No.

THE PREPARATORY STUDY
ON
DISASTER MANAGEMENT PROGRAM
FOR
INDONESIA

FINAL REPORT

MARCH 2010

JAPAN INTERNATIONAL COOPERATION AGENCY

ORIENTAL CONSULTANTS CO., LTD.

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Foreign Currency Exchange Rates Applied in the Study

Currency	Exchange Rate/USD
Rupiah (IDR)	9,350.00
Japanese Yen (JPY)	90.14

(Rate as of MARCH 1, 2009)

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ABBREVIATIONS

Terms	English
ACI	American Concrete Institute
ADB	Asian Development Bank
AIFDR	Australia-Indonesia Facility for Disaster Reduction
AMeDAS	Automated Meteorological Data Acquisition System
APBN	State Annual Budget
ATC	Applied Technology Council
AusAID	Australian Agency for International Development
AWS	Automated Weather Station
BAKORNAS PB	National Coordinating Board for Disaster Management *(Badan Koordinasi Nasional Penanganan Bencana)*
BAKOSURTANAL	National Coordination Agency for Survey & Mapping *(Badan Koordinasi Survei dan Pemetaan)*
BAPPEDA	Regional body for planning and development *(Badan Perencanaan Pembangunan Daerah)*
BAPPENAS	National Development Planning Agency *(Badan Perencanaan Pembangunan Nasional)*
BGAN	Broadband Global Area Network
BMKG	Agency of Meteorology, Climatology and Geophysics *(Badan Meteorologi Klimatologi dan Geofisika)*
BNPB	National Disaster Management Agency *(Badan Nasional Penanggulangan Bencana)*
BPBD	Regional Disaster Management Agency *(Badan Penanggulangan Bencana Daerah)*
BPKP	State finance and development surveillance committee
BPPT	Agency for Assessment and Application of Technology *(Badan Pengkajian dan Penerapan Teknologi)*
CBDRR	Community Based Disaster Risk Reduction
CBS	Cell Broadcasting System
CEWS	Climatological Early Warning System
CSO	Civil Society Organization
DART	Deep-ocean Assessment and Reporting of Tsunamis
DEPHUT	Department of Forestry *(Departemen Kehutanan)*
DEPKES	Department of Health *(Departemen Kesehatan)*
DEPKEU	Ministry of Finance *(Departemen Keuangan)*
DEPKOMINFO	Department of Communication and Informatics *(Departemen Komunikasi dan Informatika)*
DEPSOS	Department of Social *(Departemen Sosial)*
DIBI	Data and Information of Disaster in Indonesia

	(Data dan Informasi Bencana Indonesia)
DISS	Disaster Information Sharing System
DKN	National Maritime Council *(Dewan Kelautan Nasional)*
DKP	Department of Marine and Fisheries Affairs *(Departemen Kelautan dan Perikanan)*
DLR	Deutschen Zentrum fur Luft und Raumfahrt
DPRD	State Parliament house *(Dewan Perwakilan Rakyat Daerah)*
DRI	Disaster Risk Index
DRR	Disaster Risk Reduction
DSS	Decision Support System
EIA	Environmental Impact Assessment
EOC	Emergency Operation Center
ESDM	Department of Energy and Mineral Resources *(Departemen Energi dan Sumber Daya Mineral)*
ETEWS	Earthquake and Tsunami Early Warning System
GFDRR	Global Facility for Disaster Reduction
GFZ	Deutsches Geo Forschungs Zentrum
GOA	Government of Australia
GOI	Government of Indonesia
GOJ	Government of Japan
GPS	Global Positioning System
GTZ	Deutsche Gesellschaft für Technische Zusammenarbeit
HFA	Hyogo Framework for Action
IBC	International Building Code
ICZM	Integrated Coastal Zone Management
IDR	Indonesian Rupiah
InaTEWS	Indonesian Tsunami Early Warning System
ITB	Bandung Institute Of Technology *(Institut Teknologi Bandung)*
IWRM	Integrated Water Resources Management
JICA	Japan International Cooperation Agency
JMA	Japan Meteorological Agency
KOICA	Korean International Cooperation Agency
LAPAN	National Institute of Aeronautics and Space *(Lembaga Penerbangan dan Antariksa Nasional)*
MDG	Millennium Development Goal
MEWS	Meteorological Early Warning System
MMI	Modified Mercalli Intensity
NAP	National Action Plan
NDMP	National Disaster Management Plan
NEITWS	National Earthquake Information and Tsunami Early Warning System
NGO	Nongovernmental Organization
NPO	Nonprofit Organization

ODA	Official Development Assistance
PGA	Peak Ground Acceleration
PSDA	Water Resources Management *(Pengelolaan Sumber Daya Air)*
PU	Department of Public Works *(Departemen Pekerjaan Umum)*
PP	Government Regulation *(Peraturan Pemerintah)*
PROTAP	Standard Procedure *(Procedur Tetap)*
RBO	River Basin Organization
RC	Reinforced Concrete
RDMP	Regional Disaster Management Plan
RENSTRA	Strategic Plan *(Rencana Strategis)*
RPJM	Medium-Term Development Plan *(Rencana Pembangunan Jangka Menengah)*
SAPROF	Special Assistance for Project Formation
SATKORLAK PB	Provincial Coordination Unit for Disaster Management *(Satuan Koordinasi Pelaksana Penanggulangan Bencana)*
SATLAK PB	District Coordination Units for Disaster Management *(Satuan Pelaksana Penanggulangan Bencana)*
SCDRR	Safer Communities through Disaster Risk Reduction
SKPD	Government Work Unit *(Satuan Kerja Perangkat Daerah)*
SMS	Short Message Service
SNI	Indonesian National Standard *(Standar Nasional Indonesia)*
SOP	Standard Operation Procedure
TCDP	Technical Cooperation for Development Planning
TCWC	Tropical Cyclone Warning Center
TRC	Quick Response Team *(Tim Reaksi Cepat)*
UBC	Uniform Building Code
UNDP	United Nations Development Program
UNP	University of Padang State *(Universitas Negeri Padang)*
UPT	Technical Executing Unit *(Unit Pelaksana Teknis)*
US	United States
USGS	U. S. Geological Survey
VPN	Virtual Private Network
VSAT	Very Small Aperture Terminal
WB	World Bank

THE PREPARATORY STUDY ON DISASTER MANAGEMENT PROGRAM FOR INDONESIA

OUTLINE

1 BACKGROUND AND OBJECTIVE

1.1 Background of the Study

In Indonesia, various natural disasters such as Earthquakes, Tsunamis, Floods, Debris Flows, Landslides and Slope Failures occur frequently. In order to reduce economic and social losses due to these natural disasters, it is necessary to enhance comprehensive disaster risk reduction framework, land use plan, natural resources management plan and early warning system, etc.

The Government of Indonesia (GOI) has put more emphasis on 1) strengthening of relevant organizations for disaster management, 2) mitigation/prevention against disaster risk, and 3) capacity development of community-based disaster risk reduction activities, as priority issues in the Annual Governmental Action Plan of 2007 on the basis of the National Medium-Term Development Plan (RPJM 2004-2009). In the Next RPJM for 2010 -2015, it is expected that the disaster management sector will be a critical issue in the context of the national agenda of climate change adaptation.

The Government of Japan (GOJ) has stated in the assistance plan for Indonesia since November 2004 that Japan will provide supports for improving living environment, including disaster management, for the realization of “a fair and democratic social framework”. Taking into account the above policy, JICA considers the disaster management sector as one of the priority programs contributing to peace and prosperity in Indonesia, and sets its target as “to contribute to peace and prosperity in Indonesia through strengthening the comprehensive disaster risk management framework, which will increase the country’s capacity to cope with disasters at any stage of disaster risk management cycle.”

1.2 Objectives of the Study

The objectives of the Study are to reorganize JICA’s disaster management program for Indonesia by reviewing the GOI policy on disaster management sector in the next RPJM and past achievements by GOI including supports by international aid agencies, such as JICA, ADB, AusAID, WB, UNDP, *etc.* and picking out remaining challenges which GOI has to address, and thereby clarify specific fields and candidate programs and projects which JICA should focus on in the next five (5) years.

1.3 Scope of the Study

The overall study period is from the end of July to October, 2009. The team was dispatched to Jakarta, Indonesia from the end of July to August, 2009.

The scope of the Study is indicated in the table below;

Table 1.1 Scope of the Study

Component 1: Review of GOI policy and their achievements in disaster management sector	1. To review the progress of National Disaster Management Plan 2. To review past achievements by GOI in disaster management sector 3. To collect the relevant data and information related to next RPJM 4. To update analyze the natural disaster data in Indonesia
Component 2: Review and analysis of the current situation and critical issue on disaster management sector	1. To review the current situation and pick out issues on disaster management sector (e.g. disaster management framework, information network, earthquake disaster prevention counter measure, integrated water resources management) 2. To review and evaluate JICA's past assistance in disaster management sector 3. To pick out high priority and immediate issues
Component 3: Review and organization of the assistant policy and past achievement by other Inter national aid agencies	1. To review the assistance policy and their past achievements by other International aid agencies 2. To prepare a coordination map among main Inter national aid agencies
Component 4: Proposal of possible programs and projects	1. To review remaining issues to be addressed for achieving disaster management program goal 2. To propose new programs and projects expected to support by Japan

2 POLICY, ACHIEVEMENTS, CURRENT SITUATION AND ISSUES IN DISASTER MANAGEMENT SECTOR IN INDONESIA

2.1 Indonesian Policy, Achievements and Current Situation

The outline of policy, past achievements by the government of Indonesia is indicated in the fields of "Comprehensive Disaster Management", "Disaster Information Network", "Earthquake Disaster Management", "Integrated Water Resources Management", "Meteorological/Seismic Observation and Data Analysis" and "Coastal Protection" from Table 2.1 to 2.3.

Table 2.1 Outline of Indonesian Policy, Achievements and Current Situation (1/3)

Field	Indonesian Policy, Achievements and Current Situation
Comprehensive Disaster Management	– The National Agency for Disaster Management (BNPB) was established in Jan. 2008. BNPB has been preparing its organizational structure through budget acquisition and gradual increase of staff, aiming to launch its activities as the head organization for disaster measures. – BPBD (Regional Disaster Management Agency) are supposed to be established for all provinces and Kota/Kabupaten to formulate based on BNPB regulation. BPBD is a permanent institution so that continuous efforts of disaster management can be implemented systematically, while the existing SATKORLAK PB is basically temporary government bodies. As of the end of Aug. 2009, the 18 provinces (5 provinces on the process) and some 30 Kabupaten established BPBD. – The next national medium-term development plan (RPJM) 2010-2014 is underway and is expected to be finalized by Jan. 2010. In the draft of next RPJM, it stipulates "Sustainable development mainstreaming based upon disaster risk reduction and climate change mitigation" and emphasizes on importance of pre-disaster activities in order to realize activities as outlined in the Hyogo Framework for Action 2005-2015. – National Action Plan for Disaster Risk Reduction (NAP-DRR) 2006 – 2009 was formulated with the support of UNDP and has become a reference document for national and local governments, as well as other stakeholders, in undertaking the implementation of DRR. – The draft version of the National Disaster Management Plan (NDMP) was formulated by the support of "The JICA Study on Natural Disaster Management in Indonesia". BNPB started restructuring the plan by separating 8 types of natural disasters. Compared to the draft NDMP formulated during the JICA Study, the restructured plan were very much simplified. NDMP still needs restructuring through the discussions between BNPB and BAPPENAS. In parallel to formulation of NDMP at provincial level, formulation of regional disaster management plans have started in several provinces such as West Sumatra Province, DK Yogyakarta, and others. – Risk assessment process has started at national, province and Kabupaten/Kota level. As for national level disaster risk assessment, DRI (Disaster Risk Index) maps covering whole of Indonesia were produced by type of disaster to express the level of risk at Kabupaten/Kota level. In most of the provinces, production of Hazard Maps and Risk Maps is not yet started. At Kabupaten/Kota level, a scientific but simple method of producing hazard and risk maps was introduced by "The JICA Study on Natural Disaster Management in Indonesia" and it was applied in Kab. Jember, Kab. Padang Pariaman, and Kota Pariaman. The appropriate coordination among the risk assessments at national, province and Kabupaten/Kota level is necessary. – The Indonesian National Platform for DRR had been launched in Nov. 2008, which is composed of members representing the private sector, academic sector, government, the international community, mass media, and CSO/NGO. These multi-stakeholders will comprehensively coordinate and cooperate in all activities for disaster risk reduction and integrate efforts as well.
Disaster Information Network	– Network systems, for transmission and sharing disaster information among central disaster-related organizations centering on BNPB, are only partially developed and the responsibility of each organization for information collection has not yet coordinated or demarcated sufficiently. Multiplexing routes to transmit information for emergency response has not established yet. – Information transmission system is rather inadequate between BNPB and local governments. Fundamental information transmission equipments are scanty in local governments even though Emergency Operation Centers (EOCs) were established and are being established in several provinces. – Development of fundamental information infrastructure is not enough to enable transmission of high-volume data like images, to be effectively used for grasping detailed situation in affected area. – BMKG and other organizations have developped systems for observation and analysis of various data such as earthquake, meteorology and hydrology, whereas timely warning is still challenging especially for flood and forest fire. Continuous further activities are necessary. – Various activities regarding early warning to people in community (*e.g.* tsunami siren towers, drill using loudspeaker in Mosque, traditional equipment (Kenthongan) in community, warning through mobile phone, *etc.*) have been carried out. Continuous further activities are necessary. – Development of a standardized basic communication system is crucial. Fixed line telephone, fax and mobile phone are major communication means in national and local governments, even though many local governments are equipped with radio transmissions and satellite phones. However, a number of satellite phones have not been utilized due to shortage of operation cost. – BNPB has been developping a database of past disaster records which is open source and networked. However, especially in local governments, information such as disaster record and natural including social conditions are not collected and aggregated at a level which enables such information to be used for formulating concrete disaster management plans as well as an effective emergency response operation.

Table 2.2 Outline of Indonesian Policy, Achievements and Current Situation (2/3)

Field	Indonesian Policy, Achievements and Current Situation
Earthquake Disaster Management	– A technical committee for active tectonics investigated a distribution of expected earthquake motion value covering areas across Indonesia, which is in reference to "STANDAR NASIONAL INDONESIA (SNI 03-1726-2002)". This technical data shows peak ground acceleration (PGA) value that is expected for each different location in Indonesia. It was analyzed as an expected value for a 500-year return period referring to the existing Indonesian earthquake catalog. This standard is not law but a technological reference for architectural academy or licensure examination committee. – In Japan, there is the "Building Standard Law" that is uniformly effective at imposing the standard of earthquake resistance in building design. In Indonesia, the Law No.28/2002 stipulates that the Central Government regulates structural safety. However, there is no law that can control the way to design earthquake resistant buildings by means of enforceable article. In some cases, such as in Jakarta, in order to construct high rise buildings, the technical committee for evaluating building permission is functional and investigates structure in the process of construction; however, in other cases, it is not compulsory to confirm safety by structural calculation. – The grant and loan for low income peoples by State Ministry of Public Housing (MENPERA) has been promoted. However, quality of the residential buildings is usually not confirmed by MENPERA, and local government or community organization does not have the capacity to control building quality. As a result, many low quality buildings have been built.
Integrated Water Resources Management	– Directorate General of Water Resources, Ministry of Public Works (DPU) has been playing crucial roles in the field of integrated water resources management, while Ministry of Forestry has responsibility for forest conservation in upstream region in a river basin or flora conservation. – The National Medium-term Development Plan (RPJM) for 2010−2014 in the field of water resources is under preparation to be finalized by January 2010 by BAPPENAS and DPU. – The establishments of "River Basin Organization (RBO)" and "Water Resources Management Council" have been the main movements in the field of integrated water resources management after the enforcement of Water Resources Law (No.7/2004). – The 69 river basin groups are directly controlled and managed by 31UPTs (Technical Implementation Unit) established by DPU. The 69 RBOs under the supervision of DPU are supposed to formulate policy (POLA) and Master Plan (M/P). Since River Basin Organization (RBO) has been newly established, the capacity strengthening of RBO is crucial. Not only the capacity development but also structural and non-structural countermeasures are required for each river basin area in Indonesia. – DKI Jakarta has been suffered from a number of water-related disasters, especially flood disaster. The frequency of flood disaster tends to increase over time, which may be caused by growing human activities in urbanized area with insufficient structural and non-structural measures. Land subsidence due to overuse of ground water has been causing serious flood problem. However, such problems have not been clarified enough or understood because of the numerous problems and insufficient coordination among relevant organizations. – Natural disasters related to climatic factors are recently showing an increasing tendency under the influence of global climate change.
Meteorological/Seismic Observation and Data Analysis	– As a national meteorological, hydrological and geophysical agency, and one of disaster management sectors of government, BMKG is setting targets on establishment of the meteorological, climatological and geophysical (earthquake and tsunami) early warning system. BMKG has a definite goal and is trying to enhance the facilities and human resources. – BMKG has deleloped the Meteorological Early Warning System (MEWS), the Climatological Early Warning Sytem (CEWS) and the Earthquake and Tsunami Early Warning System (ETEWS). BMKG has established the tropical Cyclone Warning Center (TCWC) in the organization of BMKG. – MEWS targets the early warning system for general meteorology, or weather warnings for the general public. CEWS, dealing with atmospheric observation (air quality monitoring) and maritime observation (ocean weather monitoring), is now developed and still there is no concrete system in place. ETEWS consists of the Earthquake Information System (EIS) and the Tsunami Early Warning System (TEWS) under the operation of the National Earthquake Information and Tsunami Early Warning Center (NEITEWC) of BMKG. TCWC targets the early warning system for tropical cyclones, which is the only forecasting center for tropical cyclone in Indonesia. – There are a number of standing problems regarding MEWS, CEWS and ETEWS from the viewpoint of the systems for data observation, acquisition, analysis, forecasting, warning decision and dissemination (*e.g.* Insufficient number of observatories, Malfunction of radar systems, Insufficient capacity for weather forecast and warning, Luck of data quality control, *etc.*).

