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RISIKO BENCANA DI KABUPATEN PEKALONGAN (DISASTER RISK IN PEKALONGAN REGENCY)

**Ananto Aji¹, Wahid Akhsin Budi Nur Sidiq¹, Satya Budi Nugraha¹,
Dewi Liesnoor Setyowati¹, Nana Kariada Tri Martuti²**

Lecturer of Geography Department of the Faculty of Social Sciences, UNNES¹ and Lecturer of
Biology of the Faculty of Mathematics and Sciences, UNNES²

Email: ajiananto@yahoo.com

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Abstract

Pekalongan Regency of Central Java is a region with high risk of disaster. Various kinds of disaster such as landslide, flood, drought, and tidal flood have somehow become “seasonal customer” for occurring in Pekalongan Regency. This research aimed to prepare the mapping of disaster risk in order to strengthen the efforts in reducing disaster risk in Pekalongan Regency. The research method applied in this research refers to the Head’s Regulation of National Risk Management Agency Number 2/2012. Since the risks of tidal flood were not yet included in the regulation, the field observation approach was used in this research. The analysis of disaster risk also considered the collecting method of disaster history by organizing focus group discussion (FGD) with the related parties. The research result showed that there were high risks of flood disaster covered some sub-districts such as Kajen, Kesesi, Wonopringgo, Karangdadap, Tirto, Wiradesa and Wonokerto; there were twenty six villages in total. High risk of landslide potentially occurred in large part of villages on the south area of Pekalongan Regency. High risk of drought was relatively evenly spread in the center area. Lastly, high risk of tidal flood potentially occurred in fifteen villages along side of Java Sea.

Keyword: *Pekalongan regency, risk, disaster*

Abstrak

Kabupaten Pekalongan – Jawa Tengah merupakan wilayah yang memiliki risiko tinggi terhadap kejadian bencana. Beberapa jenis bencana sudah menjadi “langganan” terjadi di wilayah Kabupaten Pekalongan, seperti tanah longsor, banjir, kekeringan, dan rob. Tujuan penelitian ini adalah menyiapkan peta risiko bencana untuk memperkuat upaya pengurangan risiko bencana di Kabupaten Pekalongan. Metode penelitian yang diterapkan mengacu pada Perka BNPB Nomor 2 tahun 2012. Khusus untuk risiko bencana rob, mengingat belum termaktub di dalam Perka, maka digunakan pendekatan observasi lapangan. Analisis risiko bencana mempertimbangkan proses penjarangan sejarah bencana melalui focus group discussion (FGD) yang melibatkan para pihak terkait. Hasil penelitian menunjukkan bahwa risiko bencana banjir tinggi meliputi Kecamatan Kajen, Kesesi, Wonopringgo, Karangdadap, Tirto, Wiradesa dan wonokerto; dengan jumlah keseluruhan 26 desa. Risiko bencana longsor tinggi berpotensi terjadi di sebagian besar desa di wilayah selatan. Risiko bencana kekeringan tinggi relatif merata di bagian tengah Kabupaten Pekalongan. Adapun risiko bencana rob tinggi berpotensi terjadi di 15 desa di dekat pantai Laut Jawa.

Kata Kunci: peta jalur evakuasi bencana banjir, kesiapsiagaan, stakeholder

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- Alamat Korespondensi :
Gedung C1 Lantai 1FIS UNNES
Kampus Sekaran, Gunungpati, Semarang, 50229
E-mail : geografiunnes@gmail.com

1. Research Background

Indonesia is naturally a region with high level of disaster vulnerability. Indonesia is also in the Pacific ring of fire and is located in the middle of three active earth tectonic plates. This positions Indonesia of having high threat of natural disasters such as volcanic eruption, earthquake, tsunami, and landslide. Moreover, as Indonesia has tropical climate with two seasons and is located in the archipelago, it is prone to the natural consequences for the threat of flood, tidal flood, landslide, wildfire, abrasion, and extreme weather, and disease outbreaks (Koehatman, 2010).

