home. But we must remember that Mr. Abe was able to call the Director General of Fire Headquarters, and Director of Urban Construction Division of Kazuno City because he knew them personally.

After that, by the judgment of Director General of Fire Headquarters, who arrived at about 8:40 a.m., he made contact with the related 4 organizations by telephone at about 8:50. The 4 organs which he made contact with are Kazuno Public Works Office of Akita Prefecture, General Affairs Section of Kazuno City, Kazuno Police Station, and Disaster Section of Fire Department, Akita Prefecture. Some countermeasures were started by the municipal office of

Table 2 Process of the warning signs

Day	Circumstance
May 3	At night, <u>the drinking water of the three water services became muddy.</u>
May 4	The water became more and more muddy.
May 5	He thought the muddiness of the water might be due to a broken water pipe. Then, the pipe was repaired.
May 7	<u>A crack ran in the concrete pavement inside the hot spring.</u> At night it began to rain.
May 8	It kept raining and became a heavy rain with rainfall of 114mm in 2 days. <u>The side of open-air bath crumbled.</u> ← Mr. Abe thought that it was a washout by the rain. <u>The amount of spring water and the hot water of the hot spring increased.</u> <u>The electricity was cut off</u> at about 9 p.m. That was because the power line was cut. Electricity is provided by Tohoku Electric Power Co., Inc. through the mountain behind the hot spring. This is one of the signs.
May 9	At about 5 a.m. <u>cracks began to run in the mountain</u> Additionally, a crack ran in the side slope of Sumigawa, and the foundation of the open-air bath was destroyed by the sediment. <u>Some bubbles and hot water spouted from the 5m-wide "mud volcano" which usually didn't spout.</u> Mr. Abe contacted and discussed this with "the Hachimantai Subterranean Heat" (the local management company of Mitsubishi Materials. Co.) over the telephone. Mr. Abe contacted Hanawa Forest Management Center of Kazuno Forest Management by phone. Mr. Abe called a staff member of the geology consultant company in the evening of the 9th, and asked for various investigations.
May 10	At about 5a.m. the member of the geology consultant company went into the mountain, and the investigated it. It was proved that it was a large-scale landslide. Mr. Abe made all guests return home. Hot water gushed out from the crack in the promenade. At 6:30 Mr. Abe contact 3 people by phone. <b>Shinichi Taguchi</b> Director General, Fire Headquarters of Kazuno integrated municipality <b>Toshio Senda</b> Director, Urban Construction Division of Kazuno City <b>Hiroshi Kodama</b> Director, General Affairs Section of Kazuno City At 8:40 Director General of Fire Headquarters and 3 firemen arrived there and it was reported to some related organizations as a disaster.

Kazuno, the fire house, and the police station.

Furthermore it can be said that it was one of the factors to have resulted in good fortune that Mr. Abe is a local celebrity and he could make contact easily with Director General of Fire Headquarters, Director of Urban Construction Division and Director of General Affairs Section of Kazuno City because he knew them personally.

### 2.3 Countermeasures against the disaster by the disaster prevention organization and the city.

It was after 11 a.m. on 10th when all the member of the people concerned with disaster prevention of Kazuno City gathered. Disaster countermeasures then started. We would like to present the correspondence of the organs related to the disaster prevention around the activities of Kazuno City, which overlaps what we have mentioned.

Table 2 & Table 3 show the occurrence and countermeasures before and after the disaster on Saturday, May 10 and Sunday, May 11. At 7 a.m. on May 10 (Sat) each home of Director General of Fire Headquarters, Director of Urban Construction Division received the first report of the "sediment fall" from Mr. Abe, Sumigawa hot spring manager, and at 8:45 a.m. firehouse staffs began field investigations as mentioned above.

At 9 a.m. the home of Kodama, Director of General Affairs Section of the city, was contacted by telephone from the field investigator of the fire fighting staff. Kazuno city has the policy that "the firehouse should inform the Director of the General Affairs Section of the disaster report, then the Director judges whether he should inform his superior of the report or not", and the policy was about to be carried out. But he couldn't make contact with his superior, the Director of the General Affairs Division, for it was a holiday.

About 10 a.m. field investigations began by the staff member of General Affairs Section and Construction Section of the city. The concrete of the road behind the Sumigawa hot spring new building which had just opened had a crack and 2-meter movement.

After 11 a.m. when the main members of the disaster prevention organization were gathered, all people staying in the Japanese inn had already been evacuated, except the person who lived in the mountain (evacuated at 1 p.m.). So they said that they felt relieved. Though the flowing sediment pushed inns and the sound of "Bushi Bushi" was heard, it pushed in only a part of the Japanese Inn of the Sumigawa hot spring, so the people concerned were thinking that people on the lower reaches need not evacuate at that time. It was said, including by Kodama, Director of the General Affairs Section, that many have no sense of the crisis in the area yet.