Table 2.3 Outline of Indonesian Policy, Achievements and Current Situation (3/3)

Field	Indonesian Policy, Achievements and Current Situation
Coastal Protection	– Historically, DPU has been playing main role as the central government for coastal erosion for planning, supervising of construction of structural countermeasures. The projects for coastal protection have been implemented under the administration and budget of Directorate of Swamps and Coastal, Directorate General of Water Resources of DPU. – Maintenance of the coastal protection works in the post-construction stage is transferred under the control of Balai, which is regional unit of PU established for the purpose of water resources management which jurisdiction covers the whole area of a river system, or Dinas PSDA, which is a bureau of the provincial government for the purpose of water resources management. – The Ministry of Marine Affairs and Fisheries (DKP) is a newly established department of the central government which was established in Nov. 2000, and is expected to support the decentralization process and also to support the regional government to manage the maritime and coastal area that previously had been under the domain of the department of transportation. The public services on the disaster prevention, coastal protection, and the policy formulation on the mitigation and adaptation to climate change belong to the administration of Directorate of Coastal and Ocean, Directorate General of Marine, Coastal and Small Islands of DKP. – There are some duplication of jurisdiction between DKP and PU, which historically has been in charge of coastal management and coastal protection. The two ministries have had frequent opportunities of discussion for the coordination of demarcation and allocation of project and budget. – In proportion to development of the coastal area, serious problems of beach erosion have been taking place in many coastal areas such that the coastal infrastructures have become seriously threatened. The coastal environment has also been seriously degraded such as beach erosion, land subsidence, devastation of coral reefs and mangrove forests, river-mouth clogging, contamination of water quality, *etc*. Further investigation and study shall be carried out to identify the real and actual causes of the coastal erosion taking into consideration the climate change and the accompanying factors as well. Impacts of climate change that are of much concern in the coastal area of Indonesia are sea level rise and tidal flood.

2.2 Review of Assistance Policy and Past Achievements by International Aid Agencies

The outline of policy, past achievements by by international aid agencies (*e.g.* Japan International Cooperation Agency (JICA), Asian Development Bank (ADB), Australian Agency for International Development (AusAID), United Nations Development Program (UNDP) and World Bank (WB), *etc*.) is indicated in the fields of “Comprehensive Disaster Management”, “Disaster Information Network”, “Earthquake Disaster Management”, “Integrated Water Resources Management”, “Meteorological/Seismic Observation and Data Analysis” and “Coastal Protection” from Table 2.4 to 2.6. The disaster risk reduction efforts by the Indonesian Government supported by international donors have not been coordinated sufficiently, and sometimes duplication of projects does exist. In order to avoid such inconsistency, mapping of projects supported by international donors (JICA, AusAID, UNDP and WB) were tried to be drawned. This mapping effort will contribute further to better implementation of projects and avoid overlapping, and also utilize past efforts to standardize tools in disaster management activities. The two types of map were drawned: 1) Disaster Management Cycle (HFA) vs Main Actors and 2) Disaster Management Cycle (HFA) vs Disaster Type, which are shown in Figure 2.1 and 2.2, respectively. In Figure 2.1, one can notice that there are some overlaps. For instance, project coverages of J-1 (The Study on Disaster Management in Indonesia), A1.1 (Developing Risk Map in AIFDR program by AusAID), U.1 (SC-DRR program by UNDP) and W2.2 (Capacity building in GFDRR program by WB) are overlapped one another, which implies that close coordinations are required.

Table 2.4 Outline of Assistance Policy and Past Achievements by International Aid Agencies (1/3)

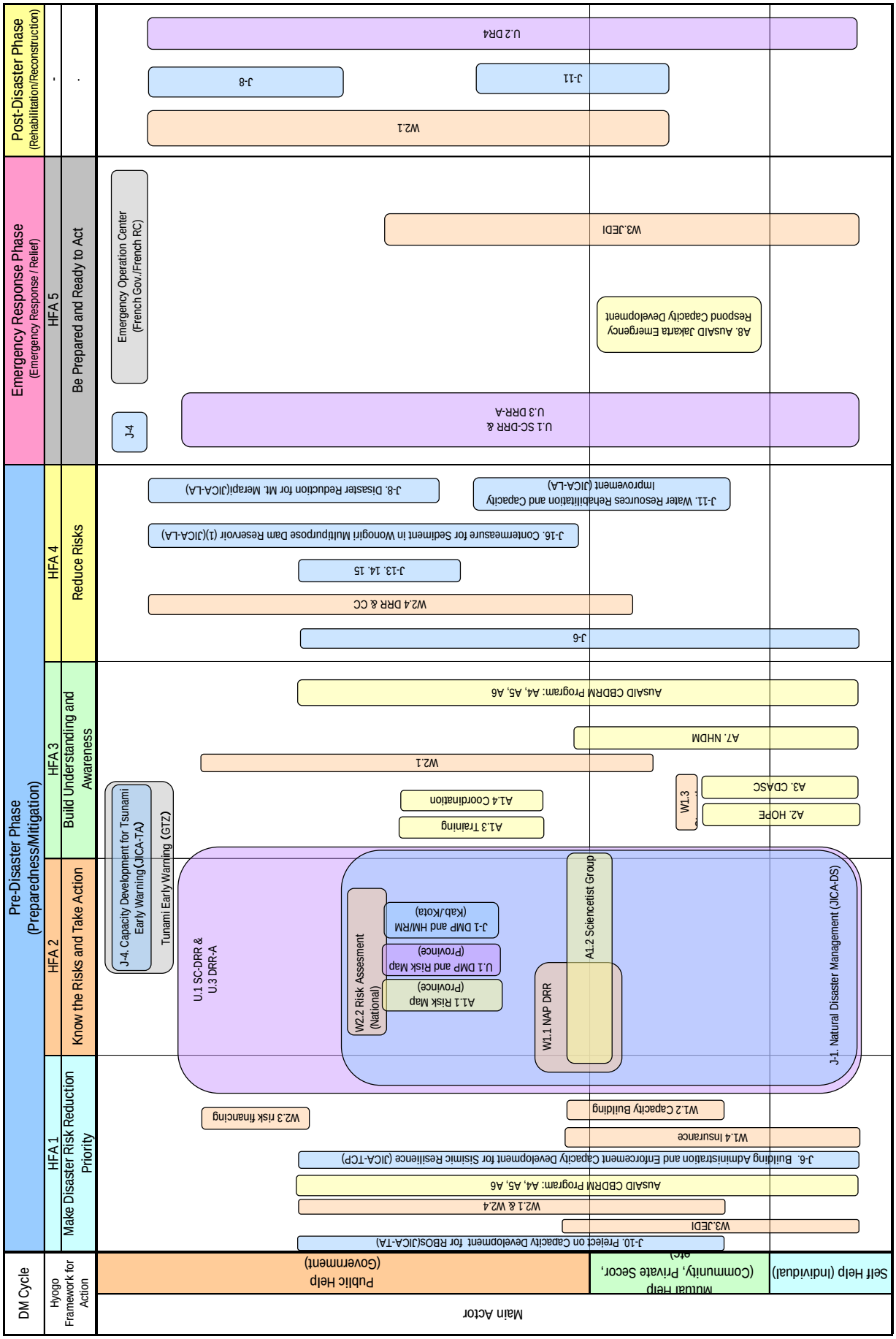
Field	Assistance Policy and Past Achievements by International Aid Agencies
Comprehensive Disaster Management	**1) Japan International Cooperation Agency (JICA)** – JICA country assistance strategy stipulates that disaster management is one of the important assistance programs for Indonesia, and especially policy and institutional improvement, investment contributing to climate change adaptation and mitigation, and structural and non-structural measures against natural disasters will be addressed by JICA in coordination with ODA loan, Technical Assistance(T/A) and Grant. JICA had implemented a number of projects to mitigate impacts from disasters from the past. – There are numbers of on going projects such as Multi-disciplinary Hazard Reduction Program from Earthquake and Volcanoes in Indonesia (T/A), Disaster Recovery and Management Sector Program Loan (Loan), Integrated Disaster Mitigation Management for "Banjir-Bandang" (T/A), Aceh Reconstruction Project (Loan), *etc*. "The JICA Study on Natural Disaster Management in Indonesia" (D/S) is one of the outstanding project, which was carried out to enhance the natural disaster management capacities and to facilitate the creation of necessary institutional mechanisms through the formulation of Disaster Management Plan at all levels. **2) Australian Agency for International Development (AusAID)** – Aligned with the AIFDR (Australia Indonesia Facility for Disaster Reduction) project, for the next five years AusAID will be focusing on the activities: 1) to improve the quality of disaster risk reduction and work to increase capacity for risk and vulnerability identification and risk mitigation in disaster planning and implementation, 2) to work collaboratively with other key DRR-focused stakeholders, and 3) to link and integrate scientific risk and hazard identification, DRR research and information generation, training and mentoring programs. The goal of AIFDR is to strengthen national and local capacity in disaster management in Indonesia, and promote a more disaster resilient region. The design of the AIFDR is flexible. Its work programs are developed annually by the staff in consultation with BNPB. **3) United Nations Development Programme (UNDP)** – UNDP provides assistance for Safer Communities through Disaster Risk Reduction (SC-DRR), Disaster Risk Reduction for Ache (DRR-A) and Disaster Risk Reduction and Recovery and Rehabilitation (DR4). Through implementation of these projects, UNDP will support the Indonesian Government for DRR. **4) World Bank (WB)** – Mainstreaming of risk reduction in the development process will include strengthening BAPPENAS capacity in preparing the national action plan, strengthening the capability of BNPB and designing a framework for disaster-risk insurance with the MoF. – WB will continue deepening the relationships established with BAPPENAS. Formulation process of NAP-DRR 2010-2012 has started with the support of WB and will be closely coordinated and integrated with NDMP and RPJM. The NAP-DRR will indicate priority activities to be taken in the next 3 years. – WB will also continue the relationships with the local governments of Aceh, Nias and Yogyakarta in supporting selected elements of the Government's actions to strengthen natural disaster resiliency. The rebuilding of Aceh and Nias will continue through the MDF (Multi Donor Fund) as well as the JRF (Java Reconstruction Program) activities for Yogyakarta and Central Java.
Disaster Information Network	**1) Japan International Cooperation Agency (JICA)** – The study named "Consultants Service for Disaster Management Communication Networks Improvement" was conducted for about four months in 2007-2008. Major items of recommendation from this study are 1) regulation or basic law about early warning system is required to clarify authority in decision making; 2) improvement for better communications infrastructure facility at local government level is necessary for disaster reporting; 3) communication via VSAT, satellite phone and mobile satellites are expected to guarantee fluency of communications; and 4) BNPB must have secure and reliable communication infrastructure. **2) French Government and French Red Cross** – The French Government takes charge of 1) establishment of emergency operations center (EOC) in BAKORNAS PB (BNPB) and training to the staff and 2) establishment of EOCs in three provinces of DKI Jakarta, West Sumatra and Aceh as well as training to the staff. The French Red Cross takes charge of 1) establishment of EOCs in three provinces of Bali, Jambi and Yogyakarta, 2) formulation of guidelines and procedures for EOC, 3) training of managers and operators and 4) community awareness-raising activities through PMI (Indonesian Red Cross). **3) Korean International Cooperation Agency (KOICA)** – A project entitled "Establishment of a National Disaster Information Dissemination System in Indonesia" has been conducted with DEPKOMINFO as a counterpart for two years starting 2008. The objective of the project is to disseminate disaster information such as earthquake and tsunami information to people through various ways like disaster information sharing system (DISS), cell broadcasting system (CBS) and TV & radio broadcast services. The project components consist of study and design of the system, installing the system and training.

Table 2.5 Outline of Assistance Policy and Past Achievements by International Aid Agencies (2/3)

Field	Assistance Policy and Past Achievements by International Aid Agencies
Earthquake Disaster Management	**1) Japan International Cooperation Agency (JICA)** – JICA has dispatched emergency aid teams to affected regions for emergency medical care and rescure including rehabilitation and reconstruction activities. Besides the emergency aid activities, JICA provided supports regarding the damage assessment in Kabupaten Jember, Kabupaten Padang Pariaman, and Kota Pariaman during "The JICA Study on Natural Disaster Management in Indonesia". The progressing "The JICA Project Building Administration and Enforcement Capacity Development for Seismic Resilience" is for supporting building administration capacity to improve non-engineered houses, which, in most cases, cause serious damage due to earthquake disaster. **2) Australian Agency for International Development (AusAID)** – AusAID plans to cooperate in school construction projects, which has a long history of support from AusAID. In the past, school construction projects mainly elementary school buildings did not consider seismic resistance; however, from now on, seismic resistant school buildings will be considered. AusAID will focus on new construction but not on existing structures that may need retrofitting. **3) World Bank (WB)** – WB plans to cooperate in retrofitting of schools, hospitals, and infrastructure in the scope of GFDRR Phase II, which is under preparation. Therefore, WB needs to conduct risk assessment; however, for retrofitting, risk assessment of each facility needs to be implemented to prioritize which facilities to be started. Risk Assessment of megacities needs to be implemented.
Integrated Water Resources Management	**1) Japan International Cooperation Agency (JICA)** – JICA has implemented numbers of projects in the field of integrated water resources management especially on engineering components from the long past. There are numbers of on going projects such as "Project on Capacity Development for RBOs Practical Water Resources Management and Technology" (T/A), "The Institutional Revitalization Project for Flood Management in JABODETABEK" (T/A), "Lower Solo Riever Improvement Project" (Loan), "Integrated Water Resources and Flood Management Project for Semarang" (Loan), *etc*. **2) Asian Development Bank (ADB)** – ADB stipulates in its Country Strategy and Program Update (2006-2009) that ADB will extend assistance for the establishment of an integrated water resource management structure taking into account the large-sized flood damage the country suffered recently. – Currently, ADB has provided technical assistance for preparing Integrated River Basin Management Policy (POLA) and is forming projects for strengthening water resource management and disaster management functions through Flood Management in Selected River Basins and Integrated Citarum Water Resources Management. **3) World Bank (WB)** – The World Bank stipulates in its CPS (2009-2012) that investment in public institutions is necessary to produce effects in country development, and in particular, the WB emphasizes assistance for environmental sustainability and disaster mitigation as one of five core engagements. – Currently, WB provides assistance for improvement of the management structure in the water control sector (transfer and enhancement of the management function to irrigation associations), Dam Operation in Safety Project (DOISP), and Jakarta Urgent Flood Mitigation Project as well as for the preparation of Implementation Plans based on each Integrated River Basin Management Policy (POLA).
Meteorological/Seismic Observation and Data Analysis	**1) Japan International Cooperation Agency (JICA)** – The group training course in Meteorology has been held for more than 30 years, which is a 3-month training course in Japan for meteorologists. The another group training course "Capacity Development for Adaptation to Climate Change in Asia, Climate Change Analysis" was held in 2008 and 2009, which was a training course designed for meteorologists to study the climate change analysis for about a month in Japan. Meteorologist of BMKG attended the training courses. – After the Indian Ocean tsunami disaster in 2004, JICA carried out the Capacity Development Project for Tsunami Early Warning from Sept. 2007 to May 2009 for BMKG. In this project, three experts were dispatched to BMKG for 3 years to establish InaTEWS (Indonesian Tsunami Early Warning System). **2) Deutsche Gesellschaft für Technische Zusammenarbeit (DTZ)** – Germany performed an important role to establish InaTEWS under the project called "Germany and Indonesia Tsunami Early Warning System (GITEWS)". In this project, GFZ (Deutsches Geo Forschungs Zentrum) and DLR (Deutschen Zentrum fur Luft und Raumfahrt) established seismographic analyzing system and tsunami analyzing system, which are nerve center of InaTEWS. The magnitude calculation system and the DSS (Decision Support System) of Tsunami, which are the core of InaTEWS, have not been completed. Then, tsunami early warning cannot be issued yet.

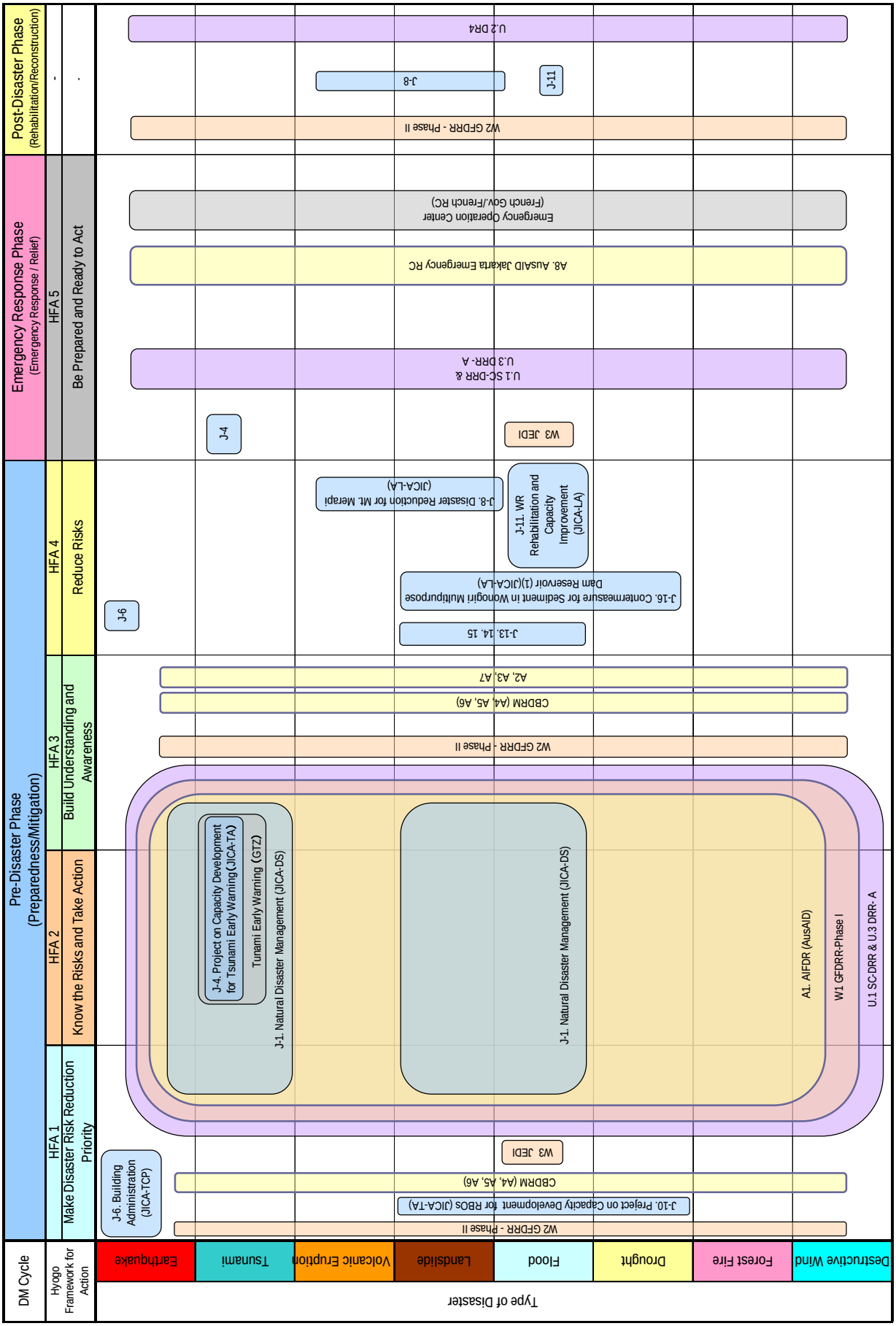
Table 2.6 Outline of Assistance Policy and Past Achievements by International Aid Agencies (3/3)

Field	Assistance Policy and Past Achievements by International Aid Agencies
Coastal Protection	**1) Japan International Cooperation Agency (JICA)** – There have been three JICA projects in the field of coastal protection: 1) Bali Beach Conservation Project, 2) Padange Flood Control Project and 3) Coral Reef Rehabilitation and Management in North Surawesi. – The Bali Beach Conservation Project was implemented at the four beaches in Bali Province (Kuta, Nusa Dua, Sanur and Tanah Lot) with technical assistance and financial assistance of Loan. The project aimed at reduction of the damage caused by beach erosion and restoration of sand beaches at the internationally famous resort beaches and tourist destination by construction of groins, detached breakwaters and beach nourishment. – The Padang Flood Control Project was implemented in two phases in the capital city of West Sumatra Province, Padang. A series of shore protection works for 5.3 km including groin works were constructed as the countermeasure for beach erosion during the Phase 2 project. – The Study on the Coral Reef Rehabilitation and Management in North Sulawesi Province (Dec. 1999 – Nov. 2001) was carried out with technical and financial assistance from JICA. The mapping information of the marine and coastal preservation zones produced in the study has been used by DKP (the counterpart agency of this study project) as the basic data for its policy making and decision.