According to the Law No 24 of 2007 on the Implementation of Disaster Management (*Undang-undang Nomor 24 Tahun 2007 tentang Penyelenggaraan Penanggulangan Bencana*), disaster is an occurrence or a set of occurrences that threaten and disrupt life and society's livelihood, which is caused by natural and/or non-natural factors or human factors, resulting in the loss of human lives, environmental damage, loss of property, and psychological impacts (Bakornas PB, 2007). United Nation - International Strategy for Disaster Reduction (in Nurjanah, et al., 2011) also provides another definition for disaster as: *"a serious disruption of the functioning of a community or a society causing widespread human, material, economy or environmental loss which exceed the ability of the affected*

community/society to cope using its own resources".

The development of paradigm of disaster management has shifted from disaster management to disaster risk management (ISDN, 2005 in Purnomo, 2013). Furthermore, Purnomo (2013) states that in the paradigm of reducing disaster risk, negative impacts of certain disasters could be reduced if the society understands the characteristics of regions that are prone to disaster, understand the objects that are vulnerable to hazard, and understand individual or society's capacity in dealing with disasters.

The study of disaster risk under the framework of disaster management in Indonesia has quite diverse translation. The Head's Regulation of National Risk Management Agency Number 2 of 2012 on the General Guidelines for Disaster Risk Studies (*Peraturan Kepala BNPB Nomor 2 tahun 2012 tentang Pedoman Umum Pengkajian Risiko Bencana*) provides certain limitation that the study of disaster risk is a tool to determine the possibility and the amount of loss due to the existing disaster threat. Furthermore on its definition, the study of disaster risk is an integrated mechanism to provide holistic view of the disaster risk in a region by analyzing the degree of threat, degree of loss, and the region's capacity. The scope of the study of disaster risk includes the study of degree of

disaster risk, the study of vulnerability level, the study of capacity level, and the study of risk level (BNPB, 2012).

The type of disaster in a region will differ from another region, depending on the condition and physical feature of the region. Pekalongan Regency (*Kabupaten Pekalongan*) as one of regencies in Central Java is a particular region that has high risk of disaster occurrences. This is because Pekalongan Regency has corrugated morphology in the southern part and lowland in the northern part. In terms of climate, the southern part tends to have high rainfall, even reaching more than 6,000 mm/year (BPS Kabupaten Pekalongan, 2013). Based on the interview conducted with BPBD Kabupaten Pekalongan, it was recorded that high rainfall in the southern areas often triggered landslide and flash flood in the northern part. In 2013, there were 79 cases of landslide and 16 cases of flood. Specifically in Kecamatan Tirto, some villages also suffered from tidal flood routinely. On the contrary, on dry season, some sub-districts (*Kecamatan*) in Pekalongan Regency also suffered from drought (BPBD Kabupaten Pekalongan, 2014).

Based on the explanation on the research background, this research aimed to perform comprehensive assessment on the risk of disaster in order to strengthen the efforts of

reducing disaster risk, which would involve some stakeholders in Pekalongan Regency.

2. Research Methods

Principally, the calculation of disaster risk refers to the guidelines included in the Head's Regulation of National Risk Management Agency Number 2 of 2012 on the General Guidelines for Disaster Risk Studies (*Peraturan Kepala BNPB Nomor 2 tahun 2012 tentang Pedoman Umum Pengkajian Risiko Bencana*) (BNPB, 2012). However, besides the analysis result, it is also important to include the process of acquiring more data on the history of disaster by conducting focus group discussion (FGD) that involved some related parties from the research areas (Chambers, 1996).

