MANUAL FOR EMERGENCY EVACUATION FOR BANJIR BANDANG

YAYASAN PENGABDI MASYARAKAT (YPM)

in cooperation with

JAPAN INTERNATIONAL COOPERATION AGENCY (JICA)

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FOREWORD

Thanks to the blessings of the Almighty God, the Team from Yayasan Pengabdi Masyarakat (YPM) has finished writing the **Manual Book for Emergency Evacuation for Banjir Bandang** for the Jember Regency.

The contents of the book are based on a Basic Research, *Focus Group Discussion*, *Site Watching*, *Table Top Exercise,* Dissemination, and Coordination Meetings for the Implementation Unit for Banjir Bandang in the Jember Regency.

Yayasan Pengabdi Masyarakat (YPM) wishes to thank:

1. *Japan International Cooperation Agency* (JICA) for their trust in YPM in the disaster management cooperation.
2. The Jember Regency Government, namely Assistant II for the Jember Regency, for the assistance given to YPM during its activities.
3. Participants in the activities (the Jember Regency Implementation Unit, the Kalijompo Plantation Administration, the Head of the Sukorambi District and staff, the Head of the Patrang District and Staff, the Head, staff and residents of the Klungkung Village, the Head, staff and residents of the Karang Pring Village, the Head, staff and residents of the Gebang Poreng Sub-District, and the Head, staff and residents of the Slawu Sub-District.

We hope this book will be useful in reducing the risks of banjir bandang and improving the capabilities of all the parties involved in disaster management.

Jember, June 2011

Head of YPM,

Dr. Ir. Evita Soliha Hani, MP.

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1. BACKGROUND

Indonesia is highly prone to natural disasters. The reasons range from natural conditions to human errors. Geologically, climatologically, and geographically speaking, Indonesia is vulnerable to disasters. Indonesia's geological arrangement has created mountains, valleys and rivers, with a level of rainfall that is higher and lasts longer than normal. This is a potential cause of banjir bandang, landslides and erosions. Banjir bandang is one of the most frequent natural disasters in Indonesia (it constitutes 60% of the natural disasters). Banjir bandang generally occurs in Indonesia's western region, where the level of rainfall is higher than that of the eastern region.

The Jember Regency is one of the areas in the Indonesian western region that are vulnerable to banjir bandang. The most severe banjir bandang in the Jember Regency that claimed the highest number of casualties occurred in early 2006 in the Panti District, and then in the Silo District in 2008 and 2009.

Due to the rising intensity of natural disasters in Indonesia, all the parties involved have become more vigilant and improved the disaster management. One of the foreign institutions that implement mentoring and review disaster management in the Jember Regency is *Japan International Cooperation Agency* (JICA). The NGO in the Jember Regency that has intensively reviewed disasters is Yayasan Pengabdi Masyarakat (YPM). Since 2006, JICA and YPM have cooperated in reviewing and examining disaster management in the Jember Regency. In 2006 and 2007, JICA and YPM carried out the following activities in the Kemiri Village, Panti District: Training for Local Leaders, Community Workshop, and Evacuation Drill. In 2010, YPM, once again in cooperation with JICA, did the "Basic Research and Preparation for Sub-Projects for Early Warning System and Early Evacuations". YPM carried out its research in three disaster-prone areas in the Jember Regency: the Panti, Sukorambi, and Silo Districts.

The implementation of the early warning system is an effort to save lives and reduce the number of casualties in a banjir bandang. The early warning will be arranged in such a way so that the public will receive information prior to disasters and be able to evacuate during emergencies, thus performing a self-rescue prior to a banjir bandang. As a follow-on to the research, YPM implemented Focused Group Discussion (FGD), Site Watching, and Table Top Exercise (TTE), in order to create an effective strategy in implementing the Early Warning System prior to a Banjir Bandang. This results in a Standard Operational Procedure (SOP) for the Early Warning System for Banjir Bandang.

In general, the manual is intended to provide a standard operational procedure in emergency evacuations prior to a banjir bandang. The manual contains examples of banjir bandang-related activities that have been carried out in the Jember Regency, which are to be used as references. In the future, the manual may be developed and divided into categories based on local methods and local wisdom in relevant areas, to make it more accurate, effective, and efficient.

2. BASIC RESEARCH AND ANALYSIS

2.1 Research on Early Indications of Banjir Bandang

The public lack of knowledge of the signs of natural disasters is one of the reasons why communities living in disaster-prone sites are vulnerable to disasters. Therefore a study is required in order to give a primer of banjir bandang to the general public and society leaders (local apparatus).

2.1.1 Purposes of Research

The purposes of the research on the banjir bandang early indications are to: (1) learn the demographic condition in banjir bandang areas, (2) learn about the public and government apparatus knowledge of banjir bandang, (3) learn the extent of the public and government apparatus knowledge of banjir bandang and its signs, (4) learn about the public and government apparatus perception on banjir bandang signs, (5) identify steps taken by the public and government apparatus to manage banjir bandang, (6) identify steps taken by the public and government apparatus following a banjir bandang.

2.1.2. Research Methods and Frameworks

The research used a descriptive-quantitative method and took place at the Panti District. The samples in the basic research consist of 120 respondents: 100 from the general public (50 respondents each from the Panti and Silo Districts) and 20 from the village apparatus (50 civil employees each from the Panti and Silo Districts). The data is taken from interviews with the general public and civil employees from the village governments. Forum Group Discussions took place as well. Afterward, the data is tabulated, cleaned, and analyzed using the descriptive method and cross-tabulation.

The general framework for the research is that disasters occur due to a high level of vulnerability and a low level of capabilities. The schema for the research framework for banjir bandang's early indications is as follows:

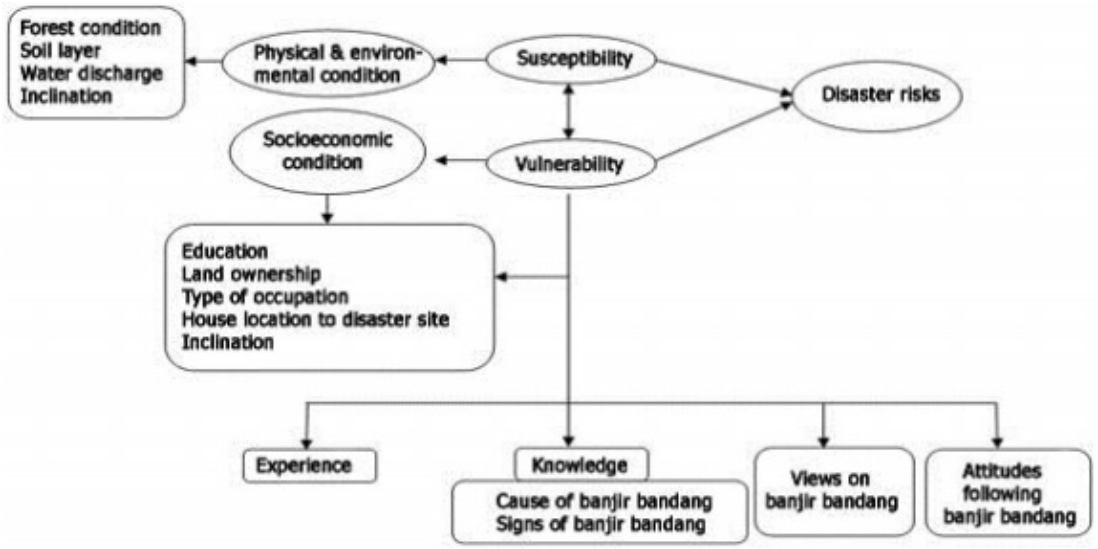


Figure 1. Frame of Reference for the Research on Banjir Bandang's Early Indications

2.1.3 Result of Research

A. Socioeconomic Condition in Banjir Bandang Areas

In a disaster, the socioeconomic (demographic) factor greatly influences the public capabilities and vulnerability in the face of the disaster. The demographic conditions described in this research include the respondents' education levels, ages, occupations; the status of land ownership and house ownership; the distance between their houses and disaster site, the distance between public facilities (village hall, houses of worship, schools) and the disaster site; land inclination; the source, condition and availability of clean water. The table below shows the research results for socioeconomic conditions in banjir bandang areas:

Table 1. Socioeconomic Condition in Banjir Bandang Areas

No	Item	Category	Residents of		Village Apparatus in	
			Silo	Panti	Silo	Panti
1.	Education Level	Didn't graduate from SD	20%	8%	0	0
		SD graduates	42%	32%	10	0
		SMP graduates	28%	28%	40%	50%
		SMA graduates	10%	30%	40%	40%
		Univ. graduates	0%	2%	10%	10%
2.	Land ownership	Self-owned	88%	82%	-	-
		Rented	2%	4%	-	-
		Rights of use	10%	14%	-	-
3.	House ownership	Self-owned	96%	94%	-	-
		Rented	2%	0%	-	-
		Rights of use	2%	6%	-	-
4.	Occupation	Farmer	22%	28%	-	-
		Farmworker	22%	14%	-	-
		Civil employee	4%	0%	-	-
		Entrepreneur	22%	32%	-	-
		Housewife	6%	10%	-	-
		Company employees	24%	12%	-	-
		Students	0%	2%	-	-
		Teacher, non-civil employee	0%	2%	-	-
5.	Distance between house and flood site	<10 m	10%	16%	-	-
		10 – 20 m	22%	16%	-	-
		20-30 m	12%	12%	-	-
		30 – 40 m	16%	2%	-	-
		40 – 50 m	16%	10%	-	-
		> 50 m	24%	44%	-	-
6.	Distance between workplace and flood site	<10 m	12%	16%	-	-
		10 – 20 m	12%	2%	-	-
		20-30 m	6%	4%	-	-
		30 – 40 m	8%	2%	-	-
		40 – 100 m	62%	76%	-	-
7.	Distance between village hall and flood site	-	-	-	4,300 m	175m
8.	Distance between community patrol post and flood site	-	-	-	99 m	96m
9.	Distance between houses of worship and flood site	-	-	-	271m	83m
10.	Distance between schools and flood site	-	-	-	401m	111m
11.	Land inclination	$36\text{-}45^0$	100%	96%	-	-
		$36 – 45^0$	0%	4%	-	-

The details for Table 1 are as follows:

*Land Ownership***.** Both in the Silo and Panti Districts, the majority of the residents have ownership rights to their lands. The lands are either given (as grants), inherited, or bought.

Private land ownerships reduce the risk of disasters - meaning, after disasters, the residents can quickly recover, compared to if their land is rented.

*Type of Occupation***.** Most respondents (27%) run their own businesses, with the following types of occupation: grocery, retail shops, gasoline booths, repair services for electronic goods, workshops, and sewing stalls. Another major occupation is farming (25%).

*Distance Between House and Disaster Site***.** Most respondents live more than 50 meters away from the banjir bandang site. However, some of them live in extreme proximity to the flood site (less than 10 meters away), especially in the Pace Village, Silo District, which is located precisely under the hill and at the edge of the river. Proximity to the disaster site results in high vulnerability to disasters.

*Distance Between Workplace and Disaster Site***.** Most of the respondents who are farmers and entrepreneurs work in locations (rice fields, booths, workshops, sewing stalls) that are 40 to 100 meters away from the disaster site. Because these respondents live at a relatively close distance from their workplaces, banjir bandang would influence their families' economic situations, as they will be temporarily unable to work.

Public Facilities. In the Panti District, public facilities that are situated near the disaster site are houses of worships (mosques), community patrol posts, schools, and the village hall. In the Pace Village, Silo District, public facilities that are situated near the disaster site are, consecutively, community patrol posts, houses of worships (mosques), schools, and the village hall. These public facilities have the following vital functions: for worship, maintaining the village discipline (security), education, and public service.

Land Inclination. Both in the Panti and Silo Districts, land inclination in the respondents' houses, in relation to the disaster site, ranges from 36° to 45° or 80% to 100% (considered as steep). In areas with an extreme level of steepness, residents are more alert to the threat of floods.

Based on the above conditions (type of occupation, distance between house and disaster site, distance between workplace and disaster site, and land inclination), the Panti and Silo Districts are considered disaster-prone.

B. Public and Government Apparatus Experience of Banjir Bandang

Experience of floods will affect public behavior in banjir bandang management. The following experiences are descriptive illustrations of the banjir bandang that have occurred in the Silo and Panti Districts. In Panti, the flood struck the Suci and Kemiri Villages in 2006, while in Silo the flood struck the Pace Village in 2009.

Public Experience

Silo Residents: The flood started with a three hour-long heavy rain and water flowing down from the Kumitir and Curah Mas Mountains, causing a landslide in the plantation and the top soil to be carried off to the river. 15 minutes after the landslide, the river very rapidly overflowed its banks with a thunderous noise. The volume of water from the river gradually increased, carrying with it mud, stones, and logs. Most of the residents ran to the mosque for protection. Although the flood claimed no lives, 1 house was severely damaged, several more sustained light damage from the onslaught of water against their walls, public facilities such as roads and small mosques were submerged, the bridge was broken, and the lights were cut off. Rice fields and cattle enclosures were submerged, and some of the cattle were carried away in the flood.

Panti Residents: The flood started with rain that lasted 2 days and 2 nights, causing a great volume of water to flow fast through abnormal conduits. A 30 cm-thick mudflow with a strong smell ran through the location, the water was muddy in color, and thunderous noises came from the river because logs slammed against the rocks. Before the flood began, heavy rain fell since 2 p.m., and since 8 p.m. some of the residents started evacuating. At 10.30 p.m. the river suddenly receded, and some of the refugees returned to their houses. Suddenly at 11.30 p.m. banjir bandang and debris hit the houses and the dam, causing the latter to break.

This was unexpected because water from the river had receded at 10.30 p.m. After the 11.30 p.m. banjir bandang, a second flood hit the district the following morning at 7.30 a.m., ruining rice fields and claiming lives. There were 86 deaths in the Panti District, hectares of rice fields were ruined, public facilities such as lights were suddenly cut off, 19 electric poles fell down, the bridge was broken, and many houses were damaged. Those who had left for their relatives' houses in safe locations (on higher ground) were safe. This experience showed that a banjir bandang took a relatively short time to occur.

The banjir bandang described above became an experience for residents in the disaster site. It also encouraged them to improve their abilities in disaster management by participating in disaster management trainings, making evacuation route maps, and avoiding actions that increase disaster risks, such as deforestation.

Government Apparatus Experience

Apparatus in Pace Village, Silo District: Floods have become a routine disaster for them due to the area's steep topography. 20% of the Silo village government apparatus said that 4 floods have occurred in the area. However, banjir bandang has only occurred once, namely in 2009. This matches the opinion of the apparatus in the Kemiri and Suci Villages in the Panti District, namely that there has only been 1 banjir bandang, in 2006.

Panti government apparatus: The flood started with heavy rain that lasted 3 days and 3 nights. At 3 p.m. the rain was accompanied by a thunderous wind. At 5 p.m. some of the residents went into mosques and multiple-story houses for protection. At 7 p.m. the water discharge increased, then decreased at 11 p.m. Suddenly at 11.30 p.m. there was a banjir bandang, and the water carried with it mud, stones, and logs. The banjir bandang in Panti caused 86 deaths, damages to local houses and to 5 hectares of rice fields. Public facilities, such as the bridge connecting Krajan and Sodong, were also damaged, cutting off access from and into the area.

C. Public and Government Apparatus Knowledge on the Causes of Banjir Bandang

As well as demographic condition, public knowledge also influences public abilities to mitigate disasters. Public knowledge falls under two categories: knowledge of long-term causes and knowledge of short-term causes or triggers. Long-term causes include steep land inclination that results in an unstable soil; denuded forests; lack of buffer zone; and shallow rivers. Triggers include rain and water flowing from upstream in disaster-prone areas.

Research in the Silo and Panti Districts shows that experiencing banjir bandang provides knowledge of the causes of banjir bandang. The experience might provide this knowledge both directly and indirectly.

According to the Panti District residents, banjir bandang is caused by several factors including: (1) Deforestation due to illegal logging; some forests have been transformed from protection forests into production forests and smallholdings; (2) The steep land results in an unstable soil; (3) The steepness results in a proneness to landslide. The vulnerability is triggered by the following: (4) violent rain; (5) the river flow is obstructed by fallen logs. The Panti District government apparatus agree with the residents that banjir bandang in Panti was caused by the following factors: (1) A high level of rainfall, causing ground cover to be carried away by the water; (2) Extreme steepness in the land, resulting in a proneness to landslide; (3) Deforestation.

Table 2. Public and Government Apparatus Knowledge on the Causes of Banjir Bandang

No	Item	Category	Residents		Village Apparatus	
			Silo	Panti	Silo	Panti
1.	Carried along with the flood	Just mud	2%	-	-	-
		Logs, stones, other	54%	62%	-	-

		forest materials, rocks				
		Debris, logs, stones, mud, other forest materials	44%	38%	100%	100%
2.	Source of debris	Forests	66%	66%	-	-
.		Plantations	24%	32%	-	-
3.	Does the public know of the natural dam?	Yes	10%	16%	-	-
		No	90%	84%	-	-
4.	Lapse from start of rain to flood	-	93.9 hours	13.8 hours	30.7 hours	115 hours

Follow-ons. Most of the residents in the Silo (54%) and Panti (62%) Districts perceive the materials carried along in the banjir bandang to be debris: logs, stones, and forest materials. The government apparatus in the Pace Village, Silo District perceive the materials carried along in the banjir bandang to be debris and mud. The government apparatus in the Panti District perceive the flows that followed the banjir bandang in Panti to be debris, mud, and landslide.

Impacts. According to the Silo District residents, banjir bandang has negative impacts on their lives. Some of these negative impacts are: (1) Properties are damaged and lost: houses, furnitures, cattle, and fields. (2) Human lives are lost in the flood. (3) Household economy is disrupted (basic needs are not fulfilled) because access to and from the area is cut off. (4) Refugees suffer due to inadequate health facilities (especially for public bathing, washing, and toilet facilities). (5) The flood leaves a psychological trauma (unease, fear, anxiety) because residents worry similar disasters will occur. (6) Public facilities such as roads are damaged, the electricity is cut off, and communication channels are interrupted.

According to residents of the Suci and Kemiri Villages, Panti District, some of banjir bandang's negative impacts are: (1) Temporary loss of their livelihoods, because their efforts are concentrated on cleaning off the mud and rubbles. (2) Properties are damaged: 1 house was completely damaged and several more sustained light damage, wells are damaged, cattle and their enclosures are carried away by the flood, rice fields and plantations are submerged. (3) Public facilities such as bridges are damaged. (4) Trauma (fear, anxiety) of similar disasters.

According to the government apparatus in the Pace Village, Silo District, the negative impacts of banjir bandang are: (1) Houses are damaged and lost after being carried away by the flood; rice fields are submerged, causing a decrease in public income. (2) Public facilities are damaged: bridges are broken, the electricity is cut off, and roads are covered with mud.

According to the government apparatus in the Suci and Kemiri Villages, Panti District, the negative impacts of banjir bandang are: (1) Temporary loss of livelihoods. (2) Public facilities are destroyed: markets, schools, Islamic boarding schools, bridges and roads. As a result, access to other villages is cut off (the village is isolated). (3) Properties are damaged and lost: houses, submerged fields, lost cattle. (4) Human lives are lost. (5) Trauma (anxiety and fear) and the discomfort of living in refugee camps where health facilities are inadequate.