Note: Refer to Tables 2.2.2.1 to 2.2.2.4 in which related project lists are shown.

Figure 2.1 Result of Mapping 1 (Disaster Management Cycle (HFA) vs Main Actor)



Note: Refer to Tables 2.2.2.1 to 2.2.2.4 in which related project lists are shown.

Figure 2.2 Result of Mapping 2 (Disaster Management Cycle (HFA) vs Disaster Type)

2.3 Critical Issues in Disaster Management Sector

In order to recommend possible programs and projects which are to be assisted by JICA, critical issues (necessary actions) are to be selected among the issues identified through review of past achievements by the Government of Indonesia and the assistance by JICA. In this study, critical issues were selected from the viewpoint of "enhancing the ability of Indonesia for disaster measures", "categorization of short- to mid-term or long-term measures" and "appropriateness and effectiveness as Japanese assistance". The issues indicated in gray in the table below are critical issues

Table 2.7 Critical Issues in Disaster Management Sector in Indonesia (1/3)

Field	Issues/Necessary Actions	
	No.	**Contents**
Comprehensive Disaster Management	**1.Legislation**	
	a.	Holding Workshop to understand enacted law and regulations
	b.	Giving actual guidance to local gov. on establishment of BPBD and their DMP
	2.Institution	
	c.	Necessary training and understanding of knowledge on DM, Table Top Exercise, Drills
	d.	Training for new officials on DM
	e.	Capacity development together with necessary experiences on DM
	3.Risk Assessment	
	f.	Understanding Type of Risk Assessment and holding Coordination workshop
	g.	Data Acquisition and Accumulation System in local government
	h.	Guideline for formulation of HM and RM and training
	4. Planning	
	i.	Guideline for formulation of DMP
	j.	Formulation of sample plan in all 8 types of disaster
	k.	Workshop to formulate DMP in local government
Disaster Information Network	a.	Design of an overall system of disaster information network
	b.	Clarification of responsibility of each organization for information collection and correspondence
	c.	Establishment of multiplexing routes to transmit information securely in a time of emergency
	d.	Design of a system for collecting and sharing standardized information
	e.	Development of a system in BNPB for collecting, transmitting and sharing information, and capacity development for effective and sustainable use of it
	f.	Development of a network system for transmitting and sharing information among central disaster-related organizations, and capacity development for effective and sustainable use of it
	g.	Development of communication equipments and facilities in local governments, and capacity development for effective and sustainable use of them
	h.	Development of a network system among central disaster-related organizations, local governments and community, and capacity development for effective and sustainable use of it
	i.	Development and reinforcement of basic communication infrastructure
	j.	Reinforcement of capacity for information collection in a time of disaster
	k.	Development and reinforcement of a system for observation and analysis of disaster information
	l.	Activities for collecting, accumulating and sharing disaster information, including their digitizing and networking
	m.	Utilization of disaster information, such as making hazard and risk maps and designating evacuation site

Note: The issues indicated in gray in the table are critical issues, which were selected from the viewpoint of "enhancing the ability of Indonesia for disaster measures", "categorization of short/mid term or long term measures" and "appropriateness and effectiveness as Japanese assistance".

Table 2.8 Critical Issues in Disaster Management Sector in Indonesia (2/3)

Field	Issues/Necessary Actions		
	No.	**Contents**	
Earthquake Disaster Management	**1.Seismicity**		
	a.	Start-up of committee on earthquake disaster management plan	
	2. Legal system for building construction		
	b.	Improvement of building law	
	c.	Develoment of building pemission system and its enforcement	
	3. Earthquake-resistance in building		
	d.	Formulation of construction guideline of Non-engineered building and applied for SNI	
	e.	Technical guidance linked with housing loan system for low income person	
	f.	Technical examination, discussion, and formulation of guideline of structural diagnosis system for existing buildings	
	g.	Technical examination, discussion, and formulation of guideline of seismic retrofitting for existing building	
	h.	Technical examination, discussion, and formulation of guideline of Post-Earthquake Quick Damage Assessment system of buildings	
	4. Disaster mitigation for megacity		
	i.	Damage assessment of megacities utilizing seismic-microzoning method	
	j.	Improving emergency response base facility (Reinforcement of school, hospital building)	
	k.	Maintenance and reinforcement of infrastructure for post earthquake emergency response activities (Road and bridge)	
	l.	Maintenance and reinforcement of infrastructure for post earthquake emergency response activities (Port facility)	
Integrated Water Resouces Management	**A.**	**Actions to be taken for RBO capacity strengthening and implementation of structural and non-structural measures**	
	a.	Capacity strengthening of RBO	Training of engineers
			Assistance for formulations of policy and master plan of integrated water resources management (River improvement, Water use, Water quality, Sedimentation, etc.)
			Strengthening of coordination among relevant stakeholders
			Increase of budget for RBOs
			Strengthening of early warning system and coordination with BPBD for emergency response
	b.	Establishment and operation of information sharing system	Facilitation of sharing of measurement data (rainfall, discharge, water level, tide level, etc.)
			Establishment and operation of database of water-related disaster
			Establishment and operation of information sharing system among stakeholders
	c.	Facilitation of infrastructure	Implementation of prioritized construction of infrastructural facilities (River improvement, Water use, Water quality, Sedimentation, etc.) based on policy and master plan of integrated water resources management
			Improvement/Rehabilitation of existing facilities
	d.	Development or strengthening of early warning system for emergency response	Development or strengthening of early warning system for emergency response
			Increase the number of measurement stations (rainfall, discharge, water level, tide level, etc.)
			Strengthening of Community-Based Disaster Risk Reduction
	e.	Climate Change Adaptation	Assessment of rainfall, discharge, water level, tidal level, etc. based on future scenarios due to climate change
			Analysis on impact of climate change on disaster measures
			Revision of water resources management plan for the necessary implementation of measures

Note: The issues indicated in gray in the table are critical issues, which were selected from the viewpoint of "enhancing the ability of Indonesia for disaster measures", "categorization of short/mid term or long term measures" and "appropriateness and effectiveness as Japanese assistance".

Table 2.9 Critical Issues in Disaster Management Sector in Indonesia (3/3)

Field	Issues/Necessary Actions		
	No.	Contents	
Integrated Water Resouces Management	**B.**	**Actions to be taken for integrated water resources management for DKI Jakarta**	
	a.	Strengthening of regulations of ground water use	Survey the details of ground water use and land subsidence
			Strengthening of regulations of ground water use
			Monitoring of ground water use and land subsidence
	b.	Implementation of comprehensive management plan for river basins related to DKI Jakarta	Review of the existing plan and identifying all of the problems for river basins related to DKI Jakarta
			Strengthening of coordination among relevant stakeholders
			Implementation of comprehensive flood control in DKI Jakarta
			Effective utilization of reservoirs for multi-purpose water resources management
			Strengthening of early warning system and coordination with BNPB & BPBD for emergency response in case of catastrophic disaster
	c.	Strengthening of conveyance of channel or river network	Strengthening of conveyance of channel or river network (Improvement, Dredging, etc.)
			Rehabilitation of degraded flood control facility
			Rehabilitation of degraded small-sized ponds and maintenance
	d.	Strengthening of early warning system for emergency response	Development or strengthening of early warning system for emergency response
			Increase the number of measurement stations (rainfall, discharge, water level, tide level, etc.)
	e.	Strengthening of activities at community level	Strengthening of Community-Based Disaster Risk Reduction
			Reduction of sediment discharge from upstream area based on forest conservation activities at community level
	f.	Climate Change Adaptation	Assessment of rainfall, discharge, water level, tidal level, etc. based on future scenarios due to climate change
			Analysis on impact of climate change on disaster measures
			Revision of water resources management plan for the necessary implementation of measures
Meteorological/Seismic observation and data analysis	a.	Automated Observatory	
	b.	Data transmission	
	c.	Central Operation System	
	d.	Radar analysis	
	e.	Precipitation now-cast	
	f.	SATAID operation	
	g.	NWP Guidance	
	h.	Meso Scale Model	
	i.	Wave Model Upgrade	
	j.	Warning criteria	
	k.	Automatic decision system	
	l.	Warning products	
	m.	Discussion and demarcation	
	n.	Statistic climate analysis	
	o.	Statistic climate index	
	p.	Climate change vulnerability	
	q.	Climate change monitoring	
	r.	Numerical climate model	
Coastal Protection	a.	Countermeasure to Beach Erosion	
	b.	Maintenance of Shore Protection Facilities	
	c.	Integrated Coastal Zone Management	

Note: The issues indicated in gray in the table are critical issues, which were selected from the viewpoint of "enhancing the ability of Indonesia for disaster measures", "categorization of short/mid term or long term measures" and "appropriateness and effectiveness as Japanese assistance".

3 PROPOSAL OF POSSIBLE PROGRAMS AND PROJECTS

Based on the Indonesian situation such as policy, past achievements by GOI, current situation and issues, the assistant policy and past achievements by international aid agencies including JICA, and the critical issues/necessary actions clarified in this Study, possible directions of the disaster management program and a series of new projects are proposed.

Table 3.1 Proposed Directions of JICA Disaster Management Program

1) Continuous supports to BNPB (National Disaster Management Agency), as the core organization of comprehensive disaster management framework in Indonesia
2) Establishment of comprehensive disaster information network system, which assists quick and accurate information transmit and information sharing among related organizations in case of emergency
3) Continuous focusing on the measures against Earthquake Disaster and Water-Related Disaster , which are the most severe natural disasters in Indonesia
4) Assistances for "Improvement of vulnerable houses to earthquake disaster" and "Damage assessment of earthquake disaster in Mega-cities" are necessary as countermeasures against earthquake disaster.
5) "RBO capacity strengthening and implementation of structural and non-structural measures" and "Assisting in the solution of water-related problems for DKI Jakarta and related river basins" are necessary assistance as countermeasures against water-related disasters. The assistances for coastal protection as a coastal zone management may also be necessary.
6) In the field of Meteorological/Seismic observation and data analysis, "Improvement of meteorological observation and weather forecasting ability for disaster prevention" and "Vulnerability assessment due to climate change" are necessary assistance.

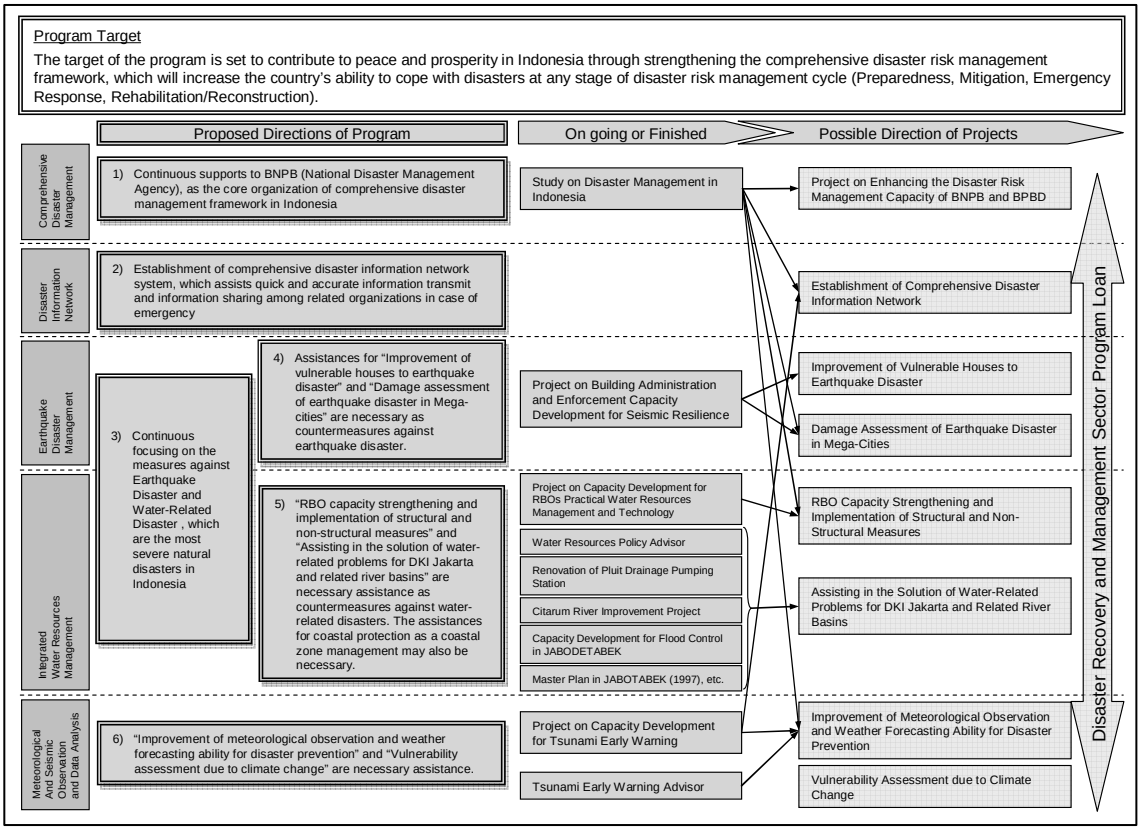


Figure 3.1 Proposed Directions of JICA Disaster Management Program

Table 3.2 Proposed Project List

Field	Title
Comprehensive Disaster Management	The Project on Enhancing the Disaster Risk Management Capacity of BNPB and BPBD
Disaster Information Network	The Study on Disaster Information Network
Earthquake Disaster Management	Financial System for Improvement of Self-help Housing Quality in Disaster-Prone Areas
	The Study on Seismic Microzonation of Megacity in Indonesia
Integrated Water Resources Management	Implementation Program for Integrated Water Resources Management and Development
	JICA's Strategic Study on Enhancement of Inter-Basin Water Resources Management and Disaster Measures including Cisadane-Cliwung, Citarum and Ciujung-Ciliman River Basins
Meteorological/Seismic Observation and Data Analysis	Improvement of Meteorological Observation and Weather Forecasting Ability for Disaster Prevention
	The Study on Climate Change Vulnerability and Climate Change Prediction Method

CHAPTER 1 BACKGROUND AND OBJECTIVE

1.1 Background of the Study

In Indonesia, various natural disasters such as Earthquakes, Tsunamis, Floods, Debris Flows, Landslides and Slope Failures occur frequently. In order to reduce economic and social losses due to these natural disasters, it is necessary to enhance comprehensive disaster risk reduction framework, land use plan, natural resources management plan and early warning system, etc. It is also required to strengthen the capacity to respond to disaster management at each level of the society.

It is still fresh in our minds that on December 26, 2004, the countries surrounding the Indian Ocean suffered unprecedented damage by a giant earthquake of magnitude 9.0 with a hypocenter in the coast of Sumatra in Indonesia and a sequent tsunami. The international community offered massive aid to assist in disaster recovery, and Japan also executed international emergency relief operations and urgent rehabilitation and reconstruction support.

Within a month after the catastrophe, the World Conference on Disaster Reduction was held from 18 to 22 January 2005 in Kobe, Hyogo, Japan and adopted the present Hyogo Framework for Action 2005-2015: Building the Resilience of Nations and Communities to Disasters. The conference provided a unique opportunity to promote a stragegic and systematic approach to reducing vulnerabilities and risks to hazards. It underscored the need for, and identified ways of, building the resilience of nations and communities to disasters. The conference also has adopted the following five priorities for action: 1) Ensure that disaster risk reduction is a national and a local priority with a strong institutional basis for implementation, 2) Identify, assess and monitor disaster risks and enhance early warning, 3) Use knowledge, innovation and education to build a culture of safety and resilience at all levels, 4) Reduce the underlying risk factors and 5) Strengthen disaster preparedness for effective response at all levels.

In July 2005, the President of Indonesia H.E. Susilo Bambang Yudhoyono and the former Prime Minister of Japan H.E. Junichiro Koizumi recognized that capacity development for reducing damage by natural disaster including earthquake and tsunami are priority issues for Indonesia, and agreed to establish the “Committee on Disaster Reduction” in order to mitigate natural disasters in Indonesia and strengthen cooperation to develop a disaster reduction system. The Government of Japan agreed to the request of Government of Indonesia, and decided to implement a series of assistance activities.

Under the above mentioned circumstances, the Indonesian Government has put more emphasis on 1) strengthening of relevant organizations for disaster management, 2) mitigation/prevention against disaster risk, and 3) capacity development of community-based disaster risk reduction

activities, as priority issues in the Annual Governmental Action Plan of 2007 on the basis of the National Medium-Term Development Plan (RPJM 2004-2009). In the next RPJM for 2010 -2015, it is expected that the disaster management sector will be a critical issue in the context of the national agenda of climate change adaptation. Natural disasters related to climatic factors are recently showing an increasing tendency under the influence of global climate change. In this regard, improvement of the Integrated Water Resources Management (IWRM), including flood control, water use and conservation, are of vital importance in order to deal with future changes in precipitation patterns.

International aid agencies other than Japan International Cooperation Agency (JICA), such as Asian Development Bank (ADB), Australian Agency for International Development (AusAID), United Nations Development Program (UNDP) and World Bank (WB) have been supporting the disaster management sector. The Government of Japan has stated in the assistance plan for Indonesia since November 2004 that Japan will provide support for improving living environment, including disaster management, for the realization of “a fair and democratic social framework”.

Taking into account the above policy, JICA considers the disaster management sector as one of the priority programs contributing to peace and prosperity in Indonesia. And its target is set as “to contribute to peace and prosperity in Indonesia through strengthening the comprehensive disaster risk management framework, which will increase the country’s capacity to cope with disasters at any stage of disaster risk management cycle (Preparedness, Mitigation, Emergency Response and Rehabilitation/Reconstruction)”.

1.2 Objective of the Study

The objectives of the Study are to reorganize JICA’s disaster management program for Indonesia by reviewing the Indonesian Government’s policy on disaster management sector in the next RPJM and past achievements, including support by international aid agencies, such as JICA, ADB, AusAID, WB and UNDP, and picking out remaining challenges which the Indonesian Government has to address, thereby clarifying specific fields and candidate programs and projects which JICA should focus on in the next five (5) years.