At 11:17 a.m. the Public Work Office began field investigations. The investigations revealed that the scale of the landslide was 500m x 700m at 1:20 p.m. At 2 p.m. exactly, they, except the firehouse staff, went back to the City Hall, and "the countermeasure room for disaster precautions" was set up. But, still then most opinions were that "It won't occur right



now.” After they ordered Fire Headquarters to take a series of countermeasure to ask for the suspension of traffic of the city way at 3:15 p.m. , “the headquarters for disaster precautions” was established at 4:45 p.m. Mr. Kodama, Director of the General Affairs Section, Mr. Takahashi, worker of Public Work Office, and Taniuchi, Director of the Fire Prevention Section

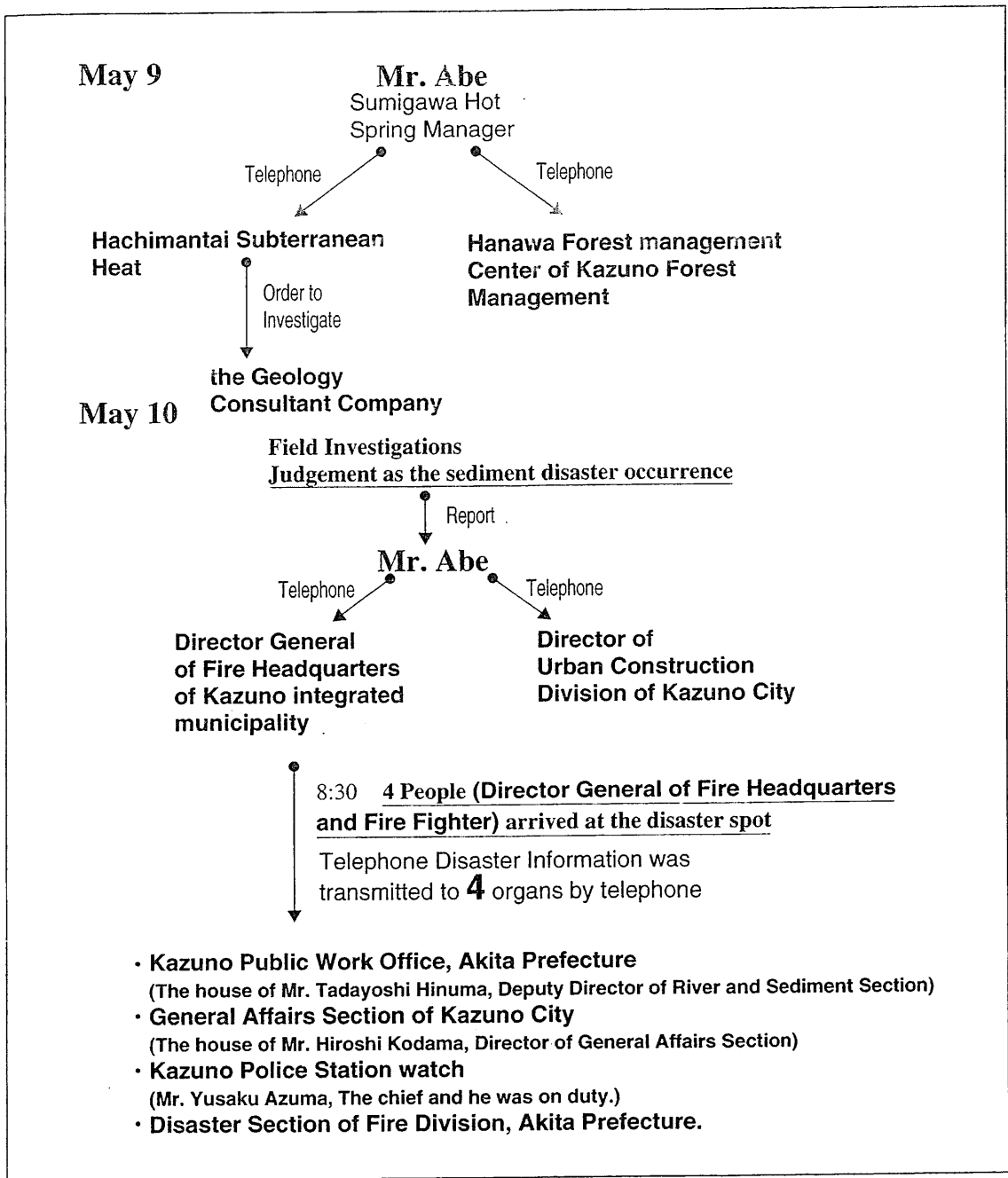


Figure 2 The Report Process of the Disaster Information

gathered in the headquarters for disaster precautions. A small sediment fall occurred, and the report “dangerous condition” came.

How the disaster manager judged that dangerous condition, and then how he advised the inhabitants’ evacuation for disaster was a problem? About the evacuation in this area there was the following circumstance as the background.

According to “Landslide Prevention Law”, the prefectural governor (if a prefectural governor is absent, prefectural staff) should judge in the case of the landslide-threatened area. However, this area was not a landslide-threatened area. So the city official was supposed to judge and decide such as evacuation. And if there is a strong possibility of a disaster occurring, the municipal head is supposed to issue an evacuation warnings for disaster under Article 60 of the Disaster Measures Basic Law. But, officially evacuation warnings couldn’t be given because the mayor and Director of General Affairs Section were absent then. But, at 4:49 by judgment that “Human life should come before all else” of Kodama, the first evacuation warnings for disaster was issued to employees at the “Sumigawa hot spring” and firehouse staff who were monitoring the site.

Though there was some delusion that evacuation warnings was taken out for the first time, it seemed that the ground for the decision was that Kodama, Director of the General Affairs Section, himself saw the site and realized that the condition was critical. Moreover, the mayor had served as Director of General Affairs Section of the city, and there was informal consent that “If there is no mayor, anyone can make the judgement”, and the appropriate correspondence could be done in Kazuno City. And, it was said that guests had already evacuated by themselves at the moment when the evacuation warnings was taken out for the Sumigawa hot spring.

