
**The proposal of Action Plan for Improving the
Capability of Banjir Bandang Mitigation in Indonesia**

This proposal has been revised by several stakeholders, namely:

- | | |
|---|---|
| 1. Ir. Arung Samudro | Directorate of River and Coastal |
| 2. Ir. Sudarsono, CES | Directorate of Operations and Maintenance |
| 3. Ir. Hariyono Utomo, ST. MM | Directorate of River and Coastal |
| 4. Dr. Untung Santoso | Balai Sabo |
| 5. Ir. Agus Sumaryono, Dip. HE. | Balai Sabo |
| 6. Drs. Sutikno Hardjosuwarno, Dip. HE. | Balai Sabo |
| 7. C. Bambang Sukoco | Balai Sabo |
| 8. Arif Rahmat Mulyana, ST. | Balai Sabo |
| 9. Ir. H. Mulyanto Dip. HE. | Practitioner |
| 10. Ir. Subarkah, Dip. HE. | Practitioner |
| 11. Ir. Haryono K., Dip. HE. | Practitioner |
| 12. A. Lesto P. Kusumo | Practitioner |

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Preface

Geographically, Indonesia is located on the equator and flanked by two oceans, causing Indonesia have tropical regions that tend to have high intensity rainfall. Besides, in some regions, Indonesia has rough geographical conditions and morphology relief. Therefore Indonesia region vulnerable to hydro-meteorological disasters, one of which is Banjir Bandang.

Problems occur because there are many residential areas around areas prone to banjir bandang. Residents who live in and around flood-prone areas is a resident that potential become victims of banjir bandang disasters. Experience shows that banjir bandang disaster has caused much harm and suffering. For example, on January 2, 2006, there was a banjir bandang in Jember, East Java, which caused 92 people dead, 1900 people were displaced, and about 2500 buildings damaged, and other events held on October 4, 2010 banjir bandang occurred in Wasior district, West Papua causing hundreds of casualties.

The Indonesian government seeks to protect the entire population from the threat of banjir bandang disasters. The efforts that should be made focus on strengthening capacity and improving disaster mitigation to reduce risk. Structuring space-based disaster mitigation is also done to improve the safety, comfort of life and livelihoods of Indonesia.

The proposal of Action Plan for Improving the Capability of Banjir Bandang Mitigation in Indonesia

1. Scope

The proposal of Action Plan is intended to National Disaster Management Agency (BNPB) coordinating with Ministry of Public Works (MPW) in improving the capability of banjir bandang mitigation efforts. In its implementation is not restricted only to BNPB and PU alone, but can also be implemented by other interested parties in improving the ability of flood disaster mitigation.

2. The purpose and objectives

The purpose of making this proposal is to improve the capability flood disaster mitigation as part of government efforts in providing protection to the public from the threat of disaster.

The objectives are:

- Assist the government in disseminating the rule of law and legislation related to banjir bandang mitigation, so that people can be involved actively and equitably in mitigation implementation according to provisions of applicable law;
- Assist the government in transferring knowledge to the public in an effort to reduce the vulnerability of individuals, families and local communities in and around areas that are vulnerable to banjir bandang disasters;
- Increase public awareness to engage actively in mitigating banjir bandang disaster in a planned manner, integrated, coordinated, and comprehensive;
- Increase the capacity of individuals, either government personnel or the general public in dealing with banjir bandang disasters, through community-based approaches (community-based disaster management), so still appreciate local culture;
- Support the officer in charge in helping and guiding the change of people's behavior in preventing the occurrence of banjir bandang;
- Provide input to local government in an attempt to prevent or reduce the risk of banjir bandang hazards in their respective areas.

3. Legal foundation

References used in the making this proposal is can not be separated from the following legal basis:

- Republic of Indonesia Government Regulation Number 38 of 2007 regarding the Division of Government Affairs between the Government, Provincial, and Local Government of Regency/City;
- Republic of Indonesia Government Regulation Number 21 of 2008 regarding the Implementation of Disaster Management;
- Republic of Indonesia Government Regulation Number 42 of 2008 regarding the Water Resources Management;
- Republic of Indonesia Government Regulation Number 37 of 2010 regarding Dam;
- Republic of Indonesia Government Regulation Number 38 of 2011 regarding River;
- Presidential Regulation No.24 of 2010 regarding State Ministry Auth;
- Republic of Indonesia Law No. 2 of 2002 regarding the State Police of the Republic of Indonesia;

- Republic of Indonesia Law No.20 of 2003 regarding National Education System;
- Republic of Indonesia Law No.7 of 2004 regarding Water Resources;
- Republic of Indonesia Law No.24 of 2007 regarding Disaster Management;
- Republic of Indonesia Law No.26 of 2007 regarding Spatial Planning;
- Republic of Indonesia Law No.4 Year 2011 regarding Geospatial Information.

4. The introduction of banjir bandang

4.1 Banjir bandang description

Banjir bandang is a flood that occurs suddenly and powerful. Banjir bandang formed in the range of a few minutes to several hours after a heavy rain in a short time on the watershed or on a narrow river channel on the upstream. The flow the river has a short time of concentration, so that runoff can quickly accumulate in the river channel.

Banjir bandang characteristics:

- has a peak discharge which jumped suddenly and subsided again quickly;
- has a big volume and high flow rate;
- has a very big flow transport capacity and erosion power, so can bring the material erosion toward downstream direction;
- the flow that bring debris material can lead to catastrophic sediment in downstream areas after the apex point.

The causes of the occurrence of banjir bandang are:

- Accumulation of heavy rainfall that fell in a short time duration on river upstream watershed, where then the volume of water collected in a short time into the river channel, causing a large spike and sudden discharge exceeds the capacity of the flow path downstream.
- The collapse of dam, levee or natural dam that occur because of the accumulation of landslide material on river channel.

4.2 Natural dam

The collapse of natural dams is one of the main causes of banjir bandang, therefore the following will be discussed more about the formation process and the cause of collapse of natural dams.

The formation process of natural dams:

- because of the landslide;
landslide material in the form of soil, rocks, or trees, can fall into the river and immediately form a dam. In other cases, the landslide material can be carried away by the flow and clog the river flow on the bottleneck pattern that will gradually form a dam.
- because of illegal logging in the uplands.
logs with irregular size accompanied by the roots and branches of trees that are the result of illegal logging, it can slowly drawn into river upstream, so can block the river flow naturally.

The cause of the collapse of natural dams:

- Overtopping;
the river water that is blocked by natural dam, slowly increase the water level. When the water level has reached the upper limit of the dam, the water will begin to spill over the dam as well as grinding dam material until all dam material eroded. This incident caused the river water becomes turbid.

- Piping;
air sungai yang terbendung oleh bendungan alam, dapat mengalir ke dalam tanah menyusur dasar dan dinding bendungan alam. Jika mencapai kecepatan kritis, butiran tanah akan terbawa sehingga terjadi peristiwa piping sehingga akhirnya bendungan alam dapat runtuh. Kejadian ini sering menyebabkan air sungai menjadi keruh.
- Liquefaction;
is the phenomenon of loss of soil strength due to soil saturation and (earthquake) vibration. At the time of vibration, pore water pressure within the layer of soil/sand can be increased, approaching or exceeding the vertical stress so that the force of friction between the sand particles becomes lost. This resulted in soil strength decreases drastically. At this time, a layer of soil/sand can turn into a liquid that cannot sustain the burden of dams in or on top of it. This event often occurs because of heavy rainfall or a discharge that causes a large vibration or rumbling sound which heard as the signs.

4.3 Landslides

Natural dam generally formed by landslide material. The characteristics of landslide prone areas and their cause factors will be explained below.

In principle, a landslide occurs when the driving force on slopes greater than anchoring force. Anchoring force is generally influenced by the strength of rock and soil density, while the driving force is influenced by the magnitude of the slope angle, water, heavy loads and types of soil/rock.

Characteristics of landslide prone areas:

- Has high rainfall intensity;
Long dry season caused the large numbers of evaporation water on the soil surface. This resulted the pores or cavities of land and thus the land surface to crack and fissure. When the rain falls with a high intensity, water will infiltrate into the cracks to make the soil becomes saturated in a short time and can accumulate at the bottom of the slope, so create the lateral movement and landslide occur.
- Classified as a slope area/steep cliffs;
Slope or cliffs that would enlarge the driving force can trigger the landslides.
- The content of the soil is less dense and thick;
The type of less dense soil is clay with thickness of more than 2.5 m. This soil type is very susceptible to ground movement because it's easy to become mushy when exposed to water and easily broken when the weather is too hot.
- Have a less strong rock;
In most cases the less strong rocks are volcanic rocks and sedimentary rocks which have sizes such as sand and a mixture of gravel, sand, and clay. The rock will easily become the soil when undergoing a process of weathering, thus generally prone to landslides.
- A land use type that prone to landslide;
Many landslides occurred in rice fields and cultivation areas. In rice field areas, the roots is less strong to bind the soil grains so the soil becomes soft and saturated with water, therefore on this land use type, landslides will easily happen. Whereas for cultivation areas, the tree roots can not penetrate the deep field of landslide and and it's generally occurs in old landslide area.
- The erosion;
Erosion is mostly done by river water towards the cliff. In addition, deforestation around the bend of the river causing a steep cliff and become prone to landslide.
- Is a former area of the old landslide;
The former area of the old landslide characterized as follows :
 - the existence of a long steep cliffs which curved shape of a horseshoe

- generally there are springs and trees are relatively thick because the soil loose and fertile
 - the existence of small landslides, especially on cliffs of the valley
 - the cliffs are relatively steep
 - presence of grooves and found the cracks on the ridge of the valley and small landslides
- Is a discontinuities plane (plane that are not aligned);
This plane is a weak plane and can serve as a glide landslides plane and has the characteristics as follows :
- the plane of bedding rock
 - the contact plane between the ground cover and the bed rock
 - the contact plane between the cracked rocks and a solid rock
 - the contact plane between the rocks that can pass water and the rocks that cannot pass water (waterproof)
 - the contact plane between the soft soil and a solid soil.

5. Basic principles

Some basic principles implemented in improving banjir bandang disaster mitigation are:

- a. Speed and accuracy of banjir bandang disaster mitigation;
Speed of mitigation is affected by equipment and trained staff. While the precision of mitigation is associated with methods that suitable with the character of an area.
- b. Priority of banjir bandang mitigation implementation;
Level of priority needs to be done because the government has limited allocation of funds and time. Priority level is determined based on field conditions.
- c. Coordination and integration of stakeholders in implementing banjir bandang mitigation;
- d. Efficient and effective in mitigating banjir bandang disasters;
- e. Transparent and accountable in implementing flood mitigation;
- f. Implementation of partnership actions among the stakeholders include the development efforts;
- g. Empowerment of existing resources to increase banjir bandang mitigation;
- h. Uphold equal rights and obligations of all parties that are involved in the enhancement of banjir bandang mitigation;
- i. Provision of assistance or contribution to improving banjir bandang mitigation should not be associated with a particular religion or belief.