Most of the residents in Silo (90%) and Panti (84%) are not aware of the natural dam in the forest. Only a minority of the residents (10% in Silo and 16% in Panti) are aware of the natural dam in the forest. The residents' insufficient knowledge of the natural dam results in less than optimum anticipatory steps against banjir bandang.

According to the residents in the Suci and Kemiri Villages, Panti District, the lapse between the start of the rain and banjir bandang is longer (93.9 hours) than the lapse in the Pace Village, Silo District (13.8 hours). This is similar to the statement from the government apparatus in the Panti and Silo Districts: the lapse between the start of the rain and banjir

bandang in Panti is longer (115 hours) than in Silo (30.7 hours). This is due to the natural dam in Panti, which serves as a barricade against rainwater. Furthermore, the river in Panti is wider and bigger, and thus its capacity is bigger and the river flows more smoothly compared to in Silo.

Based on these conditions, it can be inferred that the majority of residents in disaster sites (both in the Panti and Silo Districts) possess sufficient knowledge of the causes of banjir bandang. Only a few of the residents do not understand what cause the disaster. This is partly due to the lack of knowledge about the natural dam in the disaster area.

D. The Public and Government Apparatus Perception on Banjir Bandang Signs

Banjir bandang signs are characteristics that occur prior to a banjir bandang, or signals of the oncoming banjir bandang. These signs are important, because they will alert residents in disaster-prone areas.

If we refer to the research results in Table 3, the public takes the following as signs of an oncoming banjir bandang: heavy rain, violent rain, rains that last for a long time, muddy water after rain, a higher level of water discharge, thunderous wind, a great number of fallen trees that are carried away into human settlements. Furthermore, there are other signs (myths); for instance, noises made by a certain bird are taken as a sign of an oncoming banjir bandang.

In a community discussion at the Panti District, it was revealed that, prior to a banjir bandang, the river suddenly stops flowing for a moment, because fallen logs obstruct the water flow. The unstable soil, unable to hold off the water any longer, gives off loud noises, and a banjir bandang ensues.

The majority of the Silo District residents view banjir bandang as a catastrophe, a test, and only a few residents view it as divine punishment because humans have failed to preserve nature. A similar view has been expressed by Panti District residents, who consider banjir bandang as a catastrophe, a test or divine ordeal, a punishment because humans have failed to preserve nature. Only a few consider banjir bandang as a warning.

Only a few participants in the community discussion state that banjir bandang is part of destiny, because humans are unable to take care of nature properly. Massive logging in 1997/1998 has brought about negative impacts. Human greed in taking woods from nature has resulted in banjir bandang.

Table 3. Public Perception on Banjir Bandang Signs

No	Variables	Category	Residents		Village Apparatus	
			Silo	Panti	Silo	Panti
1.	Banjir bandang signs	Thunderous wind	26%	18%	30%	20%
		Noises made by a certain bird	6%	-	-	10%
		Many fallen trees	8%	8%	-	-
		Logs floating into human settlements	40%	30%	60%	50%
		Higher level of water discharge	8%	16%	-	-
		Violent rain	10%	26%	-	-
		Muddy water	2%	0%	-	-
		Heavy rain	-	-	10%	20%
2.	Views on banjir bandang	Test/ordeal	40%	30%	-	10%
		Karma	6%	20%	-	-

		Catastrophe	54%	48%	70%	70%
		Warning	0	2%	30%	-
3.	Knowledge of banjir bandang	Yes	52%	36%	50%	50%
		No	48%	64%	50%	50%

E. Actions Taken by the Public and Government Apparatus Following Banjir Bandang

Banjir bandang in 2006 in the Panti District and in 2009 in the Silo District have brought about direct and indirect consequences. It is understandable that banjir bandang has helped improve public knowledge of banjir bandang. Banjir bandang has increased public vigilance in disaster management both indirectly and in the long term.

The floods have influenced public knowledge and behavior, which are integrated as actions before banjir bandang (mitigation), during banjir bandang (emergency response), and after banjir bandang(rehabilitation and reconstruction). Some of the disaster mitigation-related steps taken by Silo and Panti residents following banjir bandang are: (1) Creating an evacuation route, providing safe places for evacuation, providing public kitchens, and spreading information about these steps. (2) Spreading information about disaster-prone areas and their maps. (3) Organizing search-and-rescue simulations. (4) Informing river basin residents about safety-related prohibitions. (5) Increasing public alertness to subsequent floods. (6) Providing refugee camps with adequate health facilities.

Post-disaster activities include: (1) Making a list of victims and transporting the injured to the hospital. (2) Making a list of vulnerable groups (toddlers, pregnant women, senior citizens) among the victims. (3) Ensuring that houses abandoned by the refugees are safe by initiating night patrol.

Table 4. Actions Taken by Village Residents and Apparatus

No	Variables	Category	Residents		Village Apparatus	
			Silo	Panti	Silo	Panti
1.	Pre-disaster mutual aid spirit	Low	64%	4%	6%	6%
		Medium	30%	68%	34%	34%
		High	6%	28%	60%	60%
2.	Post-disaster mutual aid spirit	Low	6%	6%	0%	0%
		Medium	34%	34%	0%	20%
		High	60%	60%	10%	80%

Post-disaster steps that are related to rehabilitation and reconstruction include: (1) Cleaning houses covered in mud and rubbles. (2) Doing community service by cleaning off public facilities. (3) Providing capitals in order to help the recovery of household economies. (4) Distributing aids in the form of food and clothes. (5) Increasing public self-reliance. (6) Spreading information about maps of disaster-prone areas, alertness to disaster, and simulations. (7) Repairing damaged houses and public facilities (bridges, roads). (8) Building dams in anticipation of floods. (9) Building bridges and new roads in order to open access to and from the area.

Table 5. Post-Disaster Actions Taken by the Apparatus

No	Item	Silo	Panti
1	Determining evacuation sites	30%	30%
2.	Making a list of vulnerable groups	30%	20%
3.	Making maps of disaster-prone areas	40%	50%

In general, disaster risks are related to susceptibility, capabilities and vulnerability in disaster management. The level of susceptibility is related to the physical features of disaster-prone areas, while the level of vulnerability is related to public abilities in the face of disasters. A primer to banjir bandang indications is given to the public, in order to learn the extent of public knowledge in recognizing banjir bandang signs and learn of the steps taken to manage banjir bandang, before, during, and after the disaster.

2.2 Research on Public and Local Government Awareness

2.2.1 Purposes of Research

The purpose of this research is to identify the extent of the local public and government awareness in taking anticipatory steps against banjir bandang.

2.2.2 Research Method

The research is undertaken in three villages in the Jember Regency: the Panti Village [1], Sukorambi Village[2], and Silo Village[3]. The research used a descriptive-quantitative method. There are 230 respondents: 200 from the general public and 30 from the village government apparatus. However, the replies analyzed are only the consistent ones from 30 apparatus and 100 residents. The data is taken from primary and secondary sources. A Focus Group Discussion (FGD) is held in order to extract further information. Afterward, the data is tabulated and analyzed using the descriptive method and cross-tabulation.

2.2.3 Result of Research

A. Public Understanding of Banjir Bandang

The public understanding of banjir bandang refers to matters related to banjir bandang, as described in Table 6.

Table 6. Public Understanding of Banjir Bandang

No	Item	Panti	Silo	Sukorambi
1	Speed of BB	Like a plane (68%)	Like a vehicle (72%)	Like a vehicle (97%)
2.	Direction respondents run to	Upstream (54%)	Upstream (60%)	Upstream (43%)
3.	Height of water in the river	.> 5 m (74%)	< 1 m (86%)	1 – 5 m (67%)
4.	Evacuation site	Available (100%)	Available (86%)	Available (83%)
5	Is the evacuation site adequate?	Yes (82%)	Yes (86%)	Yes (53%)
6	Simulation experience	No (71%)	No (100%)	No (90%)
7	Wish to move due to flood effects	No (63%)	No (89%)	No (80%)

Table 6 can be explained as follows: *Speed of banjir bandang:* Most of the residents in Silo (72%) and Sukorambi (97%) state that the speed of banjir bandang equals that of a vehicle. However, according to the majority of Panti residents (68%), it is even faster, as fast as an airplane. Other residents state that the speed of banjir bandang is similar to that of a person walking quickly.

[1] The area was struck by banjir bandang on January 1, 2006.
[2] The area is prone to banjir bandang due to existing fissures.
[3] The area is prone to landslides.

Direction respondents run to: Most of the Silo (60%), Panti (54%), and Sukorambi (43%) residents would first run to higher ground (upstream) in a banjir bandang. The second alternative is to run left or right, and the third alternative is to run into a mosque or to a safe place.

Height of water in the river: Most of the Silo (86%) and Sukorambi (57%) residents state that during a banjir bandang the water level in the river increases by 1 to 5 meters. Panti residents (74%) state that the water level increases by more than 5 meters. This shows that the banjir bandang in Panti is more severe than in the other two locations.

Evacuation site: All the residents in Panti (100%) respond that their area has an evacuation site. This shows that the public has been informed of the evacuation site's existence. On the other hand, although the majority of Silo (86%) and Sukorambi (83%) residents state that their area has an evacuation site, other residents in Silo (14%) and Sukorambi (13%) state otherwise.

Is the evacuation site adequate?: An evacuation site must be equipped with adequate facilities. The adequacy can be judged from aspects such as capacity, utilities and facilities, security, et al. Survey shows that the majority of Silo (86%), Panti (82%) and Sukorambi (53%) respondents state that the existing evacuation sites are adequate. However, other respondents state that the existing evacuation sites are inadequate, especially the bathrooms.

Simulation experience: Simulations as a training are part of the efforts to prepare the public for banjir bandang. This readiness covers many aspects, such as the readiness of the early warning system, the readiness to evacuate, the readiness to rescue victims, and so on. Survey shows that all the respondents in Silo (100%) and the majority of Panti (71%) and Sukorambi (90%) respondents admit that they never participated in simulations. This shows that simulations that have taken place in Panti and Silo have not entirely involved the communities.

Wish to move due to flood effects: After a banjir bandang, the local communities are affected by various economic and social impacts. Nevertheless, most of the residents in Silo (89%), Panti (63%) and Sukorambi (80%) do not wish to move to another place. The reasons are many: they already feel safe and comfortable in their current homes; they have no financial resources to move elsewhere; they believe there will be no more banjir bandang; and so on. This reluctance calls for a better early warning system, as these areas are still disaster-prone.

B. Public and Apparatus Institution

The perception of public institution in relation to banjir bandang is focused on the existence of organizational units for banjir bandang management and the functions of banjir bandang management agencies. Below are the details of disaster management institutions in the research sites.

Organization for Banjir Bandang Management

The organization for banjir bandang management referred to here is the Implementation Unit for Banjir Bandang Management (Satlak PBB). Table 6 shows that all Panti respondents (100%) state that their area already has an Implementation Unit for Banjir Bandang Management (Satlak PBB). On the other hand, 50% of the Silo respondents and the majority of Sukorambi residents (80%) state that their areas do not have a Satlak PBB. According to the Head of the Klungkung Village, Sukorambi District, Satlak PBB on the village level was formed in 2009. However, not many villagers are aware of the organization's structure and form. This indicates that the village government has not thoroughly informed the public of the Satlak PBB's existence. The Satlak PBB in the Sukorambi Village is indirectly born from the residents' relatively great sense of mutual assistance, mutual aid, and participation.

Functions of Satlak PBB

Although each of the three research areas has a Satlak PBB, the organizations are yet to have a formally established regular procedure (Protap). In effect, the residents have already had a naturally or instinctively established Protap, formed out of their annual experiences. Protap as they understand it involves the procedures of self-rescue (evacuation) during banjir bandang. The Protap includes: (1) the identification of banjir bandang signs, and the residents will carry out several stages of the emergency evacuation process, and (2) the procedures for emergency rescue (evacuation), namely escaping to higher ground. This is because, in the villages' history, higher ground has never been directly affected by banjir bandang.

Ideally, Satlak PBB has the following functions: (1) Coordination. (2) Planning out activities during normal situations. (3) Carrying out activities during normal situations. (4) Planning out early warning activities and evacuations during stressful situations. (5) Carrying out early warning activities and evacuations during stressful situations. (6) Fundraising. In reality, Satlak fulfills only some of these functions, namely the coordinating function. The details are explained in Table 7 below:

Table 7. Functions of Satlak PBB

No	Item	Panti	Silo	Sukorambi
1	Coordination of Satlak functions	Yes (90%)	Yes (80%)	Don't know(70%)
2.	Planning for normal situations	Yes (70%)	No (90%)	Don't know (70%)
3.	Activities for normal situations	Yes (70%)	Don't know (90%)	Don't know (70%)
4.	Planning out early warning activities	Yes (80%)	No (80%)	Don't know (70%)
5	Evacuations during stressful situations	Yes (80%)	No (80%)	Don't know (70%)
6	Fundraising	Yes (80%)	No (90%)	Don't know (70%)
7	BB emergency response plans	Yes (90%)	No (70%)	Don't know (70%)
8	BB early warning system	Yes (90%)	Don't know (50%)	Don't know (70%)
9	Criteria for starting evacuation	Yes (90%)	No (60%)	Don't know (70%)
10	Mobilization of resources	Yes (80%)	No (80%)	Don't know (70%)
11	Vigilance training	Yes (80%)	No (50%)	Don't know (70%)

Coordination of Satlak functions. Most of the Panti government apparatus (90%) state that the Satlak PBB in their area has carried out the six Satlak functions. On the other hand, most of the Silo government apparatus (80%) state that the Satlak in their area has not carried out the six functions. In Sukorambi, most of the government apparatus (70%) do not even know whether the Satlak PBB in their area has properly carried out its functions.

Planning for normal situations. It is imperative that Satlak plans for activities during normal situations. Most respondents from the Panti apparatus (70%) state that their Satlak has activity plans for normal situations. On the other hand, most of the apparatus in Silo (90%) state that their Satlak has no activity plans for normal situations. The Silo apparatus (70%) say they are not aware of any activities.

Activities for normal situations. Most respondents from the Panti apparatus (70%) state that their Satlak has activities during normal situations. On the other hand, most of the apparatus in Silo (90%) state that their Satlak has no activities during normal situations. Most respondents from the Silo apparatus (70%) are not aware of any Satlak activities. This is because there is no Satlak in Silo.

Planning out early warning activities and evacuations during stressful situations. Most respondents from the Panti apparatus (80%) state that the Satlak PBB in their area have plans for early warning activities and evacuations during stressful situations. On the other hand, most of the Silo residents (80%) state that their Satlak PBB has no plans for early warning activities and evacuations during stressful situations. The Sukorambi residents (70%) even state that they are not aware of any plans for early warning activities and evacuations during stressful situations.

Fundraising. One of Satlak's important functions is fundraising, so that it can fund its operations. In general, the village apparatus believe that the District/Regency governments

have allotted no budget for disaster vigilance. Only Panti respondents (80%) believe that the District/Regency governments have allotted no budget for disaster vigilance. According to respondents, this was proven during banjir bandang: the government was able to carry out the disaster management operation, although the exact allocation, amount, and location of the funds are not known. On the other hand, most Silo residents (90%) believe that the District/Regency governments have allotted no budget. Sukorambi residents (70%) cannot even say whether their Satlak is doing any fundraising.

Emergency response plans. Most of the Panti village apparatus (80%-90%) state that the Regency has a relevant policy regarding the emergency response plans for banjir bandang, warning system for banjir bandang, criteria for starting evacuation prior to banjir bandang, mobilization of resources, and public vigilance training. On the other hand, most of the Silo village apparatus (50%-80%) state that the District/Regency have no relevant policy regarding the abovementioned tasks. The Sukorambi village apparatus (70%) even state that they are unaware whether or not the District/Regency have a relevant policy regarding the emergency response plans for banjir bandang, warning system for banjir bandang, criteria for starting evacuation prior to banjir bandang, mobilization of resources, and public vigilance training.

Several activities that suggest vigilance on the part of the government are: creating maps for disaster-prone areas, providing buildings for evacuation sites, putting up road signs in disaster-prone areas, establishing disaster command centers, basic observation facilities, and simulations. Not all of these are carried out. Field survey shows that most villages do not have road signs in disaster-prone areas and evacuation maps, except for the Panti Village. The Panti Village's evacuation map was made by the residents, under the guidance of Yayasan Pengabdi Masyarakat and JICA in 2007. However, they do not have road signs in disaster-prone areas yet.

C. Public and Local Government Awareness on Banjir Bandang (BB)

Public and local government awareness on banjir bandang is indicated by their actions, starting from the availability of BB maps, evacuation buildings, road signs in disaster-prone areas, disaster command centers, basic observation facilities, simulations, evacuation equipments, medicine, security plans for emergencies, and early warning system. Research results (Table 8) show the following:

Evacuation maps. Most respondents in the Panti Village (100%) and Silo Village (60%) state that their areas have BB evacuation maps. On the other hand, Sukorambi village respondents state that their area do not have BB evacuation maps. Evacuation maps in the Panti Village was made in 2007, under the assistance of Yayasan Pengabdi Masyarakat (YPM) and JICA.

Buildings for evacuations. Most respondents in Panti (50%) and in Silo are unaware whether or not their villages already have buildings for evacuation. But some Silo respondents state that Satlak has chosen warehouses and schools as evacuation buildings; in Sukorambi, playing fields and schools. Silo respondents (60%) state that the village hall and mosques have been chosen as evacuation buildings.

Road signs for disaster-prone areas. Most Panti respondents (80%) state that their area already has road signs in disaster-prone areas. Silo respondents (60%) state they have no such signs. All respondents in Sukorambi (100%) state that they are unaware of any road signs for disaster-prone areas.

Table 8. Public and Local Government Awareness of BB

No	Item	Panti	Silo	Sukorambi
1	Availability of BB Maps	Yes (100%)	Yes (60%)	No (80%)
2.	Evacuation buildings	Don't know (50%)	Yes (70%)	Don't know (60%)
3.	Road signs in disaster-prone areas	Yes (80%)	No (60%)	Don't know

				(100%)
4.	Disaster command centers	Yes (90%)	Yes (100%)	No (90%)
5	Basic observation facilities	Yes (60%)	Don't know (90%)	Don't know (90%)
6	Simulations	Yes (90%)	Don't know (70%)	Don't know (70%)
7	Evacuation equipments	Yes (50%)	No (70%)	Yes (50%)
8	Availability of medicine	Yes (60%)	Yes (50%)	Yes (60%)
9	Security plans for emergencies	Yes (80%)	No (60%)	No (60%)
10	Early warning system	Yes (90%)	Yes (80%)	No (60%)

Disaster command centers. Most Panti respondents (90%) and all Silo respondents (100%) state that their areas have disaster command centers, namely in the village hall and plantation. Respondents in the Sukorambi Village (90%) state that they have no such command center, but some respondents (10%) state that they have one, and it is located in the midst of the settlements.

Basic observation facilities. The Panti government apparatus take monitoring very seriously. Most respondents from the Panti apparatus (60%) state that they have basic observation facilities, such as hourly and daily rainfall gauges, water level gauge, and fissure gauge. Respondents from the Silo and Sukorambi government apparatus give similar answers: only 10% state that their areas have basic observation facilities, and 90% say they are unaware of such facilities.

Simulations. Simulations as a training to prepare residents for actual disasters may be highly beneficial for those living in disaster-prone areas. Survey on government apparatus shows that simulations have taken place only in Panti, as proven by 90% of the respondents who state that they have had simulations. In Silo, simulations have been organized by PMI, the Jember Regency and JICA, but only 20% of the respondents are aware of this. In Sukorambi, only 10% of the respondents reply that their areas have had disaster simulations.