The outline of the program was assumed as shown below.

(1) Program Target

The target of the program is set to contribute to peace and prosperity in Indonesia through strengthening the comprehensive disaster risk management framework, which will increase the country's ability to cope with disasters at any stage of disaster risk management cycle (Preparedness, Mitigation, Emergency Response, Rehabilitation/Reconstruction).

(2) Outputs

a) Relevant organizations for disaster risk reduction (at central and local levels) will be strengthened and collaboration with the organizations will be enhanced.
b) Ability of relevant human resources (including the community) for disaster risk reduction will be enhanced.
c) Integrated Water Resources Management/Development will be promoted.
d) A disaster information network system (including earthquakes, volcanic eruptions and mudflows, floods, tsunamis, landslides, and debris flows) will be developed.

1.3 Scope of the Study

The overall study period is from the end of July to October, 2009. The team was dispatched to Jakarta, Indonesia, 1) from the end of July to August and 2) the middle of October, 2009.

The study team members are shown in Table 1.3.1.

Table 1.3.1 Study Team Members

Name	Responsibility
Mr. Noboru IKENISHI	Team Leader/Disaster Management Administration
Mr. Ryoji TAKAHASHI	Disaster Risk Management Organization and Institution
Mr. Kenji MORITA	Disaster Information Network
Mr. Akio HAYASHI	Earthquake Disaster Management
Mr. Kenichiro KATO	Integrated Water Resources Management
Mr. Kazutoshi KASHIMA	Coastal Protection
Mr. Chuji YAMAMOTO	Meteorological/Seismic Observation and Data Analysis

The scope of the Study is indicated in Table 1.3.2 below.

Table 1.3.2 Scope of the Study

Component 1: Review of Indonesian Government's policy and achievements in disaster management sector	1. To review the progress of National Disaster Management Plan 2. To review past achievements by GOI in disaster management sector 3. To collect the relevant data and information related to next RPJM 4. To update and analyze the natural disaster data in Indonesia
Component 2: Review and analysis of the current situation and critical issue on disaster management sector	1. To review the current situation and pick out issues on disaster management sector (e.g. disaster management framework, information network, earthquake disaster prevention counter measure, integrated water resources management) 2. To review and evaluate JICA's past assistance in disaster management sector 3. To pick out high priority and immediate issues
Component 3: Review and organization of the assistant policy and past achievement by other international aid agencies	1. To review the assistance policy and past achievements of international aid agencies 2. To prepare a coordination map among main international aid agencies
Component 4: Proposal of possible programs and projects	1. To review remaining issues to be addressed for achieving disaster management program goal 2. To propose new programs and projects expected to be supported by Japan

1.4 Study Approach

The Study was implemented using two (2) approaches, which are defined in Table 1.4.1.

Table 1.4.1 Study Approach

Approach 1 Drawing overall framework of JICA's disaster management program, mapping priority field and picking out remaining challenges based on the Indonesian Government policy and past achievements. **Approach 2** Formulating programs and projects contributing to achieve JICA's program target

1) Approach 1

- Based on the Hyogo Framework for Action 2005 - 2015: Building the Resilience of Nations and Communities to Disasters (2005) and the recommendations of the Report of the Japan-Indonesia Joint Committee on Disaster Reduction (2006), the team will review

the Indonesian Government's policy on disaster management and past achievements including support by international aid agencies.

- Analyzing the gap between the current situation and the program target, the team will clarify priority fields in disaster management sector and pick out remaining challenges which the Indonesian Government has to address.

2) Approach 2

- Based on next RPJM, RENSTRA and priority challenges picked out through approach 1) above, candidate programs and projects will be proposed.
- Proposed programs and projects will be sorted out from the viewpoint of whether the assistances can be effective and appropriate in line with Japanese resources and its advantages.
- Candidate programs and projects will be formulated taking into account the policy of other international aid agencies and lessons learned from their past experiences as well as that of JICA.

1.5 Report Framework

This report consists of three chapters. The framework of this report is indicated visually in Figure 1.5.1.

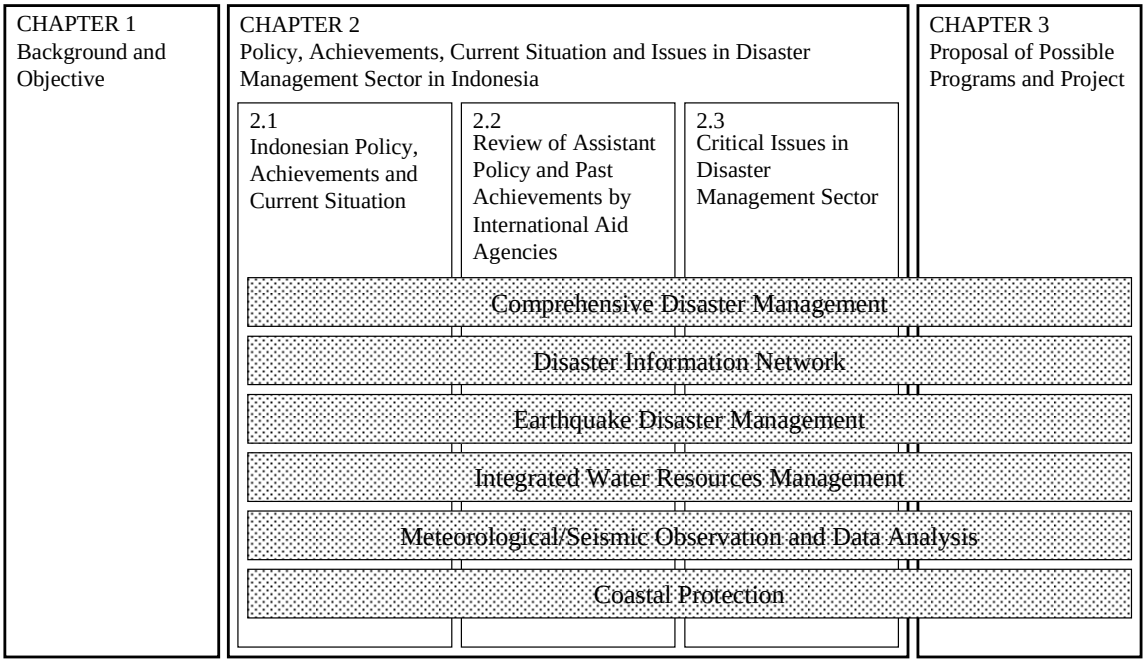


Figure 1.5.1 Report Framework

CHAPTER 2 POLICY, ACHIEVEMENTS, CURRENT SITUATION AND ISSUES IN DISASTER MANAGEMENT SECTOR IN INDONESIA

2.1 Indonesian Policy, Achievements and Current Situation

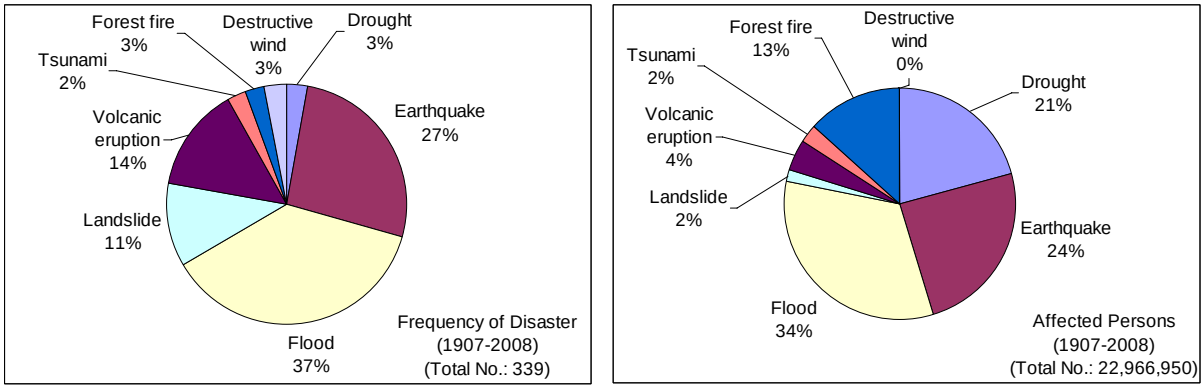
This section describes the review of the past achievements by the government of Indonesia including current status of draft version of the next national medium-term development plan (RPJM) and issues in disaster management sector as well as trend of natural disaster in Indonesia.

2.1.1 Trend of Natural Disaster in Indonesia

1) Long-Term Trend of Disaster

The long-term trend of disasters in Indonesia is examined using EM-DAT: The OFDA/CRED International Disaster Database. This database contains the data of major disasters in the world, which are classified into many different types of natural disasters such as earthquake, flood, slides (landslide), wind storm (destructive wind), wave/surge (tsunami) and volcano (volcanic eruption), as well as accidental disasters and epidemic disasters.

The following figure shows the frequency of natural disasters and number of affected persons by natural disasters during the past 100 years in Indonesia based on the data of EM-DAT. As shown in the figure, high frequency natural disasters in Indonesia are flood, earthquake, volcanic eruption and landslide, and those that greatly affect people are flood, earthquake, drought and forest fire.

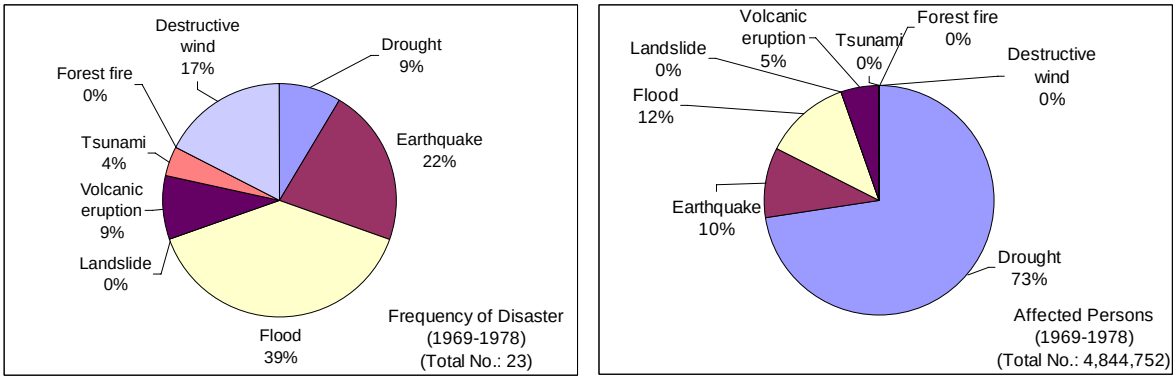


Source: EM-DAT: The OFDA/CRED International Disaster Database

Figure 2.1.1.1 Frequency of Natural Disasters and Number of Affected Persons in 1907 - 2008

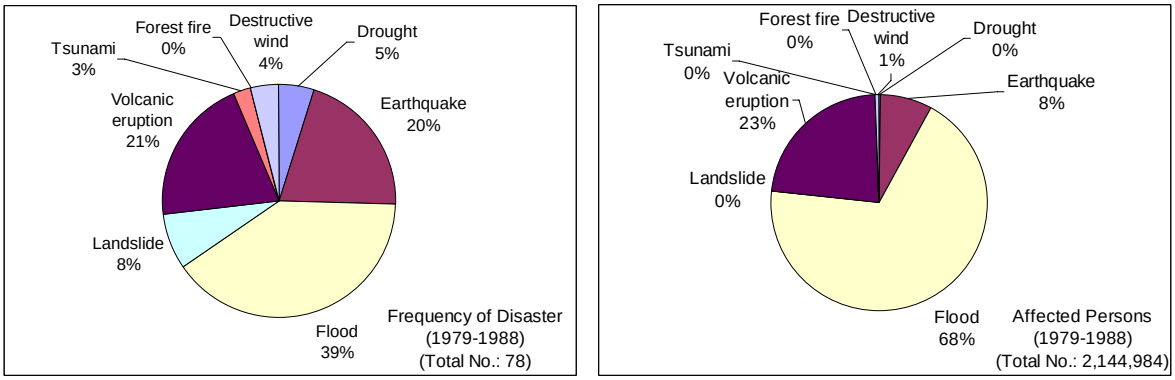
Figure 2.1.1.2 to 2.1.1.5 show the frequency of natural disasters and number of affected persons by natural disasters in a period of 10 years from 1969 in Indonesia based on the data of EM-DAT. From the figures, it is clear that both of frequency of disasters and number of affected persons tend to increase over time. Disasters which frequently occur are almost the same in each period.

Flood, earthquake and volcanic eruption are high-frequency disasters. On the other hand, the disasters most affecting people varied by period. Drought disasters occurred in 1969-1978, flood in 1979-1988, forest fire in 1989-1998, and earthquake in 1999-2008. Besides, flood is the most frequent disaster in common in each period and the total number of affected persons by floods tended to increase over time. Average numbers of affected persons per one (1) flood event increased or decreased in a range from about 45 thousands to 90 thousands in each period and the clear trend was not seen. In other words, the number of affected persons didn't tend to decrease in spite of continuous inputs for flood control measures, which may be caused by population concentration to flood prone area or growth of external force of flood by influences of urbanization and/or climate change. In addition, frequency of landslide and forest fire tended to increase over time, which may be caused by growing human activities such as logging.



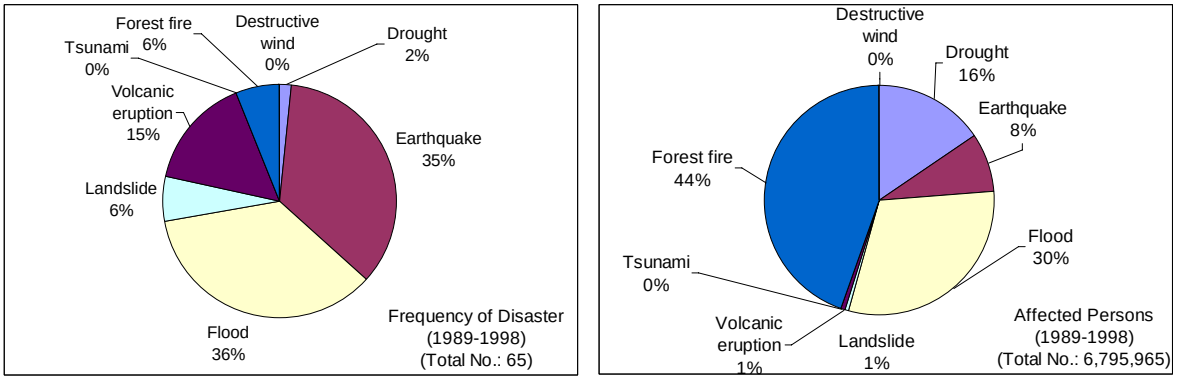
Source: EM-DAT: The OFDA/CRED International Disaster Database

Figure 2.1.1.2 Frequency of Natural Disasters and Number of Affected Persons in 1969 - 1978



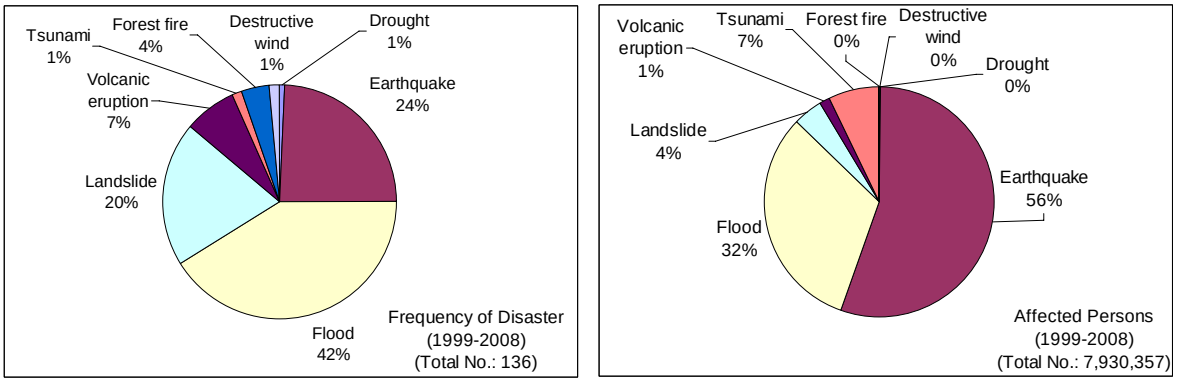
Source: EM-DAT: The OFDA/CRED International Disaster Database

Figure 2.1.1.3 Frequency of Natural Disasters and Number of Affected Persons in 1979 - 1988



Source: EM-DAT: The OFDA/CRED International Disaster Database

Figure 2.1.1.4 Frequency of Natural Disasters and Number of Affected Persons in 1989 - 1998



Source: EM-DAT: The OFDA/CRED International Disaster Database

Figure 2.1.1.5 Frequency of Natural Disasters and Number of Affected Persons in 1999 - 2008

2) Areal Distribution of Disaster

Areal distribution of natural disasters is investigated using the EM-DAT. Highly disaster-prone areas of each natural disaster are summarized as follows.

- Earthquake: Sumatra's west coast, Java's south coast, Sulawesi, Nusa Tenggara, Maluku and Papua
- Tsunami: Sumatra's west coast, Java's south coast, Sulawesi and Nusa Tenggara
- Volcanic Eruption: Sumatra, Java, Sulawesi, Nusa Tenggara and Maluku
- Destructive Wind: Java and Nusa Tenggara
- Forest Fire: Sumatra and Kalimantan
- Flood: Sumatra, Java, Kalimantan, Sulawesi and Nusa Tenggara
- Landslide: North-western part of Sumatra, Java, Sulawesi and Nusa Tenggara
- Drought: Java, Nusa Tenggara and Irian Jaya

2.1.2 Comprehensive Disaster Management[1]

1) Review of the Past Achievements by the Government of Indonesia in Comprehensive Disaster Management

After the occurrence of catastrophic disasters in Ache (2004) and in Yogyakarta (2006), the Government of Indonesia faced and realized the necessity and importance of a systematic disaster management framework, and the need for more efforts on pre-disaster activities aiming at mitigating impacts before the occurrence of disaster. In this sub-section, past achievements made by the Government of Indonesia are summarized. First step of the systematic disaster management involves the need of appropriate Legislation, Institution, and Planning. The Indonesian Government recently undertook the following activities for the first step.

(1) Legislation

The National Progress Report on the implementation for the Hyogo Framework for Action (Triutomo, 2009) states that Law No. 24/2007 on Disaster Management was formulated to bring about a shift of paradigm in disaster management in Indonesia: First is the change of focus of disaster management from emergency response to risk management. Second is the awareness of the people's right to protection through disaster management. Third concerns the shouldering of responsibility of disaster management by all parties, not only the government. In fact, disaster management moves to the domain of multi-stakeholders when it used to be the sole responsibility of the government. All spectrums of disaster management, from the policy, institution, coordination and mechanism, have to involve the roles of the civil society and the private sector.

