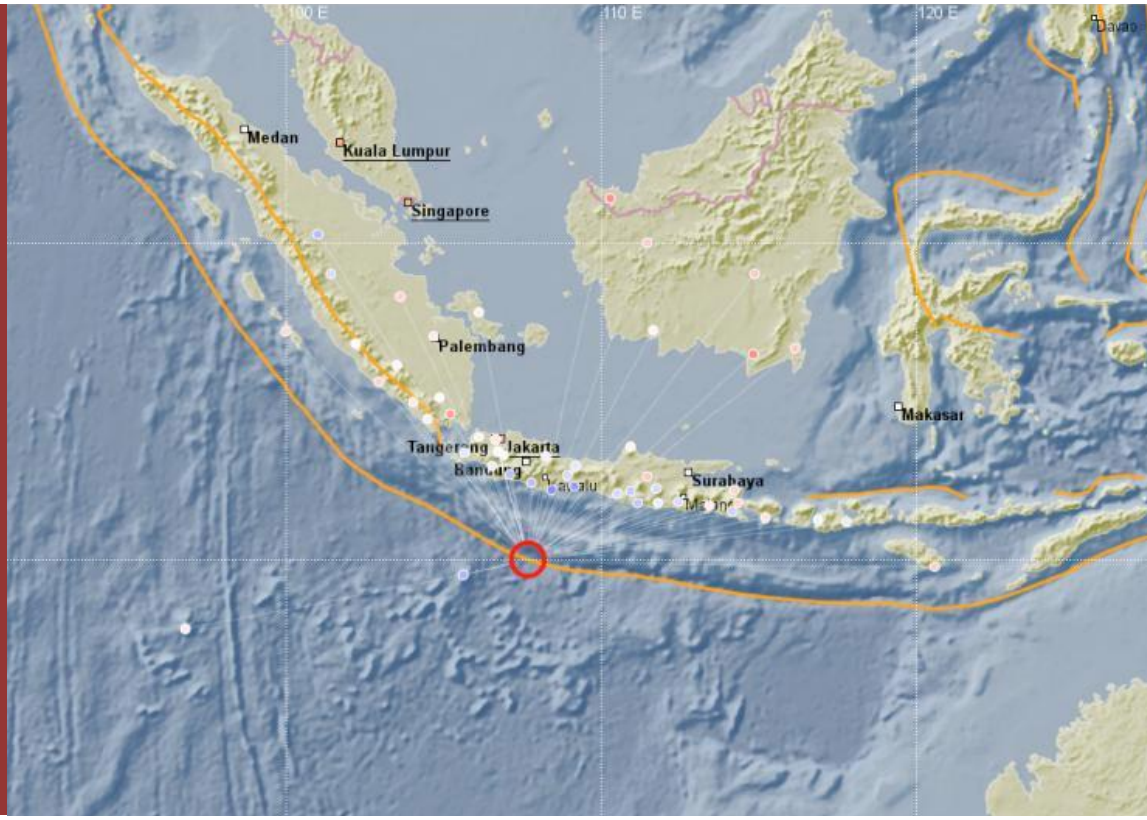

Tsunami Warning on the 4th of April 2011

Institutional and community reactions to the earthquake and related tsunami warnings in southern Java

A Case Study

August 2011

giz IS International Services

PROTECTS

Tsunami Warning on the 4th of April 2011
A Case Study

2011

Capacity Development in Local Communities

Project for Training, Education and Consulting for Tsunami Early Warning System (PROTECTS)

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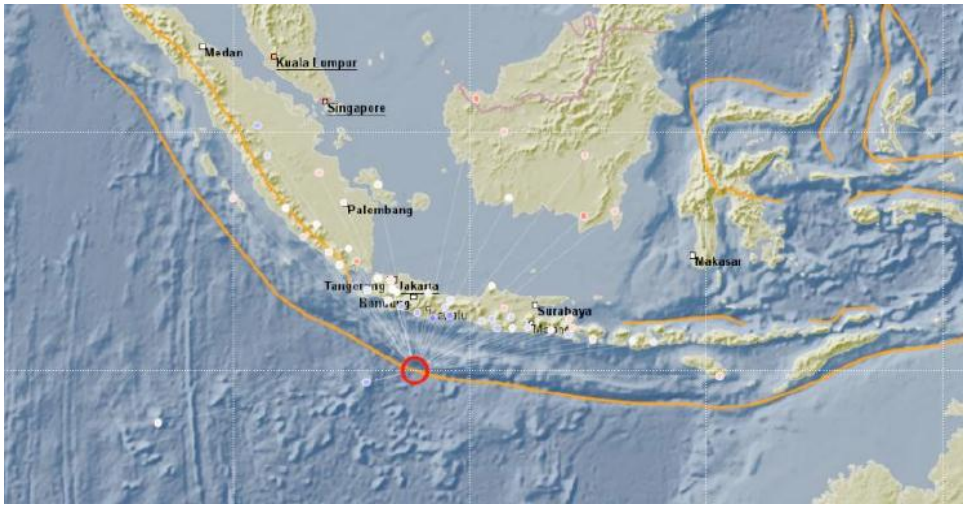
Acknowledgement
The authors would like to thank the partners from the five districts in the Pilot Area Java who were ready to contribute to the case study and share their experiences.