Next, at 5:01 and the report, “It is very dangerous condition.”, was passed to Hatakeyama, the Coordinating Supervisor of Fire Headquarters, and President Akihiro Abe. At 5:02 The second evacuation warnings for disaster was taken out for “Akagawa hot spring”. A city staff member went directly to the Akagawa hot spring Japanese inn, and passed on the warnings. Next at 6:55 an evacuation warnings for disaster was taken out for “Zenigawa hot spring”. It was said that people in Zenigawa hot spring promptly evacuated though initially they were a little disinclined to evacuate.

But no one in the headquarters for disaster precautions predicted the degree of the collapse of the large-scale debris flow which happened early the next morning. It seemed to be the real intention of the headquarters that they couldn’t predict when and how large the

disaster would be, so they gave the evacuation warnings tentatively over a wide area just in case. After that, precautions were taken at night in Toroko Snow-Removing Center of Public Works Office, and a night watch for disaster was set up.

The next day, Sunday 11th, at 4:30 a.m., the 3 observation cars of Tohoku Local Office of the Ministry of Construction arrived at the site. At 6:15, the members who couldn't inspect the site the previous day, Mr. Sugie, the mayor of Kazuno, Mr. Sato, the deputy mayor, and Katsuta, Director of General Affairs Division, started an on-the-spot inspection of the disaster. Four mass communication companies went with them. They arrived at the site at 7:00, witnessed the collapse of the building at 7:40, and they felt danger and evacuated temporarily. Then a dangerous point of landslide on the south side of the Sumigawa hot spring collapsed. A bamboo house on the mountain side of the Sumigawa hot spring was pushed up by the landslide, and it covered and crushed the self-boarding ridge next to that. The mountain itself began to slide, and the sediment was washed away in the Sumigawa River, and it is said that the water of the river became brown. The field investigations group quickly left the area. They went to the Akagawa hot spring by Route 341, then returned to the local headquarters after all of the members' evacuation was confirmed.



Picture 1 The collapse site of the debris flow

Table 3 The disaster countermeasures on Saturday, May 10.

Time	Disaster Condition or Countermeasure
7 a.m.	The first report of "sediment fall" occurrence. Mr. Abe, the Sumigawa hot spring manager, contacted the home of the Director General of Fire Headquarters and the home of the Director of Urban Construction Division.
8:40	Firehouse staff began field investigations.
8:50	The report of the sediment disaster occurrence by telephone by the Director General of Fire Headquarters to the following 4 organs. <ul style="list-style-type: none"> <li>· Kazuno Public Work Office, Akita Prefecture (The house of Mr. Tadayoshi Hinuma, Deputy Director of River and Sediment Section).</li> <li>· General Affairs Section of Kazuno City (The house of Mr. Hiroshi Kodama, Director of General Affairs Section).</li> <li>· Kazuno Police Station watch (Mr. Yusaku Azuma, The chief on duty).</li> <li>· Disaster Section of Fire Division, Akita Prefecture.</li> </ul>
After 11:00	All members concerned with disaster prevention were gathered.
11:17	Public Work Office started Field Investigations.
13:20	The result of field investigations. (Public Works Office) Landslide scale L=700m, W=500m, A=35ha, H=150m.
14:00	"Countermeasure Room for Disaster Precaution " was set up.
15:15	Fire Headquarters was ordered to suspend traffic on the city way.
16:45	"Headquarters for Disaster Precautions" was set up.
16:49	Evacuation warnings for disaster to "Sumigawa hot spring" (9 employees and 27 guests evacuated at about 1 o'clock.)
17:01	The report of the small scale debris flow occurrence by telephone to Fire Headquarters.
17:02	Evacuation warnings for disaster to "Akagawa hot spring" (9 employees and 8 guests evacuated)
17:50	Field Inspection started.
18:10	Headquarter informed Disaster Section of Fire Division, Akita Prefecture. that the evacuation warnings for disaster was given.
18:25	Disaster information was informed "Shibari Hot Spring Motoyu".
18:55	Evacuation warnings for disaster to "Zenigawa hot spring" (7 employees and 17 guests evacuated)
19:00	The report by radio communications of Local Inspection group (the condition of landslide expanding)
19:50	Field Inspection Group came back.
	Night Precaution Arrangement
	Toroko Snow-Removing Center of Public Works Office
	Public Works Office 3 people
	Fire Headquarters 2 people
	Construction Section of the City 1 people.

Table 4 The disaster countermeasures on Sunday, May 11.