Evacuation equipments. Respondents in both Panti (50%) and Sukorambi (50%) state that their villages have evacuation equipments, such as tents. Meanwhile, Silo respondents (70%) state they have no such equipments.

Availability of medicine. It is imperative to have medicine during times of disaster, in order to maintain the victims and refugees' health. Survey shows that only some respondents from the Silo apparatus (50%) reply that they have medicine available in the case of disasters. Panti and Sukorambi are relatively more prepared regarding the provision of medicine, because in each location 60% of the respondents from the apparatus reply that they have medicine available.

Security plans for emergencies. During emergencies, people sometimes neglect the security aspect. Security plans for emergencies will prevent harmful consequences that come from irresponsible acts. Most of the Panti government apparatus (80%) reply that they already have security plans for emergencies. Meanwhile, Silo and Sukorambi still have no security plans, because only 40% of the Silo apparatus respondents and 30% of the Sukorambi apparatus respondents reply that they already have security plans.

Early warning system. Most of the Panti government apparatus (90%) state that they already have an early warning system. On the other hand, most of the Silo government apparatus (80%) and Sukorambi apparatus (60%) reply that their areas have no early warning systems. These replies show that Panti has relatively high awareness, as proven by their comprehensive early warning system.

D. Steps Taken by the Public

Some of the steps taken by Silo residents during emergencies are: (1) staying alert and watchful in anticipation of an increasing water level; (2) saving their children by bringing them to higher ground (evacuating); (3) carrying movable properties (jewelry, documents, clothes); (4) afforestation; and (5) building a higher front yard.

Meanwhile, Panti residents do the following: (1) staying alert in case of bigger water currents; (2) implementing afforestation by planting trees; (3) evacuating to safe places with their families (including children) and bringing food supply (for a minimum of 2 days), clothes and documents (house ownership document/certificate, diplomas, etc.); (4) participating in trainings/simulations; (5) preparing emergency *kentongan* (drum made of bamboo or wood for sounding the alarm). Although the majority of the residents would be doing a lot of activities during emergencies, there would be some who are unable to think due to panic, unsure of what they should do first.

During emergencies, Sukorambi residents do the following: (1) staying alert and watchful; (2) avoiding careless logging and implementing afforestation; (3) evacuating with their families to safer locations, bringing only the necessary clothes; (4) doing everything else that they can and trusting God in their prayers.

E. Conclusions and Recommendations

Conclusions from the basic research on public awareness on banjir bandang are as follows:

1. Panti and Sukorambi each has already had a Satlak, whereas there is no Satlak in Silo. Almost all Panti residents are aware of Satlak's organizational structure, but the Sukorambi residents are unaware of their Satlak's organizational structure.
2. The levels of public awareness in Silo, Panti and Sukorambi differ. Silo and Sukorambi residents have a low level of awareness in flood management, whereas the Panti community has a sufficient level of awareness in banjir bandang management. This can be seen from their disaster vigilance during normal situations and during banjir bandang. The readiness is proven by the road signs in disaster-prone areas, basic observation facilities, evacuation maps, simulations, and early warning system.

Based on these conclusions, the following recommendations are made to the Silo and Sukorambi residents so that they can increase their awareness and knowledge of banjir bandang. The awareness may be achieved through the following:

1. Spreading information on the importance of the knowledge of floods and Satlak.
2. Asking the public to observe their surroundings, in order to create maps and discover evacuation sites for banjir bandang.

2.3 Research on Early Warning Systems and Evacuations in Banjir Bandang

2.3.1 Purpose of Research

The purpose of the 2010 research is to assist the Preparation of Sub-Projects for Early Warning System and Early Evacuations in the Jember Regency, which is organized by *Japan International Cooperation Agency* (JICA) in cooperation with the Indonesian Government. The research's specific purpose is for the local government to review the designs for the Early Warning System and Early Evacuations in villages and districts.

2.3.2 Research Method

The research used the survey method. Data is acquired by conducting structured interviews with respondents in the form of questionnaires. The sampling of respondents is deliberately done in disaster-prone areas in the Jember Regency. The areas are the Kemiri and Suci Villages in the Panti District (35 respondents from the public and 10 from the government apparatus), the Klungkung Village in the Sukorambi District (30 respondents from the public and 10 from the government apparatus), and the Pace Village in the Silo District (35 respondents from the public and 10 from the government apparatus).

2.3.3 Result of Research

A. History of Banjir Bandang

Results from the survey on the public and government apparatus' knowledge and memory of the banjir bandang history are shown on Table 9.

Table 9. History of Banjir Bandang According to the Public

No	Item	Panti	Silo	Sukorambi
1	Respondents experiencing BB	Yes (100%)	Yes (100%)	Yes (97%)
2.	BB during the last 10 years	Once (94%)	Once (46%)	Once (76%)
3.	Respondents who are BB victims	No (51%)	No (77%)	No (60%)
4.	House damages due to BB	Yes (46%)	Yes (77%)	No (87%)
5	Respondents' anticipation of BB	Yes (80%)	Yes (43%)	No (80%)
6	Anticipatory steps against BB	Yes (77%)	Don't know (40%)	Don't know (60%)
7	Effectiveness of BB anticipation	Yes (71%)	No (49%)	No (67%)
8	Participants in BB anticipation	Apparatus, self, NGO	Society leaders, self, apparatus	Society leaders, apparatus, self

Table 9 shows that all the residents have experienced banjir bandang in their own areas. These respondents, however, provide different answers regarding the frequency of banjir bandang in their areas during the past 10 years. In general, respondents state that banjir bandang has only occurred once, but a few respondents state there has been more than 1 banjir bandang. This divergence in the answers results from different understandings of the definition and delineation of banjir bandang.

Most of the Panti, Silo, and Sukorambi residents state that they and their families are safe during banjir bandang; however, their neighbors and neighbors' families became casualties.

Although no one in their households died, most of the Panti and Silo residents state that their houses were damaged in the banjir bandang. Sukorambi residents, on the other hand, reply that their houses were not damaged.

Most Panti residents know how to anticipate banjir bandang and have put the knowledge into practice. Silo residents know how to anticipate banjir bandang but not how to put the knowledge into practice. The residents are aware of various ways with which to anticipate banjir bandang, such as prevention by way of afforestation, alertness during rain, monitoring weather developments, and doing night patrols in turns. Meanwhile, Sukorambi residents neither know how to anticipate banjir bandang nor the ways to put the knowledge into practice.

In most of the Panti residents' opinion, their anticipatory steps are effective. On the other hand, most of the Silo and Sukorambi residents think their anticipatory steps are not. In their opinion, effective anticipatory steps will be able to prevent banjir bandang, prevent water from coming into their houses, reduce the number of victims and losses, and prevent the river from overflowing its banks.

According to most Silo and Sukorambi residents, in anticipating banjir bandang, the important roles are played by society leaders, then the apparatus, and the residents themselves. Meanwhile, according to Panti residents, the important roles are played by the government apparatus, then the residents themselves and NGOs.

Table 10. History of Banjir Bandang According to the Apparatus

No	Item	Panti	Silo	Sukorambi
1	Respondents experiencing BB	Yes (100%)	Yes (90%)	Yes (90%)
2.	BB during the last 10 years	Once (100%)	Once (100%)	Once (70%)
3.	Respondents who are BB victims	Yes (50%)	No (100%)	Yes (60%)
4.	House damages due to BB	Yes (80%)	Yes (70%)	No (70%)
5	Respondents' anticipation of BB	Yes (90%)	No (70%)	No (60%)

6	Anticipatory steps against BB	Yes (90%)	Don't know (60%)	Don't know (40%)
7	Effectiveness of BB anticipation	Yes (90%)	No (70%)	No (40%)
8	Participants in BB anticipation	Apparatus and society leaders	Don't know	Don't know

Table 10 shows that all the apparatus are aware of the banjir bandang that have occurred in their areas. These respondents, however, provide different answers regarding the frequency of banjir bandang in their areas during the past 10 years. In general, respondents state that banjir bandang has only occurred once, but a few respondents state there has been more than 1 banjir bandang. This divergence in the answers results from different understandings of the definition and delineation of banjir bandang.

Most of the Panti and Sukorambi village apparatus state that, during the banjir bandang, some of their family members died. Silo apparatus state that none of their family members became casualties during the flood. In general, banjir bandang casualties in Panti number more than 100. In Sukorambi, the number is less than 100. Meanwhile, most respondents in Sukorambi say that they are unaware of any casualties.

Most of the Panti apparatus know how to anticipate banjir bandang and have put that knowledge into practice. There are many ways with which the public anticipates banjir bandang: prevention by way of afforestation, alertness during rain, monitoring weather developments, doing night patrols in turns, and so on. There is also another response to banjir bandang, namely leaving for higher ground or safer locations.

On the other hand, Silo and Sukorambi apparatus do not know any steps with which to anticipate banjir bandang. Thus, the apparatus do not have any anticipatory steps that they can put into practice. The Sukorambi residents do not know of any steps either.

Most of the apparatus in Panti believe that their anticipatory steps are effective. On the other hand, Silo and Sukorambi residents do not have any steps with which to anticipate banjir bandang, and in effect they do nothing to anticipate it. Because of this, they do not know whether or not any steps would be effective.

According to most of the apparatus in Panti, in putting the banjir bandang anticipatory steps into practice, the key persons are the apparatus and society leaders. In Silo and Sukorambi, the apparatus do not know who the key persons would be.

B. Banjir Bandang Early Warning System

Results from the survey on respondents, both from the public and the government apparatus, on the early warning system are shown in Tables 11 and 12.

Table 11. Banjir Bandang Early Warning System According to the Public

No	Item	Panti	Silo	Sukoramabi
1	BB Early Warning System	No (60%)	No (77%)	No (90%)
2.	Creating a BB Early Warning System	No (66%)	No (94%)	No (100%)
3.	Source of Early Warning System	Learn it from other communities (43%)	Learn it from other communities (77%)	Don't know (47%)
4.	Officer informing the public of danger	Yes (66%)	Yes (63%)	Yes (80%)
5	Communication means for BB warning	Cell phones, loudspeakers at mosques	Don't know, loudspeakers at mosques, sirens	Kentongan, don't know, cell phones
6	Loudness of warning signals	Good (49%)	Good (69%)	Good (40%)
7	Condition and function of communication means for BB warning	Good (74%)	Good (80%)	Good (67%)
8	Recognition of sounds from communication means for BB warning	Yes (89%)	Yes (80%)	Yes (73%)
9	BB effectiveness	Yes (54%)	Yes (51%)	Yes (60%)

Table 12. Banjir Bandang Early Warning System According to the Apparatus

No	Item	Panti	Silo	Sukorambi

1	BB Early Warning System	Yes (80%)	No (80%)	No (60%)
2.	Creating a BB Early Warning System	No (66%)	No (94%)	No (100%)
3.	Source of Early Warning System	Training	Don't know	Learn it from other communities
4.	Officer informing the public of danger	Yes (90%)	Don't know (50%)	Yes (60%)
5	Communication means for BB warning	Kentongan (80%)	Kentongan (50%), Sirens (50%)	Sirens (50%)
6	Loudness of warning signals	Good (90%)	Good (70%)	Don't know (50%)
7	Condition and function of communication means for BB warning	Good (90%)	Good (70%)	Not good (60%)
8	Recognition of sounds from communication means for BB warning	Yes (80%)	Yes (70%)	Yes (50%)
9	BB effectiveness	Yes (54%)	Yes (51%)	Yes (60%)

Tables 11 and 12 show that most of the residents and government apparatus do not have an early warning system for banjir bandang. Mostly the reasons for not having an early warning system are: they are unaware of such a system, they have not thought of making one yet because they are already used to floods, and they have no knowledge about such a system. However, some residents believe that an early warning system for banjir bandang does exist in their areas. The residents create the system by learning about it from other communities, rather than creating it themselves.

Silo residents describe the following activities as part of the early warning system: neighbors sharing information, giving signals when the river overflows, informing others by shouting or speaking through loudspeakers, and telling others to go to evacuation sites. A structured mechanism in the early warning system's implementation is yet to exist. All the activities are spontaneous and incidental in nature. In the meantime, Panti residents describe the following as their early warning system: flood warnings from the apparatus and higher ground. The information is then relayed through walkie-talkies in disaster command centers and the heads of hamlets, also by way of kentongan and loudspeakers in mosques. Satgas (task force) members would also check the higher ground to confirm and monitor any developments. Sukorambi residents describe the following as their early warning system: signals from higher ground (plantations), the kentongan is sounded five times in a row with intervals. The information is also relayed through loudspeakers in mosques and personal means of communication such as cell phones and walkie-talkies. The person authorized to spread the information about banjir bandang warnings is the Head of the Coordination and Implementation Unit for Disaster (Satkorlak). The Head of Satkorlak sends the information to the village apparatus (heads of the villages and their staff), and they in turn relay it to heads of the hamlets, who will relay it to the public.

The residents did not create the banjir bandang early warning system themselves. They learned the system from other communities, hereditary customs, and simulations. Their banjir bandang early warning system is well-operated, especially because there are officers who will inform the public when warning signals must be sounded.

According to the public and apparatus, most of the means of communication used to give banjir bandang warning signals are kentongan, loudspeakers in mosques, and sirens. Some residents also use cell phones. In general, the public and apparatus confirm that they can hear and receive these warning signals clearly.

The public and government apparatus confirm that the means of communication used in the early warning system are in good condition and function well. Furthermore, most respondents are able to understand the warnings relayed through these means.

Judging from the above descriptions of the early warning system in these areas, it can be concluded that the public in general believes the system is effective in reducing banjir bandang risks. This assessment of the early warning system's effectiveness by the public shows that the effectiveness still needs to be improved, in order to meet public expectations.

Meanwhile, the government apparatus consider the system to be effective if it reduces banjir bandang risks and the number of victims.

C. Banjir Bandang Evacuation System

Silo residents will evacuate during heavy rain, when the river overflows, and when their neighbors have started evacuating. Meanwhile, Panti residents will evacuate when the river overflows, they hear sounds of floods, and their neighbors have started evacuating. Sukorambi residents will evacuate when the river overflows, they hear sounds of floods after rain has fallen for several days in a row, and the river suddenly recedes. They believe that, if the river suddenly recedes, it indicates that the flow is obstructed. When the obstruction can no longer stand the pressure, the obstruction will collapse, causing banjir bandang. Government apparatus from the three areas basically share the above opinion on the conditions for evacuation, namely: rain has fallen for several days in a row, the river overflows, and the thunderous sound of the flood is audible.

Table 13 shows that, according to the majority of residents, they manage the evacuation themselves through communal work, with additional assistance from Satgas and society leaders. Most residents already know where the evacuation sites are. Ideally, all residents should be aware of the sites, because they will have to head there during banjir bandang. They choose the evacuation sites based on the following criteria: the sites are the safest and most accessible, have sufficient capacity, and are located on relatively high ground. Some of the chosen evacuation sites are playing fields, warehouses belonging to plantation companies, and the village hall.

Table 13. Banjir Bandang Evacuation System According to the Public

No	Item	Panti	Silo	Sukorambi
1	Assisting the evacuation	The public (43%)	The public (86%)	The public (57%)
2.	Do respondents know where the evacuation sites are?	Yes (94%)	Yes (86%)	Yes (77%)
3.	Distance between evacuation sites and banjir bandang-prone areas	500-1,000 m	100-500 m	Don't know (37%)
4	Any evacuation maps or road signs?	No (69%)	No (69%)	No (50%)
5	Does the site have sufficient capacity?	Yes (74%)	Yes (63%)	Yes (60%)
6	Average capacity	500-1,000 persons	500-1,000 persons	100-500 persons
7	Are the refugees being kept track of in the evacuation site?	Yes (86%)	No (71%)	No (47%)
8	The officer in charge of keeping track of refugees	Village apparatus (46%)	Don't know (54%)	Don't know (73%)
9	Do victims in the evacuation site receive help?	Yes (77%)	Yes (63%)	Yes (83%)
10	Public kitchen in the evacuation site	Yes (94%)	Yes (46%)	Yes (80%)
11	Facilities-utilities in the evacuation site	Yes (80%)	No (71%)	No (63%)
12	Any problems to solve?	Yes (77%)	Yes (74%)	No (60%)
13	Experience in problem-solving	Yes (69%)	No (63%)	Don't know (57%)
14	Parties that help solve problems	Regency government	Regency government	Don't know

Silo residents believe that the distance between evacuation sites and banjir bandang-prone areas ranges from 100 m to 500 m. Panti residents believe that the distance between evacuation sites and banjir bandang-prone areas ranges from 500 m to 1,000 m. Meanwhile, Sukorambi residents do not know the distance between evacuation sites and banjir bandang-prone areas.

Evacuation maps or road signs are part of the necessities during disasters. Survey shows that only a minority of the residents reply that their areas have maps and road signs, and the majority reply that their areas have no maps and signs. Keeping track of refugees in

evacuation sites is a crucial activity, as it helps in monitoring the development of the disaster. Survey in the three areas shows that there is no such track-keeping, except in Panti where some residents state that they keep track of refugees in evacuation sites, and it is mostly done by the village apparatus. Also assisting in the process are outside parties, such as PMI, NGOs, the national military, and youth organizations.

Public survey shows that victims in evacuation sites receive help. In Sukorambi, on the other hand, the number of residents confirming the help for victims is higher than the number of apparatus that confirm the same thing, although the difference is minimal. This is due to the government apparatus' responsibility in serving the public. Thus, these replies indicate that they have done their jobs well, including giving help to victims in evacuation sites.

Public kitchens are imperative in evacuation sites, as they support the refugees' logistical needs. Most residents and government apparatus state that their evacuation sites have public kitchens, except for the Silo government apparatus who reply in the negative. The public and apparatus give various answers regarding facilities and utilities in evacuation sites, such as tents, clean water, health facilities, etc. Most residents, as do the government apparatus, state that facilities and utilities in evacuation sites are inadequate at the moment.

The majority of the public and government apparatus state that there are still problems to be solved. Their solution is worked on by the public and apparatus, as well as by outside parties such as government apparatus from above the village level (district, regency, province, and national), NGOs, and Perhutani.

In general, the residents' knowledge of banjir bandang, as well as of its causes (which differ according to local characteristics), are at different levels. However, they are able to identify the causes of banjir bandang: the river overflows during heavy rain (Silo District), the vegetation's vulnerability to a high level of rainfall, due to being in a steep land (Panti District), and floods from higher ground (Sukorambi District). The early warning system exists, but is considered to be ineffective. Among the three locations, Panti has the best early warning system, equipped with adequate infrastructures (command centers, equipments, and mechanism). Sukorambi has the second-best system, supported by the equipments (loudspeakers in mosques) and highly supported by the plantations on higher ground in the monitoring of disaster signs. In Silo, there is no early warning system due to a conflict: the public opinion is polarized regarding plans of manganese mining. Consequently, any program from the outside is greeted with suspicion. Silo already has an early evacuation system, although not yet a well-coordinated one.

Table 14 shows that, similar to results of the public survey, the majority of the apparatus state that assistance during banjir bandang is given by the residents themselves through communal work, with additional assistance from Satgas and society leaders. The majority of the apparatus are aware that the evacuation site is 1,000 m to 5,000 m away, except for the Sukorambi government apparatus who are yet to decide on an evacuation site. This reveals that the evacuation sites are still within an unsafe range, and must be reviewed once more.