The study of disaster risk is considered as an approach to present the potential of negative impacts that might occur after a potential disaster that occurs. The occurring potential of negative impacts is calculated based on vulnerability and capacity levels on a particular region. The potential of negative impacts are seen through the potential of the exposed population to the disaster, the loss of property, and environmental damage. Generally, the calculation of disaster risk is conducted by applying the following formula (BNPB, 2012):

$$\text{Disaster Risk} = \text{Threat} \times \text{Vulnerability} / \text{Capacity}$$

Based on the above approach, it could be seen that the degree of disaster risk is highly influenced by the level of threat, vulnerability, and capacity. Basically, the effort in studying the disaster risk is to determine the magnitude of three components of risks and to present them in spatial or non-spatial form to make

them more easily understood. Therefore, the efforts in managing disaster risks are in the form of: 1) reducing threat; 2) lessening vulnerability; and 3) improving capacity. The following figure presents the chart showing the method of disaster risk mapping (Figure 1).

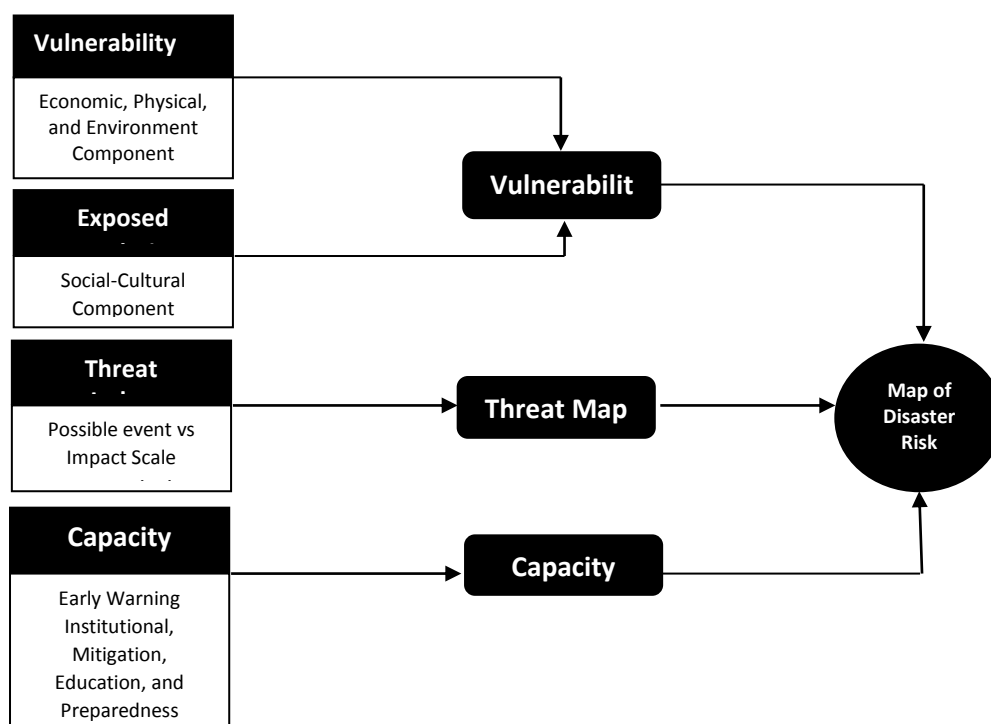


Figure 1. Method of Disaster Risk Mapping

(Source: Head's Regulation of National Risk Management Agency Number 2 of 2012)

2.1 Vulnerability Index

Vulnerability is a set of conditions and/or a result of circumstances (physical, social, economic, and environmental factors) which has negative impacts on the efforts of preventing and managing disaster (BNPB, 2012). Vulnerability has strong relation with individual or community's ability to deal with

threat. Based on the Head's Regulation (*Perka*), the study of vulnerability could be divided into four parts; they are social vulnerability, economic vulnerability, physical vulnerability and ecological vulnerability.