6. Terms and definitions

The following are descriptions of terms and their definitions used in this proposal.

6.1 debris flow

a type of mass movement flow of debris material with a very large transport content, coarse grained, non-cohesive, composed of small to large grained material such as sand, gravel, small rocks and large stones.

6.2 threat of disaster

an event or circumstances that may lead to disaster.

6.3 apex

the location of inflection point steepness riverbed from upstream to downstream which became more gentle.

6.4 flood

the event of overflowing river water exceeds the riverbed.

6.5 banjir bandang (flash flood)

big flood that occurs suddenly, because of the overflow discharge that exceeds the flow capacity of rivers by the rapid concentration of high-intensity rainfall and often brings debris flow or the collapse of the natural dam, that formed of deep-seated landslide material in the upstream area of the river.

6.6 dam

buildings in the form of barrow, stone barrow, concrete, and/or masonry built in addition to detain and hold water, can also be built to hold and accommodate mine waste, or accommodate mud that formed the reservoir.

6.7 bottleneck

narrowing of the lane

6.8 watershed

an area of land, which is a unity with the river and its tributaries, which serve to accommodate, store, and stream water originating from rainfall to the lake or the sea naturally, where the boundary on land is topographical separators and the boundary at sea until the waters are still affected land activities.

6.9 primary data

the data which obtained directly from the object or the result of a direct measurement.

6.10 secondary data

the data which obtained indirectly from its object, but through other sources with oral and written or supporting data obtained from some literature studies, maps and publication results.

6.11 emergency evacuation

the direct activities and rapid transfer of people away from the threat or actual occurrence from the hazard.

6.12 shelter

temporary shelters for victims of natural disasters and their supporting infrastructure either through temporary shelter, semi-permanents shelter, and permanent shelter by using the principles of disaster management.

6.13 international institution

organization within the scope of organizational structure of the United Nations or that perform tasks represent the United Nations or other international organizations and foreign non-governmental agencies from other countries outside the United Nations.

6.14 business institution

any legal entity which can form the state owned enterprises, regionally owned enterprises, cooperatives, or private established suitable with the provisions of legislation that runs the type of business permanently and continuously working and domiciled in the territory of the Republic of Indonesia.

6.15 landslide

a mass transfer process of soil or rock with obliquity from its original position (so apart from a solid mass), because of gravity, the current attack, earthquake, etc., with the kind of rotation and translational motion.

6.16 mitigation

series of efforts to reduce disaster risk, either through physical development as well as awareness and increasing ability to cope the threat of disaster.

6.17 stakeholder

all parties concerned with the issues and problems that are being raised.

6.18 local government

implementation of government affairs by the local government and parliament according to the principles of autonomy and the duty of assistance to the principle of autonomy within the system and the principle of the Unitary Republic of Indonesia as defined in the Constitution of the Republic of Indonesia Year 1945.

6.19 central government

President of the Republic of Indonesia who holds the power of the state government of Republic of Indonesia as defined in the Constitution of the Republic of Indonesia in 1945.

6.20 spatial planning

a system of spatial planning processes, space utilization, and control of space utilization.

6.21 refugees

a person or group of people who had or were forced out of their homes for a period that cannot be ascertained as the effect of adverse events or natural disasters.

6.22 early warning

a series of warning issuance events as soon as possible to the community about the possibility of disaster in a place by the competent institution.

6.23 disaster-prone

conditions or characteristics of geological, biological, hydrological, climatological, geographical, social, cultural, political, economic, and technology on a region for a certain period which reduces capability to prevent, mitigate, achieving readiness, and reduced ability to respond to the adverse effects of certain hazards.

6.24 rehabilitation

an effort to repair and restore all aspects of public services to an acceptable level in post-disaster area with the main goal is for the normalization the aspects of government and community life in regions hit by disaster.

6.25 reconstruction

rebuilding all infrastructure and facilities in disaster areas, at level of government or society with the primary goal is to cultivate the economic, social and cultural communities, and upholding law and order, and all aspects of social life in post-disaster areas.

6.26 disaster risk

potential losses caused by disasters on a region and a certain period that could be death, injury, illness, life is threatened, the loss of a sense of security, displaced, damage or loss of property, and disruption of community activities.

6.27 early warning system (EWS)

a sequence of deliver information of prediction result of a threat to the public, prior to the occurrence of an event that may cause a risk which aims to provide a warning so that the recipient can immediately alert and act according to the conditions, circumstances and time. The main principle is to provide fast, accurate, effective, accepted, easily understood, credible and sustainable.

6.28 river

a channel or containers of natural and/or artificial water in the form of water drainage network along with water in it, ranging from upstream to the estuary, with limited right and left by a line of demarcation.

6.29 tagana

Tagana composed of the words: "Taruna" means that the younger generation, "Siaga" that has a meaning all preparedness efforts in any circumstances, "Bencana" has the meaning of the challenges and problems to be solved.

6.30 disaster emergency response

a series of activities that carried out immediately at the time of disasters to deal with the adverse effects caused, which includes rescue and evacuation of casualties, property, fulfillment of basic needs, protection, management of refugees, rescue, and facilities and infrastructure recovery.

7. The parties that play a Roles

Here's a list of parties that contribute in efforts to increase the flood disaster mitigation in Indonesia, namely:

- Ministry of Home Affairs;
- Ministry of Energy and Mineral Resources;
- Ministry of Health;
- Ministry of Finance;
- Ministry of Communications and Information Technology;
- Ministry of Public Works;
- Ministry of National Education and Culture;
- Ministry of National Development Planning;
- Ministry of Transportation;
- Ministry of Housing;
- Ministry of Research and Technology;
- Ministry of Social Affairs;
- Directorate General of Water Resources, Ministry of Public Works;
- Directorate General of Highways, Ministry of Public Works;
- Directorate General of Human Settlements, Ministry of Public Works;
- Directorate General of Spatial Planning, Ministry of Public Works;
- Geological Agency, Ministry of Energy and Mineral Resources;
- Research and Development Agency, Ministry of Public Works;
- Geospatial Information Agency;
- Meteorology Climatology and Geophysics Agency;
- National Disaster Management Agency;
- Regional Disaster Management Agency;
- Agency for the Assessment and Application of Technology;
- Regional Development Agency;

- The National Land Agency;
- Central Bureau of Statistics;
- National SAR Agency;
- Institute of Aeronautics and Space Agency;
- Indonesian Institute of Sciences;
- Local government;
- Indonesian National Army;
- Indonesian National Police;
- Indonesian Red Cross;
- Hospital or clinic;
- Scout;
- Tagana;
- Academics;
- Banking;
- Private and international institution;
- People who participate as volunteers.

8. Duties and responsibilities

The following discussion is a description of duties and responsibilities of some agencies / institutions of government and other stakeholders is obtained based on official sources of each agency/institution.

8.1 Ministry of Home Affairs

Functions:

- a) formulation, determination, and implementation of policies in the field of domestic governance;
- b) management of property / wealth of the country which included in the responsibility of the Ministry of the Internal affair;
- c) supervise the execution of duties in the Ministry of the Internal affair; and
- d) implementation of technical activities from the center to the regions.

Roles in banjir bandang disaster mitigation:

- controlling the discipline and restoration of stability of the governance implementation, including the current implementation of disaster management activities;
- responsible for completion of confirmation boundaries activities, which is useful for positioning clear administrative of banjir bandang disaster that occurred;
- support a clear division of authority limits from village to provincial, to facilitate community service activities such as the distribution of aid for victims of banjir bandang disaster. It is very necessary especially if banjir bandang disaster occurred at the border location;
- assist the availability of population data, number of livestock, land ownership, etc., to determine the amount of loss due to banjir bandang. In this case officers working with local BPS;
- setting of the position, duties and functions of BPBD which is assigned with Regulation of the Minister of Home Affairs.

8.2 Ministry of Energy and Mineral Resources

Functions :

- a) the formulation, determination, and implementation of policies in the field of energy and mineral resources;

- b) management of property / wealth of the country are the responsibility of the Ministry of Energy and Mineral Resources;
- c) supervise the execution of duties in the Ministry of Energy and Mineral Resources;
- d) implementation of the technical guidance and supervision over the implementation of the affairs of the Ministry of Energy and Mineral Resources in the area;
- e) the implementation of technical activities at the national scale.

Roles in banjir bandang disaster mitigation:

- to make environmentally sustainable mining policy to reduce the danger of ground movement and flash floods;
- take responsibility in dealing with and to localize mining waste in areas prone to banjir bandang, to prevent the mixing of waste with water runoff during a banjir bandang disaster;
- assist in providing a source of energy (fuel and electricity) to the areas hit by banjir bandang.

8.3 Ministry of Health

Functions:

- a) national policy formulation, policy implementation and technical policy in the health field;
- b) the implementation of government affairs in accordance with its assignments;
- c) management of property / wealth of the country which they are responsible;
- d) supervise the execution of his duty;
- e) submitting the evaluation report, suggestion and consideration in the field of tasks and functions to the President.

Roles in banjir bandang disaster mitigation:

- ensure health services in the event of a disaster, for the fulfillment of the affected and displaced communities by banjir bandang disasters, and fulfilling the needs of healthcare facilities (such as public toilets, clean water, drinking water, etc.);
- provide advisory assistance and monitoring of health recovery for people and refugees who are victims of banjir bandang disasters.

8.4 Ministry of Finance

Functions:

- a) formulation, determination, and implementation of policies on finance and the wealth of nations;
- b) management Property / State Property which are the responsibility of the Ministry of Finance;
- c) supervise the execution of duties in the Ministry of Finance;
- d) implementation of the technical guidance and supervision over the implementation of the affairs of the Ministry of Finance in the area;
- e) implementate the technical activities at the national scale; and
- f) implementate the technical activities of the center to the regions.

Roles in banjir bandang disaster mitigation:

- conduct adequate budget allocation of disaster management in the budget revenues and expenditures;
- prepare a budget and organizing activities on disaster management in the pre-disaster, during and after disasters. This budget will be channeled to the BNPB or other supporting agencies such as the Ministry of Public Works, Ministry of Social Affairs, etc..

8.5 Ministry of Communications and Information Technology

Functions:

- a) formulation, determination, and implementation of policies in the field of communication and informatics;
- b) management of property / wealth of the country are the responsibility of the Ministry of Communications and Information Technology;
- c) supervise the execution of duties in the Ministry of Communications and Information Technology;
- d) implementate the technical guidance and supervision over the implementation of the affairs of the Ministry of Communications and Information Technology in the area; and
- e) implementate the technical activities at the national scale.