Table 14. Banjir Bandang Evacuation System According to the Apparatus

No	Item	Panti	Silo	Sukorambi
1	Assisting the evacuation	The public (43%)	The public (86%)	The public (57%)
2.	Do respondents know where the evacuation sites are?	Yes (80%)	Yes (100%)	Yes (40%)
3.	Distance between evacuation sites and banjir bandang-prone areas	1,000-5,000 m	1,000-5,000 m	Don't know
4.	Any evacuation maps or road signs?	Yes (70%)	No (100%)	Yes (70%)
5	Does the site have sufficient capacity?	Yes (80%)	Yes (100)	Yes (40%)
6	Average capacity	100-500 persons	1,000-2,000 persons	500-1,000 persons
7	Are the refugees being kept track of in the evacuation site?	Yes (80%)	Yes (90%)	No (50%)

8	The officer in charge of keeping track of refugees	Village apparatus	Village apparatus and youth organizations	Don't know
9	Do victims in the evacuation site receive help?	Yes (80%)	Yes (90%)	Yes (80%)
10	Public kitchen in the evacuation site	Yes (100%)	No (100%)	Yes (90%)
11	Facilities-utilities in the evacuation site	Yes (70%)	No (100%)	No (80%)
12	Any problems to solve?	Yes (80%)	Yes (90%)	No (60%)
13	Experience in problem-solving	Yes (90%)	Yes (100%)	No (60%)
14	Parties that help solve problems	Regency government	Provincial and regency governments	Don't know

The majority of the government apparatus confirm that they already have evacuation maps or road signs. The maps are simple in construction but show the evacuation direction and site clearly. Evacuation road signs have been made but are not well-maintained, and some are missing. Moreover, the materials for the signs are not durable ones.

Keeping track of refugees in evacuation sites is a crucial activity, as it helps in monitoring the development of the disaster. Survey on the government apparatus in the three areas shows that victims in evacuation sites are being kept track of, except in Sukorambi where there is no track-keeping in evacuation sites. The officers in charge of the track-keeping are mostly village apparatus and members of youth organizations. Help for victims is also provided in the evacuation sites.

Public kitchens are imperative for evacuation sites, as they support the refugees' logistical needs. Most government apparatus state that their evacuation sites have public kitchens, except for the Silo government apparatus who reply in the negative. The government apparatus provide a favorable assessment regarding facilities and utilities in evacuation sites, such as tents, clean water, health facilities, etc. Most of the government apparatus state that facilities and utilities in evacuation sites are already adequate.

The majority of the government apparatus state that there are still problems to be solved, except for the Sukorambi government apparatus who reply otherwise. Most of them have tried to solve these problems. They also confirm that outside parties are involved in the problem solving, namely governments above the village level (regency and province).

2.4 General Conclusions on the Ability of the Public and Apparatus in Disaster Management

Based on the above basic research, the Jember Regency residents' abilities in managing disasters is judged to be at the 3.47 point (in a 0 to 5 scale) or on a medium level. The average ability of the Panti District is 4.08 or on a high level, the average ability of the Silo District is 3.47 or on a medium level, and the average ability of the Sukorambi District is 2.86 or also on a medium level. Therefore, the disaster management abilities in the Silo and Sukorambi Districts need to be improved.

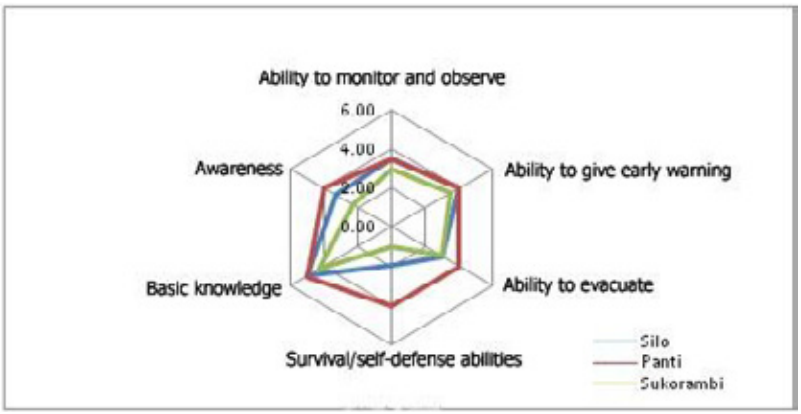


Figure 2. Public Abilities in Disaster Management

On the other hand, the average banjir bandang management abilities of the government apparatus in the three research areas is 3.93, or on a high level. The Panti District has the highest point, 4.26, then the Silo District (4.00) and Sukorambi District (3.51). This result shows that the apparatus' abilities in the three areas are relatively similar. Below are the ability scores in the research areas.

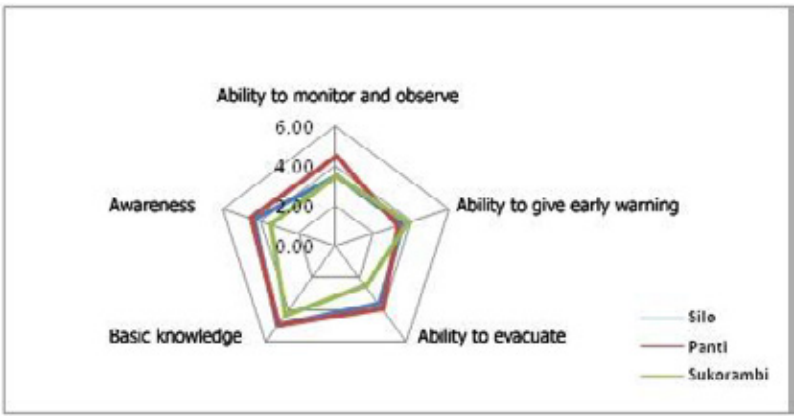


Figure 3. Apparatus Abilities in Disaster Management

Basically it can be concluded that the Panti residents have the highest ability level in banjir bandang management, followed by the Silo and Sukorambi Districts. The levels of apparatus abilities in the three research areas are relatively similar.

Analysis on Rainfall Data for Banjir Bandang

2.5.1 Purpose of Analysis

The purposes of the analysis on rainfall data are to (1) make a descriptive figure of the rainfall level in an area and (2) compare the rainfall data against sediment-related disasters, including landslides, floods, and banjir bandang, in an area.

2.5.2 Method of Analysis

Methodologically speaking, the observatory site in this research is the Kalijompo catchment area. Its geographical position is as follows: the latitude is $-8^{0}04'$ 52.9", the

longitude is $113^0$40'13.6", and the height is 475 meters above sea level. The data is based on hourly rainfalls from March 1, 2010 to March 6, 2011, in Kalijompo, Sukorambi District, Jember Regency, East Java Province. The data source is JICA's automatic rainfall recording instrument.

The methods commonly used to analyze the rainfall in order to determine its standards for warning and evacuation purposes during sediment-related disasters are method A, based on tentative instructions in 1984 (method A); method B, based on tentative instructions in 1984 (method B); the Yano method; and committee methods to learn the dimensions of sediment-related disaster control in a comprehensive manner.

2.5.3 Result of Analysis

Before discussing the rainfall analysis, we will first discuss the effects of sediment-related disasters. In general, sediment-related disasters are categorized into two types: (1) direct sediment-related disasters that cause direct damages due to shifting sediments (2) indirect sediment-related disasters that cause floods or inundation through river aggradation (deposition) or obstruction of the river flow. Direct sediment-related disasters include debris flow, landslide/slope failure, and shifting soil.

In order to predict sediment-related disasters, the connection between rainfall and disasters is examined. The steps taken are as follows:

1. Collecting and arranging data
   The data collected is rainfall data which represents the condition of the site's scope. Rainfall data shows the total of rainfall during certain periods, measured daily in milimeters, and the average rainfall is measured in mm/hour. Furthermore, the data describes the highest level of rainfall and the duration of rainfall in one period of rain. It is also necessary to make a list of the disasters.
2. Measuring several indexes of rainfall
   The process to determine the standard rainfall for warning and evacuation purposes, whether using the A, B, or committee method, is carried out by defining the rainfall indexes. When we use these indexes, the exact time for warnings can be determined and the time of the disaster can be estimated.
   Below are several important terms:

- *A series of rains*: a series of more than 24 rains.
- *Continous rainfall* (Rc)}: the total of rainfall during "a series of rains".
- *Antecedent rain*: rain that occurs two or three periods before "a series of rains" starts.
- *Antecedent rainfall* (R_A): rainfall during the antecedent rain period.
- *Rain of n days before*: the total of rain between (nx24) hours and ((n-1)x24) before the antecedent rain.
- *Working rainfall (R_W)*: cummulative rainfall including the effect of antecedent rainfall.
- *Antecedent Working Rainfall (R_{WA})* is defined at the total rainfall for 24 hours until "t" days before rainfall, symbolized with "αt" multiplied with "αt time (αt <1)". The αt coefficient is called the "t" deduced coefficient from the several days before. If *half-life* is assumed to last for one day, it means the α value is ½ from αt-1 after the day ends. The connection between deduced coefficient and half-life in αt is $0.5^{t/T}$, where T = the day in half-life and t = day before rainfall starts.
- *Inflection Point A*: the point where the values in the cummulative rainfall curve for a series of rains increase sharply. It is usually the point where, for the first time, the hourly rainfall reaches 4 mm or more.
- *Inflection Point B*: the point where the values in the cummulative rainfall curve for a series of rains stop increasing. It is usually the point where the hourly rainfall < 4mm in a rain that lasts for three hours or longer.

- *Initial Rainfall (IR)*: the cummulative rainfall, starting from the beginning of the rain to inflection point A.
- *Effective Rainfall (ER)*: rainfall that decreases through the decreased cummulative rainfall to inflection point A, from the cummulative rainfall in a series of rains to a certain point. The cummulative point is the cummulative point after point A.
- *Effective time*: the overall period of rain from inflection point A to effective rainfall.
- *Effective rainfall intensity* (IE): RE divided by effective time.

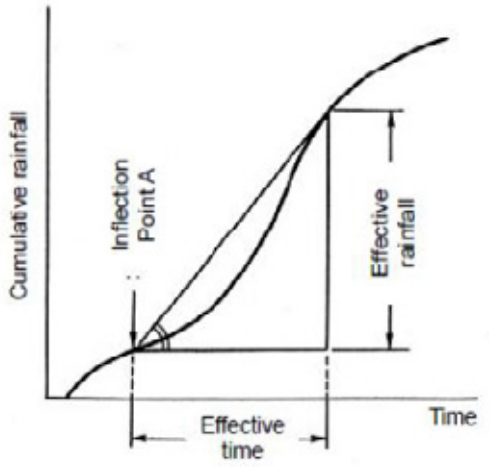


Figure 4. Connection Between Effective Time and Cummulative Rainfall

- *Past maximum rainfall*: the intensity of daily rainfall and hourly rainfall, ranked in a list of more than 10 items, including past maximum rainfall.
- These indicators of rainfall indexes are used to determine the conditions of rainfall that influence debris flow.
- Results of Kalijompo data analysis:.

  An estimation of rainfall characteristics in Kalijompo, Jember can be made based on the above data.

  1) The rainfall peaks from January to March.
  2) The rain always falls in the afternoon.
  3) There are 87 series of rains from March 2010 to early March 2011.

3. Determining standard rainfall with method A.

   This arrangement is used to find the connection among rainfall, the resulting flow, and the danger status.

   Some of the steps to determine the status are:

- Determining the critical line (CL), or the boundary in the rainfall index that points to the existence or non-existence of debris flows. The critical line is drawn in a graph where the Y axis is the hourly rainfall and the X axis is the working rainfall. If the point is located on the right side of the line, the situation is considered to be unsafe; if it is located on the left, the situation is considered safe.
- Determining the warning line (WL) and evacuation line (EL). The standard line used to determine the warning status is called the warning line, and the standard line used to determine the evacuation status is called the evacuation line. Before determining WL and EL, we must determine the appropriate time in which to give evacuation instructions: that is, how many hours before the disaster the public should be given instructions, so that they have sufficient time to evacuate. The warning line is announced two hours before CL is reached, and the evacuation line is also announced two hours before CL.

Nevertheless, the moment in which the warning and evacuation instructions are given may also be determined according to the area's conditions.

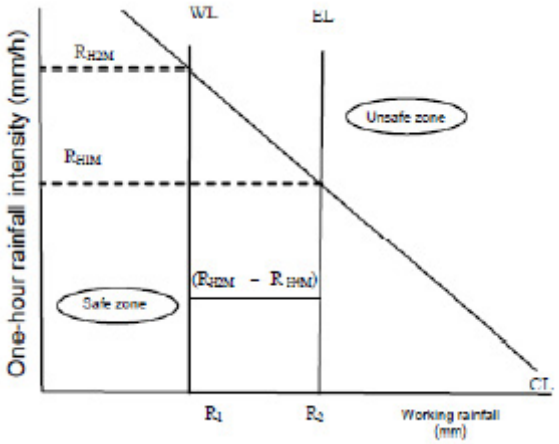


Figure 5. Connection between working rainfall (mm) and one-hour rainfall intensity (mm/h).

- Examining the accuracy of CL, WL, and EL. In order to examine their accuracy, we must pay close attention to their formulation. The formulation is available in the attachments. Next, data from Kalijompo is analyzed and integrated into the formula.

- Analysis Results of Method A in the Kalijompo case:
    1. The rainfall position is caused by the low value of the Y axis (between 0 to 40 mm/hour), meaning the rainfall is caused by a low hourly rainfall.
    2. The standard rainfall position in which warnings should be given is R_1±15mm (see above figure) and the standard position for evacuation is R2±20mm.
    3. Not all non-causing rainfalls are within the safe zone. There are seven types of series of rains which indicate an unsafe area.
    4. Based on this method, it is estimated that the following are issued during one year: 50 warnings, 37 evacuation instructions, 46 announcements about safe situations, and 33 evacuation instructions during safe situations.

4. Determining standard rainfall with method B.
   Essentially, the steps in method B are similar to those of method A, but the steps to determine WL and EL are different. In method A, the one-hour rainfall intensity is used to determine the Y axis; in method B, the Y axis is the effective rainfall intensity.
   The formulation used to determine WL and EL are also different, and can be read in the attachment.
   Analysis results show that:
   1. The rainfall position is caused by the low value of the Y axis (between 0 to 5 mm/hour), meaning the rainfall is caused by a low effective rainfall.
   2. Using the CL, WL, and EL indicators, we see that the standard rainfall during working rainfalls in which warnings are issued is more than ±25mm , and the effective rainfall is more than ±4mm. The standard rainfall during working rainfalls in which evacuation orders are issued is more than ±30 mm, and the effective rainfall is more than ±5 mm.
   3. Not all non-causing rainfalls are within the safe zone. There are many types of series of rains that are included in the unsafe zone.

4. Based on this method, it is predicted that the following are issued during one year: 37 warnings, 35 evacuation instructions, 30 announcements about safe situations, and 28 evacuation instructions during safe situations.

2.5.4 Conclusion

The rainfall analysis illustrates how rainfall influences floods, debris flow, and landslides. Therefore, in observation stations where rainfall gauges are installed, the observation must be in done in the correct order. Also, there must be a person or persons responsible for the process.

Both method A and method B are methods to detect banjir bandang at an early stage. The methods can be implemented in banjir bandang-prone areas and involve all stakeholders, including the public, government, private sectors, and universities. The methods can provide the latest information on rainfall conditions, cummulative rainfalls, rainfall status, landslides and evacuation instructions.

3. OUTLINE FOR THE SOP COMPOSITION

The Standard Operating Procedure (SOP) is a set of rules that all parties must put into operation. The important aspect in the definition is that it refers to rules that include a sequence of activities. Another important aspect is that all the parties affected by a SOP are obliged to carry out all the decisions that have received joint approval.

In the case of a disaster, a SOP refers to the standard activities that must be carried out in disaster management. It is imperative that each involved party understands their standard activities in detail. The extent, scope and arrival of disasters are based on certain time sequences (sometimes they are detectable, sometimes they occur suddenly), therefore time sequences must also be integrated into the SOP.

3.1 Purposes

1. To share information about normal monitoring procedures for banjir bandang anticipation or current procedures, and the procedure to relay information from one party to another.
2. To clarify problems in the implementation of early evacuation prior to banjir bandang, by way of normal or current monitoring and information sharing procedures.
3. To compose a guideline/SOP book on Early Warning System.

3.2 Types of Activities

In order to achieve these purposes, two indoor activities (Forum Group Discussion/ FGD and Table Top Exercise/TTE) and one field activity (Site Watching) are required.

3.3 Participants

Participants in FGD, Site Watching and TTE are residents who are both affected and unaffected by banjir bandang (in the upstream and downstream areas), village/sub-district and district apparatus (in the upstream and downstream areas), and Satlak from the Regency. In activities in the Jember Regency, participants from the upstream areas come from the Sukorambi District (Kalijompo Plantation, Karang Pring Village, Klungkung Village), dan participants from the downstream areas come from the Gebang and Patrang Districts (Gebang Poreng and Slawu Villages). Participants from the government come from the Public Works Service staff, Satlak (Bakesbang/national unity board), the military district command/Kodim, the police department, and public relation officers. The participants are chosen based on the following considerations:

(a) practical experience and concern on the focal points of the problems;
(b) private involvement in the focal points of the problems;
(c) authorities in the cases discussed;
(d) victims of disasters among the public;
(e) part of the general public who are unfamiliar with the problems but are also affected.

3.4 Mechanism and Design

The SOP for early warning system is composed in three stages: preparation, implementation, and composition. The details are as follows:

a. Preparation
   The preparation for the activities is focused on activity coordination and planning, in cooperation with the local government. In this preparatory stage, the actors, venue,

and time of implementation are coordinated. The indication parameter and scenarios for situations before, during and after disasters are also prepared for TTE activities.

b. Carrying Out the Activities
There are three activities: Focus Group Discussion (FGD), Site Watching and Table Top Exercise (TTE).

Focus Group Discussion (FGD)
Focus Group Discussion (FGD) is a data-collecting technique generally used to gather quantitative information, in order to discover the meaning of a certain theme according to a certain group's perception. This technique is used to see the way a group makes sense of a subject, based on discussion results focused on a certain problem. FGD is also used to prevent researchers from having incorrect perceptions of a certain problem.
The data and information are collected in 2 (two) stages:

- First Stage: FGD uses the (a) Fin Technique and (2) LFA (Logical Framework Analysis) Technique to discover the root of the problem;
- Second Stage: FGD uses the LFA (Logical Framework Analysis) Technique to solve the root of the problem. In the fin technique, problems are clustered together. The LFA technique is an analysis technique connecting one problem cluster with another, to discover the connection between the root of the problem and focus of the issue.

Site Watching
It is a field activity to inspect the instruments to detect the beginnings of banjir bandang. These instruments are already installed or have been sent by JICA.

Table Top Exercise (TTE)
In the context of the banjir bandang early warning system, Table Top Exercise is an indoor simulation activity designed to test a group's theoretical abilities in managing banjir bandang.

c. Composing the SOP
Information is gathered, FGD and TTE results are processed and analyzed, in order to compose a SOP.