2.2 Threat Index

Threat of disaster is a physical phenomenon or human's activities that have

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the potential in causing the loss of life, damage to property, social and economic disruptions or environmental damage (BNPB, 2012). Based on the studies of the disaster occurrence data in Pekalongan Regency, it showed that there were some natural disasters that often threatened the regions such as flood, landslide, drought, and tidal flood. The assessment of disaster risk was conducted by studying the factors influencing

the occurrence of those disasters (Table 1). Specifically for the threat of tidal flood, the determination of inundation spread was performed by field measurements on the highest tide because the method to calculate tidal inundation has not been arranged in the Head's Regulation of National Risk Management Agency Number 2 of 2012 (*Perka BNPB Nomor 2 Tahun 2012*).

Table 1. Factors Influencing the Threat of Disaster

No	Type of Disaster Threat	Parameter	Score (%)
1	Flood	Geomorphological Condition	25
		Regional Hydrology	25
		Vegetation cover	10
		Type of soil	10
		Annual rainfall	30
2	Landslide	Slope tilt	35
		Vegetation cover	25
		Intensity of shocks	20
		Annual rainfall	20
3	Drought	Annual rainfall	30
		Vegetation cover	30
		Map for the threat of drought	40

Source: Head's Regulation of National Risk Management Agency Number 2 of 2012

2.3 Capacity Index

Capacity is the ability of an individual or group of people in dealing with the danger or threat of a disaster. There are some aspects of ability such as policy, preparedness, and society's participation. The assessment of ability is conducted on human resources of an individual, a household, or a group in dealing with a threat and in surviving the impacts of a disaster threat. The assessment is conducted based on the aspects of policy, preparedness,

and the society's participation. The indicators that are used for the assessment of capacity include: a) rules and institutions of disaster management; b) early warning and the studies of disaster risks; c) education on disaster; d) reduction of basic risk factors; and e) the development of preparedness in all levels.

3. RESULTS AND DISCUSSION

3.1 History of Disaster Occurrence in Pekalongan Regency

The problems of natural disaster occurring in Pekalongan Regency are considered as highly concerning. BPBD Kabupaten Pekalongan (2014) informs that in Pekalongan Regency, there were 91 cases of

natural disaster in 2007 and increased to 262 cases in 2011. In 2013, there were 79 cases of landslide and 16 cases of flood. In dry season, some sub-districts in Pekalongan Regency often suffered from drought. Especially for Kecamatan Tirto, some villages even suffered from regular cases of tidal flood.

Table 2. History of Disaster Occurrence in Pekalongan Regency

Types of Disaster	Location (Sub-districts)	Frequency	Scale of Occurrence Possibility
Stagnant water in coastal areas (flood and tidal flood)	Siwalan, Wonokerto and Tirto	2005 - now	Annual occurrence
Intrusion of sea water	Siwalan, Wonokerto and Tirto	2005 - now	Occurrence within < 5 years
Drought and Water Shortage	Sragi and Kesesi	2005 – 2010, 2014	Annual occurrence
Flood and Erosion	Sragi, Kesesi, Wonopringgo, and Kajen	Sragi – 2006 Kesesi – 2010 Kajen – 2014	High chance of reoccurrence
Landslide	Kandangserang, Paninggaran, Petungkriyono, Doro, Talun, Kajen, Lebakbarang, Kesesi, Karanganyar	Frequent	Annual occurrence
Tornado	Kesesi, Sragi, Kajen, Wonokerto, Petungkriyono, Kandangserang, Doro, Paninggaran, Wiradesa, Tirto	Frequent	Annual occurrence

Source: Environment Agency of Pekalongan Regency, 2014

Based on the information presented in Table 2, it was found that the areas in Pekalongan Regency were considered prone to natural disaster. Landslide often occurred in the southern part with special characteristics of undulating topography with steep contours and high rainfall. High rainfall in the southern part also caused high river flow debit that flows to the Java Sea; therefore, causing flood in the northern part, which was dominated with flat

grounds (in some areas tended to be concave). The negative impacts of flood would be harder for the people because at the same time, tidal flood also occurred in the northern part, which obstructed river flow to the sea. Furthermore, drought and tornado were also prone to occur in some sub-districts of Pekalongan Regency.