1. Introduction

An earthquake (EQ) occurred on the 4th of April early in the morning (03:06 am) around 300 km south west of Cilacap in time when most people were in deep sleep. The earthquake was located at a depth of 10 km with a magnitude of 7.1 SR by BMKG. The picture of BMKG below shows the epicentre of the EQ.



A tsunami warning was issued by the InaTEWS National Warning Centre at BMKG and sent out in less than 5 minutes after the earthquake. The tremors were felt so strongly and lasted for about one minute that awakened and caused panic even to the people who were further away from the EQ source, such as in Bantul. The spontaneous reactions of the people varied. On the other hand, the local government institutions performed different tasks, engaged in an intense communication with other key stakeholders within their areas and to other neighbouring districts. All intended to do appropriate response.

The earthquake affected the communities in a number of districts along the southern coast of Java, of whom some have had begun developing preparedness measures over the past four years in partnership with the GITEWS project (Cilacap, Kebumen and Bantul from Jan 2007-May 2011, as well as Purworejo and Ciamis in 2010-2011). Preparedness activities implemented in the communities included the provision of knowledge and awareness raising for selected groups of people, strengthening capacities of key government actors, the formation of an inter-district network, establishment of local warning services and warning dissemination technologies, as well as tsunami simulation exercises.

This summary intends to document the findings from an evaluation concerning the reactions of the institutions and the people in the above mentioned five communities during and after the EQ, and the issuance of the related tsunami warning. The findings are hoped to contribute for reflection purposes by the stakeholders concerned. The experiences of the key local actors involved were compiled through a series of interviews conducted by Benny Usdianto[1] and Johanes Juliasman[2] from GIZ IS GITEWS. The interviewees are ranging from the selected personnel from the relevant government institutions, such as BPBD, Kesbanglinmas and the 24/7 service/Pusdalops, and also from the non-government actors, for examples SARs, RAPI and the representatives of communities.

[1] Advisor of GIZ IS for GITEWS Project in the Pilot Area of Java, January 2007- May 2011
[2] The Project Assistant of GIZ IS for GITEWS Project in the Pilot Area of Java, July 2009 – May 2011

2. Sequence of Events

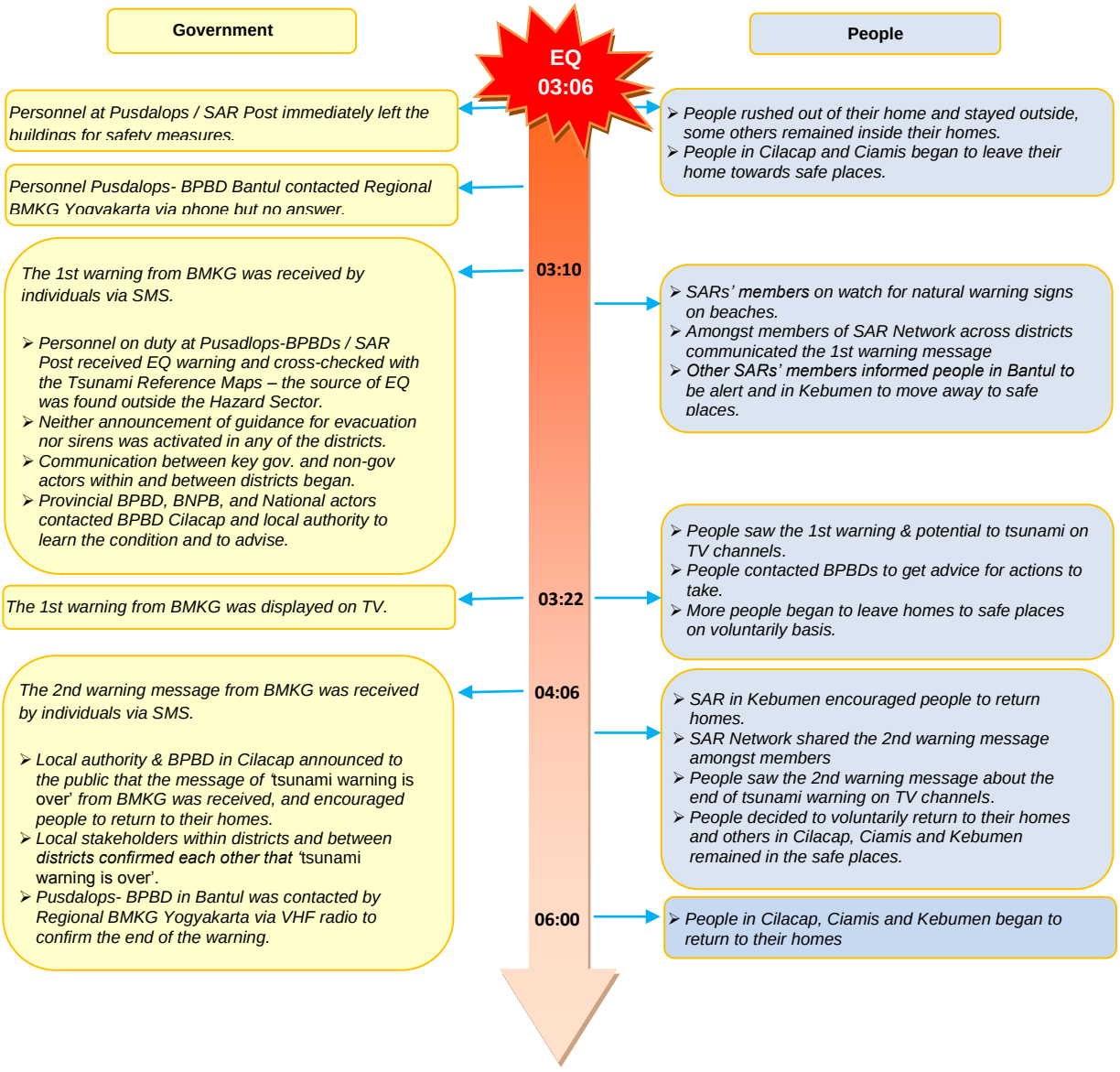
2.1. Time Line provided by BMKG

The table below shows the sequence of earthquake event until the issuance of cancellation message provided by BMKG.