4. SOP COMPOSITION PROCESS

Conceptually, a SOP is created based on a certain framework, involving a lot of parties and requiring a long period of time. A SOP is made by acknowledging the physical condition of disaster-prone areas, socioeconomic conditions, public awareness, and other public-related matters regarding disasters. In practice, the composition of SOP begins with relevant research on the condition of disaster-prone areas. The research looks into the areas' physical features, from topographical conditions, condition of the rocks and soil, land inclination, the condition of ground cover, the existence of a natural dam in the forest, and so on. Through the research, we can discover the extent of banjir bandang potentials and the subsequent flows (Figure 6).

Furthermore, the survey can also detect banjir bandang at an early stage through instruments installed in specific locations. It can also pinpoint safe locations for evacuation during banjir bandang.

Next, the SOP composition takes into consideration public abilities and vulnerability in the face of disasters. The abilities can be discovered through the residents' socioeconomic (demographic) conditions, comprehension of disaster signs, knowledge of matters related to the early warning system, and awareness in the face of disasters. By learning from the results of the research, the SOP can assimilate the steps taken by the public prior to disasters, and stakeholders will usually take the same steps.

From the research, we can also learn about the improvements to be made. For instance, if the public are not aware yet what *should* be done during disasters, the SOP will give them directions on what *must* be done during disasters in order to rescue themselves.

In short, it can be said that basic research is highly beneficial for the composition of SOP. The composition is also based on several other variables, such as time, venue, actors, and activities.

In general, the composition of SOP is based on basic research, which is constituted of researches on the early indications of banjir bandang, public and local government apparatus awareness, banjir bandang early warning system, and evaluation of banjir bandang simulations in the Pace Village, Silo District.

The area where the research is conducted is a model area, where early warning instruments are already available, such as the fissure gauge, rainfall gauge, water level gauge, and water level sensor gauge. The area chosen is the Kalijompo Plantation, Sukorambi District, Jember Regency.

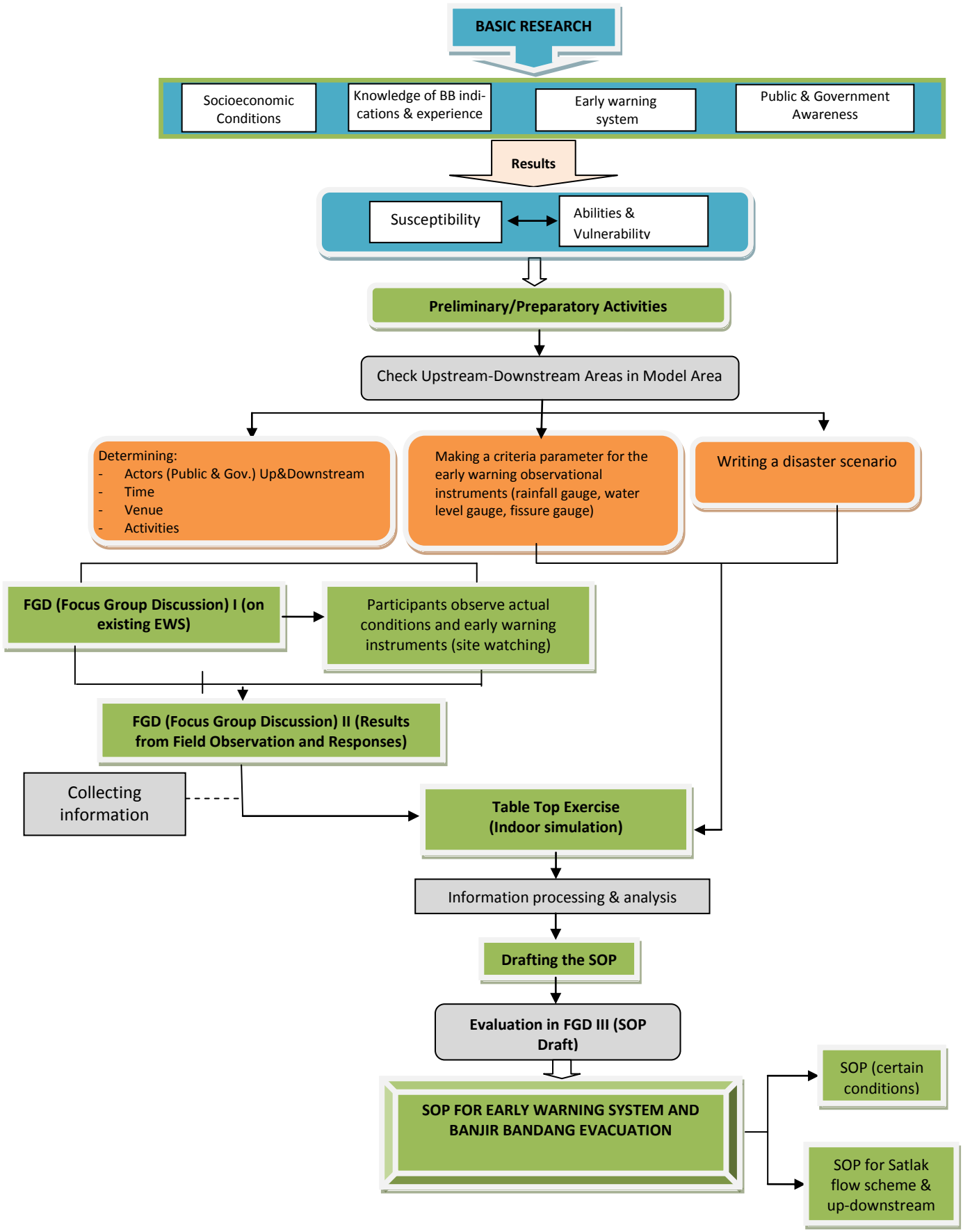


Figure 6. Compositional Framework for the SOP

Preliminary activities to plan and prepare the appropriate SOP-composing activities begin with checking the actual conditions in the SOP model area. The next steps are:

1. Determining which members of the apparatus and public will be involved in the composition of SOP.
2. Making a criteria parameter for the early warning observational instruments (fissure gauge, etc).
3. Writing a disaster scenario.

Next, the participants involved in the composition of SOP attend a discussion called FGD (Forum Group Discussion). During the discussion, participants will also observe actual conditions in the area in order to better understand them.

Results from the field observation and FGD will be briefly discussed in order to learn responses from the public and apparatus in the upstream and downstream areas, and in order for the participants to arrive at the same conclusion.

Participants will then take part in simulations, into which the parameter and scenario of events before, during and after disasters have been integrated, in order for the participants to study the events in each stage. The resulting information is collected, processed, and analyzed; the disadvantages are evaluated. The final SOP is composed after the evaluation.

5. SOP COMPOSITION PROCEDURES

5.1 Preparation

A. Choosing the stakeholders

Stakeholders to be involved in the composition of the SOP are chosen using the following methods:

1. Preliminary discussion with the Satlak Secretary and heads of the villages in the Jember Regency to determine participant candidates, which come from among the residents and apparatus. The apparatus come from the regency level and the local government (from upstream/source areas and downstream/affected areas). The residents are villagers from the upstream and downstream areas.
2. Suggestion for participants (from upstream and downstream areas) are given to the authorized official (Assistant II from the Jember Regency).
3. The authorized official approves the suggestion by sending out notices to the participants, requesting them to take part in the activities.

B. Making a Criteria Parameter for the Observation of Banjir Bandang Early Warning Instruments

The parameter is created based on technical information on observational instruments related to the banjir bandang early warning. The information on the instruments' parameter has already been gathered, so the parameter will be similar to the actual situations.

The indication parameter for banjir bandang early warning instruments in activities carried out in the Jember Regency consists of three types:

1. Rainfall gauge
2. Water level gauge
3. Water level sensor gauge

Below are examples of the parameter for indication and observational instruments:

Table 15. Level and Status of Rainfall Sensor and Water Level Sensor

Level	Status	Notes
1	Alert	Start the observation/monitoring with precision
2	Warning	Start relaying information
3	Evacuation	Start the evacuation
4	Critical	Evacuation must already be complete
5	Danger	

Table 16. Level and Status of Rainfall Gauge (ARR)

Rain per hour	Accumulated Rain	Status	Notes
20 mm/hour	70 mm	Warning	Start relaying information
50 mm/hour	100 mm	Evacuation	Start the evacuation

Table 17. Level and Status of Fissure Gauge

Increase in Size	Status	Notes
2 mm/hour	Warning	Start relaying information

2 mm/hour minimum, up to 2 hours	Evacuation	Start the evacuation

C. Writing a Disaster Scenario

A disaster scenario covers events before, during and after the disaster. The purposes are to:

1. Give a chronological and complete illustration of disasters, before, during and after.
2. Make it easier to gather information from stakeholders, in relation to activities carried out according to the sequence of events.

Table 18. Examples of Disaster Scenarios

No	Date	Hour	Hour in scenario	Rainfall data	Rainfall data accumulated	Rainfall sensor	Water level sensor	FIELD CONDITION	Activities
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
1	Oct 17, 2010	13:15	13:00	0	0	Lv0	Lv0	Cloudy	
2		13:20	14:00	0	0	Lv0	Lv0	Cloudy	
3		13:25	15:00	0	0	Lv0	Lv0	Cloudy	
4		13:30	16:00	0	0	Lv0	Lv0	Start of drizzle	
5		13:35	17:00	5	5	Lv0	Lv0	Start of drizzle	
6		13:40	18:00	0	5	Lv0	Lv0	Drizzle turns into heavier rain	
7		13:45	19:00	23	28	Lv0	Lv0	Drizzle turns into heavier rain	
8		13:50	20:00	5	33	Lv1	Lv0	Drizzle turns into heavier rain	
9		13:55	21:00	0	33	Lv1	Lv0	Drizzle turns into heavier rain	
10		14:00	22:00	15	48	Lv1	Lv0	Heavy rain	
11		14:05	23:00	30	78	Lv2	Lv1	Heavy rain	
12		14:10	24:00	22	100	Lv3	Lv1	Heavy rain	
13		14:15	01:00	9	109	Lv3	Lv2	Heavy rain, fissure gauge shows fissure increases by 2 mm/hr	
14		14:20	02:00	14	123	Lv4	Lv2	Heavy rain, fissure gauge shows fissure increases by 4 mm/hr	
15		14:25	03:00	20	143	Lv4	Lv3	Heavy rain, fissure gauge shows fissure increases by 9 mm/hr	
16		14:30	04:00	82	225	Lv5	Lv4	Heavy rain, small-scale landslide	
17		14:35	05:00	52	277	Lv5	Lv5	Heavy rain, sand, rocks, logs flow downward	
18		14:40	06:00	24	301	Lv5	Lv5	Rain recedes	
19		14:45	07:00	4	305	Lv5	Lv5	Rain recedes	
20		14:50	08:00	0	305	Lv0	Lv0	Rain stops	
21		14:55	09:00	0	305	Lv0	Lv0	Rain stops, survey and emergency actions start	

5.2 Implementing the Focus Group Discussion/FGD

In a FGD, participants explore the problems until they arrive at a solution. There are two stages, Stage I and Stage II (Figure 7).

Figure 7. Problem Exploration Process and Problem Solutions

Stage I: Fin Method

- Facilitors explain what the activities are and their purposes, and give technical directions on how to carry out the activities. They ask simple, easy to answer questions, such as, "Has the early warning sistem met the FGD participants' ideal expectations? If not, what are the reasons?" or other questions relevant to early warning system problems.
- Facilitators hand out cards to FGD participants and ask them to write down the problems on the cards. FGD participants should be given several minutes during which they write down subject-related problems.
- Facilitators must make sure that each card contains only one issue/problem. Key words should be written in capital letters so that other participants can read and understand them easily.
- Facilitators and co-facilitators collect the cards on which the problems and problem causes are written.

Stage II: LFA Technique

- The research team and FGD participants discuss the inter-relatedness of the problems and problem causes using the LFA technique and a piece of cardboard paper.
- All the issues informed by the public are grouped together, so that the real, main problems are identified (these problems are seen during the fin technique).
- Find the logical inter-relatedness among the groups of problems. By discovering the logical inter-relatedness, participants can then determine the real roots of the problem and which issues are important in indicating the reason behind the problems.
- The amount of arrows pointing outward from an opinion box shows the priority levels of the roots of the problems. In other words, the opinion box with the **highest number of outward-pointing arrows** is the most prioritized **root of the problem**.
- The opinion box with **the highest number of inward-pointing arrows** and **only a few or no outward-pointing arrows at all** shows the **main issue**.

Below is an example of a FGD that leads to problem clusters:

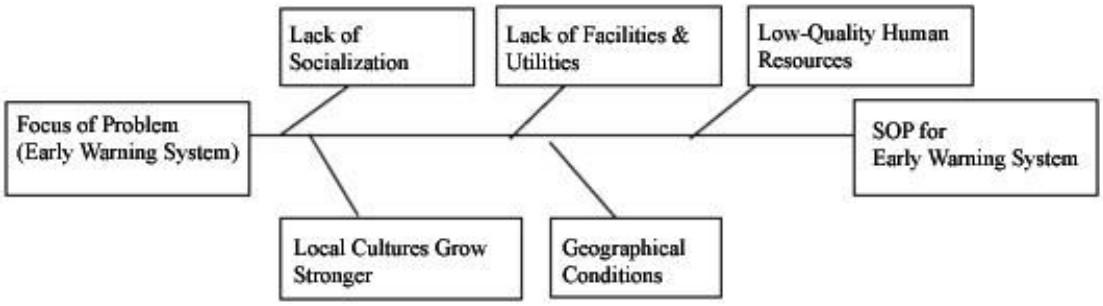


Figure 8. Clustering Problems Using the Fin Method

All FGD participants actively seek the root of the problems until they arrive at solutions for early warning system problems. FGD activities can be seen in the figures below.

Figure 9. FGD Activities

Table 19. Problem Clusters in the Early Warning System for Banjir Bandang

Cluster	Content
Lack of socialization	a. Familiarization of early warning, including rescue methods, does not reach the targeted audience. b. The public has not been made familiar enough with the early management of flood-prone areas. c. Disaster-related institutions have not conducted enough simulations for residents in flood-prone areas. d. Lack of socialization (only a few residents know about the socialization). e. Institutions and the government must increase public awareness of flood-prone areas. f. Lack of information on early warning. g. Lack of knowledge of early warning signs. h. Lack of motivation on the part of the public. i. Many residents in disaster-prone areas only know a little about early warning, due to lack of socialization. j. Lack of information about early warning. k. Lack of socialization on disaster management for villages. l. The knowledge of residents in disaster-prone areas must be improved, so that they understand what causes a disaster. m. Village command centers should disseminate information on problems that are relevant to public interest. n. Counseling field officers for disaster-prone areas must constantly relay information. o. The public tends to fall into confusion during natural disasters, and this influences the evacuation process. p. Lack of flood warnings, especially from upstream.
Lack of Facilities and Utilities	a. Lack of equipments and information from upstream to downstream. b. Inadequate equipments (early warning becomes inaccurate [e.g. tsunami warnings are incorrect, resulting in misplaced reactions]). c. Flood-prone areas should have more well-manned command centers. d. Inadequate instruments. e. A minimum amount of instruments/inadequate instruments (rubber boats, cars, etc.). f. Inadequate infrastructures. g. The public should be taught to immediately sound the kentongan as a warning. h. Evacuation equipments should be prepared immediately to reduce the number of victims. i. Accessible roads should be built to and from flood-prone areas. j. Lack of means of transportation. k. Logistical aids (food and health facilities) should be delivered immediately. l. Belated relay of information on indicators of disasters. m. Sudden disasters are not handled fast enough.
Low-Quality Human Resources	a. Lack of public concern. b. Lack of understanding of early warning. c. Public self-centeredness. d. Low education level results in lack of understanding of the benefits of early warning. e. Lack of understanding of afforestation/logging (lack of human resources). f. Lack of human resources among the public. g. Lack of socialization on natural disasters in villages. h. Lack of public concern about disasters. i. The residents are not responsive enough toward flood early warnings. j. A very low level of public awareness. k. Public management should be improved, e.g. Satlak provides security. l. Lack of public awareness about the dangers in watersheds. m. Lack of alertness on the part of village apparatus (RT/RW (neighborhood councils/associations), heads of communities) in providing facilities to and mobilizing residents.
Geographical Condition	a. Flood-prone areas in Karang Pring, Kalijompo. b. The residents' houses are located in isolated areas.
Social and Cultural Factors	a. Culturally, the public tends not to be aware of the effects of floods. b. The public takes indicators of natural disasters for granted. c. The public tends to accept things as they are, thus they refuse to move to safer locations.

During activities in the Jember Regency, the issues multiply. Initially there are 5 (five) problem clusters as the result of discussions using the Fin Method. But as the discussions move to the LFA Technique, the clusters expand into 8 (eight): lack of socialization, lack of human resources, lack of facilities and utilities, lack of budget, the strength of local culture, lack of rules in the event of disasters, poor coordination in Satlak, and geographical condictions (Figure 6).

The inter-relatedness of the problem clusters, in relation to early warning, is shown in Table 15.

Table 20. The Number of Incoming and Outgoing Arrows in Problem Clusters

Problem	Outgoing Arrows	Incoming Arrows
1. Lack of socialization	6	3
2. Lack of human resources	5	3
3. Lack of facilities and utilities	5	2
4. Lack of budget	3	4
5. The strength of local culture	3	3
6. Lack of rules in the event of disasters	0	4
7. Poor coordination in Satlak	2	1
8. Geographical condition	0	5

"Lack of socialization" has the highest number of outgoing arrows, while "geographical conditions" has the highest number of incoming arrows. Thus, it can be concluded that the root of the problems in implementing early warning is the **lack of socialization**, while **geographical conditions** are the main issue.

The determining of the existing problems and number of incoming and ongoing arrows results from a communal decision.

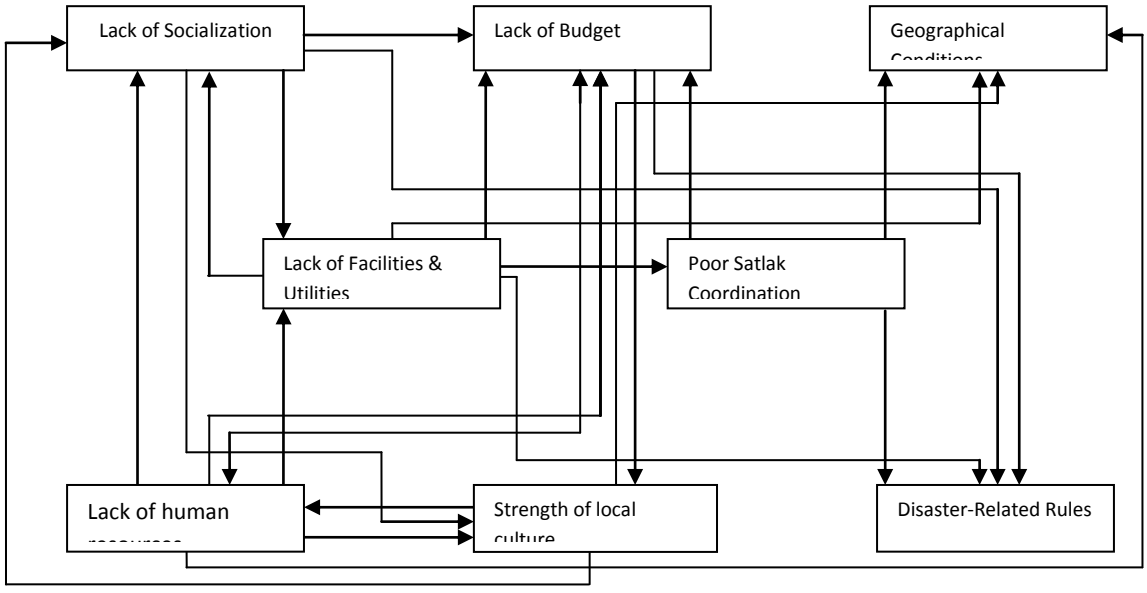


Figure 10. Problem Inter-Relatedness Viewed With the LFA Technique

5.3. Site Watching

The purpose of site watching is to learn about the actual conditions in the areas and the instruments already installed. In the case of activities in the Jember Regency, JICA has already installed the following in the model area: the rainfall gauge and water level gauge. Participants are also taken to see watersheds in Kalijompo, which flow from the Kalijompo Plantation (upstream) to the Gebang/Slawu Subdistrict (downstream).