When the authors conducted the focus group discussion (FGD) with the government officials of all sub-districts in Pekalongan

Regency on 23 December 2014, it was recorded that landslide, flood, and tidal flood were the dominant disasters that had been frequently occurring in Pekalongan Regency.

Table 3 presented the summary of FGD results of the history of disaster in Pekalongan Regency.

Table 3. Sub-districts and Villages with High Potential of Disaster Occurrence

No.	Sub-districts	Village Experiencing Disaster		
		Landslide	Flood	Tidal flood
1.	Kandangserang	Klesem, Bodas, Luragung, Bojongkoneng, Wangkelang, Gembong, Trajumas, Sukoharjo, Tajur, Karanggondang, Garungwiyono, and Kandangserang		
2.	Paninggaran	Bedagung, Paninggaran, Winduaji, Krandegan, Botosari, Lumeneng, Werdi, and Notogiwang		
3.	Lebakbarang	Wonosido, Timbangsari, Kutorembet, Tembelanggunung, Depok, Bantarkulon, and Mendolo		
4.	Petungkriyono	Songgodadi, Tlogopakis, Simego, Curugmuncar, Tlogohendro, Kasimpar, Yosorejo, and Kayupuring		
5.	Talun	Jolotigo, Sengare, and Mesoyi		
6.	Doro	Pungangan		
7.	Karanganyar	Lolong, Gutomo, and Pedawang		
8.	Kajen	Linggoasri, Brengkolang, and Kutorojo	Kutorejo, Pekiringanalit, Sangkanjoyo, Sabarwangi, and Wonorejo	
9.	Kesesi	Ujungnegoro, Sukorejo, Windurojo, Srinahan, and Kesesi	Watugajah, Jagung, and Langensari	
10.	Sragi			
11.	Siwalan			
12.	Bojong			
13.	Wonopringgo	Galangpengapon	Galangpengapon	
14.	Kedungwuni	Rengas and Kedungwuni Barat		
15.	Karangdadap	Kaligawe, Pangkah, Kalilembu, Karangdadap, and Kebonsari	Jrebengkembang	

No.	Sub-districts	Village Experiencing Disaster		
		Landslide	Flood	Tidal flood
16.	Buaran	Simbangkulon, Wonoyoso, and Watusalam		
17.	Tirto		Jeruksari, Mulyorejo, Tegaldowo, and Karangjampo	Jeruksari, Mulyorejo, Tegaldowo, and Karangjampo
18.	Wirodesa	Karangjati and Bener	Bener	
19.	Wonokerto	Pecakaran and Pesanggrahan	Werdi, Wonokertokulon, Api-api, Pecakaran, Bebel, Tratebang, Wonokertowetan, Sijambe, Pesanggrahan, Semut, and Rowoyoso	Werdi, Wonokertokulon, Api-api, Pecakaran, Bebel, Tratebang, Wonokertowetan, Sijambe, Pesanggrahan, Semut, and Rowoyoso

Source: Research Analysis and Result of FGD, 2014

3.2 Disaster Risks in Pekalongan Regency

The determination of disaster risk was acquired from the calculation of threat level, the level of vulnerability, and the capacity level of disaster in the areas of Pekalongan Regency; and by putting the results of the conducted FDG into consideration.

a. Risk of Flood

Figure 2 displayed the calculation result of flood disaster risk index in Pekalongan Regency for village or *kelurahan* analysis unit. High risk of flood was found in Kecamatan Kajen (Desa Kutorejo, Pekiringanalit, Sangkanjoyo, Sabarwangi, and Wonorejo), Kecamatan Kesesi (Desa Watugajah, Jagung, and Langensari), Kecamatan Wonopringgo (Desa Gelangpengapon), Kecamatan Karangdadap (Desa Jrebengkembang), Kecamatan Tirto (Desa Jeruksari, Mulyorejo, Tegaldowo, and Karangjampo), Kecamatan