Roles in banjir bandang disaster mitigation:

- conduct studies and research in establishment of reliable telecommunications systems in areas prone to banjir bandang. This is useful in a disaster situation, emergency response, and the rehabilitation and reconstruction;
- responsible for restoration and or maintain a good communication system in areas affected by banjir bandang disasters.

8.6 Ministry of Public Works, Directorate of Water Resources

Functions:

- a) the formulation, determination, and implementation of policies in the field of public works;
- b) management of property / wealth of the country are the responsibility of the Ministry of Public Works;
- c) supervise the execution of duties in the Ministry of Public Works;
- d) implementation of the technical guidance and supervision over the implementation of the affairs of the Ministry of Public Works in the area;
- e) the implementation of technical activities at the national scale.

Roles in banjir bandang disaster mitigation:

- emergency response and rehabilitation of infrastructure damage caused by banjir bandang disasters;
- preparation and implementation guidance of norms, standards, procedures, and criteria for banjir bandang disaster management;
- development and technical assistance to the provincial, regency / city, community and business world;
- monitoring and evaluation of preparation and countermeasures implementation of damage caused by banjir bandang disasters;
- development and facilitation of operation and empowerment of stakeholders in implementing banjir bandang disaster management;
- planning of water resources management of river area;
- institution building and community empowerment in the field of water resources.

8.7 Ministry of National Education and Culture

Functions:

- a) formulation, determination, and implementation of national policies in education;
- b) management of property / wealth of the country are the responsibility of the Ministry of National Education;

- c) supervise the execution of duties in the Ministry of National Education;
- d) implementation of the technical guidance and supervision over the implementation of the affairs of the Ministry of National Education in the area; and
- e) implementation of technical activities at the national scale.

Roles in banjir bandang disaster mitigation:

- making policy in the implementation of disaster education that are incorporated into official curriculum of school education. With this, the community are expected to know and understand about banjir bandang disaster at an early age;
- guarantee the implementation of education and teaching-learning process;
- providing facilities to support teaching and learning process in areas affected by banjir bandang disasters;
- providing the necessary books in the teaching-learning process, when the disaster occurred or after disaster.

8.8 Ministry of National Development Planning

Functions:

- a) formulation and establishment of policies in the areas of national development planning;
- b) coordinating and synchronize of policies in the areas of national development planning;
- c) management of property / wealth of the country are the responsibility of the Ministry of National Development Planning; and
- d) supervise the execution of duties in the Ministry of National Development Planning.

Roles in banjir bandang disaster mitigation:

- take part in making action plan of disaster risk reduction;
- support the planning of development programs associated with the risk of flood disaster;
- propose adequate budgetary allocation in the budget revenues and expenditures;
- proposed the budget allocation of disaster mitigation in the form of ready funds.

8.9 Ministry of Transportation

Functions:

- a) formulating, determining, and implementation of policies in the fields of transportation;
- b) management of property / wealth of the country are the responsibility of the Ministry of Transportation;
- c) supervise the execution of duties in the Ministry of Transportation;
- d) implementation of the technical guidance and supervision over the implementation of the affairs of the Ministry of Transportation in the area; and
- e) the implementation of technical activities at the national scale.

Roles in banjir bandang disaster mitigation:

- plan, construct or maintain transportation facilities required for emergency evacuation, rescue, and transport of materials and assistance in banjir bandang event;
- conduct an adequate transportation system, either before the occurrence of flood disasters, as incurred, and the recovery phase after flash floods occur.

8.10 Ministry of Housing

Functions:

- a) formulating and establishment of policies in the field of public housing;
- b) coordinating and synchronize the policy implementation in the field of public housing;
- c) management of property / wealth of the country are the responsibility of the Ministry of Housing;
- d) supervise the execution of duties in the Ministry of Public Housing; and
- e) implementation of the policy functions of the operationalization of the provision of housing and neighborhood development as part of the settlement, including the provision of flats and provision of infrastructure and the environment in accordance with the laws in the field of housing and settlements, and flats.

Roles in banjir bandang disaster mitigation:

- coordinate the provision of temporary shelter for citizens who are victims of disaster;
- ensure the fulfillment of the rights of people affected by flood disasters, to get a decent temporary shelter;
- assist the reconstruction implementation of residents shelter that are affected by banjir bandang disasters, in cooperation with Directorate General of Human Settlements, Ministry of Public Works.

8.11 Ministry of Research and Technology

Functions:

- a) formulation and establishment of policies in the field of research and technology;
- b) coordination and synchronization of policy implementation in the field of research and technology;
- c) management of property / wealth of the country are the responsibility of the Ministry of Research and Technology; and
- d) supervise the execution of duties in the Ministry of Research and Technology.

Roles in banjir bandang disaster mitigation:

- accommodate the input based on the research results of from BPPT, LIPI, and LAPAN about banjir bandang-prone areas;
- assist in providing an adequate budget for the activities undertaken by BBPT, LIPI and LAPAN associated with banjir bandang disasters.

8.12 Ministry of Social Affairs

Functions:

- a) the formulation, determination, and implementation of policies in the social sector;
- b) management of property / wealth of the country are the responsibility of the Ministry of Social Affairs;
- c) supervise the implementation of duties in the Ministry of Social Affairs;
- d) implementation of technical guidance and supervision over the implementation of the Ministry of Social Affairs in the region; and
- e) the implementation of technical activities at the national scale.

Roles in banjir bandang disaster mitigation:

- fulfillment of basic needs such as food, clothing, and shelter to the refugees who are victims of banjir bandang disasters;
- the provision of shelter for victims of banjir bandang disasters in collaboration with other agencies and local communities.

8.13 Directorate General of Water Resources, Ministry of Public Works

Functions:

- a) the formulation of policies in the field of water resources in accordance with statutory regulations covering the conservation, utilization, and control of destructive force on rivers, lakes, reservoirs, dams, irrigation, ground water, raw water, swamps, ponds and beaches;
- b) implementation of policies in the field of water resources according to the legislation covering the programming and budgeting, performance evaluation of policies, systems development financing and investment patterns, as well as emergency response and rehabilitation of water resources infrastructure damage from natural disasters;
- c) preparation of standard procedures and criteria in the utilization and management of water resources;
- d) providing technical guidance and evaluation in the field of water resources according to the legislation include the supervision hydrology, river basin planning, development, construction, development of water resource assets, building operation and maintenance, controlling utilization, institution building community empowerment; and
- e) the administration within the scope of work at the Directorate General of Water Resources.

Roles in banjir bandang disaster mitigation:

- emergency response and rehabilitation of damaged dams, weirs, water support facilities, supporting facilities of drinking water, due to banjir bandang disasters;
- planning of water resources management on river area;
- assist the maintenance of the river basin and water quality;
- institution building and community empowerment in the field of water resources.

8.14 Directorate General of Highways, Ministry of Public Works

Functions:

- a) formulation Jakstra in BM, including the implementation of national roads, provincial, county, township, and village;
- b) implementation of the implementation of the BM Jakstra including programming and budgeting, performance evaluation of policies, systems development financing and investment patterns as well as emergency response and rehabilitation of road damage caused by natural disasters;
- c) establishment of norms, standards, guidelines, procedures, and criteria in the areas of cultivated genera;
- d) providing technical guidance and evaluation of field cultivated genera include coaching the provincial road network system, counties, towns, and villages including institution building and community empowerment;
- e) development of technical capabilities in the areas of cultivated genera; and
- f) implementation of the administration of Directorate General of Highways.

Roles in banjir bandang disaster mitigation:

- emergency response and rehabilitation of damaged roads, bridges and other accessibility, which were damaged by banjir bandang disasters;
- planning the management of roads and bridges, including the planning of evacuation routes and other technical instructions;
- cooperate with the Department of Spatial Planning, monitoring the implementation of spatial planning and regional development, so development is carried do not result in environmental damage and instability;

- institution building and community empowerment in the field of roads and bridges.

8.15 Directorate General of Human Settlements, Ministry of Public Works

Functions:

- a) development of policies, programs, budgeting and performance evaluation of the field of public works construction;
- b) technical assistance and preparation of NSPM for drinking water, wastewater, solid waste, drainage, and other social facilities and public facilities;
- c) development facilities and management of urban settlements and rural infrastructure;
- d) development of funding system and investment patterns of drinking water and sanitation through the cooperation of government, business and society, as well as standardize residential areas, drinking water, environmental sanitation of settlements and building layout;
- e) provision of public works infrastructure for the development of public housing area;
- f) facilitating the construction of flats in order to rejuvenate the area;
- g) provision of settlements infrastructure for slum, rural, border areas, remote areas and small islands;
- h) provision of drinking water and sanitation for the poor and water vulnerable;
- i) technical guidance and supervision of building construction and management of buildings and country houses;
- j) emergency prevention and repair of damage settlement infrastructure caused by natural disasters and social unrest;
- k) implementation of administrative affairs in Directorate General and institutional capacity empowerment and human resources in public works construction.

Roles in banjir bandang disaster mitigation:

- emergency response and rehabilitation of damaged infrastructure and public facilities due to flood disasters, such as the village head offices, schools, clinics, places of worship, public toilets, etc.;
- planning and construction management of public facilities;

8.16 Directorate General of Spatial Planning, Ministry of Public Works

Functions:

- a) Formulation of policies on spatial planning in accordance with legislation;
- b) Implementation of policies in the field of spatial planning in accordance with the legislation which includes the realization of national spatial planning, preparation of an integrated plan of medium-term infrastructure development, spatial organization of the national territory, island, national strategic area, and preparation of support for the implementation of the national coordination of spatial planning;
- c) Preparation of norms, standards, procedures, and criteria in the field of spatial planning in accordance with legislation;
- d) Providing technical guidance and evaluation in the field of spatial planning; and
- e) The administration of the Directorate-General.

Roles in banjir bandang disaster mitigation:

- establishment of legislation in the field of spatial planning;
- dissemination of spatial information and the development of awareness and responsibility to the public about flood-prone areas;
- preparation and adoption of the National Spatial Plan (RTRWN);
- granting permits utilization of space in accordance with RTRWN;
- cancellation of permits utilization of space that is not in accordance with RTRWN;

- supervising the implementation of spatial planning in the national, provincial and regency / city.

8.17 Geological Agency, Ministry of Energy and Mineral Resources

Functions:

- a) the formulation of policies in the geology field;
- b) the formulation of plans and programs of research and service;
- c) construction and implementation of research and service;
- d) geological survey service, research and services of in the fields of geological resource, volcanology and geology disaster mitigation, and environmental geology;
- e) provision of advice and information presentation of survey results, research and service;
- f) evaluation of research implementation and service of geology field;
- g) implementation of the administrative affairs of Badan Geologi.