After the enactment of Law No. 24/2007 on disaster management, the following relevant regulations are formulated and enacted:

1. Government Regulation of the Republic of Indonesia Number 21 Year 2008 on the Conduct of Disaster Management (stipulates implementation of disaster management activities in all phases)
2. Government Regulation of the Republic of Indonesia Number 22 Year 2008 on the Funding and Administration of Disaster Aid (stipulates disaster management funding on funding source, fund allocation, implementation, monitoring, reporting and responsibility)
3. Government Regulation of the Republic of Indonesia Number 23 Year 2008 on the Participation of International Agencies and Non-government International Agencies in Disaster Management (stipulates role of international agencies and NGOs in disaster management)

[1] Terminology of "Comprehensive Disaster Management" in this report expresses framework of disaster management such as legislation, institution, planning, and others, to enhance overall capacity for disaster resilience.

4. Presidential Regulation No. 8, Year 2008, on the establishment of the National Agency for Disaster Management (BNPB) and Local Disaster Management Agencies (stipulates establishment of disaster management agencies in both national and local level)
5. Minister of Home Affairs Regulation No. 46/2008 (stipulates establishment of local disaster management agency (BPBD))
6. Minister of Home Affairs Circular Letter on the Acceleration of the establishment of Government Work Unit (SKPD)
7. At local levels, many provinces and districts have passed Local Regulations on DM, detailing the clear responsibilities of each different government level.

Also, after the establishment of BNPB, the following Head of BNPB Regulations are formulated and enacted:

1. No. 1/2008, Organization & Working Procedures from BNPB
2. No. 3/2008, Guidelines on the Establishment of BPBD (Regional Disaster Management Agency)
3. No. 4/2008, Guidelines on the Formulation of the Disaster Management Plan
4. No. 6/2008, Guidelines on Ready to Use Funds
5. No. 7/2008, Guidelines on Aid Distribution Mechanism of Basic Needs Fulfillment
6. No. 8/2008, Guidelines on the Distribution and Amount of Bereavement Compensation
7. No. 9/2008, SOP for TRC (Quick Response Team)
8. No. 10/2008, Guidelines on Disaster Emergency Response Command
9. No. 11/2008, Guidelines on Rehabilitation and Reconstruction
10. No. 12/2008, Guidelines on UPT (Technical Executing Unit) Establishment and Execution
11. No.13/2008, Guidelines on Logistic & Equipment Management in Disaster Management

(2) Institution

Disaster management covers a wide variety of fields, so that many stakeholders are involved and appropriate coordination among these stakeholders is needed. Therefore, concrete institutions must be established both at the national and local levels and they need to take the lead in disaster management. Recently, the Indonesian Government made efforts to strengthen institutions for disaster management.

A. National Agency for Disaster Management (BNPB)

Based on Law No. 24/2007 concerning Disaster Management, and Presidential Regulation No.8/2008 concerning BNPB, the National Agency for Disaster Management (BNPB) was established on 26 January 2008. Before the establishment of BNPB, it was called BAKORNAS PB, which was the coordination agency for disaster management at the national level. BAKORNAS PB had dual mandates: to coordinate both natural and man-made disasters and to take care of those people who are displaced by social conflicts.

BNPB has a wider scope of disaster management that includes the following:

1. Providing guidelines and directives on disaster management efforts addressing fair and impartial disaster prevention, emergency response, rehabilitation, and reconstruction;
2. Stipulating disaster management organization standardization and needs based on regulations of law;
3. Informing the public on activities;
4. Reporting progress achieved in disaster management organization to the President on a monthly basis during normal times and at all times during state of disaster emergency;
5. Using and accounting for national and international donations/ assistance;
6. Accounting for use of funds sourced from state budget;
7. Implementing other obligations in accordance with regulations of law; and
8. Preparing guidelines on establishment of regional disaster management agency.

Structure of BNPB is shown in Figure 2.1.2.1. Total number of officials is 116 (as of end of August 2009). Additionally, BNPB will employ 25 graduates in the near future to enhance the overall capacity of BNPB.

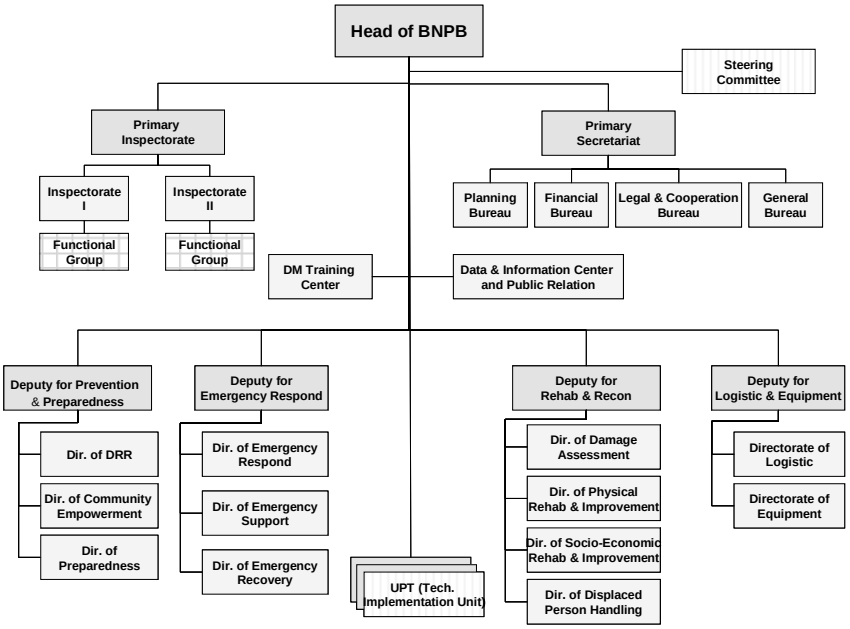


Figure 2.1.2.1 Organization Chart of BNPB

B. Local Disaster Management Agency (BPBD)

Until the establishment of BPBD, SATKORLAK PB at provincial level, and SATLAK PB at Kota/Kabupaten level are the responsible body for emergency response. They are basically temporary government bodies made up of responsible officials that gather only at the occurrence of disaster to handle emergency response activities. However, BPBD is a permanent institution so that continuous efforts of disaster management can be implemented systematically. Head of BNPB Regulation No.3/2008 concerning Guidelines on Establishment of BPBD (Regional Disaster Management Agency) is formulated to disseminate the guidelines for all provinces and Kota/Kabupaten to formulate BPBD. At provincial level, establishment of BPBD is mandated; however, at Kota/Kabupaten level, establishment is optional. However, it is expected to be established in high-risk regions of disaster occurrence. As of the end of August 2009, the following 18 provinces (5 provinces are waiting for approval from the Ministry of Home Affairs) and approximately 30 Kabupaten established BPBD.

Table 2.1.2.1 Progress of Establishment of BPBD

Established (13 provinces)	Waiting for Approval (5 provinces)
1. North Sumatra 2. Bengkkulu 3. Lampung 4. Central Java 5. East Java 6. South Kalimantan 7. East Kalimantan 8. North Sulawesi 9. Central Sulawesi	1. Jambi 2. Bangka Belitung 3. Bali 4. North Maluku 5. West Sulawesi

10. Southeast Sulawesi 11. West Nusa Tenggara 12. East Nusa Tenggara 13. Maluku	

C. National Platform for Disaster Risk Reduction

Disaster risk reduction efforts are everybody's business. To realize this movement, the Indonesian National Platform for DRR had been launched on 20 November 2008. On that day, representatives from six stakeholder groups signed a petition to support disaster risk reduction in Indonesia. The Platform is composed of members representing the private sector, academic sector, government, the international community, mass media, and CSO/NGO. These multi-stakeholders will comprehensively coordinate and cooperate in all activities for disaster risk reduction and integrate efforts as well.

The establishment process of the Indonesian National Platform for DRR had been led mainly by UNDP (SCDRR), non-governmental organizations and thematic forums.

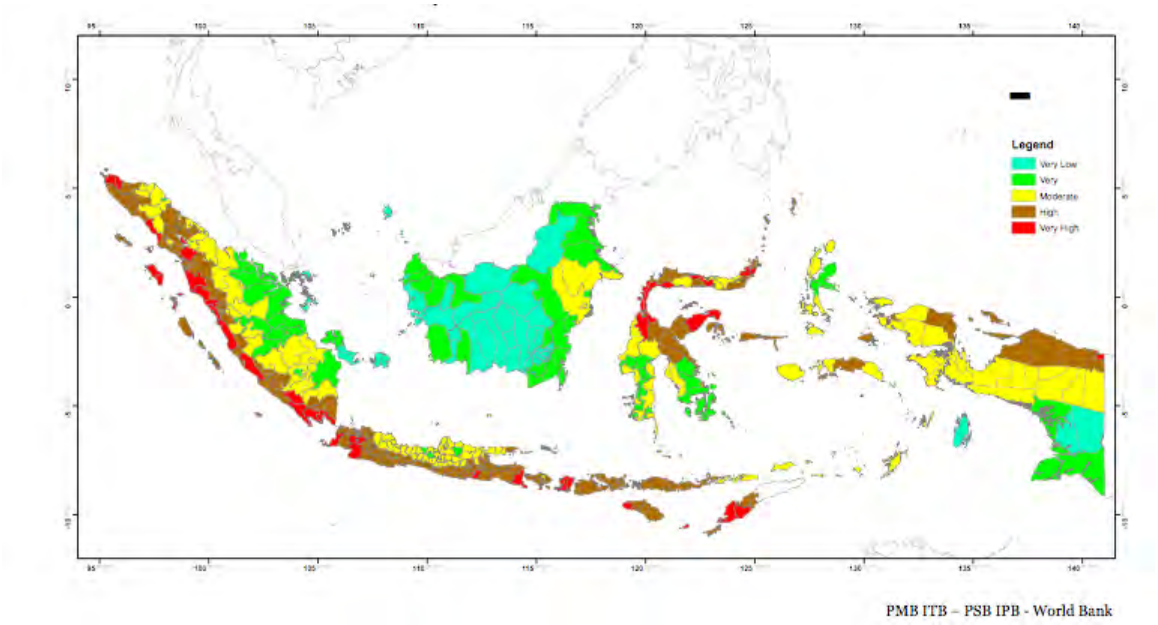
(3) Risk Assessment

Risk Assessment, which aims to provide an understanding of spatial spreading of risk in the target region, is fundamental and an important source for disaster monument planning. Therefore, before starting the formulation of disaster management plan, target disaster with estimated scale of hazard and risk should be identified in all levels, including national, provincial, and Kota/Kabupaten level. Implementation of Risk Assessment and production of Hazard and Risk Maps is the first step of formulation of disaster management plan. The plan should be formulated based on the result of risk assessment.

A. National Level

To prioritize regions with target disaster across Indonesia, BNPB, together with ITB and with support of the World Bank, recently produced Disaster Risk Index (DRI) Maps. DRI maps are produced separately by type of disaster and categorized into 5 ranks (3 ranks in some disasters), to express the gravity of risk at Kota/Kabupaten level. The 5 ranks are: 1) Very High Risk, 2) High Risk, 3) Moderate Risk, 4) Low Risk, and 5) Very Low Risk, and they take into account hazard, exposure, vulnerability and emergency response (for earthquake, also include external context), and cover all 8 types of natural disaster (earthquake, tsunami, volcano, landslide, flood, drought, forest fire, destructive wind). Based on the interview survey to ITB produced DRI, reliability of the index value was not high enough for political decision making since the fundamental data for estimation of DRI were insufficient. Then, the DRI value and maps were provided to BNPB as

background information only. They have been produced in a rather short time that continuous improvement is needed. A sample of draft DRI Map recently produced is shown below:



Source: World Bank, 2009

Figure 2.1.2.2 Draft DRI Map (Earthquake)

The table below shows the regions/cities which were assessed as "Very High Risk" or "High Risk" perceived from the DRI maps for Earthquake Disaster, Flood Disaster, Landslide Disaster, Drought Disaster, Tsunami Disaster and Volcano Disaster, respectively.

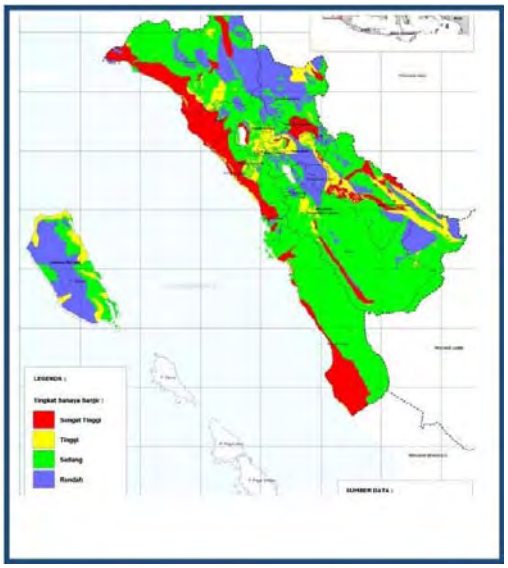
Table 2.1.2.2 Regions/cities assessed as "Very High Risk" or "High Risk" in DRI

Type of Disaster	Regions/cities assessed as "Very High Risk" or "High Risk" in DRI
Earthquake Disaster	Western region of Sumatra Island (Banda Ache, Padang) Western, Southern and Eastern regions of Java Island (Jakarta, Bandung) Northern and Central regions of Sulawesi Island (Manado) Bali Island (Denpasar) Nusatenggara (Kupang) North region of Papua Island
Flood Disaster	North-Eastern and South-Eastern region of Sumatra Island (Medan, Palembang) North-Western and East region of Java Island (Jakarta, Surabaya) Western and Central regions of Kalimantan Island (Pontianak, Banjarmasin) Southern region of Sulawesi Island (Makassar) Bali Island (Denpasar) Nusatenggara South region of Papua Island

Landslide Disaster	Western region of Sumatra Island(Bengkulu) South-Western and Southern regions of Java Island Most of all regions of Sulawesi Island (Manado) North region of Kalimantan Island Bali Island Nusatenggara (Kupang) North region of Papua Island
Drought Disaster	Central region of Sumatra island (Palembang) Western, Northern and Eastern regions of Java Island (Jakarta, Surabaya) Eastern region of Kalimantan Island South-Western region of Sulawesi Island
Tsunami Disaster	Western region of Sumatra island (Padang) Southern region of Java island South-Western region of Sulawesi Island Bali Island (Denpasar) Nusatenggara
Volcano Disaster	Western region of Sumatra island Southern and Central regions of Java island (Central Java, Jogjakarta) Bali Island Nusatenggara

B. Provincial Level

In order to formulate a Disaster Management Plan at the provincial level, Hazard Maps are produced. For instance, the disaster management plan of West Sumatra Province contains hazard maps for 4 types of disaster: 1) Earthquake, 2) Tsunami, 3) Volcano, and 4) Flood. However, some of them are the same as those produced for national level, and the province of West Sumatra has not produced its own from the beginning. As a result, production of Hazard Maps and especially Risk Maps in provincial level is not yet started in most of the provinces.



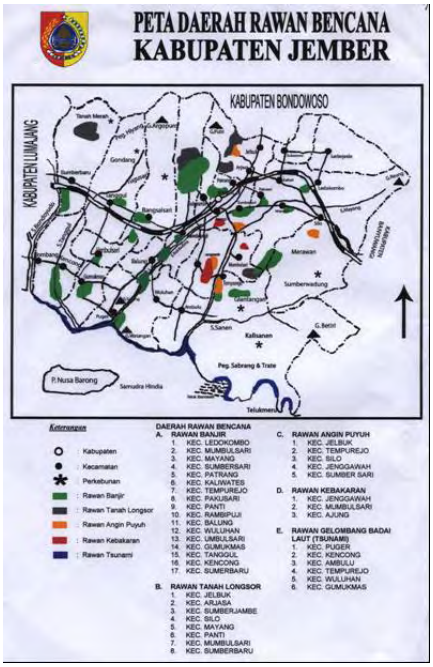
Source: West Sumatra Province, 2008

Figure 2.1.2.3 Hazard Map (Flood)

C. Kota/Kabupaten Level

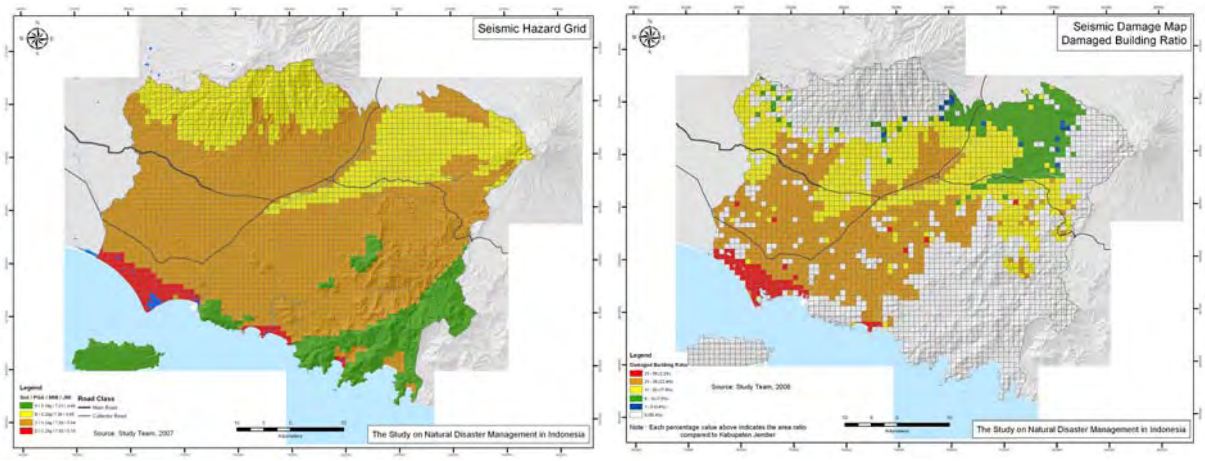
Disaster affected areas cannot be separated by the administrative boundary of Kota/Kabupaten government; however, Hazard Maps and Risk Maps in Kota/Kabupaten level are the most informative tool for knowing any kind of hazard or risk in a specific region both for government and community. Relatively speaking, many Kota/Kabupaten governments produce Hazard Maps where possible risks by type of disaster are drawn on the map; however, these maps are produced without proper analysis. A sample hazard map of Kabupaten Jember, East Java Province, is shown in Figure 2.1.2.4. The hazard maps are not published for public dissemination of risks prevailing in the region which can help to increase awareness of community and community resilience against disaster.

Therefore, by understanding the situation, a scientific but simple method of producing hazard and risk maps was introduced in the Study, and it was applied in Kabupaten Jember in East Java Province, Kabupaten Padang Pariaman, and Kota Pariaman in West Sumatra Province. A sample hazard map of Kabupaten Jember, East Java Province, is shown in Figure 2.1.2.5.