Time	Disaster Condition or Countermeasure
4:30	The 3 observation cars of Tohoku Local Office of the Ministry of Construction arrived at the site.
6:15	Mayor of Kazuno, Deputy Mayor, Director of General Affairs Division, Director of Construction Section and so on started an on-the-spot inspection of the disaster.
7:00	They arrived at the site (report by radio communications)
7:40	They witnessed the collapse of the building and evacuated temporarily.
8:00	A dangerous point of the landslide (on the south side of Sumigawa hot spring) collapsed. The debris flow occurred.
8:04	The report of the debris flow occurrence by telephone to the Police Station.
8:07	The report of power failure from Toroko Snow-Removing Center to Taniuchi by telephone.
8:16	Director of General Affairs Division ordered by radio communication system to issue evacuation warnings for disaster to "Shibari hot spring Motoyu" and "Yukinokosya".
8:17	Evacuation warnings for disaster to "Shibari hot spring Motoyu" by phone
8:24	Evacuation warnings for disaster to "Yukinokosya" by phone
8:28	The report that Akagawa hot spring collapsed about 8 o'clock and Akagawa Bridge in Route 341 was buried by the debris flow passed by radio communication.
8:43	Contact to Kumazawa head's house for households to take precautions
8:45	The direction to inform inhabitants in Kumazawa hamlet to take precautions
10:00	"Local Headquarters for Landslide Disaster Countermeasures of Hachimantai Sumigawa and Akagawa hot spring in Kazuno City" was established "Headquarters for Sediment Disaster Countermeasures of Kumazawa River " was established
10:40	"Headquarters for landslide disaster precautions of Hachimantai, Kazuno City, Akita Prefecture"
11:00	"Institute of disasters countermeasures" arrived at the site.
12:00	"Headquarters for disaster countermeasures" was established, "Countermeasure Conference" was held.
12:30	Direction for the alert arrangement as a policy of the countermeasure headquarters
13:08	Evacuation warnings for disaster to 6 households in "Shinisawa hamlet" to evacuate to Mizusawa hall.
14:50	The evacuation conditions report of Mizusawa hall. · Mizusawa hamlet 2 households 6 people · Sinisawa hamlet 5 households 20 people
16:00	Prefectural governor arrived by helicopter, and inspected.
16:50	Call from NTT. On 12, 6 satellite telephone and 1 circuit and 14 Portable telephones were established.
17:50	Director of Citizen Service Section (Traffic Guidance Car). · Field investigations from the upper reaches of Inamura bridge to Sinisawa. Evacuation warnings for disaster to 5 fishermen and 2 car washers · Field investigations from the lower reaches of Inamura bridge to Tsuchifukai. Advised precaution to 10 people having barbecues, 4 people playing gate ball, and 2 people taking wild plants in the river park.
18:30	40 blankets for the disaster prevention were transported to Mizusawa hall refuge site.
19:00	In Mizusawa hall "arrangements about the countermeasure with the people concerned"
20:10	The formal name of the Headquarters decided. "Headquarters for Landslide and Debris Flow Disaster Countermeasures, Hachimantai Area, Kazuno City"
20:30	Director of General Affairs Division and other officials returned to the municipal office.
23:45	Firehouse staff local patrol (the report that Akagawa sediment control dam was filled with sediment).

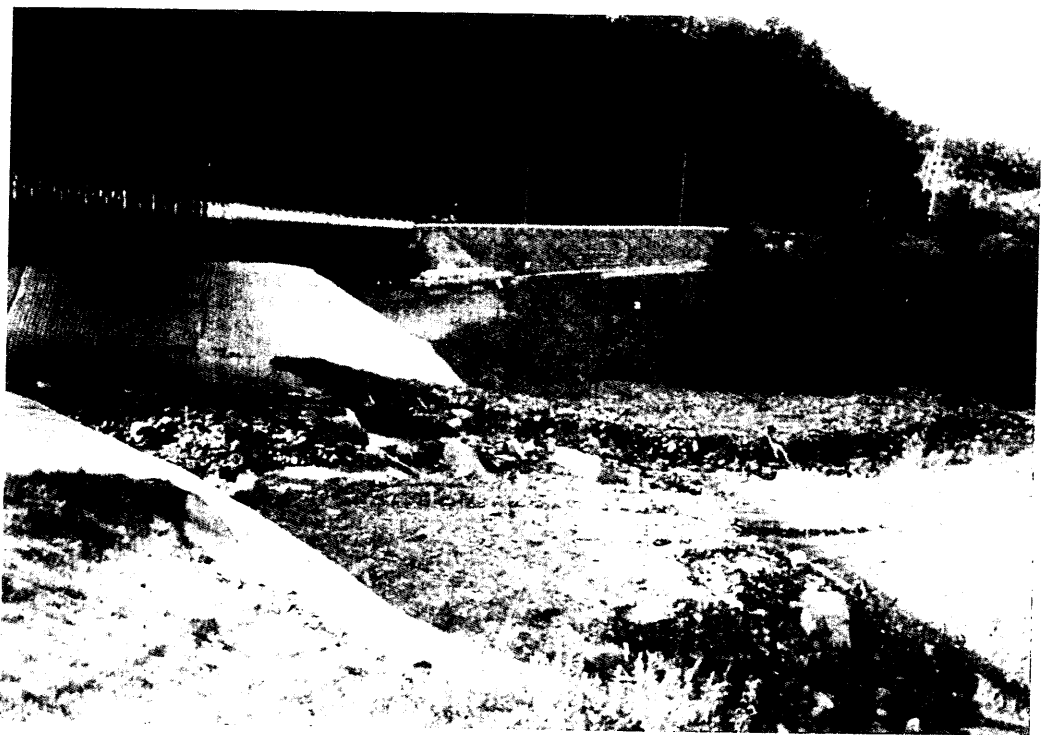
Before 8 a.m. white vapor could be seen from the Akagawa River direction, and trees and rocks with the brown water were flowing at the same time with the thud of "GGGGGG". The debris flow began to pour into Akagawa River at the same time with a gust and a thud.