Roles in banjir bandang disaster mitigation:

- assist in providing maps and geological data, maps of land movement prone zoning, the survey and research results in making banjir bandang hazard map and other purposes related to banjir bandang;
- provide input to the Ministry of Energy and Mineral Resources in terms of policy formulation concerning the prohibition of mastery and depletion of natural resources that exceeds nature's ability to perform the recovery which is feared to cause banjir bandang.

8.18 Badan Penelitian dan Pengembangan, Kementerian PU

Functions:

- a) Formulation of policy, planning, implementation, evaluation of research and development, technology services and expertise applied field of water resources, roads and bridges, and settlements;
- b) Development of public works standardization, coordination, planning, correctional standards and standard evaluation, preparation of certification and accreditation;
- c) Formulation of policy, planning, implementation, assessment of social, economic, cultural, environmental management coaching, and fostering partnership and development of the community's role in development of public works;
- d) Preparation of planning and evaluation, public information services field of science and technology, personnel, finance and administration bodies.

Roles in banjir bandang disaster mitigation:

- Assessment of the application of technology to prevent or reduce the impact of flash floods;
- Implementation of testing and preparation of technical advice technology water environment, hydrology, hydraulic building and construction of water engineering, river and sabo, marshes and beaches as well as irrigation in flood disaster mitigation efforts;
- Dissemination and socialization of research results and development of water resources;
- Development of programs, implementation, evaluation and analysis of results of research and development of water resources;
- Improved quality of human resources in the field of development and management of water resources;
- Development of corporate and service in research and development of water resources.

8.19 Geospatial Information Agency

Functions:

- a) assessment and formulation of national policy in the field of survey and mapping;
- b) development of national spatial data infrastructure;
- c) coordination of functional activities in the implementation of the task BAKOSURTANAL;
- d) monitoring, mentoring, and guidance to the activities of government agencies in the field of national surveying and mapping;
- e) implementation of the coaching and general administrative services in the field of general planning, administration, organization and administration, personnel, finance, filing, legal, coding, equipment, and household.

Roles in banjir bandang disaster mitigation:

- help to provide data and various types of thematic maps include: map of administrative boundaries, land use maps, rainfall maps and Isobars, street maps, and other base maps. In conducting the provision this map, BIG cooperate with other agencies such as Ministry of Public Works, Geological Agency, BMKG, Kemendagri, and other agencies;
- distributes a variety of thematic maps that are their results of own research and from other agencies, to the parties in need.

8.20 Meteorology Climatology and Geophysics Agency

Functions:

- a) formulation of national policy and public policy in the field of meteorology, climatology, and geophysics;
- b) formulation of technical policy in the field of meteorology, climatology, and geophysics;
- c) coordination of policies, plans and programs in the fields of meteorology, climatology, and geophysics;
- d) implementation, development and control of observation, data processing and information in the fields of meteorology, climatology, and geophysics;
- e) data and information services in the fields of meteorology, climatology, and geophysics;
- f) submission of information to agencies and parties involved and the community with regard to climate change;
- g) the delivery of information and early warning to the institution and related parties and also the public regarding the disaster because of meteorology, climatology, and geophysics factors;
- h) the implementation of international cooperation in the fields of meteorology, climatology, and geophysics;
- i) implementation of research, assessment, and development in the fields of meteorology, climatology, and geophysics;
- j) implementation, development, and control instrumentation, calibration, and communication networks in the fields of meteorology, climatology, and geophysics;
- k) coordination and cooperation instrumentation, calibration, and communication networks in the fields of meteorology, climatology, and geophysics;
- l) implementation of education, training administration and management expertise in the field of meteorology, climatology, and geophysics;
- m) implementation of professional education in the fields of meteorology, climatology, and geophysics;
- n) implementation of data management in the field of meteorology, climatology, and geophysics;

- o) coaching and coordinating the implementation of administrative duties within the BMKG;
- p) management of the property/wealth of the country which are the responsibility BMKG;
- q) supervision over the implementation of tasks in the environment BMKG;
- r) submission of reports, suggestions, and considerations in the field of meteorology, climatology, and geophysics.

Roles in banjir bandang disaster mitigation:

- assist in monitoring the potential risks associated with meteorology, climatology and geophysics;
- help to provide data and maps (such as rainfall distribution, tides, weather changes, direction and speed of wind, etc.), the results of survey and research for the purposes of banjir bandang-related analysis.

8.21 National Disaster Management Agency

Main duties:

- a) provide guidance and direction to the efforts of disaster management including disaster prevention, emergency response, rehabilitation, and reconstruction in a fair and equitable;
- b) establish standardization and the need for disaster management based on laws and regulations;
- c) conveying information to the community activities;
- d) reports on disaster management to the President every once a month under normal conditions and at any time in a state of disaster emergency;
- e) use and account for donations/aid national and international levels;
- f) account for the use of budget received from the state budget revenues and expenditures;
- g) carry out other duties in accordance with legislation; and
- h) develop guidelines for the establishment of regional disaster management agencies.

Roles in banjir bandang disaster mitigation:

- help to improve the banjir bandang disaster preparedness at the provincial level, that cover activities include: preparation of backup logistics, equipment, trained personnel, and policies that support the implementation of mitigation;
- determine the status and levels of banjir bandang disasters in the national and regional levels;
- determining policy cooperation in banjir bandang disaster management with other countries, agencies, or international parties;
- control the collection and assistance in the form of money or goods for flood victims;
- propose sufficient budget to improve banjir bandang disaster mitigation.

8.22 Regional Disaster Management Agency

Main duties:

- a) establish guidelines and directives in accordance with the policies of local government and National Disaster Management Agency on disaster management effort that includes disaster prevention, emergency treatment, rehabilitation, and reconstruction in a fair and equitable;
- b) establish standardization and the need for disaster management based on laws and regulations;
- c) develop, establish, and inform the hazard maps;
- d) prepare and establish permanent disaster management procedures;
- e) implement disaster management in its territory;

- f) reports on disaster management to the regional head every once a month under normal conditions and at any time in a state of disaster emergency;
- g) controlling the collection and disbursement of money and goods;
- h) account for the use of budget received from the revenue budget expenditures; and
- i) carry out other duties in accordance with legislation.

Roles in banjir bandang disaster mitigation:

- determine the status and levels of banjir bandang disaster in the working area, equipped with detail information that is useful to increase preparedness in dealing banjir bandang disasters;
- control the collection and assistance in the form of money or goods supplied to the affected areas by banjir bandang;
- as a BNPB policy implementers in the autonomous region.

8.23 Agency for the Assessment and Technology Implementation

Functions:

- a) assessment & preparation of national policy in the field of assessment and application of technology;
- b) coordination of functional activities in the implementation of the task BPPT;
- c) monitoring, guidance and services to government agencies and private activities in the field of assessment and application of technology in the context of innovation, diffusion, and development capacity, and foster transfer of technology;
- d) implementation guidance & general administrative services in the field of general planning, administration, organization & management, personnel, finance, filing, coding, equipment & household.

Roles in banjir bandang disaster mitigation:

- conduct research and study on the use of technologies that can be used in banjir bandang mitigation;
- provide input and consideration for the formulation of policies relating to use of technologies that can be used in banjir bandang mitigation.

8.24 Planning and Regional Development Agency

Bappededa tasks include:

- a) arrange Long Term Development Plan Area (RPJP-D) and Regional Medium Term Development Plan Area (RPJM-D);
- b) formulate regional development programs;
- c) coordinate planning among departments, agencies within the province, the unit of local government organizations in the environment;
- d) prepare local government annual work plan and the revenue budget plan and expenditures of the province;
- e) follow the progress of the preparation and implementation of development plans in the area for further improvement of planning
- f) monitors the implementation of regional development;

Roles in banjir bandang disaster mitigation:

- create a regional development program that supports efforts to banjir bandang disaster risk reduction;
- responsible for implementation of spatial planning and regional development in their respective areas;
- proposed sufficient budget allocation to improve banjir bandang mitigation in the budget revenues and expenditures;

- proposed budget allocation of banjir bandang disaster mitigation in the form of ready funds.

8.25 The National Land Agency

Functions:

- a) the formulation of national policies in land affairs;
- b) the formulation of the technical policy in land affairs;
- c) policies coordination, plans and programs in land affairs;
- d) development and general administrative services in land affairs;
- e) implementation of surveys, measurements and mapping in land affairs;
- f) implementation of administration of land, agrarian reform and structuring specific areas;
- g) administration preparation of land controlled by and or governments collaboration with the Ministry of Finance;
- h) supervision and control of land tenure;
- i) cooperation with other institutions;
- j) organization and execution of policies, plans and programs in land affairs;
- k) assessment and management issues, disputes, cases and conflicts in land affairs;
- l) management of data and information in land affairs;
- m) other functions in land affairs as regulated by legislation in force.

Roles in banjir bandang disaster mitigation:

- assist in providing maps and data, results of surveys and research, such as land use maps, and other thematic maps for various purposes related to analysis of banjir bandang;
- help to serve the communities affected by banjir bandang disaster in remaking the land ownership papers.

8.26 Central Bureau of Statistics

Main duties:

- a) providing data to the government, and public. The data is derived from its comprehensive statistical activities, comprises of periodic information on structure and growth of economy, social change, and development. Those statistics may be derived from its own researches and surveys as well as from other government department as secondary data;
- b) to assist statistics divisions of government departments and other institutions, in developing statistical system, needed to setup work program and periodic reporting scheme;
- c) developing and promote standards to be incorporated in the implementation of statistical techniques and methods, and to provide necessary services in the field of education and training in statistics;
- d) establish cooperation with international institutions and other countries for the benefit of Indonesia's statistical development.

Roles in banjir bandang disaster mitigation:

- collecting data, information, credible and authentic documents related to the threat and impact of banjir bandang disasters, such as: potential conflicts due to the impact of social insecurity, political, and cultural;
- collecting data or information and do analysis related to the level of losses due to the impact of occurrence of banjir bandang disasters, including data of economy inflation and potential or unemployment caused by banjir bandang disaster in a region.

8.27 National SAR Agency

Main duties:

implement the guidance, coordination and control of potential Search and Rescue (SAR) in SAR activities for the missing or lost people and materials, face the danger of the voyage or flight, and providing assistance in disaster SAR and other disasters in accordance with the regulations of the National SAR and International.