Source: West Sumatra Province, 2008

Figure 2.1.2.4 Hazard Map of Kabupaten Jember, East Java Province, produced by National Unity and Public Protection Board



Source: JICA, 2009

Figure 2.1.2.5 Hazard and Risk Map of Kabupaten Jember, East Java Province, by JICA Study

(4) Planning

Disaster Management covers a wide variety of fields with involvement of multi-stakeholders, which makes it possible to implement relevant activities simultaneously in a prompt and effective manner. The activities in all disaster management cycle (pre-disaster, emergency response, post-disaster activities) cannot be implemented without proper planning including short, medium and long term measures with clarification of roles in each activity. Law No.24/2007 on disaster management stipulated that national and local governments are mandated to formulate disaster management plans, and the formulation process has started recently. This section describes current situation of planning related to disaster management.

A. National Disaster Management Plan (NDMP)

National Disaster Management Plan is the superior plan besides Law No.24/2007 on Disaster Management. The draft version of the plan was formulated as main output of "The Study on Natural Disaster Management in Indonesia" (March 2009) implemented by the support of JICA. The plan was formulated based on components of "Disaster Management Basic Plan" in Japan.

The plan was formulated by holding several workshops together with relevant ministries to get consensus on the plan. After finalization of the draft plan in March 2009, BNPB started restructuring the plan by separating each type of disaster. In the JICA study, target disaster was limited to major disasters of: 1) Earthquake, 2) Tsunami, 3) Landslide, and 4) Flood. The Indonesian Government, on the other hand, includes 8 types of natural disasters, namely: 1) Earthquake, 2) Tsunami, 3) Volcano, 4) Landslide, 5) Flood, 6) Drought, 7) Forest Fire, and 8) Destructive wind. Figure 2.1.2.6 shows structure of National Disaster Management Plan.

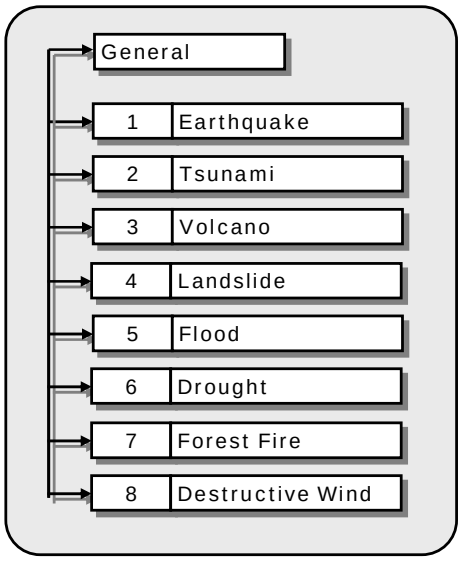


Figure 2.1.2.6 Structure of Disaster Management Plan

National Disaster Management Plan is a 5 year cross-sectoral government plan prepared for the purpose of:

1. Identifying disaster risk across Indonesia, prioritizing disaster risk by urgency, as well as disaster risk reduction strategies and programs.
2. Serving as reference to ministries and government agencies, non-government agencies, businesses and all stakeholders, in order to be able to undertake a comprehensive, coordinated and integrated disaster management.
3. Serving as reference to local government to be able to undertake a comprehensive, coordinated and integrated disaster management.

Compared to the draft NDMP formulated in the course of JICA Study, contents of the Plan were very much simplified. As of the end of August, BNPB is intentionally holding discussions with BAPPENAS on the contents of Plan. The Plan still needs restructuring based on the initial comments received by BAPPENAS.

B. National Action Plan for Disaster Risk Reduction (NAP-DRR)

National Action Plan for DRR 2006 – 2009 was formulated with the support of UNDP and has become a reference document for national and local governments, as well as other stakeholders, in undertaking the implementation of DRR. The plan was formulated before the issuance of Law No.24/2004 on DM. The plan was formulated through the collaboration between former BAKORNAS PB and BAPPENAS, and elaborates the interest and responsibility of stakeholders through the participation and coordination process concurrent with the Hyogo Framework for Action. The plan emphasizes the significance of platforms, priorities, action plans and relevant mechanism with the implementation of Disaster Management and the institutional basis framework in Disaster Management in Indonesia. It also provides guidance/references and information that facilitates decision makers in delivering their commitment with their sectors respectively and priorities on the basis of strong and systematic fundamentals.

Formulation process of National Action Plan for DRR 2010-2012 has started with the support of the World Bank and will be closely coordinated and integrated with NDMP and National Mid-term Development Plan (RPJM). The plan will indicate activities to be taken in the coming 3 years as priority actions.

C. Regional Disaster Management Plan (RDMP)

In parallel to formulation of NDMP at provincial level, formulation of regional disaster management plans have started in several provinces such as West Sumatra Province, DK Yogyakarta, and others. These activities were supported by UNDP and implemented by local universities. Since the structure of the plan applied old guidelines for formulation of regional

disaster management plan of former BAKORNAS PB, it does not unify with structure of NDMP. Also, the plan does not differentiate and separate by type of disaster, so that each activity and corresponding responsibilities are not defined clearly.

In accordance with the Law Number 24 Year 2007, West Sumatera Province has prepared its own Disaster Management Plan. The process started in November 2007 and completed in August 2008. In preparing the Disaster Management Plan, participation from other stakeholders is necessary. They included Universities, NGOs, Departments under West Sumatra Province including Departments under Kota/Kabupaten within West Sumatra, Private Companies, Press, Scholars, Informal Leaders, etc. However, to coordinate the process systematically, the Core Team from competent experts was established. The plan is effective from 2008 to 2012.

For Kota/Kabupaten level, regional disaster management plan must be formulated in accordance with Law No.24/2007 on Disaster Management. Together with the activities for production of Hazard and Risk Maps, Disaster Management Plan was formulated in the JICA Study. Pilot regions were Kabupaten Jember in East Java Province, Kabupaten Padang Pariaman, and Kota Pariaman in West Sumatra Province

(5) Summary

In summary, achievements made by the Government of Indonesia are stipulated in the National Progress Report on the implementation for the Hyogo Framework for Action (Triutomo, 2009), as follows:

HFA Priority 1: Make Disaster Risk Reduction Priority
1. Enactment of Disaster Management Law
2. Establishment of National Agency for Disaster Management
3. Establishment of several local disaster management agencies
4. Drafting of a national strategy for mainstreaming DRR into the national education system
HFA Priority 2* Know the Risks and Take Action
5. Installation of early warning systems for floods, volcanic eruptions, landslides and tsunami
6. Applied research held by universities on hazard and risk analysis tools
7. Information system for poverty reduction linked to disaster history database
HFA Priority 3: Build Understanding and Awareness
8. Establishment of DRR National Platform for Indonesia
9. Establishment of a number of local platforms
10. Use of participatory community level initiatives for risks assessment and monitoring including adoption of indigenous knowledge
11. Exchange of information on disaster between limited stakeholders
12. Availability of graduate level education on disaster management
13. CBDRR practice embraced by many DRR practitioners
14. Putting in place disaster preparedness mechanism and personnel down to the local level
HFA Priority 4: Reduce Risks
15. Enactment of regulations including building codes, spatial plan, coastal and small island management
HFA Priority 5: Be Prepared and Ready to Act
16. Establishment of a number of information systems for disaster, including data centers and disaster history database
17. Availability of disaster risk insurance scheme
18. Conduct of contingency plan trainings
19. Conducted drills at national and local levels
20. Availability of multi-stakeholder contingency fund and mechanism for emergency response

From the summary, it seems that a relatively wide field of disaster management was implemented; however, from the viewpoint of regional coverage, these activities only cover very limited areas and an enormous amount of activities must be sustained.

(6) Budget

Disaster Management needs sufficient budget allocation for realization of planned activities, which are mostly concentrated on disaster risk reduction. And although BNPB's budget is increasing annually, it is still not enough and needs to be increased, as shown in Table 2.1.2.3.

This budget is only limited to BNPB and there are disaster management related budget proposed by relevant ministries such as PU, BMKG, and others.

Table 2.1.2.3 Annual Budget of BNPB

Ministry/Departments	APBN[2] 2009 (IDR billion)	Indication Budget[3] 2010 (IDR billion)
BNPB	145.5	172

Source: BAPPENAS, 2009

According to BAPPENAS, for evaluation of NPA-DRR, budgets allocated by categorizing HFA priorities are summarized as shown in Table 2.1.2.4 and Table 2.1.2.5. The tables compare the budget proposed in NAP-DRR 2009 and the actual budget allocated in APBN and Donor/NGO. Both actual budgets allocated by the Indonesian Government and Donor/NGO greatly increased; however, budget for DRR activities is still lacking. More planning and an appropriate approach for effective utilization of budget are needed, and this could be done by coordination among all stakeholders.

Table 2.1.2.4 Comparison of Program Proposal in NAP-DRR 2006-2009 vs. APBN 2007-2009

HFA	NATIONAL ACTION PLAN IN DISASTER RISK REDUCTION CORE PROGRAM	Proposed Budget			Total Proposed	Budget Allocated			Total Allocated
		2007	2008	2009		2007	2008	2009	
Priority 1	Disaster risk reduction as a national and regional priority as well as institutional strengthening	2,290.00	2,131.26	3,186.18	7,607.44	76,650.21	65,460.54	120,075.63	262,186.38
Priority 2	Identify, assess and monitor disaster risks and enhance early warning	79,108.04	62,306.34	66,605.76	208,020.14	85,218.99	79,781.70	74,970.92	239,971.61
Priority 3	use of knowledge, innovation and education to build a culture of safety and resilience	2,199.40	2,502.10	3,649.33	8,350.83	19,497.31	30,564.36	16,201.70	66,263.37
Priority 4	Reduction of underlying disaster risk factors	127,385.95	93,161.39	47,855.41	268,402.75	127,385.94	93,796.09	47,855.41	269,037.44
Priority 5	Strengthen disaster preparedness for effective response at all levels	138,564.15	128,177.11	38,867.50	305,608.76	2,176,622.12	518,235.08	441,735.78	3,136,592.98
	Total	349,547.54	288,278.20	160,164.18	797,989.92	2,485,374.57	787,837.77	700,839.44	3,974,051.78

Note: In IDR Million, Data compilation as of Feb. 2009

Source: BAPPENAS, 2009

[2] APBN = Government Annual Budget.

[3] Indication Budget is an indication on how much allocation will be provided for each agency for the upcoming Fiscal Year. This amount will be provided by MOF and BAPPENAS around April every year. This will be used for developing the annual Government Working Plan.

Table 2.1.2.5 Comparison of Program Proposal in NAP-DRR 2006-2009 vs. Donor/NGO 2007-2009

HFA	NATIONAL ACTION PLAN IN DISASTER RISK REDUCTION CORE PROGRAM	Budget			Total Budget	Actual Allocation			Total Allocation
		2007	2008	2009		2007	2008	2009	
Priority 1	Disaster risk reduction as a national and regional priority as well as institutional strengthening	-	3,000.00	-	3,000.00	212,587.22	25,314.18	73,901.07	311,802.47
Priority 2	Identify, assess and monitor disaster risks and enhance early warning	-	16,500.00	-	16,500.00	2,500.00	34,015.30	36,450.00	72,965.30
Priority 3	Use of knowledge, innovation and education to build a culture of safety and resilience	7,400.00	4,630.00	5,940.00	17,970.00	33,600.00	34,630.00	59,400.00	127,630.00
Priority 4	Reduction of underlying disaster risk factors	-	-	-	-	-	-	-	-
Priority 5	Strengthen disaster preparedness for effective response at all levels	2,000.00	18,771.73	-	20,771.73	182,441.14	22,522.30	-	204,963.44
	TOTAL	9,400.00	42,901.73	5,940.00	58,241.73	431,128.36	116,481.78	169,751.07	717,361.21

Note: In IDR Million, Data collection Jan - Feb 2009, Most of the programs are multi years. The budget allocation is recorded at the first year of the program.

Source: BAPPENAS, 2009

In NAP-DRR 2010-2012, budget columns are added and requested to line ministries to propose projects for DRR with necessary budget in each HFA Priority.

Table 2.1.2.6 shows proposed budget in draft NAP-DRR 2010-2012. As a result, total budget for DRR activities increased drastically in planned budget, which shows Indonesian efforts mainstreaming DRR. The reason that actual allocated budget for 2006 – 2009 is high is that a high percentage of budget was spent for rehabilitation and reconstruction.

Table 2.1.2.6 Proposed Budget in NAP-DRR 2010-2012 (Still under consideration)

Priority 1:

Ensure that disaster risk reduction is a national and localnpriority with a strong institutionsl basis form implementation.

No	Line Ministry	Total budget (Rupiah)					
		2010		2011		2012	
1	Bakosurtanal	Rp	1,500,000,000	Rp	2,000,000,000	Rp	2,000,000,000
2	Bapeten	Rp	300,000,000	Rp	330,000,000	Rp	363,000,000
3	Ditjen Bina Marga PU		Rp150,000,000,000		Rp200,000,000,000		Rp250,000,000,000
4	Badan Geologi DESDM	Rp	3,978,380,000	Rp	4,417,637,000	Rp	4,922,782,550
5	Depdagri	Rp	11,050,000,000	Rp	1,000,000,000	Rp	1,000,000,000
6	DIREKTORAT KEAMANAN PENERBANGAN (DEPHUB)	Rp	800,000,000				
7	Direktorat Sarana Teknologi Komunikasi, Ditjen SKDI-Depkominfo	Rp	2,500,000,000	Rp	2,500,000,000	Rp	3,000,000,000
8	LIPI, Puslit Oseanografi	Rp	2,000,000,000	Rp	4,000,000,000	Rp	1,000,000,000
9	Depsos, Dinas Sosial/Kesos/ Institusi Sosial Provinsi terkait	Rp	98,137,391,000	Rp	117,764,869,200	Rp	141,317,843,040
10	Depsos	Rp	3,744,283,000	Rp	4,493,139,600	Rp	5,391,767,520
	TOTAL	**Rp**	**274,010,054,000**	**Rp**	**336,505,645,800**	**Rp**	**408,995,393,110**

Priority 2:

Identify, assess and monitor disaster risks and enhance early warning

No	Line Ministry	Total estimate budget (Rupiah)		
		2010	2011	2012
1	BAKOSURTANAL, ESDM, PU, BMKG, Pemda	Rp 1,200,000,000	Rp 1,500,000,000	Rp 2,000,000,000
2	BAKOSURTANAL	Rp43,650,000,000	Rp40,530,000,000	Rp38,563,000,000
3	Bakosurtanal, PU, BMKG	Rp 1,300,000,000	Rp 1,500,000,000	Rp 1,900,000,000
4	BAPETEN Pelaksana : Pusat Pengkajian Sistem dan Teknologi Pengawasan Fasilitas Radiasi dan Zat Radioaktif (P2STPFRZR)	Rp 500,000,000	Rp 550,000,000	Rp 605,000,000
5	Badan Geologi, DESDM	Rp2,261,570,000	Rp2,597,205,500	Rp2,983,186,325
6	DIREKTORAT KEAMANAN PENERBANGAN (DEPHUB)	Rp 250,000,000		
7	BNPB, LIPI, RISTEK, BNPB, DEPDAGRI	Rp 1,000,000,000	Rp 1,500,000,000	
8	LIPI, Puslit Geoteknologi	Rp 1,000,000,000	Rp 1,500,000,000	Rp 2,000,000,000
9	Depsos- Akademisi (Perguruan Tinggi)	Rp 4,891,670,000	Rp 5,625,420,500	Rp 6,750,504,600
	TOTAL	**Rp 56,053,240,000**	**Rp 55,302,626,000**	**Rp 54,801,690,925**

Priority 3:

Use knowledge, innovation and education to build a culture of safety and resilience at all level

No	Line Ministry	Total Estimate Budget (Rupiah)		
		2010	2011	2012
1	BAPETEN Pelaksana : Pusat Pengkajian Sistem dan Teknologi Pengawasan Instalasi dan Bahan Nuklir (P2STPIBN)	Rp641,676,000	Rp705,843,600	Rp776,427,960
2	Badan Geologi, DESDM	Rp 1,422,540,000	Rp 1,635,921,000	Rp 1,881,309,150
3	DEPDAGRI	Rp 300,000,000		
4	LIPI, Puslit Oseanografi	Rp 2,000,000,000	Rp 3,000,000,000	Rp 1,000,000,000
5	Depsos	Rp 6,328,590,000	Rp 7,594,308,000	Rp 9,113,169,600
	TOTAL	**Rp 10,692,806,000**	**Rp 12,936,072,600**	**Rp 12,770,906,710**

Priority 4:

Reduce underlying risk factors

No	Line Ministry	Total budget(Rupiah)		
		2010	2011	2012
1	Badan Geologi, DESDM	Budget has been included in activity 1 & 2		
2	DIREKTORAT KEAMANAN PENERBANGAN (DEPHUB)	Rp 1,000,000,000		
3	LIPI, Puslit Oseanografi	Rp 1,000,000,000	Rp 1,000,000,000	
4	Depsos	Rp 31,600,000,000	Rp 37,920,000,000	Rp 45,504,000,000
	TOTAL	**Rp 33,600,000,000**	**Rp 38,920,000,000**	**Rp 45,504,000,000**

Priority 5:

Reduce underlying risk factors Strengthen disaster preparedness for effective response at all levels

No	Line Ministry	Total budget (Rupiah)		
		2010	2011	2012
1	Bakosurtanal		Rp 1,000,000,000	Rp 1,000,000,000
2	BAPETEN Pelaksana : Direktorat Keteknikan dan Kesiapsiagaan Nuklir	Rp 665,221,000	Rp 731,743,100	Rp 804,917,410
3	Badan Geologi, DESDM	budget has been included in activity 3		
4	Depdagri	Rp 250,000,000		
5	LIPI, Puslit Oseanografi, LIPI Puslit Kependudukan, Perguruan Tinggi, BNPB, DEPDIKNAS	Rp 3,000,000,000	Rp 2,000,000,000	Rp 2,000,000,000
6	Depsos	Rp 126,395,991,500	Rp 151,675,189,800	Rp 182,010,227,760
	TOTAL	**Rp 130,311,212,500**	**Rp 155,406,932,900**	**Rp 185,815,145,170**

Source: BAPPENAS, 2009

In summary, as shown in Table 2.1.2.7, proposed budget for next NAP-DRR 2010-2012, is increased annually and will be spent mostly in DRR activities.