After that, Katsuta, Director of General Affairs Section, directed by radio to issue an evacuation warnings for disaster to the "Shibari hot spring Motoyu", "Yukinokosha". Evacuation warnings was taken out to the "Shibari hot spring Motoyu" by phone at 8:17. At 8:24 an evacuation warnings for disaster was issued to "Yukinokosha" by phone.

Just after that, an Akagawa hot spring Japanese Inn collapsed and was destroyed by the debris flow, and information was received that the Akagawa bridge was buried by the debris flow. So, he phoned the house of the head of Kumazawa hamlet in the lower reach, and ordered him to inform the hamlet of the precaution. It was directed that he directly transmit evacuation warnings to inhabitants in Kumazawa hamlet.

At 10 a.m. the "Local Headquarters for Landslide Disaster Countermeasures of Hachimantai Sumigawa and Akagawa hot spring in Kazuno City" was established. At 12:00 "Headquarters for Disaster Countermeasures" was established in the Branch Office of the City

From then various problems began to take place about the countermeasure. First, an area



Picture 2 Akagawa bridge ruins washed away by the debris flow.

photograph was received from the helicopter of the Prefectural Police, and it was discovered that the sediment of 200 cubic meter was still left in the disaster site. If this collapsed, the lower reaches area would also be exposed to danger. Should they give evacuation warnings for disaster to the Shinisawa hamlet and Kumazawa hamlet, or not? And to Nagata hamlet on the lower reach or not? How would the inhabitants have responded if they gave the evacuation warnings? Difference emerged between Kazuno City officials and Akita Prefecture officials, and confrontation arose little by little about these problems.

Akita Prefecture officials judged by the map “Calculating the collapse scale, an evacuation warnings should be issued to the whole area of Kumazawa hamlet, Nese hamlet, and Nagata hamlet.” On the other hand, Kazuno City officials, who knew the area well and grasped the height of the land and an inhabitant’s sense, judged that “it is issued over too wide a range, and shouldn’t confuse inhabitants. It is still unnecessary.” The situation which an opinion about the countermeasure arose. It was said that some confusion arose because the prefecture officials and the city officials were separate as to the spot for correspondence. What was said by the various levels of the prefecture staff members and the city staff members was different. So it was said that some confusion arose over the correspondence. After all, Kumazawa, Nese,



Picture 3 Around Kumazawa hamlet

Nagata hamlet were not given evacuation warnings, but only direction for the alert arrangement as a policy of the countermeasure headquarters at 12:30.

The above is the countermeasure that the headquarters implemented from when the debris flow disaster occurred until the evacuation warnings. Here we would like to examine this correspondence of Headquarters for Countermeasure.

First, there are two kinds of inhabitants evacuation in the Disaster Measures Basic Law.

- 1) "The evacuation warnings or advice for disaster" LACKS the compulsory power.
- 2) "The establishment of the precaution zone" HAS the compulsory power.

The head of municipalities will take out these two measures in principle. However, when there is little time, the staff of firehouses and the staff of General Affairs Section of the municipalities, the staffs related to the disaster prevention, and the police can implement them. Kodama, Director of General Affairs Section, took out evacuation warnings in the case of this disaster because the Mayor of Kazuno City, the deputy mayor, and Director of General Affairs Division were absent on 10th, the day before the disaster occurred.

Then, some important points about this evacuation warnings will be tackled in the chapters that follow.



Picture 4 Around Sinisawa hamlet



### 3. Problems along with the evacuation warnings for the disaster.

Also there are some unlucky points in this debris flow disaster.

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- An evacuation warnings for disaster had never been issued and it was the first experience for anyone.
  - The municipal office was closed on Saturday.
  - The Kazuno Mayor, the deputy mayor, and Director of General Affairs Section were away because they went out to a suburb.
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These bad conditions usually cause hesitation in the countermeasure and delay, and can possibly enlarge the damage. Why could evacuation warnings be taken out effectively before the disaster even though these bad conditions occurred at the same time?

Next, there are some reasons listed below why it was possible to make the announcement of the evacuation warnings for disaster.

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- Many warning signs appeared comparatively slowly and were easy to recognize.
  - It was Mr. Akihiro Abe, president of general construction company, that discovered the signs and he could make contact directly with Director General of Fire Headquarter and Director of Urban Construction Division, who were Mr. Abe's acquaintances.
  - The policy that staff members related to the disaster prevention can take out evacuation warnings if mayor is away. The policy was understood thoroughly by the city staff.
  - Evacuation warnings could be taken out without hesitation because the scale of the disaster occurrence was very large, and the pace was also slow.
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Points 3 and 4 are especially important. Mr. Kodama, Director of General Affairs Section, states "The evacuation warnings could be taken out without worrying about the responsibility problem at all," because Kazuno City had a disaster prevention plan with such flexibility. And, he said "So, there was also good relationship with the administration which didn't make us hesitate." Actually, it is said that there was no objection at all from the city council or the other related authorities about the countermeasure of this debris flow disaster.

The most important point is whether to give the evacuation warnings or not, and when and

where to give it. The worst that a municipality could do would be not to give or hesitate to give an evacuation warnings for disaster. Specially Hachimantai is a hot spring area and therefore a tourist resort crowded with tourists. Administrative bodies can sometimes hesitate to give evacuation warnings even in the case of the disaster, for they are afraid of damaging the image and causing a drop in the number of tourists in the case of tourist resorts like this. But, inhabitants want evacuation warnings for disaster to be given without fear of misinformation according to the results of an abundant questionnaires about the various disasters. It would be important that administrative bodies keep in mind “Don’t overlook that even if it is false” regarding evacuation warnings.