Wirodesa (Desa Bener), and Kecamatan Wonokerto (Werdi, Wonokertokulon, Api-api, Pecakaran, Bebel, Tratebang, Wonokertowetan, Sijambe, Pesanggrahan, Semut, and Rowoyoso). Furthermore, especially for the flood occurring in 16 villages on three sub-districts (Tirto, Wirodesa and Wonokerto) was the accumulation of flood coming from the southern side and was also caused by the tidal rob that routinely engulfed the north part of Pekalongan Regency. The occurrence of tidal rob caused the seawater to flood the river estuary, therefore, it hindered the river flow to the Java Sea.

b. Risk of Landslide

The calculation result of the landslide disaster risk in Pekalongan Regency for village or *kelurahan* analysis unit was presented on Figure 3. Most of the villages in the south side had high risk of landslide disaster. This was

mainly caused by the fact that the morphology in the south side was dominated with undulating hills and high rainfall.

Landslide is the most common disaster to occur in the south side of Pekalongan Regency. In some cases, landslide in Pekalongan Regency even resulted in casualties. Among the southern sub-districts with high risk of landslide, Kecamatan Kandangserang had the highest risk of landslide. This was mainly because the range of hills in Kecamatan Kandangserang merges with the range of hills in Kecamatan Karangkoobar of Banjarnegara Regency.

c. Risk of Drought

The calculation result of the drought disaster risk index in Pekalongan Regency for village or *kelurahan* analysis unit was displayed on Figure 4. The spread of villages with the potential of drought was relatively evenly spread in all regions in Pekalongan Regency, especially in the center area. This

was actually ironic remembering that with high rainfall in the area, the land should have been able to store rain water in large quantity. However, in fact, most of the rainfall turned into run off and flowed into the river or creek.

d. Risk of Tidal Flood

The determination of tidal flood risks is actually not yet included in the Head's Regulation of National Risk Management Agency Number 2/2012 (*Peraturan Kepala BNPB Nomor 2 Tahun 2012*). Therefore, the regional government often encountered some obstacles in organizing disaster risk alleviation programs. Figure 5 presented the map of tidal flood disaster risk in Pekalongan regency. The spread of tidal inundation was quite evenly in the north part of Pekalongan regency, even, tidal flood had started to spread until some kilometers in the south side, especially in some locations on the river banks that are mostly flat or concave areas, and is still affected by tidal currents.