Time (WIB)	Time Interval (minute)	TIME LINE
3:06:39		Earthquake occurred
3:07:12	0:00:33	Live signal and status of the station were blinking (LEM, SKJI, CISI)
3:08:00	0:01:21	Earthquake felt in Pangandaran IV MMI
3:08:05	0:01:26	Result Seiscomp3 first location OT= 03:06:38 WIB, 9.92 Lat S – 107.61 Long E, Mag = 7.1 SR Depth: 10 km, were followed by sound alarm
3:08:45	0:02:06	Start interactively using Seiscomp3 Tool
3:08:56	0:00:51	Update interactively (*first manual*) using Seiscomp3 OT= 03:06:38 WIB, 10.09 Lat S – 107.73 Long E, Mag = 7.1 SR, Depth: 10 km
3:10:27	0:03:48	Commit **Seiscomp3/BMKG** OT= 03:06:39 WIB, 10.01 Lat S – 107.69 Long E, Mag= 7.1 SR, Depth = 10 km
3:11:05	0:04:26	Decision for dissemination OT= 03:06:39 WIB, 10.01 Lat S – 107.69 Long E, Mag= 7.1 SR, Depth = 10 km
3:11:12	0:04:33	SENDING data for dissemination (OT= 03:06:39 WIB, 10.01 Lat S – 107.69 Long E, Mag= 7.1 SR, Depth: 10 km) **POTENTIAL TSUNAMI**
3:11:15	0:04:36	Geofon/ Germany; OT: 20:06:39 WIB, 9.87 Lat S – 107.68 Long E, Mag = 6.6 SR, Depth= 15 km
3:11:15	0:04:36	USGS ; OT: 03:06:39 WIB, 9.865 Lat S – 107.612 Long E, Mag= 6.7 SR, Depth: 10 km
3:11:24	0:04:45	Confirmation of DVB (OT= 03:06:39 WIB, 10.01 Lat S – 107.69 Long E, Mag= 7.1 SR, Depth: 10 km) potential Tsunami.
3:13:00	0:06:21	Received Email from **ITEWC/RTWP** India
3:13:05	0:06:26	A Tsunami Warning broadcasted on Anteve
3:13:23	0:06:44	A Tsunami Warning broadcasted on MNC TV Station
3:22:00	0:15:21	A Tsunami Warning broadcasted on **Metro TV**
3:27:00	0:20:21	PTWC called Mr. Suharjono
3:27:01	0:20:22	Received Email from JMA
3:28:13	0:21:34	**Update** earthquake information through NOW SMS (Pangandaran IV MMI, Karangkates II MMI, Cisarua II MMI, Denpasar II MMI)
3:39:53	0:33:14	**Update** earthquake information through NOW SMS (Cilacap IV MMI, Yogyakarta II MMI, Purworejo II MMI)
3:40:05	0:32:00	Received telephone call from public
4:40:16	1:33:37	Cancellation of Tsunami warning of Cilacap earthquake (OT= 03:06:39 WIB, 10.01 Lat S – 107.69 Long E, Mag= 7.1 SR, Depth: 10 km) a Tsunami potential warning is ENDET
4:40:16	1:33:37	DVB Tsunami warning of Cilacap earthquake (OT= 03:06:39 WIB, 10.01 Lat S – 107.69 Long E, Mag= 7.1 SR, Depth= 10 km) a Tsunami potential warning is ENDED
4:43:01	1:36:22	Cancellation of Tsunami warning broadcasted on TVONE
4:44:40	1:38:01	Cancellation of Tsunami warning broadcasted on RCTI TV Station

2.2. Sequence of events observed at the community

The chart below shows the sequence of highlighted actions taken by local stakeholders following the earthquake on the 4th of April 2011:



3. Reaction of people in coastal communities and representatives from local institutions during and right after the earthquake

The tremors of the 7.1 RS EQ on the 4th of April were so powerful and long-lasting that they were felt strongly by the people particularly closer the EQ source, such as in Cilacap and in the coastal areas in Ciamis like: Pangandaran and Batukaras villages. In Kebumen, the tremors were felt less strong, and only light tremors were felt in Purworejo and in Bantul. Most people in the town of Cilacap spontaneously came out of their homes, in panic, stayed in crowds, worrying about possible tsunami to follow. Soon many people in Cilacap and Ciamis immediately decided to leave their homes to safe places previously agreed, whereas others remained around their homes awaiting information. It was an extremely difficult moment for the people in Cilacap. Whilst they were still shocked by the strong EQ, wondering what it had caused to the lives of their kin and properties and they had also feeling of uncertain threats of tsunami, there was no information available at all as a clue to all the questions they had in minds. Different reactions were observed among the people in Kebumen, Purworejo and Bantul, as they were not panicking but being precautious and awaiting official information. Many people remained around their homes during and just after the EQ happened.