This time it was fortunate that the pace of the danger of the debris flow disaster was slow. Evacuation warnings could be given in good time; to put it harshly at the lowest time. Though as for this timing, we can say it was right that the headquarters for countermeasure didn’t hesitate to give the evacuation warnings for disaster.

But, we can indicate some problems about correspondence this time. It seems that giving the evacuation warnings for disaster was a complete success. However, it was already mentioned that Kazuno City staff was opposed to Akita Prefecture staff about the range of the area covered by this evacuation warnings. Consequently the debris flow didn’t surge to Kumazawa hamlet, Nese hamlet, and Nagata hamlet, so it can be said that it was right judgement by Kazuno City staff not to give evacuation warnings to the area. However, this result about the scale of the debris flow was nothing but a mere coincidence, and judging from the scale of the sediment piled up on the spot, it could have become a much bigger debris flow disaster.

If the scale of this debris flow disaster were large, damage might have taken place in Kumazawa hamlet and Nagata hamlet where evacuation warnings for disaster wasn’t given. If it were, it was Akita Prefecture staff that judged properly.

Only second-guessing, it is a serious problem whether the designated range of the evacuation warnings for disaster should be made small to avoid the confusion or extend it in the case of the worst case scenario, and all of this depend on the judgment of the headquarters for disaster countermeasures.

#### **4. Reality of the evacuation activities**

First, in the morning on May 10 all of the guests at “Sumigawa hot spring” decided t

return to their homes. At 4:49 p.m., after the countermeasure headquarters was set up, the first evacuation warnings for this disaster was given to the firehouse staff, who were monitoring the site, and nine employees of "Sumigawa hot spring". Next, at 5:02 the second evacuation warnings for this disaster was taken out to "Akagawa hot spring". A municipal worker went directly to Akagawa hot spring Japanese inn , and transmitted the evacuation warnings. Of course it was not compulsory. Feeling a sense of crisis, eight guests and nine employees started to evacuate immediately. The employees said "We felt it was an order of evacuation rather than the evacuation warnings." It saved their lives as a result. Next, at 6:55 an evacuation warnings for disaster was issued to "Zenigawa hot spring". Though the employees of the Zenigawa hot spring had the impression that "Would a debris flow really come here?" they were persuaded to evacuate just in case by the municipal workers.

Then before 8 a.m. of 11th, the large-scale debris flow occurred, and evacuation warnings was taken out over the phone to "Shibari Hot Spring Motoyu" and "YUKINO Kosha", located at the lower reach of Aka River. Three guests and 3 employees of "Shibari Hot Spring Motoyu" and 2 employees of "YUKINO Kosha" evacuated at once.

These were the evacuation warnings for disaster to the guests and employees of hot springs, which were different from those issued to the inhabitants who live there. After noon on the 11th, evacuation warnings were issued to the inhabitants in Hachimantai. At 1:08 p.m. an evacuation warnings for disaster was taken out to six households of Shinisawa hamlet. Shinisawa hamlet is on the uppermost reach among Shinisawa hamlet, Mizusawa hamlet, and Kumazawa hamlet. It was the most dangerous hamlet. Officials advised all the households to evacuate. Actually 5 of the 7 households of Shinisawa hamlet evacuated to Mizusawa Hall, which was specified as the shelter. The other 2 households in Shinisawa hamlet were a dilapidated house and a cottage where were no one lived in those days. The following inhabitants were given the evacuation warnings for disaster and evacuated.

- 
- Object of evacuation warnings for this disaster 7 households (2 households of Mizusawa hamlet, 5 households Shinisawa hamlet ).

Evacuatees 25 people, 6 households 2 persons working away from home 1 person in a hospital.

→ 10 people, 2 households : evacuate to Mizusawa hall (Community center of Mizusawa hamlet)

→ 18 people, 5 households : evacuate to their relatives' house and so on)

- Evacuated by themselves 12 households 52 people

→ 27 people, 6 households : evacuate to the relatives house and so on)

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As there was no radio communication system in this area, the evacuation warnings for disaster was transmitted to these inhabitants by telephone. But, because it was in the evening on Sunday, some people were in the nearby farm, the garden, and so on. Therefore, policemen and fire fighters informed inhabitants of the evacuation warnings one after another, and explained the conditions.

Let's look at one woman who actually evacuated as an example. Ms. Yamaguchi Iyeko, who lived near the river in Shinisawa hamlet, noticed the water of the river being rising and thought that the conditions of the river were strange. The water of the river became soil color or black. At that time, she didn't hear the telephone with the evacuation warnings ringing because she was outside watching the river. At that time, a person from the fire brigade came to explain and said "Do not approach the river because it is dangerous". At 1:30 a policeman came and told her that an evacuation warnings for disaster had been issued. So she packed only their clothes into the bag, and evacuated to Mizusawa Hall with her daughter-in-law and three of her grandchild who were at home. Ms. Yamaguchi had lived near the river for many years. However, she had never seen such discoloration of the water of the river, so she thought it was strange. But, she thought the debris flow would never come here. She evacuated just in case because she didn't understand the evacuation warnings for disaster very well and she thought that it was compulsory, like an "evacuation order". And she called her son, who went to the company by car though it was Sunday. Since the son's two children were in Aomori playing basketball, she called the teacher, and she asked the teacher to tell them to go to the relative's house. In this way, 4 houses in the neighborhood were evacuated. Ms. Yamaguchi thought that the debris flow would not come to her house in Sinisawa hamlet, and similarly, the employees of Zenigawa hot

spring thought that the debris flow could not come to them.