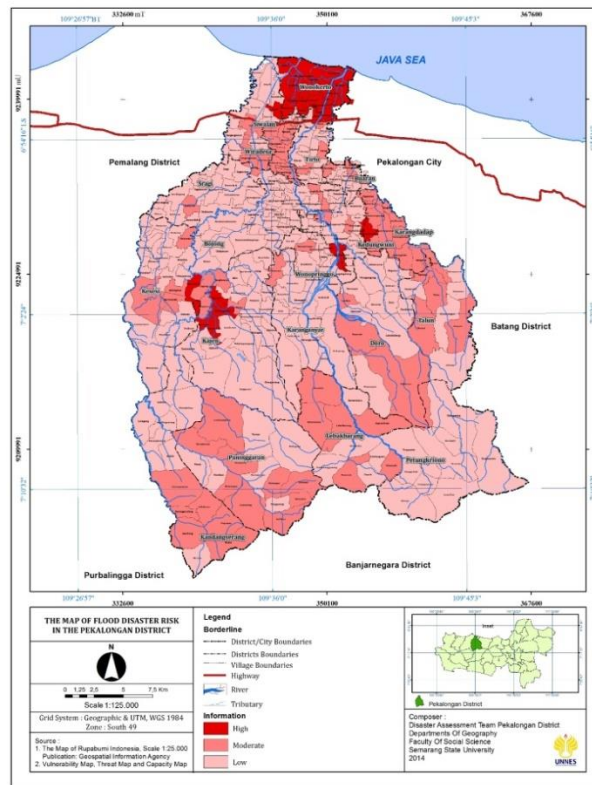


Figure 2. The Map of Flood Disaster Risk

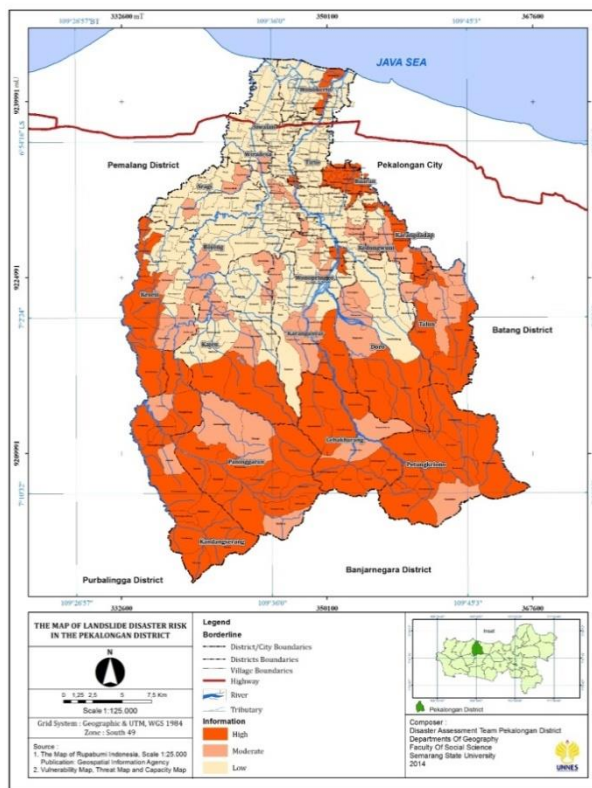


Figure 3. The Map of Landslide Disaster Risk

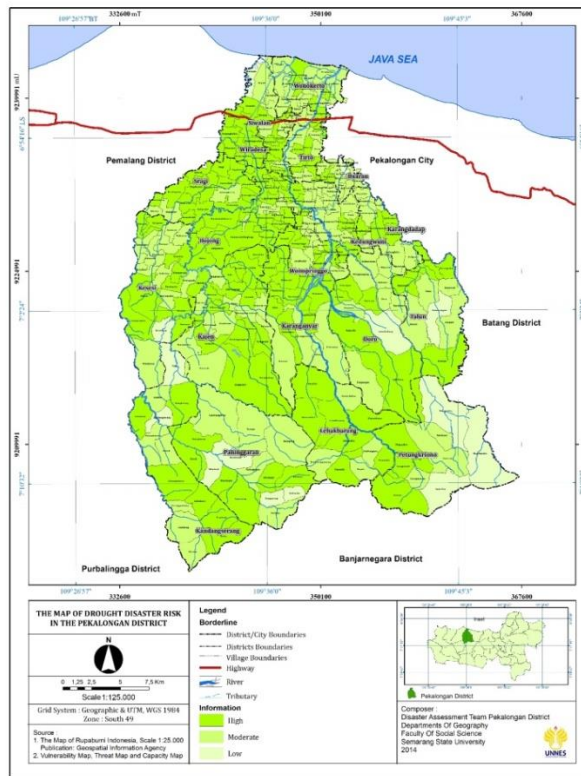


Figure 4. The Map of Drought Disaster Risk

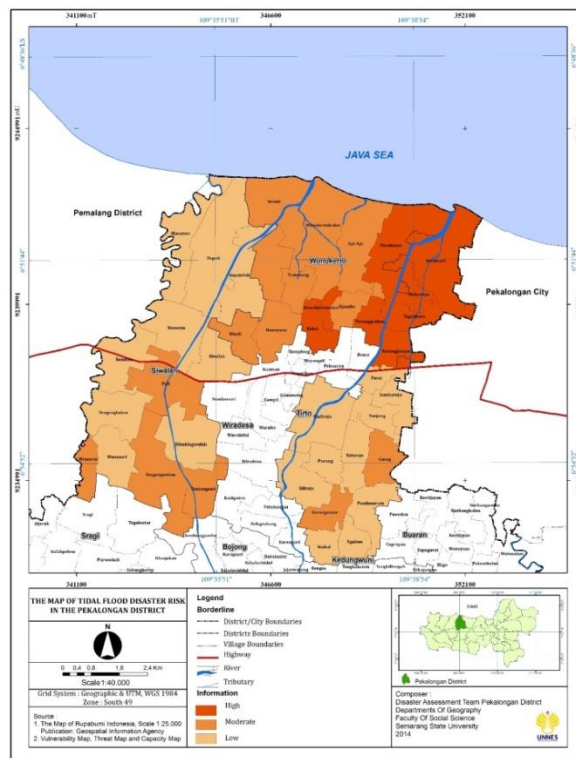


Figure 5. The Map of Tidal Flood Disaster Risk

4. CONCLUSION

Based on the research result conducted, it was identified that Pekalongan Regency had significantly high disaster risk. There were some disaster risks that would need thorough attention such as landslide, flood, drought, and tidal flood. The research had successfully created a map of disaster risk for the four types of disasters by each village (*kelurahan*) analysis unit.

The creation of map for disaster risk was expected to be beneficial for some related parties. Therefore, the programs of disaster management and alleviation could be more organized and right on the proper targets. The regency government and the local society should have done some adaptation and mitigation actions on the occurring disaster risks; hence, they would be able to minimalize the loss that might occur due to disasters.

5. REFERENCES