At that time, the personnel on duty at BPBD in Cilacap, at BPBD in Ciamis, at Posko BPBD and at Posko SAR Elang Perkasa in Kebumen, at Posko Penanggulangan Bencana (disaster management post) at Kesbanglinmas in Purworejo and at Pusdalops in Bantul reacted in a similar way, many of them leaving the buildings during the earthquake. One personnel at Pusdalops in Bantul (Nur Eta Effendi) attempted to contact the Regional BMKG in Yogyakarta via telephone, but it was not responded. The EQ did not disrupt the electricity and the communication equipment in any of the districts. In fact, no significant damages to homes, public facilities and infrastructures were known.

3.1. Reactions to the 1st Tsunami Warning Message from BMKG

At 03:10, the first EQ information and the tsunami warning from BMKG was received via SMS by some government officials and other individuals linked to BMKG. The warning message contained ***Info Gempa Mag:7.1 SR, 04-Apr-11 03:06:39 WIB, Lok:10.01 LS, 107.69 BT (293Km Barat Daya CILACAP-JATENG), Kdlm:10 Km, Potensi TSUNAMI utk dtrskn pd msyrkt::BMKG***. The warning was also displayed on television channel(s) some minutes later. This first warning triggered various reactions amongst the key stakeholders and the people of the communities in the five districts.

Local Government Reactions

During the implementation of GITEWS project, procedures were discussed in the five districts and agreed to be followed up after the reception of a tsunami warning by the local governments or the on-duty personnel at the 24/7 posts/Pusdalops. These included i) to cross-check the content of the warning message with the existing standard operation procedure (SOP), ii) to make a decision whether or not an evacuation order is to be announced to the people, and iii) to call for evacuation and/or to activate sirens (referring to the agreed SOP).

The below describes the actual reactions of the local governments in the five districts after the reception of the 1st tsunami warning from BMKG.

<u>BPBD in Cilacap</u>

Reception of warning: An SMS containing EQ information and tsunami warning was received by personnel of BPBD of Cilacap (Fatar and Arif) who at that time were at home, and immediately they rushed off to BPBD Office. A few minutes later they arrived at BPBD and directly checked the Tsunami Reference Map[3] and found that the EQ source was out of the Hazard Sector. The same warning message was also observed on TV (the channel was said to be the TV One). One personnel then communicated their finding to the head of BPBD Cilacap (Wasi Aryadi) via mobile phone, and the other contacted SAR and RAPI to ask them to monitor f*or* any *natural signs* on the coasts, such as sea water retreats. The Regional BMKG in Cilacap contacted BPBD Cilacap and confirmed the warning, and since then they established contact.

The existing decision making process in Cilacap

BPBD Cilacap was formed in December 2008, and operated Posko 24/7 since early 2009. The Posko assigns 3 shifts, each is run by 4-5 persons, and it is equipped with basic communication technology to monitor and to disseminate warnings, comprising of DVB, a TV, landline phone, facsimile, and additional UHF & VHF radios, as well as Tsunami Reference Maps. All personnel at Posko own personal HPs, but very few are direct linked to BMKG. BPBD is connected to some selected of coastal communities via local loud-speakers/sirens

BPBD is currently finalising local decision-making procedure. In the meantime, the head of BPBD in consultation with Bupati holds the authority to decide whether or not to call for evacuation in case of tsunami emergency. In making decision, BPBD followed the procedure of cross-checking the EQ and tsunami warning mesage with the Tsunami Reference Maps and an SOP chart.

Decision making: The head of BPBD Cilacap arrived at the office at 03:20 and immediately coordinated his staff to anticipate worse condition. A moment later, he received a phone call from PVMB or the vulcanology and disaster mitigation centre (Dr. Surono) from overseas - suggesting to conduct observation on the coast. Later the head of BPBD contacted the Vice Bupati to discuss about the information received and actions to take. Based on the finding at the Tsunami Reference Map and monitoring of normal

[3] Tsunami Reference Map is a tool contributed by GIZ IS GITEWS (2008) indicating certain magnitudes of an EQ and the likely hazard sector affected. The map is meant to assist local government in making decision as for calling for evacuation or not. It is suggested particularly when applying the current warning scheme.

sea water on the beaches, the head of BPBD decided not to call for evacuation. This decision made was due to the fact that people in town were generally had begun to move away from the risk areas to higher ground. BPBD received a phone call from BNPB questioning about the local condition and suggesting for preparedness measures.

Dissemination of warning and guidance: The local government observed that more and more number of people were on the street towards safe places. This led to a decision that it was unnecessary to activate sirens and to announce guidance to evacuate, and they would rather assist the moving people to be less panic.

Note: Two days before the EQ event, Cilacap was in an alert mood due to the fire occured in the vicinity of the oil refinery plant (Pertamina). The event brought a large presence of national media, including a number TV stations. This was said to be the reason why the coverage of the EQ event in Cilacap on televisions and the other public media was quick.

BPBD in Ciamis

Reception of warning: Two personnel on duty (Yayan and Deni) at BPBD office in Ciamis received the EQ warning via DVB provided by BMKG. Immediately, the warning message was distributed to the people on the list, such as other key staff of BPBD, Kesbanglinmas, and Camats. Upon the reception of the warning, the head of Preparedness Division (Wardianto) contacted the head of BPBD (Odang R. Widjaja) and other key staff via telephone to inform them about the warning.