Roles in banjir bandang disaster mitigation:

- search and rescue victims of banjir bandang disasters, in cooperation with community elements and other agencies, such as SAR units incorporated under private enterprise in the region;
- assist and advise to BNPB/BPBD in coordinating and conducting search and rescue in a location affected by banjir bandang disasters;
- cooperating with Scouts, Tagana, PMI, Police and the TNI, in order to rescue disasters victims, as well as post-disaster recovery under the coordination of BNPB/BPBD or other parties appointed to represent.

8.28 National Aeronautics and Space Institute

Functions:

- a) assessment and formulation of national policy in the field of research and development aerospace and utilization;
- b) coordination of functional activities in the implementation of LAPAN's duties;
- c) monitoring, mentoring and coaching to the activities of government agencies in the field of aerospace and utilization;
- d) cooperation with related institutions at national and international levels;
- e) research, development and utilization of remote sensing field, and the development of national remote sensing data bank and its services;
- f) research, development and utilization of atmospheric science, space weather and space environment, assessment of aerospace development, development of aerospace and information services;
- g) research, development of applied aerospace technology, aerospace electronics, aerospace and vehicle utilization and service;
- h) socialization and marketing in the aerospace field;
- i) control and supervision over the implementation of the duty of all elements in the LAPAN environment;
- j) organizing, coaching of general administrative services.

Roles in banjir bandang disaster mitigation:

- helping to provide various types of data, survey results and the results of research in making banjir bandang hazard maps and variety of purposes related to banjir bandang analysis.
- provide information based on remote sensing data, which is information of forecast anomaly in nature which would be an indication of the occurrence of banjir bandang.

8.29 Indonesian Institute of Sciences

Main duties:

- a) assessment and formulation of national policy in the field of scientific research;
- b) the implementation of fundamental scientific research;
- c) the implementation of inter-and multi-disciplinary research focused;
- d) monitoring, evaluating progress, and review of the tendency of science and technology;
- e) coordination of functional activities in the performance of LIPI's duties;

- f) accelerate and guide the government agencies activities in the field of science;
- g) guidance implementation and general administrative services in the field of general planning, administration, organization and administration, personnel, finance, filing, coding, and household supplies.

Roles in banjir bandang disaster mitigation:

- conduct research and study of certain methodology that can be used in banjir bandang mitigation;
- conduct research and study about the incidence of banjir bandang in a particular area;
- provide input and assist BNPB in making prone zoning maps of ground motion, in cooperation with BPPT, Geological Agency, and Sabo Center that is under Ministry of Public Works.

8.30 Local Government

Functions:

- a) assessment of national policies and development planning in the areas of decentralization and regional autonomy;
- b) coordination and synchronization of national development policies and planning in the areas of decentralization and regional autonomy;
- c) preparation of policy formulation and funding of national development planning in the areas of decentralization and regional autonomy;
- d) inventory of the various policies and information relating to the formulation of plans and policies of decentralization and regional autonomy;
- e) monitoring, evaluation, and assessment of implementation performance of national development plans in the field of regional autonomy which includes the development of institutional and local government officials, structuring and synchronization daerah new autonomous regional legislation, as well as local finance;
- f) preparation of work plan implementation tasks and functions as well as evaluation and reporting implementation; and
- g) coordinate the implementation of the activities of officials in the directorate of functional planners.

Roles in banjir bandang disaster mitigation:

- preparing regional disaster plan, including: mitigation, pre-disaster activities, and post-disaster activities;
- ensure consistency between national disaster management plans with regional medium-term development plans;
- preparing regional action plans for banjir bandang disaster;
- improve the provision and smoothness of logistical preparedness;
- improve the preparedness of local Muspida.

8.31 Indonesian National Army

The principal tasks of military operations other than war:

- a) overcome the armed separatist movement;
- b) resolve an armed rebellion;
- c) address the act of terrorism;
- d) securing the border region;
- e) securing strategic national vital objects;
- f) carry out the task of world peace in accordance with foreign policy;
- g) securing the President and Vice President and their families;

- h) empower the region's defense and the strength of their supporters early in accordance with the defense system of the universe;
- i) assist the task of governance in the region;
- j) assisting the Police of the Republic of Indonesia in the framework of security and public order duties set out in legislation;
- k) to help secure a state guest-level heads of state and representatives of foreign governments who were in Indonesia;
- l) to help cope with natural disasters, refugee, and humanitarian assistance;
- m) to help search and rescue in accidents (search and rescue); and
- n) assist the government in the shipping and aviation security against piracy, piracy and smuggling.

Roles in banjir bandang disaster mitigation:

- search and rescue disaster victims;
- assist during emergency response, post-disaster, rehabilitation and reconstruction period of areas affected by banjir bandang disasters;
- assist aid/logistics delivery for victims of banjir bandang disasters;
- helping the provision of transport and other basic needs for victims of banjir bandang disasters.

8.32 Indonesian National Police

Main duties:

- a) maintaining security and public order;
- b) enforce the law; and
- c) provide protection, aegis, and services to the community.

Roles in banjir bandang disaster mitigation:

- search and rescue of disaster victims;
- play an active Roles in maintaining security during emergency conditions, including securing abandoned sites because its inhabitants has evacuated;
- cooperate with Basarnas, Linmas and local officials in creating conducive environment situation after the occurrence of banjir bandang disasters.

8.33 Indonesian Red Cross

Main duties:

- a) the relief and disaster preparedness;
- b) first aid training for the volunteers;
- c) health and welfare services;
- d) blood transfusion service (in accordance with Government Regulation No. 18 year 1980).

Roles in banjir bandang disaster mitigation:

- assist process of search and rescue of disaster victims;
- maintain and restore the health conditions of disaster victims;
- maintain the availabilityof logistics, medicine, hospital equipment, etc., in cooperation with local authorities.

8.34 Hospital and clinic

Roles of hospital or health center in banjir bandang disaster mitigation:

- maintain the health recovery of banjir bandang victims through the active Roles of medical personnel such as doctors or nurses who served in the hospital or clinic of a disaster area;
- helping the provision of health facilities and infrastructure that support flood mitigation, such as: masks, ambulances, medicines, etc..

8.35 Scout

Scouting as an education provider scouting Indonesia, which is part of national education, aims to nurture young people in achieving full potential spiritually, socially, intellectually and physically, so they can:

- a) forming personality and noble character of youth;
- b) inculcate the spirit of nationalism, love the homeland and defend the country for young people;
- c) improve the skills of young people so ready to become a useful member of society, patriot and a fierce fighter, and become future leaders of the powerful in the future.

Roles in banjir bandang disaster mitigation:

- helping to build temporary camps for displaced victims of banjir bandang disasters;
- participate in rescuing victims of banjir bandang disasters, in cooperation with Basarnas, Police, Army and the local Medical Officer;
- assist the delivery of social aid to victims of banjir bandang disasters.

8.36 Tagana

Functions:

- a) support the implementation of the functions of Ministry of Social Affairs in disaster management efforts;
- b) support the implementation of technical guidance and supervision over the implementation of the Ministry of Social affairs in the region.

Roles in banjir bandang disaster mitigation:

During pre-disaster:

- collecting data of banjir bandang prone area;
- conduct assessments and risk analysis of banjir bandang disasters;
- conduct outreach & training for the community and formed the village of Disaster Preparedness;
- strengthening cooperation networks;
- preparing an action plan;
- conduct surveillance, monitoring and evaluation.

During a disaster:

- activate all systems;
- collecting data and information;
- mobilize all potentials;
- delivering and organizing public kitchens;
- anticipating the impact of further disasters;
- preparing follow-up aid;

During post disaster:

- make notes and selection of the disasters impact;
- develop a plan of rehabilitation;
- reviewing the impact of disasters;

- make a referral;
- conduct an evaluation;
- prepare reports;

8.37 Academics

Academics is obliged to provide education, research, and community service.

Roles in banjir bandang disaster mitigation:

- produce experts in the field of disaster mitigation, one of them in the banjir bandang disaster;
- making research about banjir bandang that covers research of the process, the factors that cause and the resulting impacts, to obtain full information in banjir bandang mitigation efforts.

8.38 Banking

The Roles banking in banjir bandang disaster mitigation is in restoration of liquidity provision in areas affected by banjir bandang. It is necessary to support the provision of funds that is required during the process of rehabilitation and reconstruction of areas affected by banjir bandang disasters.

8.39 Private and international institution

The Roles of private and international institutions, among others:

- assist the collection of aid to be distributed to victims of banjir bandang disasters;
- assist in the rehabilitation and reconstruction of affected areas;
- assist in providing data based on the results of research conducted independently by the institution.

8.40 People who participate as volunteers

The roles of communities in banjir bandang disaster mitigation are needed on pre-disaster stage, during disaster and post disaster. All activities conducted by the community in disaster mitigation carried out under the coordination BPBD or Muspida/Muspika.

9. The proposal of action plan for improving banjir bandang disaster mitigation

Here's a breakdown points of the proposed action plan proposed in order to improve the ability of flood disaster mitigation to be implemented by the parties that contribute as discussed previously.

9.1 Coordination between agency/institution/organization

- 1) Doing coordination for the division of task, authorities and resources; Mitigation improvement could be achieved by clarifying line of coordination of mitigation implementation in each region vulnerable to banjir bandang that could form the fast, accurate and low cost coordination. In mitigation of banjir bandang disasters, mitigation steering and implementator is handled by BNPB. Ministries, government agencies and NGO involved in supporting the smooth and successful implementation of banjir bandang mitigation, in accordance with the duties, authority and limit capacity of existing resources. For examples:

KemenPU, PMI, Basarnas, BPBD, local government and international agencies involved

- 2) Involvement planning in banjir bandang mitigation;
The involvements of relevant parties are under direction of BNPB. Planning involvement of those parties are made together with all stakeholders involved in banjir bandang mitigation and should had passed government agreement, which is represented by BNPB or other credible parties. Planning that has been approved and agreed before, can avoid potential conflicts that could arise during the implementation of mitigation.
- 3) Commitment improvement for the banjir bandang mitigation actors;
Commitment improvement from each stakeholder can improve the quality of mitigation implementation itself. One form of commitment improvement may be in the form of an increased funding for assistance, addition of trained personnel, repair of mitigation facilities and infrastructure, as well as the research and studies for reducing the impact of banjir bandang disaster.