- Chambers, Robert. 1996. *PRA (Participatory Rural Appraisal), Memahami Desa Secara Partisipatif*. Yogyakarta: Penerbit Kanisius.
- Kodoatie, Robert J and Sjarief, Roesta. 2008. *Pengelolaan Sumber Daya Air*. Yogyakarta: Andi.
- Nurjanah, R. Sugiharto, Kuswanda Dede, Siswanto BP, Adikoesoemos. 2011. *Manajemen Bencana*. Jakarta: Alfabeta.
- Purnomo, Nugroho Hari, Sutikno, Sunarto, and Lutfi Muta'ali. 2013. Risiko Longsor Lahan pada Lahan Pertanian di Kompleks Gunungapi Kuarter Arjuno Jawa Timur. *Jurnal Forum Geografi* Volume 27, Nomor 1, Juli 2013. Surakarta: Fakultas Ilmu Geografi UMS.
- Ramli, Koehatman. 2010. *Pedoman Praktis Manajemen Bencana*. Jakarta: Dian Rakyat.
- Tjokronegoro, et al., 2009. *Mengelola Risiko Bencana di Negara Maritim Indonesia (Gestion du risque des catastrophes en Indonésie)*. Zen, M.T (editor). Bandung. ITB Press.
- BAKORNAS PB. 2007. *Undang-undang Republik Indonesia Nomor 24 Tahun 2007 tentang Penanggulangan Bencana*. Jakarta: BAKORNAS PB.
- BLH Kabupaten Pekalongan. 2014. *Status Lingkungan Hidup Daerah*.
- BNPB. 2012. *Peraturan Kepala BNPB Nomor 2 Tahun 2012 tentang Pedoman Umum Pengkajian Risiko Bencana*. Jakarta.
- BPBD Kabupaten Pekalongan. 2014. *Data Kejadian Bencana di Kabupaten Pekalongan*.
- BPS Kabupaten Pekalongan. 2013. *Kabupaten Pekalongan dalam Angka*.