At the same time, the Navy saw the EQ warning on TV, and later observation on the beach was conducted. One Tsunami Working Group member (Dede Nugraha) from home contacted the Regional BMKG in Bandung via telephone to get confirmation on the warning and to ask for advice; he then maintained contact with the BMKG for updates.

The existing decision making process in Ciamis

BPBD Ciamis was formed in November 2009 and began to operate 24/7 in June 2010. It assigns 3 shifts; each is run by 3 persons. The 24/7 is equipped with DVB, TV, landline phone, facsimile, and additional UHF & VHF radios. In time of the EQ event, BPBD was not yet linked to the community.

To date, BPBD in Ciamis has not yet defined a procedure for decision making. However, it is understood that during an event the personnel on duty at the 24/7 recommended a decision, and the decision must be consulted with the head of BPBD. Later, the head of BPBD is to consult with Bupati before deciding to activate sirens and/or to issue guidance publicly.

Decision making: After receiving the warning, the head of BPBD decided not to forward the warning to the Bupati. He instead asked BPBD personnel to stay alert and to monitor for any updates.

Dissemination of warning and guidance: Having sent out the warning to Camats via SMS, BPBD did not send any further message.

BPBD in Kebumen

Reception of warning: Three personnel on duty at Posko BPBD Kebumen did not receive any EQ warning since none of their personal mobile phones was linked to BMKG. The head of BPBD (Joko Waluyo) received the 1st warning directly from BMKG via SMS. The DVB kept at Kesbanglinmas was on offline mode in time of the EQ event.

The head of SAR Elang Perkasa (Bambang Widjanarko) saw the EQ warning on TV, and he immediately initiated a series of contacts via VHF radio to Posko SAR in Luwuk, the Navy Post in Ayah and SAR Lawet Perkasa in Argopeni. He suggested that personnel SAR to conduct observation on the coast.

The existing decision making process in Kebumen

BPBD Kebumen was formed in October 2010. It operates Posko 24/7, assigns 3 shifts - each is run by 4-5 persons. The Posko was equipped with TV, landline phone, facsimile, and additional UHF & VHF radios. Due to the unavailability of room at Pusdalops, the DVB contributed by BMKG is being kept at Kesbanglinmas office and the control to the local siren (installed in the community) temporary is also kept with SAR Elang Perkasa.

BPBD was not equipped with SOP. A SOP is presently being drafted for BPBD. Thus, decision to call for evacuation rests with Bupati. In case of tsunami emergency, SAR Elang Perkasa contacts BPBD and local authority before calling evacuation.

Decision making: BPBD was in an alert manner - waiting to receive further information before making any decision. The personnel on duty maintained communication with SAR. The chief of SAR Elang Perkasa cross-checked the warning message with the Tsunami Reference Maps, and found that the EQ source was out of the hazard zone. The on-going communication amongst the members of SAR Network Selatan-Selatan across districts also indicated that the condition on the coasts in Cilacap was normal. These factual findings encouraged SAR Elang Perkasa not to make any suggestion that the local authority to call for evacuation.

Dissemination of warning and guidance: At this stage guidance was not announced and siren was not activated. Instead the SAR members who happened to be among the people shared the warning and advised the people to stay alert.

BPBD in Bantul

Reception of warning: Two personnel on duty at Pusdalops Bantul (Eta and Hari) opened Twitter (@infobgempabmg) and saw the EQ warning. The DVB installed at Pusdalops did not properly function, and the warning was not found at the BMKG website. The warning message found was then cross-checked with the Tsunami Reference Maps, and they found that the EQ source was again out of the Hazard Sector. Later, one personnel contacted SAR member in Parangtritis and asked them to observe the coast for any natural signs. *Info Gempa* popped up at the TV Metro at 03:20.

The existing decision making process in Bantul

BPBD Bantul was formed in June 2010. A Pusdalops running 24/7 has been operating since late 2008. While now BPBD is constructing Rupusdalops, the operation of Pusdalops is still placed at Kesbanglinmas Office. Pusdalops assigns 3 shifts, each is run by 3 persons. It is equipped with DVB and other internet connection, TV, landline phone, facsimile, and additional UHF & VHF radios. Tsunami Reference Maps and SOP are used. Pusdalops has been linked to the community since 2008.

The decision-making process in Bantul is delegated to Pusdalops. Pusdalops is to report to the local authority upon decision made, and it also coordinates with other internal and external key stakeholders.

The head of BPBD Bantul (Dwi Daryanto) received the EQ warning via SMS directly from BMKG and forwarded it to the Bupati and the Sekda. Soon he called Pusdalops via mobile phone asking the personnel to run the procedure; he then rushed to Pusdalops. Arriving at Pusdalops at 03:20, he immediately made contacts via VHF radio to SAR Parangtritis and also to the chief of SAR Elang Perkasa in Kebumen to get updated on the coastal condition and the actions taken. BPBD Bantul and BPBD Cilacap (Suherman) shared information about the latest local condition in both areas.

Decision making: Having found that the EQ source was outside the Tsunami Reference Map (7.0-8.4 RS) and the information about normal coastal condition from various sources, the personnel at Pusdalops, in consultation with the head of BPBD, decided not to call for evacuation.