The officer in the Kalijompo Plantation (Mr. Agus) maintains and uses the instruments well. Therefore, participants are taken there not just to view the instruments, but also to learn about their operation from the Kalijompo Plantation officer and about events during banjir bandang.

Figure 11. Site Watching at the Kalijompo Plantation

After the site watching, participants once again discuss FGD results, matching them with field observation results in order to arrive at a similar conclusion.

5.4 Table Top Exercise (TTE)

Table Top Exercise activities mean stakeholders are practicing their disaster management abilities. The practice concept is based on actual conditions and a previously made concept, namely the standard operating procedure.

One of the major advantages of TTE is that stakeholders are able to test a hypothetical situation without disturbing the residents. TTE for the early warning system is a practice session intended to improve the public and stakeholders' abilities in implementing the early warning system.

5.4.1 Preparation

The Table Top Exercise is led by facilitators who will write a complete practice scenario, using facilities to support the scenario. The scenario is made for rainfall and landslide situations.

The preparation for the activities is focused on the position arrangement for the participants, dividing the scenario into four screens, and composing the scenario. The rehearsal is shown below:

- Position arrangement for the participants

  To achieve maximum results, the participants are positioned in such a way so that the coordinator can see and hear them clearly, as shown in Figure 11.

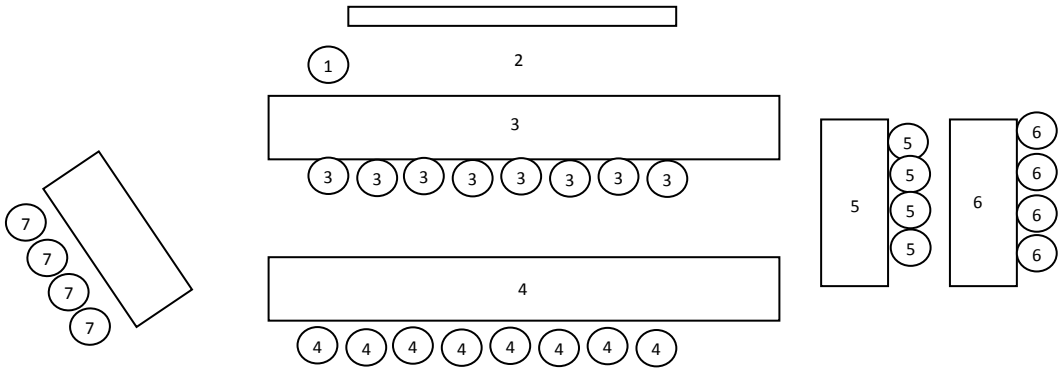


Figure 12. TTE Layout for the Early Warning System

Notes:

1. Coordinator/moderator
2. Four-scene scenario
3. Participant chairs and tables, side 1
4. Participant chairs and tables, side 2
5. Participant chairs and tables, side 3
6. Participant chairs and tables, side 4
7. Observer

- Scenario display

  To improve the participants' understanding and make it easier for them to implement the scenario, the scenario is divided into four screens:

  1. First screen: maps of disaster-prone areas, rainfall, water level, and some of their inherent conditions.

  2. Second screen: rainfall conditions and accumulation.

  3. Third screen: signs of rainfall and natural conditions under certain conditions.

  4. Fourth screen: records of discussions

- Scenario Plans

  The scenario is based on actual conditions, signs of rainfall, and signs of landslides. The events in the scenario begin at 13.00 WIB and end at 9 a.m. the next morning (Table 16). However, due to the time limit in simulations, the scenario is based on the assumption that one hour in the scenario equals five minutes in the simulation.

Table 21. TTE Scenario for the Early Warning System for Banjir Bandang – Kalijompo

No	Date	Hour	Hour in scenario	Rain-fall	Accumulated Rainfall	Rainfall sensor	Water level sensor	Actual conditions
1	Oct 17, 2010	13:15	13:00	0	0	Lv0	Lv0	Cloudy
2		13:20	14:00	0	0	Lv0	Lv0	Cloudy
3		13:25	15:00	0	0	Lv0	Lv0	Cloudy
4		13:30	16:00	0	0	Lv0	Lv0	Start of drizzle
5		13:35	17:00	5	5	Lv0	Lv0	Start of drizzle
6		13:40	18:00	0	5	Lv0	Lv0	Drizzle turns into heavier rain
7		13:45	19:00	23	28	Lv0	Lv0	Drizzle turns into heavier rain
8		13:50	20:00	5	33	Lv1	Lv0	Drizzle turns into heavier rain
9		13:55	21:00	0	33	Lv1	Lv0	Drizzle turns into heavier rain
10		14:00	22:00	15	48	Lv1	Lv0	Heavy rain
11		14:05	23:00	30	78	Lv2	Lv1	Heavy rain
12		14:10	24:00	22	100	Lv3	Lv1	Heavy rain
13		14:15	01:00	9	109	Lv3	Lv2	Heavy rain, fissure gauge shows fissure increases by 2 mm/hr
14		14:20	02:00	14	123	Lv4	Lv2	Heavy rain, fissure gauge shows fissure increases by 4 mm/hr
15		14:25	03:00	20	143	Lv4	Lv3	Heavy rain, fissure gauge shows fissure increases by 9 mm/hr
16		14:30	04:00	82	225	Lv5	Lv4	Heavy rain, small-scale landslide
17		14:35	05:00	52	277	Lv5	LV5	Heavy rain, sand, rocks, logs flow downward
18		14:40	06:00	24	301	Lv5	LV5	Rain recedes
19		14:45	07:00	4	305	Lv5	LV5	Rain recedes
20		14:50	08:00	0	305	Lv5	LV5	Rain stops
21		14:55	09:00	0	305	Lv5	LV5	Rain stops, survey and emergency actions start

- Rehearsal

  The rehearsal takes place before the table top exercise begins. In the rehearsal, participants are conditioned to face the actual simulations. The rehearsal begins with an explanation from the rehearsal coordinator on what participants would need to do. The explanation covers:

  a. The content of each screen.

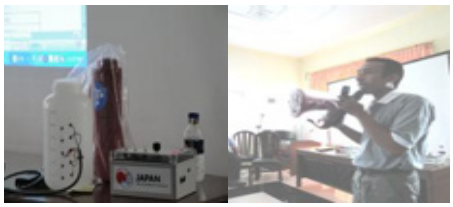
b. The level of the early warning parameter in instruments already inspected during site watching.
c. The procedure of the Table Top Exercise, whose implementation will be guided by the moderator. The rehearsal details for the TTE for banjir bandang early warning system can be found in the Attachment.

5.3.2 Implementation

The implementation of the TTE is based on simulation plans that are composed in accordance with actual-time scenarios. Guided by the moderator, participants provide information on what each stakeholder should do. Each stakeholder will have an opportunity to present their activities in each phase in a clear and concise manner. Examples of applications are shown on Table xx.

Figure 13. Example of Table Top Simulation for Early Warning Observational Instruments Under Certain Conditions

The scenario also demonstrates the use of several instruments, such as the rainfall record sensor, the use of which the JICA representative will demonstrate. TTE participants also demonstrate the use of early warning system instruments, such as megaphones and walkie-talkies.



In the Jember Regency activities, the cooperation among participants is fairly good. However, at the beginning participants did not fully know what to do under normal conditions: they merely wait for information from the plantation. Nevertheless, after further questioning, more information on what to do under normal conditions can be extracted.

Afterward, the simulation of pre-rain situations go effectively and efficiently, in relation to time allocation and responses from simulation participants. But under certain conditions during the

pre-evacuation stage, the time is limited, and consequently not all participants take the necessary actions.

Prior to the evacuation, TTE participants have grown responsive and carried out their main tasks and functions. Residents prepare for evacuation when the rainfall sensor indicates a certain level but the rainfall still increases. The scenario shows, under this condition, the increase in the fissure up to the time of the landslide (from <2mm to >9mm). The residents evacuate as soon as they receive information from the plantation that the rainfall has reached Level 3. Examples of TTE activities in the Jember Regency are shown in the Attachment.

5.3 Information Processing and Analysis for the SOP Composition

Data and information from FGD and TTE is collected and categorized, to become materials for the SOP composition. There are also cross-checks with various sources for data validation.

The collected data is analyzed and become part of the materials for composing the SOP. SOP sections are composed based on a framework that makes reading and comprehension easier.

After the SOP is composed, it continues to be evaluated in various ways, such as with FGD and socialization, in order for it to be perfected.

6. EVACUATION TRAINING WITH SOP

The training for banjir bandang emergency evacuation is basically the implementation of the SOP (Standard Operating Procedure) that has already been composed. The SOP will be put into practice by stakeholders. Simulation-based, indoor SOP will differ from steps taken in the actual location. Therefore, the evacuation training also tests the validity of the SOP results.

The early warning system SOP composed by stakeholders in the Kalijompo watersheds is used for the evacuation training. Most of the participants in the evacuation training are also FGD and TTE participants. The main purpose of the activity is to apply the early warning system SOP in the Kalijompo watershed. The evacuation training goes through the following phases: alert, warning, evacuation, critical, and danger. The evacuation training is intended to provide a real portrayal of the various stages of actual disasters. The evacuation training is divided into two stages, preparation and training.

6.1 Preparation for the Evacuation Training

To support the evacuation training, the following need to be prepared:

a. Instruments

- Observational instruments, on-location observation (gauges, fissure gauge, rainfall gauge, water level gauge)
- Tools for relaying information (megaphones, walkies-talkies, cell phones, kentongan)
- Evacuation equipments (stretchers, vehicles to transport refugees with)
- Emergency responses equipments (refugee tents, health facilities, kitchen utensils)

b. Material preparation

Prior to the evacuation training, participants are provided with training material, which contains the SOP draft jointly composed on October 16-17, 2010. The material covers the steps that need to be taken and who should take them under what conditions. For instance, under certain conditions, such as the alert phase, someone will be tasked to relay the information about rain under certain conditions. The information is then relayed to all stakeholders involved in the evacuation process.

6.2 Carrying out the Evacuation

The evacuation is carried out in accordance with the SOP's concept and contents. The SOP concept consists of the functions of time/conditions, from alert, warning, evacuation, critical, to danger, and also the function of stakeholder activities. Below are the details:

A. Alert Phase

- **The Plantation (Mr Agus)**
  - Monitor the rainfall gauge and water level, and relay the information about the rainfall level. If water level is on Level 1, the following must be alerted: the Regency Satlak (Mr. Hery Setiawan - Bakesbang), Klungkung Village (Husni), Karang Pring Village (Rita Tri Widariati),

Gebang Poreng Village (Nur Mustari), Slawu Village (Moh. Tosan), and Sukorambi District (Hartini, S.Sos).
- Mr. Agus will also warn the residents to be on alert. Some of the instruments used are loudspeakers, walkie-talkies, cell phones, kentongan, megaphones, and others.

- **Regency Satlak (Mr. Hery Setiawan)**
  - After receiving the latest information from the plantation, the Regency Satlak in cooperation with all Satlak members (Kodim, Polres (district command), the Public Works Service for Irrigation (Da'i Agus), the Social Service) will inform that rain has started to fall in the Kalijompo plantation.
  - Satlak will also prepare the equipments for early warning system and evacuation (vehicles, evacuation sites, refugee tents, etc.).

- **Klungkung Village (Husni)**
  - After receiving information from the plantation, the Klungkung village instructs the task force on the village level (Suparno, SH) to monitor the latest situations and coordinate with other task forces in the Klungkung village, and remind each other about the rainfall and water level on Level 1.
  - In addition, the head of the Klungkung village coordinates with other villages (Karang Pring, Gebang Poreng, Slawu) regarding the rainfall and water level, both on Level 1.
  - The latest public activities are reported to the Sukorambi District (Hartini, S.Sos) and the Regency Satlak (Mr. Hery Setiawan - Bakesbang).
  - The existing facilities and utilities for early warning system and banjir bandang evacuation must be inspected.

- **Karang Pring Village (Rita Tri Widariati)**
  - After receiving information from the plantation, the village coordinates with the Kalijompo Plantation (Mr. Agus and his team) regarding the latest rainfall, water level, and landslides.
  - In addition, the Karang Pring village instructs the task force on the village level (Nuryanto) to monitor the latest conditions and coordinate with other task forces in the Karang Pring village, and remind each other about the rainfall and water level on Level 1. They also coordinate with other villages (Klungkung, Gebang Poreng, Slawu) regarding the rainfall and water level, both on Level 1.
  - The latest public activities are reported to the Sukorambi District (Hartini, S.Sos) and the Regency Satlak (Mr. Hery Setiawan - Bakesbang).
  - The existing facilities and utilities for early warning system and banjir bandang evacuation must be inspected.

- **Sukorambi District (Hartini)**
  - After receiving information from the plantation, the village coordinates with the Kalijompo Plantation (Mr. Agus and his team) regarding the latest rainfall and water level. They remind each other about the rainfall and water levels, both on Level 1.
  - The village **coordinated** with Muspika (the District, Military Subdistrict Command (Sujono), Police Station (Agus Supariono)) regarding the latest weather condition in disaster-prone areas (upstream: Klungkung and Karang Pring villages; downstream: Gebang Poreng and Slawu villages).

- The Sukorambi District and Muspika check the facilities and utilities for early warning system and banjir bandang evacuation. The latest condition (the rainfall and water level on Level 1) is reported to the Regency Satlak.

- **Gebang Poreng Village (Sungkono)**
  - The village coordinates with the Kalijompo Plantation (Mr. Agus and his team) regarding the latest condition of rainfall, water level and landslides.
  - The task force on the village level (Hamim) is instructed to monitor the latest condition and coordinate with other task forces in the Gebang Poreng village, and remind each other about the rainfall and water level, both on Level 1.
  - The village coordinates with other villages (Klungkung, Karang Pring, Slawu) regarding the rainfall and water level, both on Level 1.
  - The latest public activities are reported to the Sukorambi District (Hartini, S.Sos) and the Regency Satlak (Mr. Hery Setiawan - Bakesbang). The existing facilities and utilities for early warning system and banjir bandang evacuation must be inspected.

- **Slawu Village (Imam Tohari)**
  - After receiving information from the plantation, the village instructs the task force on the village level (Syaifudin) to monitor the latest conditions and coordinate with other task forces in the Slawu village, and remind each other about the rainfall and water level, both on Level 1.
  - The village coordinates with other villages (Klungkung, Karang Pring, Gebang Poreng) regarding the rainfall and water level, both on Level 1.
  - The latest public activities are reported to the Sukorambi District (Hartini, S.Sos) and the Regency Satlak (Mr. Hery Setiawan - Bakesbang). The existing facilities and utilities for early warning system and banjir bandang evacuation must be inspected.

- **Patrang District (Gatot Suharyono)**
  - After receiving information from the plantation, the District coordinates with Muspika (District, Military Subdistrict Command) regarding the latest weather in disaster-prone areas (upstream: Klungkung and Karang Pring villages; downstream: Gebang Poreng and Slawu villages).
  - Patrang District and Muspika inspect the facilities and utilities for early warning system and banjir bandang evacuation.
  - They report the latest situation (the rainfall and water level, both on Level 1) to the Regency Satlak.

B. Warning

1. **Plantation (Mr. Agus)**
   - Monitor the rainfall, water level, and fissures on the ground with the available instruments.
   - Relay information about the rainfall and water level, both on Level 2 which means WARNING, to the Regency Satlak (Mr. Hery Setiawan - Bakesbang), Klungkung Village (Husni), Karang Pring Village (Rita Tri Widariati), Gebang Poreng Village (Nur Mustari), Slawu Village (Moh. Tosan), and Sukorambi District (Hartini, S.Sos).

- Mr. Agus will also warn the residents of the WARNING status using instruments such as loudspeakers, walkie-talkies, cell phones, kentongan, megaphones, and others.

2. **Regency Satlak (Mr. Hery Setiawan).**
   - Coordinate with the Kalijompo Plantation (Mr. Agus and his team) regarding the latest rainfall, water level, and landslides.
   - Coordinate with all Satlak members (Kodim, Polres, the Public Works Service for Irrigation (Da'i Agus), the Social Service) and inform them of the heavy rain in the Kalijompo plantation, and instruct Regency Satlak members to leave for disaster-prone areas.
   - Carry all equipments for early warning system and evacuation (vehicles, evacuation sites, refugee tents, etc.) to banjir bandang-prone areas.

3. **Klungkung Village (Husni)**
   - Coordinate with the Kalijompo Plantation (Mr. Agus and his team) regarding the latest rainfall, water level, and landslides.
   - Instruct the task force on the village level (Suparno, SH) to monitor the latest conditions, coordinate with other task forces in the Klungkung village, remind each other about the rainfall and water level, both on Level 2, and inform residents about the banjir bandang WARNING status.
   - Coordinate with other villages (Karang Pring, Gebang Poreng, Slawu) regarding the level of rainfall and water level, both on Level 2, and be aware of the banjir bandang WARNING status.
   - Report the latest public activities to the Sukorambi District (Hartini, S.Sos) and Regency Satlak (Mr. Hery Setiawan - Bakesbang).
   - Inform all residents using means of communication (loudspeakers, walkie-talkies, cell phones, kentongan, megaphones, and others) to heed the WARNING status due to the increasing rainfall.

4. **Karang Pring Village (Rita Tri Widariati)**
   - Coordinate with the Kalijompo Plantation (Mr. Agus and his team) regarding the latest rainfall, water level, and landslides.
   - Instruct the task force on the village level (Nuryanto) to monitor the latest conditions, coordinate with other task forces in the Karang Pring village, remind each other about the rainfall and water levels, both on Level 2, and inform residents about the banjir bandang WARNING status.
   - Coordinate with other villages (Klungkung, Gebang Poreng, Slawu) regarding the rainfall and water level, and be aware of the banjir bandang WARNING status.
   - Report the latest public activities to the Sukorambi District (Hartini, S.Sos) and Regency Satlak (Mr. Hery Setiawan - Bakesbang).
   - Inform all residents using means of communication (loudspeakers, walkie-talkies, cell phones, kentongan, megaphones, and others) to heed the WARNING status due to the increasing rainfall.

5. **Sukorambi District (Hartini)**
   - Coordinate with the Kalijompo Plantation (Mr. Agus and his team) regarding the latest rainfall and water level.

- **Coordinate** with Muspika (the District, Military Subdistrict Command (Sujono), Police Station (Agus Supariono)) regarding the latest rainfall and water level, both on Level 2 (WARNING), in disaster-prone areas (upstream: Klungkung and Karang Pring villages; downstream: Gebang Poreng Slawu and villages).
- In cooperation with Muspika, the Sukorambi district **prepares** the facilities and utilities for early warning system and banjir bandang evacuation.
- The latest condition (the rainfall and water level, both on Level 2) is reported to the Regency Satlak (Mr. Hery Setiawan - Bakesbang).