9.2 Compilation of law regulation

- 1) Compilation of law regulation;
As a nation based on law, implementation of disaster mitigation should be based on a regulation of Law. This regulation arranges all areas related to the implementation of disaster mitigation, including mitigation of banjir bandang mitigation. The regulation can determine the scope of tasks, authorities, and responsibilities that should be given to each parties involved in banjir bandang mitigation. This regulation is made general, and then formulated in other detailed regulation in certain autonomous regions.
- 2) Preparation of guidelines/standards/ procedure;
Preparation of the document in the form of guidelines, standards or reference procedures are the documents required for the implementation of banjir bandang mitigation. This documents type is made in general, dynamic, but should in accordance within the regulations corridor, and to be adopted and adapted based on each local condition. The existence of guidelines, standards or procedures may facilitated the process of monitoring and evaluation being conducted.
- 3) Preparation of planning documents and implementation guidelines (juklak);
In the implementation of mitigation, it need to prepare a written plan and guidelines for the implementation in the field. Planning documents and guidelines are different in each region. Planning and guidelines should made in detail and clear, including the coordination position which involving the local government, institutions, and local communities. Planning and guidelines became the starting point when implementing mitigation of banjir bandang in the region. Changes can be made if it is found the discrepancies or difficulties on the implementation.

9.3 The introduction, analysis, and monitoring of disaster risk

9.3.1 Data collecting

The data collecting are needed to analyze the risk of banjir bandang. The data being collected can be primary data and secondary data. The more complete the data collected, the more accurate the result obtained for disaster risk analysis.

Examples of primary data needed including:

- Newest rainfall data;
Rainfall data is used as reference in early warning system in the region
- Interview with the community and related agency;
Interviews were conducted to the local community to obtain information related to banjir bandang disasters that have occurred include: the form or type of disaster that occurs,

the time and date of the disaster, the area affected by banjir bandang disaster, banjir bandang elevation, and impact damage.

Interviews were also conducted to determine the daily activities of the population, form of preparedness and efforts being made to increase awareness of banjir bandang disaster mitigation.

This interview comes with documentation.

- The results of the field surveys;
Field surveys conducted include: investigation of flood trail, cross-sectional surveys, and surveys of natural DAM location.
- Landslide potential map;
This map is used to identify areas in the upstream river prone to formation of natural dams caused by the landslides of material, which can lead to the occurrence of banjir bandang.
- Map of banjir bandang prone area;
These maps are used in making the district and provincial policies. Mitigation efforts can be done and improved when the problems associated with banjir bandang disasters can be mapped clearly.
- Evacuation map route;
This large scale maps is needed as guidance for the community during emergency evacuation. This map can also used for supporting logistics distribution to evacuee in the disaster area.

Examples of secondary data needed i.e.:

- Data/Contour map;
This data/map is used to analyze the topography, berguna untuk analisa topografi, analysis of flow patterns and to support analysis of lithology.
- Previous rainfall data;
Rainfall data being analyzed to find the standard rainfall, which led to banjir bandang disaster
- Population data;
- The data area of infrastructure;
- Geological map;
Each watershed is formed by layers of soil and lithological characteristics specific to the physical, mechanical, and chemical properties of each. These characteristics determine the level of vulnerability of an area of ground movement or banjir bandang.
- Map of administrative boundaries;
Clear administrative boundaries in each region can facilitate the implementation of banjir bandang mitigation. A clear border being agreed together can avoid conflict and confusion between the local government authorities, at the occurrence of banjir bandang.
- Landuse map;
This map is used to know the distribution of population, land use and conservation areas.
- Map of the ground movement vulnerability zone ;
This map is useful to know the zoning areas vulnerable to ground movements. The information from this map is included the primary data analysis of physical and mechanical properties of soil-forming layer in certain region.
- Map of catchment area.
This map useful to calculate the potential of the river flow.

9.3.2 Data analysis

- 1) Research and analysis of disaster risk
In the early stages, assessment and analysis is made based on occurrence of banjir bandang disasters in a region. The results of this analysis will be used as input for further analysis.
- 2) Research and study of disaster characteristic
Research and disaster assessment is done based on occurrence of banjir bandang in some places to determine the characteristics of the disaster. Research and assessment can be done at institutions or universities by involving skilled human resources.
- 3) Identification and study of the disaster threat.
Identification and study of the disaster threat is done based on the results of the research in previous stage. The process in this stage had already involving direct interaction between local government and local communities
- 4) Conduct analysis of disaster risk;
Disaster risk analysis is done to minimize losses due to the impact of banjir bandang. This analysis is based on hazard analysis, vulnerability analysis and capabilities analysis in dealing with disasters. Disaster risk analysis is an advanced analysis to conclude the action for disaster risk reduction.
- 5) Identification of disaster risk reduction measures;
Identification of disaster risk reduction measures need to be done as there are differences in geological and rainfall conditions in each area. This identification is done by adjusting the result of disaster risk analysis with the disaster mitigation capabilities of each region. Thus the mitigation improvement can be accomplished in line with the capability of existing local resources.

9.3.3 Monitoring the risk of banjir bandang

This action is performed to obtain the latest data of the degree of vulnerability of an area prone to banjir bandang due to changes of natural condition. There are several alternative methods for monitoring:

- 1) Preparing a clinical card;
Clinical card meant here is a series of observations of a number of areas prone to landslide hazards or debris in different time which can be used as a source for designing a plan to protect people, house and public facilities in the region. It is done by observing the areas like the cliff/ravine, region that has tendency for landslide, upstream and downstream of the river, hillsides, springs etc. These areas should be observed by recording the condition by using photo or video. After that, the records are arranged by combine it based on time queue in clinical card, then observe the changes of condition, river widening, new landslide and the chasm that shift.
- 2) Direct observation, made with reference to historical data recorded in the local area.
- 3) Monitoring by remote sensing approaches;
Monitoring was carried out on a potentially vulnerable areas using aerial photographs, satellite imagery or radar images. The method uses light aircraft or Copter can be used for areas that tend steep or condition that is difficult to make observations by using a landline.

9.4 Prioritize the disaster management in the development plan

All data, information, studies, research and analysis becoming as a consideration in development plan. To improve banjir bandang mitigation, development plan taken should consider the aspect of disaster management. This proves that the Government can formulate the integrated mechanism to implement the mitigation supported by institution (in this case Bappenas), as well as evidence of strong commitment from the Government in reducing

disaster risk by more prioritizing preventive action (through the national development planning) than the responsive action.

9.5 Implementation of physical, nonphysical effort and banjir bandang mitigation arrangement

Implementation of physical and non physical effort in banjir bandang mitigation involves some stakeholders. Road infrastructure and bridges development activities that will be used as evacuation routes should be prioritized and implemented correctly. At the same time, the strengthening of coordination and network should still be done and coupled with the socialization, transfer knowledge and simulation to improve community preparedness in disaster-prone location. Mitigation arrangement needs to be prepared and socialized to smooth the implementation and avoid conflict or misunderstanding among the parties involved.

9.6 Strengthening of social resilience

Strengthening social resilience in the community needs to be done to facilitate the coordination and transfer of knowledge about disasters, and also to avoid disputes and divisions caused by provocation from certain parties during implementation of banjir bandang mitigation. A good social resilience is useful to assist implementation of mitigation during the rescue process and post-disaster recovery. Community leaders or religious leaders generally have a strong influence in creating the strengthening of social resilience. Therefore, any form of banjir bandang mitigation that needs to be done is involving religious leaders or local community leaders.

9.7 Control and implementation of spatial planning

Control and implementation of spatial planning needs to be done because of limited space. These efforts need to be supported by monitoring and evaluation system sustainable from time to time. Appropriate monitoring can know early indication of misuse of land or diversion of land use on banjir bandang-prone locations. The evaluation is performed to determine whether a policy concerning about the spatial planning implemented correctly, and whether the existing policy should be enhanced. Policies of spatial planning need to be made and done to avoid errors in the utilization and land use. For example: the supervision of the issuance of building permit (IMB).

9.8 Environmental management

Banjir bandang can occur because of natural factors for example an area affected by geological structure or because is triggered by wrong human action in managing the environment. Mistakes in environmental management can result in an imbalance nature, such as avalanche mass of soil on the slopes of the river so that forming natural dam. This natural dam could potentially lead to the occurrence of banjir bandang during heavy rains at the upstream.

Therefore, methods of environmental management to reduce the risk of flood disasters need to be socialized, where some of them are:

- Forest management in an integrated way by not doing illegal logging or reduce the transfer functions of forests;
Harvesting vegetation may eliminate the roots of plants that can bind and retain the land mass, consequently the soil becomes prone to landslides. Banjir bandang can occur suddenly during heavy rains resulting in landslides and mud flows on the surface. If not too heavy rainfall, landslides can also occur and form a natural weir and can withstand

the volume of surface water within a certain amount. Over time the surface water volume detained by natural weir increased, causing banjir bandang.

- The management of the mining area to minimize watershed damage that triggered landslides in the area around the basin;
Development of the mining area is generally uncontrolled artisanal mining. The area was originally a stable will be prone to landslides, so the potential of banjir bandang occurs when heavy rains occur in these locations.
- Maintain and preserve vegetation in accordance with the carrying capacity of the environment;

9.9 Management of watershed and sedimentation

Natural events such as landslides and floods in the rainy season and drought in the dry season is the main indicator of watershed damage. Damaged watershed is generally characterized by the decrease in infiltration capacity of the soil where the contributing factors are: a permanent vegetation cover (forest) in the upstream areas that have been damaged or lost, the use of land that is not according to his ability, and application technology of land management / river basin management that does not meet a necessary condition.

With reduced infiltration capacity of the soil, the soil will eroded so that the surface flow (run off) will increase. Soil and parts of the soil will be transported by surface runoff or deposited in certain parts go into the river and deposited in rivers, reservoirs, lakes or waterways. Siltation of rivers caused flooding in every rainy season. Materials sediment that settles in the upper river may form a natural dam that leads to the occurrence of flash floods.

Watershed management objectives are:

- preventing or controlling floods and sedimentation, so does not destroy and lower the land capability;
- improve the drainage of land to enhance its ability;
- enhances the usability of water from water sources available;
- improve the responsiveness of irrigation land.

Watershed management that can be done include:

- 1) Conduct reforestation and afforestation on marginal lands;
- 2) Implement soil and water conservation techniques that are grouped into four main groups:
 - agronomic groups: mixed planting (intercropping), planting sequence (rotation), contour planting, use of green manure or artificial fertilizers, and use of compost;
 - vegetative groups: planting trees or perennial crops (such as coffee, tea, sugarcane, and bananas), planting annual crops on land boundaries (hedgerows);
 - structure group: the manufacture of runoff catcher channel, drainage, terrace channels, storm water trench, sengkedan, patio benches, water-retaining dams, and ponds of rain water harvesting;
 - management group: changes in land use becomes more appropriate, the selection of a more suitable agricultural businesses, the selection of equipment and commercial inputs that more appropriate, agricultural settlement, including the combination of agriculture, and the timing of land preparation, planting, and provision of inputs.