Dissemination of warning and guidance: Similar to the other districts, Pusdalops in Bantul did not send out guidance neither did activate the sirens. This was mainly due to the fact that Bantul experienced only light tremor, no natural sign was indicated and the people were not so panic.

Kesbanglinmas in Purworejo

Reception of warning: None of the personnel on duty at Posko 24/7 at Kebanglinmas received warning from BMKG. They heard that the warning had been issued by BMKG through SAR radio communication and stayed on alert, awaiting instructions from the head of Kesbanglinmas. Meanwhile, the Kesbanglinmas head (Agus Budi) received the first warning from BMKG via SMS at his house.

The existing decision making process in Purworejo

BPBD has not yet been formed in Purworejo, and disaster management matters are operated under SATLAK. A Posko 24/7 is operated at Kesbanglinmas Office as the secretary of SATLAK. The Posko is equiped with internet connection, TV, landline phone, faximile, and additional UHF & VHF radios, and it has not been linked to the community.

Purworejo has not defined SOP for decision-making. This means that decision making rests with Bupati.

Decision making: The head of Kesbanglinmas took no action following the reception of the warning, but awaiting for further information,. The Military

Commander called the head of Kesbanglinmas to confirm about the EQ event and to prepare for necessary actions.

Dissemination of warning and guidance: The head of Kesbanglinmas immediately forwarded the SMS containing the warning to the Camats of Grabag, Ngombol and Purwodadi. He also followed it up by telephoning the Camats to ask each of them to take necessary anticipative measures.

Peoples' Reactions

People in the 5 districts generally found the tsunami warning merely from the TV. People did not receive warning or official guidance from local government officials.

Cilacap: In Cilacap, some people called BPBD to seek further information and advice for appropriate actions, and many others took immediate decisions to voluntarily move to safe places. Thousands of people ended up at the mosque and the town square in front of the Bupati Office as temporary safe havens and other thousands continued to the higher grounds in Jeruklegi located about 9 km away from the coastal line and further in Tunggulwulung about 15 km. Many of the people used vehicles (motors and cars) which then predictably caused traffic jams in many street junctions – creating chaos. One casualty was reported but the death was not caused by the direct impact of the EQ neither by the evacuation process.

Ciamis: Immediately after feeling the tremors, many of the people in the coastal areas in Ciamis took the initiative to voluntary leave their homes to safe places. In Pangandaran the people and the tourists[4] went to Masjid Agung (mosque), about 1 km from the beach, and many used vehicles. Similarly the people in Batukaras village voluntarily went to Sanghyangkalang mosque[5] located about 300 metres away from the beach or 5 metres high and others to the T-junction towards the Village Office about 2 km away. In the same time, the village head of Batukaras (Ikin) contacted BPBD and a Ciamis Working Group member (Dede of Kesbanglinmas) to get further information and advice for actions. Balawista in Pangandaran observed the coast for any natural signs.

Kebumen: There was an intense communication amongst the SAR members in Suwuk. The chief of SAR Elang Perkasa suggested that SAR informed the people to immediately leave their homes to the safe places commonly known. This suggestion was confirmed as people saw the tsunami warning on the TV. The people in Suwuk went to Gupit Hill in Jladri village, about 1 km from the coast. Meanwhile, the people in Ayah beach contacted the Navy Post located in the same village to get more information and advice. The people in Ayah did not evacuate. The Navy Post played a coordinating role in the communication of SAR Network 'Selatan-Selatan', which was connecting its members spread from Bantul to Ciamis.

Purworejo: Not many people in Purworejo live by the coast, and reportedly they did not leave their homes. People learned about the tsunami warning from the TV. Some SAR members received SMS about the warning directly from BMKG. Some others kept on following updates on the progressing condition in deferent places through the SAR Network frequency, and a few members went to Jatimalang beach to observe for any natural signs.

Bantul: The people were reportedly not in panic as the tremors were lightly felt. However, they kept on being alert and monitoring for any updates on TV. Some people approached SAR members in the nearby and others contacted BPBD to get information on the ongoing condition. Many of the men who lived closer to the beach observed for any natural signs. No evacuation was initiated in Bantul.

[4] The Jakarta Post, Jakarta, Monday, 4 April 2011

[5] During the last event of tsunami (27 July 2006) the people in Batukaras experienced that the tsunami water did not reach the Sangyangkalang mosque. This experience was again used by the people to try to find a safe place in the mosque.

3.2. Reaction upon the 2nd Warning Message 'Tsunami threat is over' from BMKG

The 2nd warning message issued by BMKG was at 04:06. The information indicated that the warning was over, and literally contained ***Peringatan dini TSUNAMI yang disebabkan oleh gempa mag: 7,1SR, tanggal: 04-Apr-11 03:06:39 WIB, dinyatakan telah berakhir::BMKG***. This information was sent out through SMS and broadcasted on TV channels (TV One and RCTI[6]). The people in the 5 districts generally received the 2nd warning from the TV.

Cilacap: BPBD in Cilacap received the information via SMS at about 04:10. Forty minutes later or at about 5 PM the Vice Bupati, accompanied by the head of BPBD in the town square, made public announcement using portable loudspeaker regarding the end of the warning and asked the people to return home as there was no more tsunami threat to be worried about. Soon, people gradually left the square to their homes. Other people in different places saw the information from BMKG on the TV channels, and they also decided to return to their homes.

The return of the large number of the evacuees in Cilacap caused traffic jams in some junctions. The overall return process took hours, and by 11 AM the return was reportedly finished.