6. **Gebang Poreng Village** (**Sungkono**)
   - Coordinate with the Kalijompo Plantation (Mr. Agus and his team) regarding the latest rainfall, water level and landslides.
   - Instruct the task force on the village level (Hamim) to monitor the latest conditions, coordinate with other task forces in the Gebang Poreng village, remind each other about the rainfall and water level, both on Level 2, and inform residents about the banjir bandang WARNING status and they should prepare for EVACUATION.
   - Coordinate with other villages (Klungkung, Gebang Poreng, Slawu) regarding the rainfall and water level, both on Level 2, be aware of the banjir bandang WARNING status, and prepare for evacuation.
   - Report the latest public activities (WARNING status) to the Sukorambi district (Hartini, S.Sos) and Regency Satlak (Mr. Hery Setiawan - Bakesbang).
   - Inform Gebang Poreng residents using means of communication (loudspeakers, walkie-talkies, cell phones, kentongan, megaphones, and others) to heed the WARNING status due to the increasing rainfall and to prepare for EVACUATION.

7. **Slawu Village (Imam Tohari)**
   - Coordinate with the Kalijompo Plantation (Mr. Agus and his team) regarding the latest rainfall, water level and landslides.
   - Instruct the task force on the Slawu village level (Syaifudin) to monitor the latest conditions, coordinate with other task forces in the Slawu village, remind each other about the rainfall and water level, both on Level 2, and inform residents about the banjir bandang WARNING status.
   - Coordinate with other villages (Klungkung, Karang Pring, Gebang Poreng) regarding the rainfall and water level, be aware of the banjir bandang WARNING status, and prepare to assist in EVACUATION.
   - Report the latest public activities as a preparation for EVACUATION to the Sukorambi district (Hartini, S.Sos) and Regency Satlak (Mr. Hery Setiawan - Bakesbang).
   - Inform Slawu residents using means of communication (loudspeakers, walkie-talkies, cell phones, kentongan, megaphones, and others) to heed the WARNING status due to the increasing rainfall and to prepare for EVACUATION.

8. **Patrang District (Gatot Suharyono)**
   - Coordinate with the Kalijompo Plantation (Mr. Agus and his team) regarding the latest rainfall and water level.
   - Coordinate with Muspika (the District, Military Subdistrict Command, Police Station) regarding the latest rainfall and water level, both on Level 2 (WARNING), in disaster-prone

areas (upstream: Klungkung and Karang Pring villages; downstream: Gebang Poreng and Slawu villages).
- In cooperation with Muspika, the Parang district prepares the facilities and utilities for early warning system and banjir bandang evacuation.
- The latest condition (the rainfall and water level, both on Level 2) is reported to the Regency Satlak (Mr. Hery Setiawan - Bakesbang).

C. Evacuation

1. **Plantation (Mr. Agus)**
   - Monitor the rainfall, water level and fissures on the ground with the available instruments.
   - Relay information on the rainfall and water level, both on Level 3 (EVACUATION), to the Regency Satlak (Mr. Hery Setiawan - Bakesbang), Klungkung Village (Husni), Karang Pring Village (Rita Tri Widariati), Gebang Poreng Village (Nur Mustari), Slawu Village (Moh. Tosan), and Sukorambi district (Hartini, S.Sos).
   - Inform residents that they must EVACUATE using the available equipments.

2. **Regency Satlak (Mr. Hery Setiawan)**
   - Coordinate with the Kalijompo Plantation (Mr. Agus and his team) regarding the latest rainfall, water level and landslides.
   - Coordinate with all Satlak members (Kodim, Polres, the Public Works Service for Irrigation (Da'i Agus), the Social Service) and inform them of the heavy rain, rainfall, water level (on Level 3), and fissure increase by 2 mm/hr at the Kalijompo plantation, and instruct them to help residents in evacuating.
   - Use all equipments for early warning system and evacuation (vehicles, evacuation sites, refugee tents) to evacuate the residents.

3. **Klungkung Village (Husni)**
   - Coordinate with the Kalijompo Plantation (Mr. Agus and his team) regarding the latest rainfall, water level and landslides.
   - Instruct Klungkung residents to EVACUATE to the evacuation sites.
   - Instruct the task force on the village level (Suparno, SH) to assist residents in the EVACUATION, remind each other about the rainfall and water level, both on Level 3, and tell residents to EVACUATE to safe locations.
   - Coordinate with other villages (Karang Pring, Gebang Poreng, Slawu) regarding the rainfall and water level, both on Level 3, and EVACUATE to safe locations.
   - Report that the residents have EVACUATED to the Sukorambi district (Hartini, S.Sos) and Regency Satlak (Mr. Hery Setiawan - Bakesbang).

4. **Karang Pring Village (Rita Tri Widariati)**
   - Coordinate with the Kalijompo Plantation (Mr. Agus and his team) regarding the latest rainfall, water level and landslides.
   - Instruct the task force on the village level (Nuryanto) to assist residents in the EVACUATION, remind each other about the rainfall and water level, both on Level 3, and tell residents to EVACUATE to safe locations.

- Coordinate with other villages (Klungkung, Gebang Poreng, Slawu) regarding the rainfall and water level, both on Level 3, and EVACUATE to safe locations.
- Report that the residents have EVACUATED to the Sukorambi district (Hartini, S.Sos) and Regency Satlak (Mr. Hery Setiawan - Bakesbang).

5. **Sukorambi District (Hartini)**
   - Coordinate with the Kalijompo Plantation (Mr. Agus and his team) regarding the latest rainfall and water level.
   - In cooperation with Muspika, the Sukorambi district **assists in the evacuation using all facilities and utilities**, such as vehicles, tents, etc.
   - Report the latest condition (rainfall and water level, both on Level 3) to the Regency Satlak (Mr. Hery Setiawan - Bakesbang).

6. **Gebang Poreng Village** (**Sungkono**)
   - Coordinate with the Kalijompo Plantation (Mr. Agus and his team) regarding the latest rainfall, water level and landslides.
   - Instruct the task force on the Gebang Poreng village level (Hamim) to assist residents in the EVACUATION, remind each other about the rainfall and water level, both on Level 3, and tell residents to EVACUATE to safe locations.
   - Coordinate with other villages (Klungkung, Karang Pring, Slawu) regarding the rainfall and water level, both on Level 3, and EVACUATE to safe locations.
   - Report that the residents have EVACUATED to the Sukorambi district (Hartini, S.Sos) and Regency Satlak (Mr. Hery Setiawan - Bakesbang).

7. **Slawu Village (Imam Tohari)**
   - Coordinate with the Kalijompo Plantation (Mr. Agus and his team) regarding the latest rainfall, water level and landslides.
   - Instruct the task force on the Slawu village level (Syaifudin) to assist residents in the EVACUATION, remind each other about the rainfall and water level, both on Level 3, and tell residents to EVACUATE to safe locations.
   - Coordinate with other villages (Klungkung, Karang Pring, Gebang Poreng) regarding the rainfall and water level, both on Level 3, and EVACUATE to safe locations.
   - Report that the residents have EVACUATED to the Sukorambi district (Hartini, S.Sos) and Regency Satlak (Mr. Hery Setiawan - Bakesbang).

8. **Patrang District (Gatot Suharyono)**
   - Coordinate with the Kalijompo Plantation (Mr. Agus and his team) regarding the latest rainfall and water level.
   - In cooperation with Muspika, the Parang district assists in the evacuation using all facilities and utilities, such as vehicles, tents, etc.
   - Report the latest condition (rainfall and water level, both on Level 3) to the Regency Satlak (Mr. Hery Setiawan - Bakesbang).

D. Critical

1. Plantation (Mr. Agus)

- Monitor the rainfall, water level and fissures on the ground with the available instruments.
- Relay information on the rainfall and water level, both on Level 4, and fissure increase by 4 mm/hr, which means it is a CRITICAL condition, to the Regency Satlak (Mr. Hery Setiawan - Bakesbang), Klungkung Village (Husni), Karang Pring Village (Rita Tri Widariati), Gebang Poreng Village (Nur Mustari), Slawu Village (Moh. Tosan), and Sukorambi district (Hartini, S.Sos).
- Inform residents of the CRITICAL condition, that the EVACUATION must already be complete, and they must be careful of the flow as the rain grows heavier and there is a landslide.

2. Regency Satlak (Mr. Hery Setiawan)

- Coordinate with the Kalijompo Plantation (Mr. Agus and his team) regarding the latest rainfall, water level and landslides.
- Coordinate with all Satlak members (Kodim, Polres, the Public Works Service for Irrigation (Da'i Agus), the Social Service) and inform them of the heavy rain, rainfall, water level (on Level 4), and fissure increase by 4 mm/hr at the Kalijompo plantation, and instruct them to help residents in evacuating, as the rain grows heavier and the condition is CRITICAL.
- Use all equipments for early warning system and evacuation (vehicles, evacuation sites, refugee tents) to evacuate the residents.

3. Klungkung Village (Husni)

- Coordinate with the Kalijompo Plantation (Mr. Agus and his team) regarding the latest rainfall, water level and landslides.
- Instruct the task force on the Klungkung village level (Suparno, SH) regarding the CRITICAL condition and to assist residents in the EVACUATION, remind each other about the rainfall and water level, both on Level 4, and tell residents that the EVACUATION must already be complete.
- Coordinate with other villages (Karang Pring, Gebang Poreng, Slawu) regarding the rainfall and water level, both on Level 4, and be careful of the intensity of the rain.
- Report that the EVACUATION is already complete to the Sukorambi district (Hartini, S.Sos) and Regency Satlak (Mr. Hery Setiawan - Bakesbang).

4. Karang Pring Village (Rita Tri Widariati)

- Coordinate with the Kalijompo Plantation (Mr. Agus and his team) regarding the latest rainfall, water level and landslides.
- Instruct the task force on the Karang Pring village level (Nuryanto) regarding the CRITICAL condition and to assist residents in the EVACUATION, remind each other about the rainfall and water level, both on Level 4, and tell residents that the EVACUATION must already be complete.
- Coordinate with other villages (Klungkung, Gebang Poreng, Slawu) regarding the rainfall and water level, both on Level 4, and be careful of the intensity of the rain.
- Report that the EVACUATION is already complete to the Sukorambi district (Hartini, S.Sos) and Regency Satlak (Mr. Hery Setiawan - Bakesbang).

5. Sukorambi District (Hartini)

- In cooperation with Muspika, the Sukorambi district **assists in the evacuation using all facilities and utilities**, such as vehicles, tents, etc, and informs that the evacuation process is already complete.
- Coordinate with the Kalijompo Plantation (Mr. Agus and his team) regarding the latest rainfall and water level.
- Report the latest condition (rainfall and water level on Level 4) to the Regency Satlak (Mr. Hery Setiawan - Bakesbang).

6. Gebang Poreng Village (**Sungkono**)

- Coordinate with the Kalijompo Plantation (Mr. Agus and his team) regarding the latest rainfall, water level, and landslides.
- Instruct the task force on the Gebang Poreng village level (Hamim) regarding the CRITICAL condition and to assist residents in the EVACUATION, remind each other about the rainfall and water level, both on Level 4, and tell residents that the EVACUATION must already be complete.
- Coordinate with other villages (Klungkung, Karang Pring, Slawu) regarding the rainfall and water level, both on Level 4, and be careful of the intensity of the rain.
- Report that the EVACUATION is already complete to the Sukorambi district (Hartini, S.Sos) and Regency Satlak (Mr. Hery Setiawan - Bakesbang).

7. Slawu Village (Imam Tohari)

- Coordinate with the Kalijompo Plantation (Mr. Agus and his team) regarding the latest rainfall, water level, and landslide.
- Instruct the task force on the Slawu village level (Syaifudin) regarding the CRITICAL condition and to assist residents in the EVACUATION, remind each other about the rainfall and water level, both on Level 4, and tell residents that the EVACUATION must already be complete.
- Coordinate with other villages (Klungkung, Karang Pring, Gebang Poreng) regarding the rainfall and water level, both on Level 4, and be careful of the intensity of the rain.
- Report that the EVACUATION is already complete to the Sukorambi district (Hartini, S.Sos) and Regency Satlak (Mr. Hery Setiawan - Bakesbang).

8. Patrang District (Gatot Suharyono)

- In cooperation with Muspika, the Patrang district assists in the evacuation using all facilities and utilities, such as vehicles, tents, etc, and informs that the evacuation process is complete.
- Coordinate with the Kalijompo Plantation (Mr. Agus and his team) regarding the latest rainfall and water level.
- Report the latest condition (rainfall and water level on Level 4) to the Regency Satlak (Mr. Hery Setiawan - Bakesbang).

E. Danger

1. **Plantation (Mr. Agus)**
   - Monitor the rainfall, water level and fissures on the ground with the available instruments.
   - Relay information on the rainfall and water level, both on Level 5, and fissure increase by 9 mm/hr, which means the status is DANGER, to the Regency Satlak (Mr. Hery Setiawan - Bakesbang), Klungkung Village (Husni), Karang Pring Village (Rita Tri Widariati), Gebang Poreng Village (Nur Mustari), Slawu Village (Moh. Tosan), and Sukorambi district (Hartini, S.Sos).
   - Inform residents of the DANGER status, that the EVACUATION must already be complete, and they must be careful of the flow as the rain grows heavier and there is a landslide.

2. **Regency Satlak (Mr. Hery Setiawan)**
   - Coordinate with the Kalijompo Plantation (Mr. Agus and his team) regarding the latest rainfall, water level and landslides.
   - Coordinate with all Satlak members (Kodim, Polres, the Public Works Service for Irrigation (Da'i Agus), the Social Service) and inform them of the heavy rain, rainfall, water level (on Level 5), and fissure increase by 9 mm/hr at the Kalijompo plantation, and instruct them to help residents in evacuating, as the rain grows heavier and the status is DANGER.
   - Use all equipments for early warning system and evacuation (vehicles, evacuation sites, refugee tents) to evacuate the residents.

3. **Klungkung Village (Husni)**
   - Coordinate with the Kalijompo Plantation (Mr. Agus and his team) regarding the latest rainfall, water level and landslides.
   - Inform the task force on the Klungkung village level (Suparno, SH) of the DANGER status and instruct them to assist residents in the EVACUATION, remind each other about the rainfall and water level, both on Level 5, and tell residents that the EVACUATION must already be complete.
   - Coordinate with other villages (Karang Pring, Gebang Poreng, Slawu) regarding the rainfall and water level, both on Level 4, and inform residents that the EVACUATION must already be complete.
   - Report that the EVACUATION is already complete to the Sukorambi district (Hartini, S.Sos) and Regency Satlak (Mr. Hery Setiawan - Bakesbang).

4. **Karang Pring Village (Rita Tri Widariati)**
   - Coordinate with the Kalijompo Plantation (Mr. Agus and his team) regarding the latest rainfall, water level and landslides.
   - Instruct the task force on the village level (Suparno, SH) regarding the DANGER status and to assist residents in the EVACUATION, remind each other about the rainfall and water level, both on Level 5, and tell residents that the EVACUATION must already be complete.
   - Coordinate with other villages (Klungkung, Gebang Poreng, Slawu) regarding the rainfall and water level, both on level 5, and tell residents that the EVACUATION must already be complete.
   - Report that the EVACUATION is already complete to the Sukorambi district (Hartini, S.Sos) and Regency Satlak (Mr. Hery Setiawan - Bakesbang).

5. Sukorambi District (Hartini)

- In cooperation with Muspika, the Sukorambi district **evacuates the residents using all facilities and utilities**, such as vehicles, tents, etc., and informs that the evacuation is already complete. The district must also inform that the rainfall, water level, and fissure on the ground indicate the danger status.
- Coordinate with the Kalijompo Plantation (Mr. Agus and his team) regarding the latest rainfall and water level.
- Report the latest condition (rainfall and water level on Level 5) to the Regency Satlak (Mr. Hery Setiawan - Bakesbang).

6. Gebang Poreng Village (Sungkono)

- Coordinate with the Kalijompo Plantation (Mr. Agus and his team) regarding the latest rainfall, water level and landslides.
- Instruct the task force on the Gebang Poreng village level (Hamim) regarding the DANGER status and to assist residents in the EVACUATION, remind each other about the rainfall and water level, both on Level 5, and tell residents that the EVACUATION must already be complete.
- Coordinate with other villages (Klungkung, Karang Pring, Slawu) regarding the rainfall and water level, both on level 5, and tell residents that the EVACUATION must already be complete.
- Report that the EVACUATION is already complete to the Sukorambi district (Hartini, S.Sos) and Regency Satlak (Mr. Hery Setiawan - Bakesbang).

7. Slawu Village (Imam Tohari)

- Coordinate with the Kalijompo Plantation (Mr. Agus and his team) regarding the latest rainfall, water level and landslides.
- Instruct the task force on the Gebang Poreng village level (Syaifudin) regarding the DANGER status and to assist residents in the EVACUATION, remind each other about the rainfall and water level, both on Level 5, and tell residents that the EVACUATION must already be complete.
- Coordinate with other villages (Klungkung, Karang Pring, Gebang Poreng) regarding the rainfall and water level, both on level 5, and tell residents that the EVACUATION must already be complete.
- Report that the EVACUATION is already complete to the Sukorambi district (Hartini, S.Sos) and Regency Satlak (Mr. Hery Setiawan - Bakesbang).

8. Patrang District(Gatot Suharyono)

- In cooperation with Muspika, the Patrang district evacuates the residents using all facilities and utilities, such as vehicles, tents, etc., and informs that the evacuation is already complete. The district must also inform that the rainfall, water level, and fissure on the ground indicate the danger status.
- Coordinate with the Kalijompo Plantation (Mr. Agus and his team) regarding the latest rainfall and water level.
- Report the latest condition (rainfall and water level on Level 5) to the Regency Satlak (Mr. Hery Setiawan - Bakesbang).

6.3 Evaluasi

The evacuation training went well and might improve public abilities in disaster management. Moreover, the training connects all the parties involved in disaster management. However, there are a few flaws in the implementation of the evacuation training: the participants' understanding of rain status in various levels is still lacking.

7. SOP IMPROVEMENT THROUGH TRAINING EVALUATION

The next activity after evacuation training is SOP improvement through training evaluation. This activity is carried out in one meeting, the Meeting of the Coordination and Implementation Unit for Banjir Bandang Disaster, Jember Regency, April 27, 2011, in Restaurant Taman Salero. Participants in the meeting are all members of the Jember Regency Satlak, Bappeda (the regency development planning board), Bakesbangpol Linmas (the National Unity, Political and Public Protection Board), Irrigation Service, Public Works Service, Forestry and Plantation Service, Social Service, Health Service, Public Relations, the Environment Board, PMI, Kodim, the police department, PDP, Sukorambi District, Panti District, Kalijompo Plantation, ORARI, BKSDA, and the Disaster Study Center at Universitas Jember.

The purpose of the Meeting of the Coordination and Implementation Unit for Banjir Bandang Disaster, Jember Regency, is to simulate the SOP for the Kalijompo watershed early warning system. The expected output is a perfected SOP that the public can understand and put into practice.

The evaluated subjects are as follows:

7.1 Evaluation of Preparations

In general, what needs to be evaluated in the preparations are the preparation for simulations, the types of preparation, and the participants' participation in preparing simulations. Below are the details:

a. Preparation for simulations
   The preparation for simulations is already done.
b. Types of preparation
   The preparations already done are: coordination with Assistant II, Bakesbangpol Linmas, and the Kalijompo plantation; the provision of early warning equipments (such as walkie-talkies, megaphones, cell phones).
c. Participants' participation
   The participants involved in the preparation are Assistant II, Bakesbangpol Linmas, and the Kalijompo plantation.