9.10 Construction of facilities and infrastructure

Development of facilities and infrastructure is one of the stages to improvement mitigation. The location of the building shall be in accordance with the plans and designation of their land. The structure of the building must comply with the provisions of the specification and can be used to prevent, secure and reduce the impact caused by disasters, such as dikes,

dams, retaining surface erosion, earthquake-resistant buildings and the like. Development of facilities and infrastructure should also consider the number of local residents who will be accommodated and the need for other support during banjir bandang.

To improve banjir bandang mitigation, structural measures that can be done such as by making buildings sediment prevention (SABO building).

9.11 Making an early warning system and evacuation of banjir bandang

- 1) Perform the mastery and control over natural resource management that could potentially lead to disaster;
- 2) Organizing, installation, and testing of early warning systems;
- 3) Development of a computerized information system;
as the development of information technology, communication tools such as GPS and GIS information and data processing have been extensively absorbed and allows to monitor the weather on the spot. In addition, information systems by displaying pictures of the damage have also been developed. The system has not only changed the way to communicate but also provide major improvements to the collection of information for disaster damage in the event of disaster. But the system is complicated, so if the system is damaged by the disaster, the system will not work. Therefore, divide the system into a multi-system are very important.
- 4) Establish radio disaster management system to collect and communicate reliable information about related disasters;
- 5) Submission of information via the website;
on government websites, including information of interest on the location of warning and evacuation hazard banjir bandang disasters, shelters, signs, information about the disaster, the status of the establishment of shelters and evacuation advice should be published. Also important to publish rainfall, banjir bandang warning information related and other information obtained from the government in a way that is easily understood by people in the municipality.
- 6) Preparation and placement of warning signs, dangers, a ban on entering the disaster-prone areas and so on;
- 7) Provision of supplies of goods and preparation of basic needs;
In normal daily life, especially in urban areas, the dependence on basic facilities is very high. Damages and termination of these services will greatly affect the lives of citizens. Facility providers of basic needs were assigned to continue its services even in times of emergency. The agency must prepare and pursue vigorously in minimizing the damage when a disaster occurs.
- 8) Ensuring Place of Refuge;
Refugee camps near the house and the route to achieve them should be informed to the population.
- 9) Policies related to the construction of temporary shelters and the determination of evacuation routes;
when efforts to transfer of population to safer areas is difficult to do, then the government should plan the temporary shelters and evacuation routes are already well socialized. So that local people are (still) live in areas prone to flood disasters can perform self-rescue during the banjir bandang disaster.
- 10) Provision of Special Attention For Weak Physical Society;
when the ratio of elderly and young people is relatively high, when there are deadlines before a disaster occurs, physically weak segments of society would require a longer time compared with those who are young to recover. Therefore, special attention is needed for the physically weaker segments of society. In addition, it takes preparation, guidance or specific design criteria will help the group when physically weak people to evacuate early. These activities are conducted within the community itself.

- 11) Emergency Transportation Network Security;
when disasters occur, emergency transportation network is also one of the most important criteria in disaster management in order to be able to perform all kinds of emergency response activities. If the region has a limited network, it is important to design a transportation network, including emergency airfields. Emergency transportation network will provide a quick reaction of emergency response.
- 12) Ensuring Security and Maintenance Facility;
to reduce the damage of buildings and other facilities, security checks must to be done regularly, especially by strengthening facilities and improvement of emergency supplies.
- 13) The establishment of the coalition during emergency conditions;
an efficient disaster management can be done by forming a coalition between government, community organizations, volunteer organizations and private companies at the time after the bencana. Coordination with the army in terms of information dissemination and placement of volunteers will also further improve efficiency.
- 14) Implement disaster management training;
training conducted in the form of Emergency Training (training camps and training on how to take action for the elderly and sick) as well as First Aid and Rescue Training (training in first aid, take the victim on a stretcher, and various other emergency relief act)
- 15) Briefing on Public Awareness for Disaster Mitigation.
not only government officials are faced with natural disasters. Disaster management should also be prepared with good cooperation between government officials, private companies and communities together. Therefore, each party must be aware of the importance of disaster management. It is rather difficult to realize how serious disaster, however, when disaster strikes, disaster management is really very valuable.

9.12 Education and dissemination of disaster

Efforts to improve mitigation can be done through education and the implementation of banjir bandang to the community, especially for people living in areas prone to banjir bandang disasters. Education carried out with the aim to transfer knowledge on matters relating to banjir bandang disasters. While socialization done to promote disaster mitigation measures, early warning and evacuation system developed in the area, the introduction of evacuation routes, as well as training to support the rehabilitation and reconstruction are carried out by the government. Forms of education and socialization conducted disaster include:

- 1) Counseling and improvement of public awareness;
- 2) Basic training of disaster management for officers and community;
- 3) Internalization of disaster management in the education local content at level of schooling as well as simulation training for emergency response to disasters;
- 4) Preparation of brochures/leaflets/posters;
- 5) Workshop;
- 6) Simulation of evacuation;
- 7) The establishment of an organization or a disaster task force;
- 8) Strengthening the social units in society, such as forums;
- 9) Development of disaster awareness culture;
- 10) Operation of counseling, and training;
- 11) Monitoring the use of technology to detect objects that could potentially be a source of disaster;
- 12) The introduction and monitoring of disaster risks;
- 13) The identification and introduction of a source of danger or threat of disaster;
- 14) Improving understanding of vulnerability of society;
- 15) Organizing, outreach, training, and simulation of emergency response mechanisms.

9.13 Relocation of residents from prone areas to safer areas

Policy of resettlement from disaster prone areas to safer areas is actually one of ways to reduce losses from banjir bandang disasters. But the implementation is not easy to do. For that we need efforts and particular ways in dealing with this issue in accordance with local situations and conditions. Method that is less appropriate can cause new problems in society.

When resettlement is difficult to do, the government should plan and provide temporary shelter areas, and evacuation routes are already well socialized. So that local community who still live in banjir bandang prone areas can perform self-rescue during floods.

10. Monitoring and evaluation

To support the successful implementation of banjir bandang mitigation, then you should be monitoring and evaluation. This stage is an important stage because this stage can be controlled through an increase or decline of the implementation of mitigation, as well as things that need to be improved in future implementation.

10.1 Monitoring

Monitoring of mitigation implementation as proposed in this action plan proposal, conducted in the form of monitoring of:

- strengthening the coordination and networks formed in the community;
- the form of regulatory framework and policies imposed by the government and local government;
- institutional reformation which was formed to support the improvement of mitigation in each region;
- level of community participation in banjir bandang mitigation;
- learning process of banjir bandang disaster management for authorities and local communities;
- use of assessment of damages and losses so the results of monitoring can provide concrete data;
- implementation of banjir bandang disaster recovery;
- allocation and the use of funds for flood mitigation enhancement

The whole monitoring has been carried out, evidenced by documentary evidence in the form of a daily journal, recording data, reports, tables, photos, etc. that facilitate the subsequent evaluation process.

10.2 Evaluation

The evaluation aims to:

- obtain data and information about the progress that is obtained when the current mitigation measures carried out, to be compared with previous mitigation measures, so it can be known that the undertaken mitigation measures was already increase or not;
- obtain the information about the problems that arise when current mitigation is done, for the improvements or changes in the future;
- be a material input and suggestions for recommendations and action plans follow-up in the next period.

The evaluation results of implementation of banjir bandang mitigation need to be assessed and reported to the concerned agencies. The assessment indicators meted on these things: consistency, coordination, capacity building, consulting, and sustainability. Mitigation improvement can be said have been done when the results or the final assessment that is obtained is better than the previous assessment results of mitigation actions.

11. Conclusion and Suggestion

Improvement of mitigation should be done with appropriate and community-based in order to minimize or to avoid losses in casualties and property resulting from banjir bandang disasters. In practice it will have a variety of constraints, therefore it is expected an active roles and cooperation from all stakeholders at central and also at regional levels.

Our suggestions are to create a good coordination among stakeholders in accordance with each function and roles, putting the education and socialization associated with banjir bandang disasters, establish system of banjir bandang disaster mitigation that are suitable to be applied in their respective areas.

12. Closing

The proposal is expected to be taken into consideration by the government and stakeholders to enhance the ability of banjir bandang disaster mitigation in Indonesia.

Appendix
(informative)
Matrix plan for the proposal of action plan

OBJECTIVE	ACTIVITIES	PERFORMANCE TARGET	DURATION	TIMELINE								
				1 st year	2 nd year	3 rd year	4 th year	5 th year				
1. Coordination between agency												
1) Coordination for the division of task, authorities and resources;	<ul style="list-style-type: none"> Clarify the coordination lines in the implementation of banjir bandang disaster mitigation; 	<ul style="list-style-type: none"> Form the fast, accurate and low cost coordination; 	1 year and continuously									
2) Avoid potential conflicts that could arise during the implementation of mitigation;	<ul style="list-style-type: none"> Involvement in the mitigation plan together with all stakeholders under the direction of BNPB; 	<ul style="list-style-type: none"> The formation of the collective agreement on the role of each stakeholder in banjir bandang disaster mitigation; 										
3) Commitment improvement for the mitigation actors.	<ul style="list-style-type: none"> Coordination and socialization through meetings with institutions / stakeholders. 	<ul style="list-style-type: none"> The addition of trained personnel, the addition of funds and budgetary activities, research, facilities and infrastructure improvements, etc.. 										
2. Compilation of law regulation												
1) Compilation of law regulation as a legal shield in the implementation of disaster including banjir bandang mitigation;	<ul style="list-style-type: none"> Develop regulations on disasters in general that can be specified according to each local conditions; 	<ul style="list-style-type: none"> The availability of law regulation to determine the scope of tasks, authorities, and responsibilities that should be given to each parties involved in banjir bandang mitigation; 	1-2 years									
2) Preparation of guidelines/ standards/ reference procedures as a complete document in implementing banjir bandang mitigation;	<ul style="list-style-type: none"> Create guidance documents, standard or reference procedure in general and dynamic within the remit of existing regulations; 	<ul style="list-style-type: none"> The availability of the document in the form of guidelines, standards or reference procedure that can be adopted based on each local condition for implementing the monitoring and evaluation; 										
3) Preparation of planning documents and implementation guidelines as an initial reference to implemented the	<ul style="list-style-type: none"> Develop plans and implementation guidelines mitigation of banjir bandang disasters that are detailed and clear, coordinated with local 	<ul style="list-style-type: none"> The availability of planning documents and written guidelines (juklak) which can be adapted with local condition. 										

mitigation of banjir bandang disasters in a region.	governments and local communities.																				
3. The introduction, analysis, and monitoring of disaster risk			1-2 years																		
1) Data collection to assist the process of disaster risk analysis;	<ul style="list-style-type: none"> Primary and secondary data collection, such as current rainfall data and previous land-use maps, banjir bandang prone map, natural dam presence data, contour maps, geological maps, etc. 	<ul style="list-style-type: none"> Availability of primary and secondary data in order to produce a complete disaster risk analysis accurately and adequately; 																			
2) Data analysis;	<ul style="list-style-type: none"> The review and analysis of disaster risks is based on previous banjir bandang event data in a region; 	<ul style="list-style-type: none"> The results of data analysis can be used for further analysis; 																			
	<ul style="list-style-type: none"> Research and study of disaster characteristics based on the incidence of banjir bandang events in many places; 	<ul style="list-style-type: none"> Determine the characteristics of banjir bandang disasters globally; 																			
	<ul style="list-style-type: none"> Identification and study of the disaster threat based on the results of previous research results, involving local government and local communities; 	<ul style="list-style-type: none"> Knowing the characteristics of the threat of disaster in the area concerned; 																			
	<ul style="list-style-type: none"> Conduct analysis of disaster risk, based on hazard analysis, vulnerability analysis, and analysis capabilities in dealing with disasters; 	<ul style="list-style-type: none"> Obtain the conclusion necessary action to reduce disaster risk, ie, minimize the impact of losses due to banjir bandang; 																			
	<ul style="list-style-type: none"> Identification of disaster risk reduction measures are carried out by adjusting the results of analysis of risk to the ability of each region to mitigate disasters. 	<ul style="list-style-type: none"> Mitigation of banjir bandang disasters can be improved according to the ability of local area resources. 																			