Table 2.1.2.7 Summary of Proposed Budget in NAP-DRR 2010-2012 (IDR Billion)

HFA Priority	2010	2011	2012	Total
Priority 1	274.0	336.5	408.9	**1,019.4**
Priority 2	56.1	55.3	54.8	**166.2**
Priority 3	10.7	12.9	12.8	**36.4**
Priority 4	33.6	38.9	45.5	**118.0**
Priority 5	130.3	155.4	185.8	**471.5**
Total	**504.7**	**599.0**	**707.8**	**1,811.5**

Source: BAPPENAS, 2009

As for reference, annual budget for disaster management in Japan is over 2 trillion yen (over 20 billion US$) which occupies 2.52% of National Budget in 2008 as shown in Table 2.1.2.8. The table shows disaster management budget from 1963 to 2008. Disaster management budget in Japan gradually increased and reached over 3 trillion yen in 1994 and the peak was almost 3.5 trillion yen in 1997, in order to rehabilitate and reconstruct from Hanshin-Awaji Earthquake in 1995. After the peak in 1997, disaster management budget gradually decreases, however, keeping more than 2 trillion yen. In the past, share of cost for recovery (rehabilitation and reconstruction) was relatively high compare to cost for disaster preparedness, however, due to change of importance to investigate for DRR activities, total recovery cost has decreased and as a result, total amount spent for disaster management decreased as well. It is proved that more invest in DRR activities, less cost for rehabilitation and reconstruction. Figure 2.1.2.8 shows this trend clearly.

In Indonesia, also same trend to investigate for DRR activities are motivated in central government especially with BNPB and BAPPENAS, and expected to continue the efforts. However, budget for disaster management is still limited compare to the case in Japan, since total proposed amount requested in 2010 reached 504.7 billion IDR, indicated in NAP-DRR 2010-2012, and compared to National Budget 2010 (APBN 2010), the share reaches only 0.82 % of National budget. It is not easy to compare the budget with other country, however, it is necessary to increase budget for disaster management especially for preparedness in order to decrease number of casualties. In fact, DRR activities will greatly deduce cost for rehabilitation and reconstruction which occupies large amount in Indonesia.

Table 2.1.2.8 Disaster Management Budget in Japan

Year	Revenue Budget of General Account (mil. Yen)	Research on Technology		Disaster Preparedness		Land Conservation		Disaster Recovery. etc		Total Budget of DM (Mil/Yen)	% of DM Budget/ Revenue Budget
		mil. Yen	Share (%)	mil.Yen	Share (%)	mil.Yen	Share (%)	mil.Yen	Share (%)		
1963	3,056,807	643	0.3	22,798	11.5	113,735	57.4	60,901	30.7	198,077	6.48%
1964	3,340,498	1,231	0.5	29,271	12.2	122,180	50.8	87,691	36.5	240,373	7.20%
1965	3,744,725	1,690	0.6	27,254	9.2	157,767	53.3	109,157	36.9	295,868	7.90%
1966	4,477,147	2,319	0.7	40,709	11.5	165,966	46.9	144,697	40.9	353,691	7.90%
1967	5,203,436	1,946	0.5	50,495	13.2	189,245	49.5	140,341	36.7	382,027	7.34%
1968	5,917,332	2,230	0.5	54,737	12.2	205,580	45.8	186,045	41.5	448,592	7.58%
1969	6,930,854	2,870	0.6	71,225	14.6	235,808	48.4	177,104	36.4	487,007	7.03%
1970	8,213,085	2,797	0.5	83,788	15.4	272,620	50.0	186,041	34.1	545,246	6.64%
1971	9,658,999	3,266	0.6	84,564	14.3	317,364	53.7	185,969	31.5	591,163	6.12%
1972	12,118,949	3,922	0.5	126,560	16.4	389,646	50.4	253,702	32.8	773,830	6.39%
1973	15,272,616	6,372	0.6	195,355	17.5	498,206	44.7	413,791	37.2	1,113,724	7.29%
1974	19,198,131	14,867	1.5	195,625	19.2	497,835	48.9	309,345	30.4	1,017,672	5.30%
1975	20,837,157	18,018	1.7	202,548	18.8	523,683	48.6	334,208	31.0	1,078,457	5.18%
1976	24,650,234	20,831	1.6	227,587	17.1	630,813	47.4	450,643	33.9	1,329,874	5.39%
1977	29,346,615	21,799	1.3	289,514	17.7	764,728	46.8	559,324	34.2	1,635,365	5.57%
1978	34,440,043	28,716	1.5	380,519	20.5	1,009,810	54.3	440,360	23.7	1,859,405	5.40%
1979	39,667,586	34,183	1.6	451,387	21.5	1,228,688	58.4	387,885	18.5	2,102,143	5.30%
1980	43,681,366	40,325	1.8	545,384	23.8	1,223,859	53.5	478,542	20.9	2,288,110	5.24%
1981	47,125,364	28,315	1.3	517,360	23.0	1,223,229	54.4	481,228	21.4	2,250,132	4.77%
1982	47,562,139	28,374	1.2	610,046	25.9	1,226,469	52.1	491,364	20.9	2,356,253	4.95%
1983	50,839,441	28,627	1.2	666,618	27.7	1,226,013	50.9	486,991	20.2	2,408,249	4.74%
1984	51,513,359	27,522	1.2	631,402	27.6	1,226,189	53.5	405,029	17.7	2,290,142	4.45%
1985	53,222,882	25,776	1.2	536,739	25.2	1,211,389	56.9	353,694	16.6	2,127,598	4.00%
1986	53,824,828	28,915	1.4	555,979	27.0	1,186,757	57.6	288,559	14	2,060,210	3.83%
1987	58,214,155	30,718	1.6	513,826	26.3	1,157,548	59.3	250,858	12.8	1,952,950	3.35%
1988	61,851,731	30,802	1.4	611,446	27.0	1,376,303	60.7	248,326	11	2,266,877	3.67%
1989	66,311,891	34,224	1.4	605,079	24.1	1,625,547	64.7	246,299	9.8	2,511,149	3.79%
1990	69,651,178	35,084	1.5	593,545	24.7	1,528,074	63.6	245,346	10.2	2,402,049	3.45%
1991	70,613,465	35,321	1.4	601,906	24.1	1,616,993	64.7	246,542	9.9	2,500,762	3.54%
1992	71,489,671	33,979	1.3	618,627	24.1	1,686,528	65.6	232,929	9.1	2,572,063	3.60%
1993	77,437,497	34,548	1.3	652,584	24.4	1,743,368	65.1	245,603	9.2	2,676,103	3.46%
1994	73,430,517	35,851	1.2	660,778	21.5	1,789,155	58.1	592,680	19.3	3,078,464	4.19%
1995	78,034,005	37,324	1.3	676,964	22.7	1,856,711	62.4	405,914	13.6	2,976,913	3.81%
1996	77,771,230	47,919	1.5	873,490	26.8	1,926,575	59.1	410,711	12.6	3,258,695	4.19%
1997	78,533,159	54,819	1.6	1,077,710	31.1	1,952,161	56.3	385,423	11.1	3,470,113	4.42%
1998	87,991,484	56,932	1.8	1,010,564	31.9	1,766,001	55.7	334,425	10.6	3,167,922	3.60%
1999	89,018,896	58,551	1.8	1,066,382	32.4	1,864,317	56.6	306,631	9.3	3,295,881	3.70%
2000	89,770,226	60,784	1.9	1,067,668	32.6	1,877,044	57.3	272,736	8.3	3,278,232	3.65%
2001	86,352,554	47,144	1.5	883,306	29.0	1,846,019	60.7	266,009	8.7	3,042,478	3.52%
2002	83,688,984	43,454	1.6	778,031	28.4	1,652,939	60.4	263,417	9.6	2,737,841	3.27%
2003	81,939,568	42,372	1.6	790,900	29.6	1,586,734	59.4	251,667	9.4	2,671,673	3.26%
2004	86,878,703	32,668	1.2	933,626	34.2	1,524,090	55.8	241,587	8.8	2,731,971	3.14%
2005	86,704,827	30,326	1.2	752,741	29.8	1,496,718	59.3	245,461	9.7	2,525,246	2.91%
2006	83,458,343	28,987	1.2	649,596	27.0	1,471,392	61.2	254,841	10.6	2,404,816	2.88%
2007	83,804,191	9,687	0.4	684,928	31.4	1,228,763	56.4	255,860	11.7	2,179,238	2.60%
2008	83,061,300	8,921	0.4	664,889	31.8	1,173,777	56.2	241,955	11.6	2,089,542	2.52%

Source: Cabinet Office, 2009

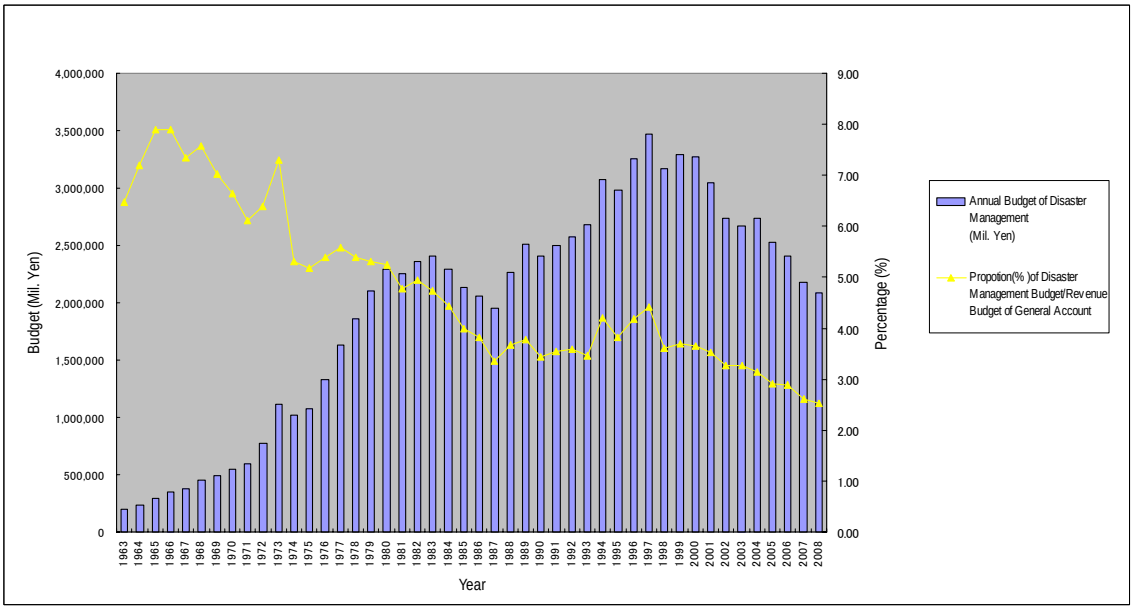


Figure 2.1.2.7 Annual Budget of Disaster Management and its share compared with National Budget in Japan

Source: Cabinet Office, 2009

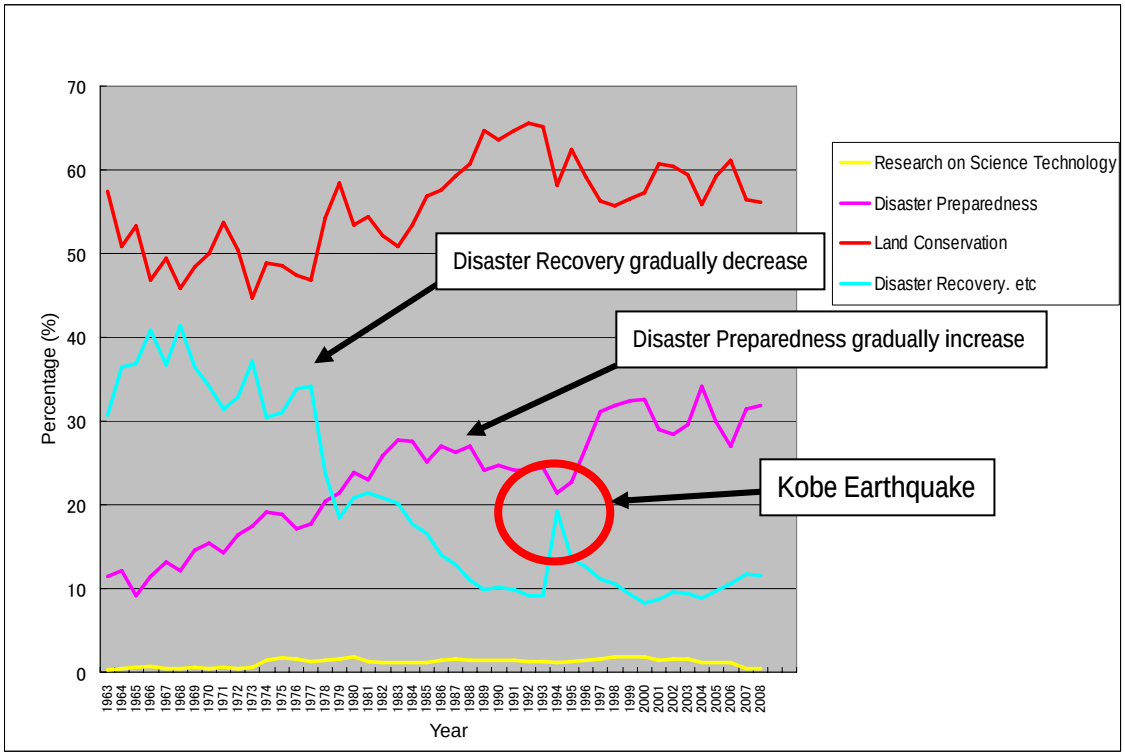


Figure 2.1.2.8 Share of Disaster Management Budget in Japan

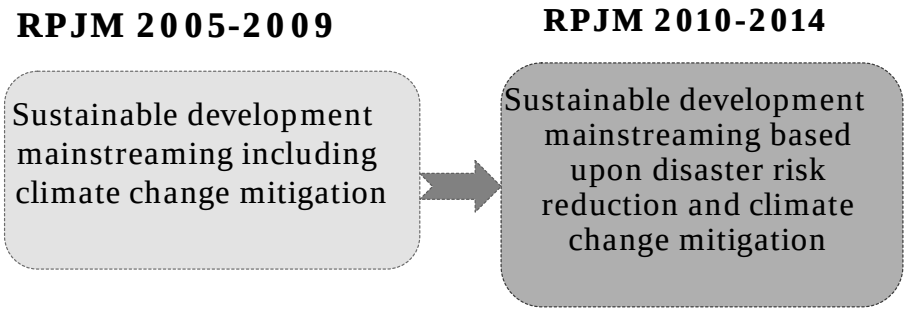
Source: Cabinet Office, 2009

2) Current Status of Draft Version of National Medium-Term Development Plan (RPJM) 2010 – 2014

The National Medium-term Development Plan (RPJM) 2010-2014 is underway and is expected to be finalized by January 2010. It would be very interesting to note indications of mainstreaming disaster risk reduction in this next RPJM.

Previously in RPJM 2005-2009, the indication of disaster management is limited to "Sustainable development mainstreaming including climate change mitigation" and this is mainly under the field of water resource development. The focus is basically on post-disaster activities and not on pre-disaster activities. However, in order to realize activities as outlined in the Hyogo Framework for Action 2005-2015, in the draft of RPJM 2010-2014, it stipulates "Sustainable development mainstreaming based upon disaster risk reduction and climate change mitigation" and emphasizes on importance of pre-disaster activities. Also priority focus in relation with DRR in the preliminary draft of RPJM 2010-2014 stipulates as follows:

1. Completion of post-disaster area restoration through rehabilitation and reconstruction with integrating aspects of disaster risk reduction in the local development plan and the spatial plan
2. Defining disaster risk reduction national action plan (DRR-NAP) at Central and Local levels.
3. Institutional and human resources capacity building in early detection and disaster mitigation system
4. Enforcement of national and local spatial plan through spatial utilization control enhancement in the event of disaster risk reduction
5. Integration towards global climate change and disaster risk reduction adaptation



Source: BAPPENAS, 2009

Figure 2.1.2.9 RPJM Transformation on DRR

This is a positive move for reducing risks and is expected to help mainstream DRR as a pillar of RPJM in the future.

3) Issues of Comprehensive Disaster Management

Based on the past achievements and existing conditions of the Indonesian Government on comprehensive disaster management, plenty of activities to reduce disaster impact were carried out. However, critical issues still remain as explained below.

(1) Legislation

The Indonesian Government made one of the most important steps by formulating and enacting Law No.24/2007 on Disaster Management and its ancillary regulations. By law and regulations, disaster management efforts in all disaster management phases are mandated and enforced. However, it is very important to guide local governments and their officials to enhance disaster management capacity. Therefore, informative guidelines are formulated as a form of Head of BNPB Regulations.

Critical issues found in legislation are:

1) Dissemination of information on law and regulations to local government,

2) Enforcement of law and regulations in local government, and;

3) Actual implementation such as establishment of BPBDs and their disaster management plans.

For above issues, at local governments, awareness of enacted law and regulations is still low and also due to luck of knowledge and budget, disaster management efforts can not be implemented by themselves. Strong leadership in central government together with sufficient guidance is necessary.

In order to solve the above issues, the following actions should be taken:

a) Holding of Workshop to understand enacted law and regulations*: Response to 1) and 2)*

b) Giving actual guidance to local government on establishment of BPBDs and their DMP*: Response to 3)*

(2) Institution

BNPB, which was officially established after the enactment of the Law No. 24 for Disaster Management (2007), has been preparing its organizational structure through budget acquisition and gradual increase of staff, aiming to launch its activities as the head organization for disaster measures. Activities related to disaster measures should be implemented under a clear direction for disaster risk reduction. Prompt establishment of the comprehensive disaster measures framework is quite necessary. In this regard, organizational strengthening of BNPB, including improvement of its ability on policy development is an urgent issue. Also in some Provinces and

Kota/Kabupaten, Regional Disaster Management Agencies are established. These institutions are new institutions and the following issues remain to be solved:

1) Capacity development of officials is urgently necessary to be able to guide local government officials;

2) There should be a sufficient number of officials, thus, the number of officials should be increased; and

3) BNPB needs to act as the main body and take the leadership role in Disaster Management in control of relevant organizations.

For above issues, officials at all levels need trainings for knowledge improvement of disaster management, also institutional enhancement including recruitment of sufficient number of officials.

In order to solve the above issues, the following actions should be taken:

c) Necessary training and understanding of knowledge on DM, Table Top Exercise, Drills*: Response to 1)*

d) Training for new officials on DM*: Response to 2)*

e) Capacity development together with necessary experiences on DM*: Response to 3)*

(3) Risk Assessment

Implementation of Risk Assessment for all levels has started, and there are many issues and topics to be considered before the local governments start with the related activities:

1) Risk Assessment process has started without appropriate coordination, so that mismatching of result in each level could be observed;

2) The data stored in local governments for risk assessment is lacking or poor in quality, and;

3) Methodology of risk assessment is not yet standardized and there is lack of capacity in all levels.