Kebumen: Posko BPBD and Posko SAR in Kebumen did not receive the 2nd warning message directly from BMKG but they saw the message on TV at 04:06. The head of Kesbanglinmas in Kebumen received this second information via SMS, and he forwarded it to the Camats. No information was once again sent out to the community by BPBD.

The people in Kebumen received no information regarding the cancelation from the local authority, since BPBD did not make any announcement. At about 5 PM, SAR members were asked by the chief of SAR Elang Perkasa via VHF radio to stop any activities on the coast and to encourage the people to return to their homes. People began to return home. People in Suwuk (Kebumen) remained in the safe places until 7 PM.

Ciamis: BPBD in Ciamis received the 2nd information via DVB, but nothing was done to communicate it to the people. BPBD Ciamis has not yet linked to the community. The people in Ciamis began to leave the safe places and to return to their homes at about 5-6 AM.

Bantul: The head of BPBD at Pusdalops Bantul received the information via SMS. The same information was confirmed by the Regional BMKG in Yogyakarta via VHF radio. Later, Pusdalops contacted SAR in Parangtritis concerning the end of the warning. Soon after receiving SMS, the head of BPBD in Bantul forwarded the warning to the Bupati and to the village apparatus. Meanwhile, radio communication via SAR Network 'Selatan-Selatan' continued.

A family sits on a pickup truck as they return to their home after a tsunami warning was called off in Cilacap. (Jakarta Post, Jakarta, Monday, 4 April 2011)

People in Cilacap returning home after taking voluntary evacuation to higher grounds. (Reuter, 4 April 2011)

[6] BMKG, Earthquake Report, Cilacap, 04 April 2011

4. Conclusions & Lessons Learned

The EQ event had given a valuable opportunity to all concerned to learn the current capacity of the five communities regarding the general preparedness level and specifically on how each of the communities reacted to an instant potential tsunami threat. The below is some important lessons noted.

4.1. Reaction of people to the EQ

In general the reaction of the people in the pilot communities can be perceived as being consistent with what they have planned during the past events of socialisation and evacuation planning process. The consensus they previously made, among others, are that

- *People should move away to the safe places once they feel strong tremors of EQ*
  Such a reaction was also demonstrated amongst the community who felt the strong tremors, for example the people in Cilacap town, the people in Pangandaran and Batukaras in Ciamis and the people in Suwuk in Kebumen. The people in these places took spontaneous decision to evacuate to safe places as previously agreed during the evacuation planning process.

- *People do not need to wait for the call from the local official to start evacuation*
  In none of the 5 districts local authorities issued announcements or activated sirens. However, this did not discouraged people to make their own decision to take precautions by initiating voluntary evacuation. The number of evacuees, especially in Cilacap, was enormously large – thousands people. It shows the awareness of the people to take own responsibility towards their lives had increased.

- *The evacuation process in general followed the evacuation plans made*
  Generally people left their homes to the designated safe places as agreed in the village evacuation planning - no matter how far the places were, e.g. in Cilacap, or how difficult it could be since the evacuation took place early in the morning when it was still dark outside.

  There was inevitably serious chaos and traffic jams in Cilacap due to the fact that people took vehicles to do evacuation. During the evacuation planning processes, people in many places agreed not to use vehicles to ensure smooth flow of evacuation procession; the prevention of using vehicles was applied particularly due to the limitations on the streets, e.g. narrow streets, unreliable bridges to bear heavy loads. Nevertheless, many of the evacuees took their vehicles; this might happened because they were in panic and in the rush. However, this indicates that sound evacuation procedures in relatively densely populated areas had not been well understood by many people.
  .

4.2. Reaction of institutions to the earthquake information and tsunami warning message

It is apparent that the level of preparedness and the implementation of the local tsunami warning chain in the five pilot districts vary a lot. For example, the districts of Cilacap, Kebumen and Bantul apparently have a relatively solid warning chain mechanism and understanding of the procedures. Having received the 1st warning message from BMKG, the personnel on duty cross-checked the warning message with the Tsunami Reference Maps, the findings of which were communicated to their superiors (heads of BPBDs).

However, the decision by the local authorities in the three districts not to issue guidance remains somewhat an internal arrangement to be discussed further on – as for whether or not in a future similar situation it is necessary to issue guidance to help people reduce feeling of panic and either people to stay or to move away to recommended places.

On the other hands, the local authorities in Ciamis and Purworejo who had much less experiences in developing tsunami preparedness and early warning mechanism did very basic actions. They need to learn from the situation and to define appropriate measures and procedures.

4.3. The tsunami warning chain:

4.3.1. Access of local 24/7 services and local authorities to BMKG warnings

All five districts operated 24/7 services have assigned personnel in shifts. Whilst some were relatively new in their posts, they generally performed quick and sensible actions, such as proactively seeking for warning messages from any alternative sources (Internet, HT and TV), initiating communication upwards and downwards within the line of command chain and horizontally to the other neighbouring key stakeholders through HPs and VHF/UHF radios, the latter used the established radio frequency of SAR Network *Selatan-Selatan*.