3) Monitoring the risk of banjir bandang.	<ul style="list-style-type: none"> Monitoring with the clinical cards; Making observations in places that potential to debris/rock avalanches by using photographic and video cameras. A series of observations in some areas vulnerable to landslides in different times is called a clinical card. Direct observation; Monitoring by remote sensing approach (aerial photographs, satellite images, radar images). 	Monitor the changes in disaster-prone areas in order to become the source of the banjir bandang disaster forecasting system that will occur through the data set of monitoring results.											
4. Prioritize the disaster management in the development plan			1-2 years and continuously										
	<ul style="list-style-type: none"> Making all data, information, studies, research, and analysis to be a material consideration in development planning. 	<ul style="list-style-type: none"> Aspects of disaster mitigation should be the primary consideration in development planning; The government could develop an integrated mechanism to implement banjir bandang mitigation which are supported by institutional (Bappenas). 											
5. Implementation of physical, nonphysical effort and banjir bandang mitigation arrangement			1-5 years gradually and continuously										
1) Non-technical approach;	Pre disaster : a. Establishment of Working Group (POKJA) under the coordination of BNPB / BPBD;	Pre disaster : a. Working Group (POKJA) formed cross-institutional / sectoral coordination of BNPB / BPBD;											
	b. Inventory of potential resources available (PMI, KSR, NGOs, police, military, volunteers, etc.);	b. Potential of human resources and a coordinated institution in BNPB / BPBD;											
	c. Socialization and dissemination of manuals	c. Educate the public and government officials in establishing early warning systems and evacuation of banjir bandang disaster											
	d. Training / education for officials and the community;	d. Increased community capacity and apparatus;											

	<p>b. Rehabilitation of infrastructure damaged by the earthquake;</p> <p>c. Giving encouragement and mental spirit spiritual disaster victims;</p> <p>d. Relocation of totally destroyed residential;</p> <p>e. Performance evaluation of disaster management working group;</p> <p>f. Evaluation of equipment performance and early warning systems;</p> <p>g. Monitoring and evaluation of the effectiveness of building control sediment.</p>	<p>b. Socioeconomic activities in the disaster area quickly recovered;</p> <p>c. The trauma of affected people rapidly lost and morale remains high;</p> <p>d. Shelter quickly available;</p> <p>e. Working group known performance data for improvement in the future;</p> <p>f. Performance data to improve early warning system that will come;</p> <p>g. Repairs to damaged buildings can be done immediately.</p>																		
2) Technical approach; performed by applying a sediment control system as besides.	<p>1) Identify the field;</p> <ul style="list-style-type: none"> Preliminary field survey, Alternative treatment solutions. 	Ensure the potential threat of banjir bandang and target areas threatened to disasters.	1-3 years																	
	<p>2) Feasibility study;</p> <ul style="list-style-type: none"> Detailed field surveys, Basic sediment control plan, Building site sediment control planning, Evaluation of the cost plan. 	Assessment system of banjir bandang control, site planning and building control sediment type, the estimated cost.																		
	<p>3) Implementation program;</p> <ul style="list-style-type: none"> Determination of program implementation, Priority-setting activities. 	Implementation of priority programs and activities based on various considerations are adequate, such as building interests, economic feasibility, environmental aspects, etc.																		
	<p>4) Design details.</p> <ul style="list-style-type: none"> Details survey, Detailed design, determination of the dimensions of the building height and sediment control. 	Formulation of implementation plan, detailed design of buildings, preparation of implementation, program execution based on the available annual budget.																		
6. Strengthening of social resilience																				
	Social approach to religious leaders and local community leaders	<ul style="list-style-type: none"> The strengthening of social resilience; The creation of the ease of exchange of scientific dialogue 	Continuously																	

		<p>about the banjir bandang disaster in the region;</p> <ul style="list-style-type: none"> The community is not easily provoked, so the split does not occur. 																	
7. Control and implementation of spatial planning																			
	<ul style="list-style-type: none"> Conduct monitoring and evaluation system in a sustainable spatial planning; 	<ul style="list-style-type: none"> Determine the initial indication of misuse of land use in banjir bandang prone locations and the truth of the implementation of policies; 	Continuously																
	<ul style="list-style-type: none"> Preparation of spatial policy. 	<ul style="list-style-type: none"> Errors in the allocation and land use can be avoided (building permits, etc). 																	
8. Environmental management																			
Socialization of environmental management	<ul style="list-style-type: none"> Forest management in an integrated manner; 	<ul style="list-style-type: none"> No landslide soil mass; 	Continuously																
	<ul style="list-style-type: none"> The management of mining areas in landslide-prone areas; 	<ul style="list-style-type: none"> The area of land be kept stable so as not to be a landslide-prone areas; 																	
	<ul style="list-style-type: none"> Maintain and preserve vegetation in accordance with the environmental carrying capacity. 	<ul style="list-style-type: none"> The surface soil is not prone to landslides 																	
9. Watershed conservation and management of sedimentation																			
	<ul style="list-style-type: none"> Establish reforestation on degraded land; 	<ul style="list-style-type: none"> Improve the soil infiltration capacity so that no more floods and droughts occur in a watershed. 	Continuously																
	<ul style="list-style-type: none"> Implement soil and water conservation techniques; 																		
10. Construction of facilities and infrastructure																			
	Manufacture of a wide range of buildings suitable sediment control plan	<ul style="list-style-type: none"> The founding of a wide range of building control sediment in the river basins concerned (check dams, consolidation dams, dikes, etc.); Realization of a system for controlling sediment from upstream to downstream, as a means of controlling banjir bandang in river basins concerned. 	1-3 years																

11. Making an early warning system and evacuation of banjir bandang																		
	<ul style="list-style-type: none"> Control over management mastery water resources that could potentially lead to disaster; 	<ul style="list-style-type: none"> Mastery of natural resource management can be controlled; 																
	<ul style="list-style-type: none"> Installation, operation, and management of early warning systems; 	<ul style="list-style-type: none"> Early warning systems are managed and operated properly; 																
	<ul style="list-style-type: none"> Develop a computerized information system; 	<ul style="list-style-type: none"> Realization of computerized information systems to speed up data collection of building control facilities; 																
	<ul style="list-style-type: none"> Establish a radio broadcasting station for disaster; 	<ul style="list-style-type: none"> Dissemination accurate information about disaster-related; 																
	<ul style="list-style-type: none"> Submission of disaster information via the website; 	<ul style="list-style-type: none"> The availability of disaster information through government websites; 																
	<ul style="list-style-type: none"> Preparation and installation of various warning signs in areas prone to disasters; 	<ul style="list-style-type: none"> People in disaster-prone areas are always alert to the threat of disaster; 																
	<ul style="list-style-type: none"> Provision and preparation of materials supply basic needs of daily life, goods and equipment to restore damaged facilities and infrastructure; 	<ul style="list-style-type: none"> Ensured smoothness supply of basic daily needs, equipment and materials for repairs of infrastructure though during emergency; 																
	<ul style="list-style-type: none"> Ensure the location of evacuation and shelter; 	<ul style="list-style-type: none"> Availability of evacuation sites that are easily known by the population; 																
	<ul style="list-style-type: none"> Planning the location of temporary shelter areas for the people who remained in the disaster area when the disaster occurred; 	<ul style="list-style-type: none"> There is a government policy related to the construction of temporary shelters and evacuation routes; 																
	<ul style="list-style-type: none"> Give special attention to the people who physically weak; 	<ul style="list-style-type: none"> There are specific guidelines for the physically weaker in early evacuations; 																
	<ul style="list-style-type: none"> Security and emergency transport network planning in the event of a disaster; 	<ul style="list-style-type: none"> Transportation links can act as a means of quick reaction of emergency response; 																
	<ul style="list-style-type: none"> Regular security checks of buildings and facilities; 	<ul style="list-style-type: none"> Reduce the damage of buildings and facilities; 																

1-3 years and continuously

	<ul style="list-style-type: none"> The establishment of a coalition between government, community organizations, volunteers, private and TNI/Police during emergency conditions; 	<ul style="list-style-type: none"> The treatment of disaster and the dissemination of information can take place efficiently; 																
	<ul style="list-style-type: none"> Training of various acts of emergency disaster response; 	<ul style="list-style-type: none"> Increased community and officials preparedness of disaster in the region; 																
	<ul style="list-style-type: none"> Increase public awareness of the importance of disaster mitigation. 	<ul style="list-style-type: none"> Increased disaster mitigation capacity of the communities whos living in disaster prone areas. 																
12. Education and dissemination of disaster																		
	Various activities related to disaster problems for people in disaster-prone areas such as counseling, training, evacuation simulations, the formation of task forces, the introduction of disaster risk, understanding the vulnerability of societies, etc.	Making people in disaster areas have adequate capability in handling disasters and may act as subjects in banjir bandang disaster mitigation in the region.	Continuously															
13. Relocation of residents from prone areas to safer areas																		
	<ul style="list-style-type: none"> Provide the location for relocation in a safe area; Perform the action for the relocation of people living in disaster prone areas; Planning for temporary shelter areas for populations that are difficult in the relocation. 	Reducing the the number of victims and losses from banjir bandang disasters.	Gradually															

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