We could regard as "normalcy bias" these state of mind that we always think "Whatever happens, it's not serious, and it will never happen to me." Actually, a lot of people had this normalcy bias, so in the various disasters we often fail to run away, and suffer as a result. However, there was no victim in this debris flow disaster though inhabitants had normalcy bias. The reason must be that inhabitants received evacuation warnings as an evacuation "order", and then they honestly followed though it originally lacked the compulsory power as Ms. Yamaguchi said.

It is the next 2 points that were characteristic of the evacuation activities in this debris flow disaster.

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- Evacuation warnings for disaster could only be informed to inhabitants by telephone and directly because there were few houses in the mountain village
  - Even if the inhabitants had normalcy biases, they received evacuation warnings as evacuation orders, and all followed them honestly.
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Officials did not conduct disaster prevention campaigns of sediment disasters such as the landslide, the soil fall, and the debris flow disaster in this area. Inhabitants didn't know that Aka River (Kumazawa River) was specified as a dangerous stream of debris flow, and a sediment control dam was prepared. And an information transmission system for disaster prevention against sediment disasters wasn't prepared. The reasons inhabitant's evacuation activities were done smoothly must be the 2 points mentioned above.

After that, Mizusawa hall, located on high and safe ground, was specified as a refuge site. Inhabitants who received an evacuation warnings gathered in Mizusawa hall at about 1:30. Thus refuge life in Mizusawa hall began.

The first joint explanation meeting by the city, the fire service, and the police was held in Mizusawa hall at about 7 p.m. (arrangements about the countermeasure with the people concerned). Most of the inhabitants who took shelter with no preparation asked some questions such as "How long will we be here?" or "What should we do about farming work because now is the important rice-planting season." Refugees didn't have concrete information about the disaster at all, and they were concerned about refuge life because they couldn't know until when the refuge life would last. At first they were informed that they would "be here for two days.". After that, people gathered at each hamlet, countermeasures were discussed, and a 24-

hour river monitoring system was started by the fire brigade and the young people's volunteer group of the village. And, they independently checked the paddy fields in the morning and evening. Buses stopped, and the school was closed, too.

Mr. Toshio Hatakeyama, the head of Mizusawa hamlet stated, "We were uneasy because the city didn't give us any explanation or information unless we ourselves asked the municipal staff about the disaster. Correspondence by the city to the refuge was not good, though correspondence about the evacuation warnings and so on was very good. I think the concerns of the refugees increased because there was little information offered."

It is natural that daily commodities for the evacuation life are provided by official organs in the refuge. However, disaster managers should learn from this disaster about the importance and necessity of proper information from the countermeasure headquarters and enough communication between the city and the inhabitants.

## **5. Merits and demerits of mass communication reports**

Mass communication such as televisions and newspapers reported this debris flow disaster extensively. Mass communication visited there, and various information was reported in real time. Pictures when the debris flow collapsed were broadcast, and there was some sensational reporting, too. Mass communication presented a stereotyped view that precise evacuation warnings prevented damage, and reported that the people concerned were heroes. In this chapter we would like to mention the merits and demerits of these mass communication reports.

Many cars passed along national route 341 along the Kumazawa River on the disaster day. The inhabitant of Kumazawa hamlet and Mizusawa hamlet saw fire engines, mass communication vehicles, cars of the Ministry of Construction and so on racing toward the upper reaches, and they came to realize "This is an unusual situation." Mr. Hatakeyama, the head of Mizusawa hamlet, stated "Many people of the mass communication were seen to be gathering specially, and I appreciated the seriousness of the thing." But, because traffic was suspended, the site on the upper reach of Kumazawa River couldn't actually be seen. Though inhabitants said that a judgment was troublesome because detailed information wasn't given to inhabitants at all, they said "The live image of the site was seen on television, and we realized that it was a really dangerous disaster." Inhabitants, who couldn't see the conditions of the area and it couldn't get detailed information directly, knew the conditions of the spot by the television's

reports. With information giving them a sense of the crisis like this, they could cope with actual evacuation warnings for disaster rapidly. This is the part of the “merit” of the disaster report of the television.

But, there was a “demerit” in the television report about this debris flow disaster, too. The local inhabitants said the “demerit” was greater. One after another, tourists who misunderstood and thought the whole area of Hachimantai was damaged and dangerous canceled reservations, and the hot spring Japanese Inn of Hachimantai suffered significant economical damage due to the continuous mass communication reports of this debris flow. This is the so-called “rumor damage”. The debris flow only affected some of the hot spring areas of Hachimantai. Most parts of Hachimantai were actually safe. Nevertheless, the image that the whole of Hachimantai was dangerous was created by television reports and newspapers reports, and great rumor damage was produced. It is said that that cancellations of reservations at the hot spring Japanese inn totaled 600 cases, or about 6000 people.

There was also rumor damage in the Unzen Eruption Disaster in 1991. The Unzen eruption disaster was also reported using the word “Unzen”, and this had a big influence on Unzen hot springs, where there was no damage. And, at the time of the Great Hanshin - Awaji Earthquake in 1995 this rumor damage lasted for a long time as well.