The evaluation shows that warning receiver devices at the 24/7 require attention for improvement. Four districts - Cilacap, Kebumen, Ciamis and Bantul, were able to receive warning directly from BMKG via one or more of the three recommended devices (DVB/Internet, HPs and TV channels) at the 24/7s, except Purworejo where the Kesbanglinmas head received the warning via SMS at home. The evaluation further revealed that only few persons at the 24/7/Pusdalops in the districts had direct access via SMS from BMKG. The DVB connection installed at BPBD Ciamis was the only one which was able to receive the warnings timely. The DVBs at Pusdalops in Cilacap and Bantul were not functioning well, apparently due to the troubled computer operation system. (Rebooting the system in Bantul took about 10 minutes before the DVB functioned again.) None of the installed Warning Receiver Systems (WRS) at the 24/7 services were programmed to redistribute warning to local actors in the districts. The BMKG website as an alternative media at Pusdalops Bantul to get information did not provide updated information either. The 1st warning message was seen on Metro TV at Pusdalops Bantul at 03:22 or 16 minutes after the EQ, see the hours circled at the bottom, left corner in the picture shown below.

The unavailability of direct access to the 1st warning message from BMKG have said by some personnel on duty to have put them temporarily in uncertainty and being unable to share the right information to the people who contacted the 24/7 service.

4.3.2. Decision making on local level

The districts of Cilacap, Kebumen and Bantul which had longer experience in exercising their decision-making procedures showed consistent steps in reacting to the warnings. Before a decision was concluded, the personnel on duty at the 24/7 followed the procedure agreed by i) proactively seeking for warning messages, and ii) cross-checking the warning content with the available Tsunami Reference Maps and referring it to the SOP chart to conclude an action to take. The maps indicated that the EQ epicentre was outside the hazard sector and the chart indicated that there was no need to call for evacuation. The Tsunami Reference Maps were considered useful by the personnel at the 24/7 particularly when the current warning scheme providing very basic information is still applied. The current warning information was found difficult to be used as a reference to make decision as to announce evacuation or not.

The quick reactions of the BPBD heads who arrived at the 24/7 within minutes had made the personnel on duty more confident to take further actions. The 24/7 in the three districts gave instructions to SARs' members to observe the coasts for natural warning signs. The feedbacks of the observation added the confidence that evacuation was indeed unnecessary.

The absence of clear SOP at the 24/7 and warning dissemination technology in the community in Ciamis and Purworejo had caused uncertainty for the heads of BPBD/Kesbanglinmas and the personnel on duty for decision making and for dissemination of the warning to the public.

4.3.3. Provision of guidance to the community at risk by local authorities

None of the personnel in charge in the districts issued warning and/or guidance to the public. The reasons leading to these decisions varied and were situational. On the other hands, people who were in panic needed information and guidance for appropriate actions.

Knowing that InaTEWS relies on the local authorities as the determiner for evacuation and the guidance to the communities in the respective areas, it then became necessary for BPBDs to reconsider in the future if they decide either to call or not to call for evacuation and to announce any decisions made to the public.

4.3.4. Access to warning and guidance by the community at risk (general public)

- As part of the procedures after a strong earthquake it was agreed that *people should be proactive to seek correct information from different sources*
  It was evident that the majority of the people did not have direct access to the warning from the local authorities. Many made efforts to seek information by contacting Pusdalops, BPBDs and nearest SAR members, observing TVs or listening to the communication of SAR Network. This proactive manner had helped them obtain the expected information quite timely, and in turn, it gave confidence to make own decisions for either to evacuate, to stay or to return.

  Soon after the EQ stopped, members of SAR Communication Network 'Selatan-Selatan' immediately began operationalising the frequency to share information and to know what decision made in the other districts. This frequency linked not only the members across the 5 districts but also the related officials in the districts. The communication retained the latest updates from different sources, the information of which was then shared to the nearby individual people in the community. The users felt the usefulness of the frequency which so far remained reliable. Further it also shows that the presence of VHF users and being connected to the SAR Network frequency gave the advantage to help the nearby people receive the warning collectively almost in a timely manner.

- *Television was one of public media which managed to serve the public well.*
  Many people said to obtain the information of the 1st warning message from TV channels or sometime after certain people received the warning via SMS. The message which contained the magnitude, the time, the epicentre, the depth and the additional information of 'Potensi Tsunami' were felt still unclear for the people to make decision for evacuation. However, many decided to leave for safe places immediately as precautious measures. The late display of the warning on TV – about 16 minutes[7] after the EQ, could put the people at risk if i) tsunami was really triggered by the EQ and ii) people only began to move out from the risk areas after seeing the warning.

4.4. Other

Very little documentation related to the reactions of both the governments and the people had been made by a few related local institutions (Pusdalops, BPBD/Kesbanglinmas) or other key players (SAR, RAPI, ORARI, etc.) in the districts. Having poor documentation may cause the local stakeholders to easily forget and miss the valuable opportunities to have a flashback about what

[7] See the snapshot on Metro TV at Pusdalops Bantul on the previous page

had been done well or what needed for improvements. Such a poor practice needs to be improved in the future. Each local institution needs to encourage their personnel (on duty) to document any important events related to their roles and responsibilities and to withdraw lessons from the events.

Last but not least, this EQ event had indeed given a valuable opportunity to the community to have a real response exercise. After several tsunami drills were conducted in selected communities, this earthquake and the following tsunami warning tested the peoples' evacuation plans, the decision making process at Pusdalops and BPBD, the coordination between disaster management personnel and the local authority and other local stakeholders, and the operability of communication equipment used. It is expected that the individuals in the community takes this event as important lessons.

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