7.2 Evaluation of Early Warning System Material

In general, what needs to be evaluated in the material for early warning system simulation acitivities are: the material for early warning system, the types of material, and how the material matches the simulations. Below are the details:

a. The material
   The material is available and stored in a folder.

b. Types of material

   The materials provided are: instruction from the organizer, SOP book from YPM, and SABO book from JICA, as well as early warning equipments.

c. How the material matches the simulations
   Simulations are carried out based on the material.

7.3 Evaluation of Banjir Bandang Evacuation

In general, what needs to be evaluated in the simulation of banjir bandang evacuation is whether the simulation material has met the expected standards: that the public will be alert to disasters, from awareness of indications to evacuation. In the Satlak meeting, most participants say that evacuation sites may be located on areas that are higher, safer, and broader, such as mosques, warehouses, government buildings, and playing fields. This is already in accordance with the Kalijompo watershed SOP.

YPM and JICA have explained about the examples of maps of banjir bandang-prone areas in the Jember Regency, based on FGD results. Most participants state that the three maps are not widely available in banjir bandang-prone areas, even though the maps must be available in disaster-prone locations.

7.4 Evaluation of Help and Rescue

In general, what needs to be evaluated in the simulation is the material concerning help, rescue, the use of facilities, group collaboration, and inter-group collaboration. In the Satlak coordination meeting, examples of help and rescue are demonstrated as an instruction, not in action. Examples of help and rescue are also available in the SABO (JICA) book.

7.5 Evaluation of Government Involvement

In general, what needs to be evaluated in the material simulation are: government involvement in the preparation of simulation activities, local government involvement in simulations, support from the local government, and the types of support from the local government. Below are the details:

a. Preparations

The regency government is involved in preparing the evacuation simulation, by, for instance, recommending parties to be involved in evacuation activities.

b. Involvement in simulations
The government is involved in the simulation, that is, the head of Bappeda participates in the simulation. Bappeda actively joins the discussion and suggests that some names in the SOP are removed to make the SOP more flexible.

c. Types of support
The type of support given by the government is help in socializing the simulation.

After the evaluation, the results are filtered to pinpoint the subjects to be improved, in order to create a SOP that can be used by both the apparatus and the public, as they are directly involved in its composition.

8. CONCLUSION

In general, all activities in the basic research, the composition of the SOP and evacuation training in the Meeting of the Coordination and Implementation Unit (Satlak) for Disaster and Refugees (PBP), Jember Regency, went well and according to expectation. All participants in the FGD, TTE, simulations, evacuation training, and coordination meeting for the PBP Satlak actively participate in the discussions. Participants even suggest that activities to improve disaster management in the Jember Regency are held regularly.

Yayasan Pengabdi Masyarakat (YPM) Jember wishes to thank JICA and the Jember Regency Satlak for promoting the SOP for banjir bandang early warning system made by the Kalijompo watershed residents. The SOP serves as a fine example and may become a reference in composing SOP, for the Jember Regency in particular and all the areas in Indonesia in general.

ATTACHMENT

Results of Early Warning System TTE for Banjir Bandang in Kalijompo

No.	Hour	Hour in Scenario	Rainfall	Accumu-lated Rainfall	Level	Rain-fall Sensor	Water Level Sensor	Coordinator	TTE Participants
1	13:15	13:00	0	0	0	Lv0	Lv0	Coordinator instructs participants to look at the screen, where the scenario starts at the Cloudy condition. What do participants do?	**Plantation:** Do their daily activities (prepare evacuation sites), make disaster-prone maps, explain the program to the residents around the plantation, and make sure the measuring instruments work well. **Koramil:** Carry out their routines and instruct Babinsa (Village Leadership NCO) to coordinate their areas for disaster anticipation. Training is done in cooperation with the Regency Satlak. Ask for information from Mitra Karib (reliable residents) whose phone numbers are already noted down by Babinsa. **Polsek:** Stay alert, monitor and ask for reports from disaster-prone areas, wait for info on development (by observing and monitoring), spread information, and conduct simulations in disaster-prone areas. **Upstream Residents (Klungkung)** : Stay alert by relaying information to villagers, conduct simulations, make maps of disaster-prone areas, and inform others of disaster-prone points. **Karang Pring Village**: Inform RT/RW, carry out routines while still on alert, make maps of disaster-prone areas, and spread information to the public. **Gebang Poreng Residents**: Spread information to the public. **Regency Satlak:** Coordination meetings on the regency level with the Regency (Regent) and Satlak members. Prepare equipments to be used during floods (boots, kentongan, explanation on how to sound the kentongan) and inventory the supporting equipments (rubber boats).
No.	**Hour**	**Hour in Scenario**	**Rainfall**	**Accumu-lated Rainfall**	**Level**	**Rain-fall Sensor**	**Water Level Sensor**	**Coordinator**	**TTE Participants**

2	13:20	14:00	0	0	0	Lv0	Lv0	Coordinator informs participants that, although some time has passed, it is still cloudy. What do participants do?	**Plantation:** Do their daily activities (prepare evacuation sites), make disaster-prone maps, explain the program to the residents around the plantation, and make sure the measuring instruments work well. **Satkorlak:** Stay alert, monitor and ask for reports from disaster-prone areas, wait for info on development (by observing and monitoring), spread information, and conduct simulations in disaster-prone areas. **Koramil:** Carry out their routines and instruct Babinsa to coordinate their areas for disaster anticipation. Training is done in cooperation with the Regency Satlak. Ask for information from Mitra Karib (reliable residents) whose phone numbers are already noted down by Babinsa. **Upstream Residents (Klungkung)** : Stay alert by relaying information to villagers, conduct simulations, make maps of disaster-prone areas, and inform others of disaster-prone points. **Karang Pring Village**: Inform RT/RW, carry out routines while still on alert, make maps of disaster-prone areas, and spread information to the public. **Gebang Poreng Residents:** Spread information to the public. **Regency Satlak**: Coordination meetings on the regency level with the Regency (Regent) and Satlak members. Prepare equipments to be used during floods (boots, kentongan, explanation on how to sound the kentongan) and inventory the supporting equipments (rubber boats).
3	13:25	15:00	0	0	0	Lv0	Lv0	Coordinate tells participants to keep looking at the Cloudy condition on the screen. What do participants do?	Additional information: Regency Regulation No. 63/2006 on the Coordination and Implementation Unit for Disaster and Refugees. Plantation: The training is done in the actual area under actual conditions. Under normal conditions in the rainy season: Prepare the means of evacuation and communication (all must be on standby). Saklak: Instruct the lower ranks via letters to be ready and on alert.
No.	**Hour**	**Hour in Scenario**	**Rainfall**	**Accumu-lated Rainfall**	**Level**	**Rain-fall Sensor**	**Water Level Sensor**	**Coordinator**	**TTE Participants**

4	13:30	16:00	0	0	0	Lv0	Lv0	Coordinator instructs participants to look at the screen, where it starts to drizzle. What do participants do?	**Plantation:** Monitor the instruments more closely and monitor any development. **Polsek:** Exchange information with Danramil (the Koramil commander), Regent, Babinkamtibmas, heads of villages, irrigation officer; instruct them to stay in position and not to leave. **Karang Pring Village:** Coordinate with residents, Babinsa, Babinkamtibmas, Regent/Regent's secretary. **Klungkung Village:** Coordinate with upstream area (Mr. Agus). **Gebang Poreng Village:** Coordinate with RT, the location, upstream area (Mr. Agus, administration). **Regency:** Stay in position at the command center, coordinate with villages (wait for reports from villages) and check the villages; **Koramil:** Follow Polsek and the Regency's (Muspika) steps by receiving reports from Babinsa, report the situation to Kodim/higher units. **Bakesbang**: Stressing the instructions to command center officers; coordination with the Regency and villages.
5	13:35	17:00	5	5	0	Lv0	Lv0	Coordinator instructs participants to look at the screen, where it starts to drizzle. What do participants do?	Idem with 13.30. Continue to carry out activities around the river.
6	13:40	18:00	0	5	0	Lv0	Lv0	Coordinator instructs participants to look at the screen, where the drizzle turns into heavier rain. What do participants do?	**Plantation:** Monitor the available gauges and carry out any other activity. Divide the tasks: Danramil coordinates with S. Bedabung, Head of District monitors Kaliputih River, Kapolsek reports to Polres, Danramil reports to Dandim (the Kodim commander), Head of District reports to Regent. **District**: The command center officers go to the location, report to the District Satlak, coordinate with the Regency regarding the situation/circumstances. Instruct Satpol PP (Civil Service Police Unit) to go to the location and prepare means of transportation. **District**: Koramil tells members to be alert (alert level 3/lowest level) and coordinate with the Regency Satkorlak.
7	13:45	19:00	23	28	0	Lv0	Lv0	Coordinator instructs participants to look at the screen, where the drizzle turns into heavier rain. What do participants do?	**Plantation**: Observe the gauges (observation); **Police**: Contact irrigation officer; **Klungkung Village**: Coordinate with upstream (plantation) because they have transmitters, inform the RW based on info from upstream. **Plantation**: Be watchful, tell residents to be careful and on alert. **Gebang Poreng Village:** Maintain coordination with the plantation, keep watch on the river flow, coordinate with head of the Gebang village. When the color of the river changes, protect the source of livelihoods (seedlings).
No.	**Hour**	**Hour in Scenario**	**Rainfall**	**Accumu-lated Rainfall**	**Level**	**Rain-fall Sensor**	**Water Level Sensor**	**Coordinator**	**TTE Participants**

8	13:50	20:00	5	33	0	Lv1	Lv0	Coordinator instructs participants to look at the screen, where the drizzle turns into heavier rain. What do participants do?	**Plantation:** Status: Alert. Monitor the situation. **Karang Pring Village:** Relay info from upstream to the residents (water is on Level 1) and maintain coordination. **Klungkung Village:** Coordinate with upstream and inform residents, for instance using mosque loudspeakers. **Gebang Poreng Village:** Coordinate with residents (rainfall is at 33 mm), observe river flow. **Slawu Village:** Carry out the routines as usual.
9	13:55	21:00	0	33	0	Lv1	Lv0	Coordinator instructs participants to look at the screen, where the drizzle turns into heavier rain. What do participants do?	**Polres:** Intruct members who are still at home to go to the office. Start patroling, keep the public informed, report the current situation to Kapolres (chief of Polres). **Koramil:** Monitor water discharge (for which Koramil is responsible), report to Dandim (superiors) so they can coordinate with the Regency Satkorlak, set the alert level to Level 2. **Regency**: The 24-hour command center must be ready to inspect the areas, in coordination with the village or the patrol (Satpol PP, Regency Task Force, Kapolsek (chief of Polsek), Danramil).
10	14:00	22:00	15	48	0	Lv1	Lv0	Coordinator instructs participants to look at the screen, which shows heavy rain. What do participants do?	**Plantation:** Accumulated rainfall is 48 mm/hr (the increase is quite high); report the development to the public and related parties, Muspika, Satlak. **Klungkung Village**: Inform residents, via RT/RW and loudspeakers, of the heavy rain and ask them to stay on alert. **Slawu Village:** Coordinate with upstream areas and the public. Tell residents, via RT/RW, to start packing. **Satlak**: Instruct the command center to coordinate reports and deliver them to the head of Satlak, instruct the head of the district to stand by, whether via walkie-talkie, cell phone, office phone and home phone.
11	14:05	23:00	30	78	1	Lv2	Lv1	Coordinator instructs participants to look at the screen, which shows heavy rain. What do participants do?	**Plantation:** Start evacuating residents around the plantation. **Klungkung Village:** Instruct RT/RW and heads of hamlets in middle areas to evacuate residents in stages. **Polsek**: Coordinate evacuation, relay evacuation instructions from Muspika, ask for means of transportation.
No.	**Hour**	**Hour in Scenario**	**Rainfall**	**Accumu-lated Rainfall**	**Level**	**Rain-fall Sensor**	**Water Level Sensor**	**Coordinator**	**TTE Participants**
12	14:10	24:00	22	100	1	Lv3	Lv1	Coordinator instructs participants to look at the screen, which shows heavy rain. What do participants do?	**Plantations:** Still evacuating. **Karang Pring Village:** Prepare vehicles for evacuation. Children, pregnant women and senior citizens are prioritized. **Gebang Poreng**: Coordinate directly with RT/RW, and evacuate to higher ground. **Koramil:** Tell all the available (18) personnels to assist the evacuation, ask for help from Makodim (Kodim HQ/the higher rank), and send the personnels (around 35) to the disaster location.

									Saklak: Coordinate all the assistance from Saklak members (tents, medical supplies, equipments such as rubber boats, sanitary supplies). When the evacuation instruction arrives, the equipments must already be available at the evacuation site.
13	14:15	01:00	9	109	2	Lv3	Lv2	Coordinator instructs participants to look at the screen, where rain falls heavily and fissure gauge shows fissure increases by 2 mm/hr. What do participants do?	**Plantation:** When the water level reaches 120 mm, the evacuation is already complete. **Klungkung Village**: Residents have moved away from the river and grown calmer. **Slawu Village:** Evacuation of senior citizens, women, children, and all residents. Satlak: Open the public kitchen (DU) because the refugees do not bring any food. Saklak coordinates with Kodim to secure locations whose inhabitants leave for evacuation sites.
14	14:20	02:00	14	123	2	Lv4	Lv2	Coordinator instructs participants to look at the screen, where rain falls heavily and fissure gauge shows fissure increases by 4 mm/hr. What do participants do?	**Plantation**: Residents are already at the evacuation sites. Coordinate with relevant institutions regarding the refugees' needs. **Polsek:** Coordinate with Muspika regarding the complete evacuation. DU is organized by the district. Locations are secured. **Klungkung Village:** Residents are already at the evacuation sites. They are reassured that the properties they leave behind are guaranteed to be safe. **Gebang Poreng Village:** When the rainfall level reaches 120 mm, coordinate with the apparatus regarding the refugees' needs.
15	14:25	03:00	20	143	3	Lv4	Lv3	Coordinator instructs participants to look at the screen, where rain falls heavily and fissure gauge shows fissure increases by 9 mm/hr. What do participants do?	**Plantation:** Residents are at the evacuation sites. The employees' houses are guarded by Koramil and Polsek. Residents are informed when the flow stops, so they can be alert to the possibility of landslides. **Polsek:** Residents are reassured that their properties are safe. The safety of prisoners in jail is also looked after. **Koramil:** Make sure that evacuation sites do not lack food. Assist the police in securing areas whose inhabitants have evacuated.
No.	**Hour**	**Hour in Scenario**	**Rainfall**	**Accumu-lated Rainfall**	**Level**	**Rain-fall Sensor**	**Water Level Sensor**	**Coordinator**	**TTE Participants**
16	14:30	04:00	82	225	4	Lv5	Lv4	Coordinator instructs participants to look at the screen, where rain falls heavily and there is a small-scale landslide.	**Plantation:** The accumulated rainfall is 225 mm, there is a small landslide, and plantation soil has become loose, indicated by the sudden, water-absorbent water sources which pop up in cliffs. Muspika is informed of this. **Satlak:** In carrying out their tasks, Satlak uses heavy equipments (excavators) in order to prevent public facilities from being destroyed by, for instance, an avalanche of soil, or landslides that block the roads. The head of the district and villages must stay in position and their means of

									communication must always be turned on. **Klungkung Village:** The residents are requested not to leave evacuation sites and to stay calm. The apparatus stay with residents in evacuation sites.
17	14:35	05:00	52	277	5	Lv5	LV5	Coordinator instructs participants to look at the screen, where rain falls heavily; sand, rocks, logs flow downward.	**Plantation:** Facilities are destroyed. **Polsek**: Always report the latest development and keep the residents safe. **Saklak:** The Regency Secretariat has moved to lower ground. The aids are delivered in a well-ordered fashion and an accountable mechanism, to prevent overlapping and the disaster from becoming a disaster tourism site. Work collaboratively (based on the Panti experience) to sterilize the location from unwanted persons (visitors). **Gebang Poreng**: The upper ranks are expected to help keep the location safe.
18	14:40	06:00	24	301	5	Lv5	LV5	Coordinator instructs participants to look at the screen, where the rain is receding.	**Plantation:** Keeping track of refugees, the number of residents and children under five years old, is done after the evacuation. Refugees are asked not to go near the river because the soil is very unstable. **Polsek:** With Muspika, check the equipments at the evacuation sites (DU equipments, facilities, etc.) and guard the location. **Slawu Village:** Residents are requested to stay at evacuation sites and wait for coordination results with the authority (Saklak). **District**: Start assisting in making a list of the refugees, and report the result to the Regency Saklak (superiors). Help provide food and other facilities. **Klungkung Village Residents:** Follow the head of the village's orders; **Slawu Village Society Leaders:** Stay calm and pray the flood will recede soon. **Karang Pring:** Keep women company and provide them with their needs (especially medics to help women who have just given birth) and inventory the necessities.
No.	**Hour**	**Hour in Scenario**	**Rainfall**	**Accumu-lated Rainfall**	**Level**	**Rain-fall Sensor**	**Water Level Sensor**	**Coordinator**	**TTE Participants**
19	14:45	07:00	4	305	5	Lv5	LV5	Coordinator instructs participants to look at the screen, where the rain is receding. What do participants do?	**Plantation:** Keeping track of refugees, the number of residents and children under five years old, is done after the evacuation. Refugees are asked not to go near the river because the soil is very unstable. **Polsek:** With Muspika, check the equipments at the evacuation sites (DU equipments, facilities, etc.) and guard the location. **Slawu Village:** Residents are requested to stay at evacuation sites and wait for coordination results with the authority (Saklak). **District**: Start assisting in making a list of the refugees, and report the result to the Regency Saklak (superiors). Help provide food and other facilities. **Klungkung Village Residents:** Follow the head of the village's orders; **Slawu Village Society Leaders:** Stay calm and pray the flood will recede soon. **Karang Pring:** Keep women company and provide them with their needs (especially medics to help

									women who have just given birth) and inventory the necessities.
20	14:50	08:00	0	305	5	Lv5	LV5	Coordinator instructs participants to look at the screen, where the rain has stopped. What do participants do?	**Plantation:** Keep the refugees company and coordinate with related institutions. **Koramil:** With Muspika, report the situation to Dandim, Brigif, Armed, etc, in case extra troops from Kodim are required. **Klungkung Society Leaders**: Maintain a disciplined administration (check the situation on lower ranks) by inventorying the necessities. **District**: Keep the residents comfortable by establishing a trauma center.
21	14:55	09:00	0	305	5	Lv5	LV5	Rain stops (start survey and emergency actions)	**Plantation:** Stay on alert. **Polsek**: With Muspika, check on the refugees to obtain a valid and complete data; report any development; when the situation returns to normal, ask the refugees to return home. **Saklak**: Follow up on reports, especially those regarding whether or not there are casualties. Disaster management means minimalizing casualties and determining evacuation responsibilities (preparing valid data) by making a list of the refugees, damages and losses. **Klungkung Village**: Ask residents and refugees to stand by at evacuation sites, for fear of subsequent disasters. **District**: Be alert to subsequent floods, record the casualties and destroyed properties, compose a program, make an inventory, and make a report for the Regency Saklak.