After that, Akita Prefecture and Kazuno City which took the situation seriously, on June 3 changed the name of the headquarters for disaster “ Hachimantai, Kazuno City “ into “Sumigawa · Akagawa hot spring, Kazuno City “ and also took the countermeasure that it appealed for the safety of other hot springs. It is not enough for disaster managers only to cope with the reporters of mass communication at the time of the disaster. They must also consider the image and any rumor damage which a mass communication report can create.

## **6. Lessons from the debris flow disaster**

As mentioned, we have considered the debris flow disaster which occurred in Hachimantai, Kazuno City, Akita Prefecture. We would like to touch on the valuable lessons we learned from this disaster. Roughly speaking, the lessons we could learn from this debris flow disaster would be summarized in the following four points. These lessons can be applied not only to other debris flow disaster but also to the various natural disasters.

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- 1) How should we grasp disaster warning signs?
  - 2) Establishment of an information route when warning signs were discovered.
  - 3) Rapidity of evacuation warnings, and evacuation order.
  - 4) Establishment of evacuation conduct  
(in such cases as making the most of the fire brigade).
- 

First, it is important how we discovered the warning signs of disasters such as a debris flow disaster, a landslide and a soil fall. This is difficult without the cooperation of inhabitants who live there. Municipal disaster managers must tell inhabitants places which are specified as “the dangerous stream of debris flow” and “the dangerous place of landslides”, must prepare to grasp any disaster warning signs, and must prepare the reporting system. This wasn’t done fully in Hachimantai. However, fortunately the warning signs were discovered by Mr. Akihiro Abe, who was the manager of the hot spring Japanese inn and president of a general construction company, and who had the experience and the knowledge to recognize these signs.

Second, It is important to consider where and how the person who discovers the warning signs should report. In the disaster of Hachimantai it was Mr. Abe who discovered the signs. Mr. Abe’s personal acquaintanceship could transmit the report though it was Saturday because he could make contact easily with Director General of Fire Headquarter, Director of Urban Construction Division, and so on. This is not always the case. The disaster manager should inform inhabitants widely how and where the person who discovers the warning signs should report. And, we should take into consideration countermeasures when it is happens on a Saturday, Sunday or National Holiday. And it becomes important that disaster prevention organs establish an information system so that reports are transmitted to each related organ smoothly. The information transmission of the related organs was effective in this disaster by the route established by the “The Local Disaster Prevention Plan of Kazuno City”. And, it was said that the contact system of the related organs for “Countermeasure against accidents in wild plant picking” was useful, too.

Third, it is important for the headquarters for disaster countermeasures, which is established when we face some disaster, to issue evacuation warnings. The headquarters grasps information and must immediately make decisions based on it. It is important to make a precise judgment to give evacuation warnings or order of the evacuation without hesitating . It is important to immediately determine whether to give the evacuation warnings or not, when to



give it, where to give and how to inform the inhabitants. Often the opinion is different between City staffs and Prefecture staffs in the headquarters for disaster countermeasures about the range of the area which this evacuation warnings for disaster should be given in disasters such as this debris flow disaster. However, when to give the warnings is important and the headquarters must not hesitate to give it to areas that are obviously in danger. The inhabitants in Sinisawa hamlet and Mizusawa hamlet, who evacuated, believe that it was best to evacuate this time though they didn't receive any actual damage. Mr. Hatakeyama, the chief of Mizusawa hamlet said "If it is dangerous, inhabitants want the headquarters to give evacuation warnings". Disaster managers must not forget that inhabitants would much rather ere on the side of caution than hesitate and miss an opportunity to evacuate when it comes to evacuation warnings.

Fourth, it is probably important to establish the means of the evacuation. Hachimantai was such a mountain village that the number of inhabitants who should evacuate was small. The headquarters for disaster countermeasures could implement the evacuation process in Hachimantai only by phone and direct contact. The importance of this evacuation process is common in not only sediment disaster such as debris flow, sediment fall, and landslide, but also other various disaster such as flood in the typhoon, heavy snow, and volcanic eruption. In cases where there are a lot of houses over a wide area, the disaster manager would not be able to inform all households only by phone or patrol to each door. Disaster managers should prepare the medium such as a disaster prevention radio communications which can transmit evacuation warnings for disaster to the inhabitants if the area is specified specially in the danger zone or the danger place of some disasters. Fr evacuation guidance to run smoothly, it is important to use the local fire brigade and to implement disaster prevention training.

Fortunately it can be said that this debris flow disaster in Hachimantai was an example in which all of the above ran smoothly. Each local government should learn many points about the disaster countermeasures from this debris disaster.

# **The Debris Flow in Hachimantai, 1997 and Dissemination of Disaster Information**

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The Debris Flow in Hachimantai occurred on May 11, 1997. In Hachimantai, many bridges and houses were damaged. But, there were no casualties. Even though it was large-scale debris flow disaster, why were there no casualties?

To clarify this, we interviewed residents and public officials.

As a result, we found the following points.

- 1) A resident discovered the disaster warning signs.
- 2) Information about outbreak of debris flow was communicated by an appropriate route quickly.
- 3) Administration sent in refuge order early.
- 4) Refuge area is a very small hamlet.

To prevent the damage of disaster, these points are very important.

**Key Words:** Disaster, Disaster Information, Debris Flow, Warning Signs, Evacuation Activities, Broadcasting.

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