In order to solve the above issues, the following actions should be taken:

f) Understanding Type of Risk Assessment and holding Coordination workshop*: Response to 1)*

g) Data Acquisition and Accumulation System in local government*: Response to 2)*

h) Guideline for formulation of HM and RM and training*: Response to 3)*

(4) Planning

Formulation of Disaster Management Plan has just started in all levels. Especially the contents of National Disaster Management Plan, which is the superior plan besides Law No. 24/2007 on

disaster management, need to be considered well. As mentioned in the past achievements of the Indonesian Government, NDMP is a 5-year plan and NAP-DRR is a 3-year plan. The relationship between these two plans must be effectively and closely correlated, so that objectives of plans must be clearly identified. In this sense, NDMP should not indicate target years since NAP-DRR should include activities to be implemented in the coming 3 years chosen from NDMP. Thus NDMP should not be limited to a period of 5 years and needs to include vision, goal and long-, medium-, and short-term measures in all disaster management cycle. A draft National Disaster Management Plan prepared in "The Study on Natural Disaster Management in Indonesia" includes such items mentioned above, and this document will be a good reference for making road maps to achieve the goal of disaster management even though there is no goal for specific disaster management efforts. However, should the planning period be 5 years and includes long-term measures, the plan can remain as it is. Basically, NDMP is a master plan for disaster management in the country that needs to be formulated indicating overall strategy for disaster management and clearly indicating the activities to be implemented and who will implement said activities.

There are many issues and topics to be considered before many of the local governments start the planning activities:

1) Disaster Management Planning is new to Indonesia and there is lack of capacity of formulation at local level by themselves.

2) Head of BNPB Regulation No.4/2008 concerning Guidelines for Formulation of Disaster Management Plan does not contain a sample of the plan and type of disaster to be covered; therefore, outputs from local level could be different in structure and contents, and; and

3) Local government officials do not have capacity to implement activities indicated in the plan.

BNPB needs to take necessary actions to solve these issues. Such actions include the following:

i) Guideline for formulation of DMP*: Response to 1)*

j) Formulation of sample plan in all 8 types of disasters*: Response to 2)*

k) Workshop to formulate DMP in local government*: Response to 3)*

(5) Budget

After formulation of Disaster Management Plans, activities mentioned in the plan must be implemented. However, the following issues are observed:

1) Budget for disaster management is still insufficient and very much relies on international donors, and

2) Mainstreaming DRR is not yet realized in RPJM 2010-2014. (as of August, 2009, the contents of RPJM 2010-2014 is not finalized, however, GOI is moving ahead to realize mainstreaming DRR in next RPJM 2010-2014)

BNPB and the Indonesian Government need to take necessary actions to solve these issues.

2.1.3 Disaster Information Network

1) Review of the Past Achievements by the Government of Indonesia in Disaster Information Network

The achievements of the Indonesian departments and institutions relevant to disaster information are summarized as follows:

(1) BNPB

A. Establishment of EOC (Emergency Operation Center)

The Emergency Operations Center at national level (EOC) was established at the 4th floor of BNPB in cooperation with the French Government. The functions of EOC are 1) to collect, gather, analyze and present data and information, 2) to make decisions that protect life and property, and maintain continuity of the organization, within the scope of applicable law, and 3) to disseminate those decisions to all concerned agencies and individuals. The components of EOC are 1) infrastructure such as rooms, basic facilities, network and server, 2) information system such as computers, GIS and database software, spatial and statistical data, 3) communication system such as fixed line telephones, fax, the Internet, cellular phone, satellite phone, BGAN satellite phone, handy talkie and radio transmission, 4) staff, and 5) SOP. Main server of the EOC is equipped with a UPS with eight (8) hours availability but there is no electrical backup system for EOC's building itself.

An EOC at provincial level has also been developed. Three EOCs were already established in DKI Jakarta, West Sumatra and Aceh in cooperation with the French Government, and three EOCs have been prepared in Bali, Jambi and Yogyakarta in cooperation with the French Red Cross.

B. Development of Guidelines for Establishment of Regional EOCs

EOC guidelines are being prepared in cooperation with the French Red Cross and UNDP SC-DRR, aiming at establishing EOCs with same function and specification in other provinces.

C. Development of Integrated Disaster Management Data & Information Network System

A network with relevant organization as well as disaster information database has been developed. As for disaster information database, DIBI (Data dan Informasi Bencana Indonesia) has developed and organized past disaster information and is published through the Internet.

As for information network, BNPB is carrying on the development of the network system to connect every organization relevant to disaster management by internet/intranet. According to the information from BNPB, PU, DEPKES, DEPSOS and three provincial BPBDs which have an

EOC already connected to Disaster Management Information System by VPN network as of 2008.

Besides, BNPB received several disaster-related information individually from some organizations as follows:

- Earthquake information from BMKG through SMS and server installed in BNPB
- Monitoring data of water level measured at several structures in upstream of Jakarta area from PU through dialing up system
- Volcano information from ESDM through Fax
- Forest fire information analyzed using satellite data from LAPAN and DEPHUT through the Internet.

D. Development of Relevant Regulations regarding Disaster Information

BNPB has prepared various kinds of "Head of BNPB Regulations". Some of them such as No.9 Year 2008 and No. 10 Year 2008 include disaster information-related matters like items of information to be collected and reported when disaster occurs.

(2) BMKG

BMKG is developing National Earthquake Information and Tsunami Early Warning System (NEITWS) and Indonesian Tsunami Early Warning System (InaTEWS). As of basic observation, data collection and operation and maintenance of the equipment for the project, the demarcation of relevant organizations is as follows: BMKG operates and maintains DSS (decision support system), seismograph and accelerograph. BAKOSURTANAL operates and maintains GPS and tidal gauge. BPPT operates and maintains DART buoy. In addition, VSI operates and maintains volcanic sensor.

Besides, BMKG has a system to send the disaster information like earthquake information including magnitude and location and depth of epicenter to relevant organizations such as governmental organizations and media through SMS, VPN and so on.

(3) DEPKOMINFO

DEPKOMINFO is developing a disaster information dissemination system for early warning in cooperation with KOICA and BMKG. (Refer to 2.2.2 for more information.) This project is proceeded on the basis of Law No. 36 Year 1999 regarding Telecommunications as shown below.

(4) Local Governments

Fixed line phones, fax, mobile phones, radio communication including handy talkie, loud speaker and traditional equipment are mainly used as a communication device for transmission of disaster information in local governments. Some of local governments possess VSAT and/or Siren tower.

Type, number and condition of communication devices owned by local government vary depending on conditions of local governments.

2) Relevant Laws and Regulations

Contents related to disaster information are extracted from relevant laws and regulations. These contents are shown below.

(1) Law No. 24 Year 2007 regarding Disaster Management

The law stipulates the provisions concerning base, principles and purpose, responsibilities and power of government, institutional structures, social rights and obligations, role of business organizations and international agencies, organization of disaster management, funding and management of disaster assistance, etc. in terms of disaster management.

Although some descriptions regarding disaster information are found to focus on early warning, responsible organization(s) is not clearly designated in the law.

(2) Presidential Regulation No. 8 Year 2008 regarding BNPB

The regulation stipulates position, duty, function, organization, framework, finance, etc of National Disaster Management Agency (BNPB).

Item c of Article 2 on the duties of BNPB states: “Distribute the information of disaster management activities to the community”. Besides, disaster reporting can be read as a role of BNPB. Other description regarding responsible organization of disaster information cannot be found.

(3) Presidential Regulation No. 21 Year 2008 regarding Disaster Management Implementation

The regulation stipulates efforts and activities in each disaster phase of pre-disaster, during emergency response and post disaster in order to implement the planned, integrated, coordinated and comprehensive disaster management.

As for disaster information, early warning is mentioned in Article 19. According to the article, BNPB and/or BPBD are responsible organizations for decision making to determine the actions of early warning. The decision (early warning) must be disseminated through government agencies and privately owned broadcasting companies and media. Also, BNPB and/or BPBD are organizations responsible for coordinating all actions taken by the community to rescue and protect the community.

(4) Head of BNPB Regulation No. 9 Year 2008 regarding Permanent Procedure of BNPB TRC (Quick Response Team)

The regulation stipulates main tasks, function and assignment of BNPB Quick Response Team (TRC) to operate in emergency respond stage.

TRC is established by the Head of BNPB soon after all types of disasters struck with specific escalation. TRC members are selected to suit with the types of disasters and their knowledge/skill, and consist of 1) Team leader: BNPB personnel or related institution(s), 2) members: BNPB personnel and related institution(s), and 3) administration staff: BNPB personnel.

Regarding disaster information, information and data to be gathered and organized by TRC in disaster occurring site are stipulated with various format sheets.

(5) Head of BNPB Regulation No. 10 Year 2008 regarding Guidelines on Disaster Emergency Response Command

The regulation stipulates steps, organization, work flow and implementation pattern of disaster emergency response command system, and evaluation and reporting system.

The regulation includes general activities regarding disaster information in emergency response phase, communication tools configuration and lists of information facilities.

(6) Law No. 36 Year 1999 regarding Telecommunications

The law stipulates the provisions concerning principle and objective, administration, operation, etc. in terms of telecommunications. The law consists of nine (9) chapters and 64 articles. The Chapter IV: Operation is a main portion of the law. The Chapter IV is segmented into eleven Parts and includes 37 articles from Article 7 to Article 43.

In Article 20 of Part Five (Rights and Obligations of the Operator and the Public) of Chapter IV, the following is stipulated as an obligation of telecommunications operator[4]:

Every telecommunications operator is obligated to give priority to the transmission, distribution and conveyance of important information relating to:
a. state security;
b. safety of human life and property;
c. natural disasters;
d. grave danger; and/or
e. epidemics.

[4] In Article 1 of the Law No. 36 Year 1999, telecommunications operator is defined as "an individual, cooperative, regional-owned business enterprise (BUMD), state-owned business enterprise (BUMN), private enterprises, government agency, and state defense and security agency."

3) Current Situation and Issues of Disaster Information Network

Since all the disaster management activities are determined and implemented based on information, the information is a core element of disaster management measures. Therefore, it is a central issue of disaster management measures to organize and incorporate the information from various sources including disaster-related agencies, citizens, NPOs and private companies and to share the information on disaster management for sure with concrete strategy

In this section, an overall picture of disaster information field is shown first, then present issues or inadequate matters are investigated comparing the overall picture and actual present condition.

(1) Overall Picture of Disaster Information/Disaster Information Network Field

The table below shows the contents of activities regarding disaster information in each disaster phase which are considered to be implemented in order to come up to an ideal state. The table also includes the example of disaster information related to the activities in each disaster phase. The table is made extracting related items from draft national disaster management plan formulated by JICA development study, 2009, and compiling them.

Table 2.1.3.1 Overall Picture of Disaster Information/Disaster Information Network Field

Pre-Disaster Measures
Contents of activities regarding disaster information
1) Developing a system for collecting, transmitting and sharing information (1) Sharing information among disaster-related organizations at national and regional levels 1. Multiplexing routes of information transmission among organizations at national and regional levels 2. Clarifying responsibility and routes of information collection/exchange among organizations at national and regional levels 3. Developing a system for collecting information and communication within each organization and among organizations, and clarifying their role and responsibility 4. Standardizing formats for disaster information to be shared by each organization in a cross-sectoral manner, and aggregating information into a common system. (2) Developing a system for collecting and transmitting information 5. Introducing information technology (IT) to a system for collecting information and communication 5-1 Promoting digitization of network, and developing a nation-wide system of high-capacity communication network, to enable communication and transmission of high-volume data like image data. 5-2 Developing a graphical information collection and communication system 6. Developing a system that enables to utilize various means for information collection, e.g. aircraft and vehicles 7. Pre-assigning personnel to mobilize for disaster affected area for prompt and appropriate collection and communication on disaster information 8. Developing a system for collecting disaster-related information from various sources, including private companies, mass media, citizens and others, by developing various communication means. (3) Developing a system for observation and analysis of disaster information

9. Developing and maintaining observation equipment, such as seismographs and rainfall gauge, and developing and maintaining a system for instant transmission of disaster information
10. Reinforcing a system, facilities and equipment, to observe, collect, analyze and disseminate information on various types of disasters like earthquake, tsunami, flood and forest fire, meteorological phenomenon, i.e. rainfall and flooded volume, oceanographic phenomena, water level, and others.
11. Developing human resources to arrange and analyze collected information adequately.

(4) Developing a system for information dissemination to people

12. Reinforcing communication facilities and equipment and a system to transmit and disseminate information on earthquake, tsunami, disaster-related information like rainfall and water level, warning and so on to disaster-related organizations and people.
13. Developing an information dissemination system that is easy-to-understand for all population, including disaster vulnerable groups.

(5) Developing communication facilities and their operation system

14. Reinforcing security of information transmission facilities against disaster and measures to avoid electrical power outage of their facilities, as well as risk distribution of them
15. Developing an emergency communication system, developing integrated operation of wired and radio communication system, and securing important communication at the time of disaster.
16. Securing information transmission means during the disaster in normal time
    - 16-1 Reinforcing multiple radio transmissions and mobile communication lines
    - 16-2 Developing a system that utilizes mobile communication network
    - 16-3 Securing coordination among network by promoting enhancement of radio communication network and intra-network connection
    - 16-4 Securing sufficient circuit capacity of electrical communication lines by taking into account its usage at the time of disaster.
    - 16-5 Conducting regular full maintenance of communication facilities during normal times by referring to the importance of disaster management activities, and Conducting communication training and drills to acquire proficiency in handling of emergency communication and operation of equipment
    - 16-6 In regard to operation of mobile communication means, considering measures against problems, such as interference during congestion of communication, and formulating emergency operational plan
    - 16-7 Conducting regular practical communication drills which assume communication congestion and disruption, thereby including communication control, securing important communication and emergency communication usage.
    - 16-8 Developing and familiarizing priority telephone at the time of disaster and phone voice-mail service for disaster
    - 16-9 Constructing an operation and maintenance system of information transmission facilities in normal times
    - 16-10 Securing information transmission routes by developing and reinforcing central disaster management communication network

2) Collecting, accumulating and sharing disaster-related information

17. Collecting and accumulating information related to disaster management, such as natural and social conditions, and disaster records. Developing a geographic information system. Promoting a database development with such information through making it open source and networked
18. Grasping disaster vulnerable areas, developing hazard maps and risk maps with comprehensive information on disasters to publicly distribute disaster risks.
19. Collecting, organizing and sharing information on disaster vulnerable groups
20. Preparing manuals that identify hazard and risk areas, evacuation criteria, methods for information transmission. Designating evacuation site and evacuation route, and keeping

citizens informed about such information.

List of relevant disaster information

a. Natural conditions (topography, geology, rainfall pattern, river network and others)
b. Social conditions (population, type and distribution of buildings, landuse, public facilities like schools and hospitals, public infrastructure such as road, railway, electrical facilities, communication facilities, water supply facilities, flood control facilities and others)
c. Disaster-related information (hazard and risk areas, evacuation criteria, methods of transmission of disaster information, evacuation site, evacuation route, information on disaster vulnerable groups)

Emergency Response Measures

Contents of activities regarding disaster information

1) Transmitting and disseminating disaster information, warning, evacuation order and others

21. By responsible organization, transmitting disaster information such as earthquake information, meteorological conditions like rainfall and wind, forest fire occurrence condition and tsunami warning, to relevant departments and agencies, relevant provinces, districts, RRI &TVRI and other mass media.
22. By national and local governments, mass media and others, disseminating received information in easy-to-understand manner to residents covering all the target people including disaster vulnerable groups
23. By responsible agency, disseminating evacuation order to residents promptly and properly in easy-to-understand manner covering all the target people including disaster vulnerable groups by using effective and reliable multiple information transmission means
24. By responsible agency, keeping residents informed about evacuation sites.

2) Activities for rapid assessment of damage size

25. Collecting related information for estimating damage size, which includes general damage information, extent of lifeline damage, and condition of injured persons who come to medical agencies
26. Collecting information by visual inspection and/or video shooting from aircraft
27. Grasping damage size by utilizing image information
28. Conducting rapid assessment utilizing geographic information system, monitoring system and others.

3) Collecting and corresponding about damage information

29. By every organization, collecting information on damage condition of humans and buildings, occurrence condition of disasters such as fire, tsunami and sediment disasters, as well as corresponding about grasped information promptly with relevant organizations to share them.

4) Corresponding about information on emergency response activities

30. By responsible agency, corresponding with coordination agency about information such as emergency response activities, conditions of establishment of Command Post, and necessity of support.
31. By coordination agency, corresponding with relevant organizations about collected information on emergency response activities as well as information on emergency response activities coordinated by Responsible organization.
32. By relevant organizations, exchanging information about emergency response activities mutually and closely.

5) Securing means of communication

33. Securing communication means for correspondence of disaster information just after disaster occurrence
    33-1 Confirming function of information transmission means and allocating necessary personnel to sites immediately to recover facilities in trouble

33-2 Setting lines for emergency information communication by utilizing mobile communication lines such as mobile phone and satellite phone.

34. By telecommunication corporations, securing preferentially important communication among relevant disaster management agencies such as national and local governments at the time of disaster
35. By responsible organization, collecting and organizing damage conditions of communication systems, and smoothly conducting adjustment to devote available communication systems to important communication
36. Operating communication properly and uninterruptedly, by allocating personnel to disaster area and implementing communication control, to deal with problems such as interference during congestion of communication in radio transmission stations at the time of disaster.

List of relevant disaster information

1) Disaster scale, forecasting and warning, and evacuation

d. Meteorological conditions such as wind and rainfall, warnings, and complementary information
e. Earthquake information including earthquake intensity, epicenter, magnitude and aftershock conditions
f. Conditions of flood and high tide (water level, discharge, inundated area, water depth and others)
g. Conditions for volcanic eruption, sediment disasters and forest fire (affected area and magnitude)
h. Tsunami warning
i. Predictive information about tornado wind and gust
j. Information for evacuation preparedness
k. Evacuation directive and evacuation order
l. Information for evacuation including evacuation site, evacuation route, inundation area, existence of risk area of sediment disaster, general description of disaster, and others

2) Damage information

m. Related information for estimating damage size
n. Image information for grasping damage size
o. General information on damage size
p. Condition of human suffering
q. Damage condition of buildings
r. Extent of lifeline damage
s. Occurrence condition of disasters such as fire, tsunami and sediment disasters

3) Emergency response activities

t. Activity condition of emergency response
u. Information on coordinated emergency response activities
v. Necessity of support
w. Condition of establishment of National Command Post

Post-Disaster Measures (Rehabilitation and Reconstruction)

Contents of activities regarding disaster information

37. Grasping and sharing contents of assistance by relevant Indonesian organizations and international donors
38. Grasping and sharing plans for rehabilitation and reconstruction
39. Grasping and sharing contents of activities for rehabilitation and reconstruction

List of disaster information

x. Contents of assistance (human resources, relief goods, donation)
y. Plans for rehabilitation and reconstruction
z. Contents of activities for rehabilitation and reconstruction

As shown in the above table, there are many items to be implemented regarding disaster information field, especially in pre-disaster and emergency response phases. Among them, activities in emergency response phase can be carried out properly and effectively when adequate preparedness activities have been implemented in advance in pre-disaster phase. In other words, preparedness activities are a key factor or base of activities in emergency response phase. From this point of view, present issues or inadequate matters are investigated only for activities in pre-disaster phase.

(2) Evaluation of Current Situation

Evaluation and extraction of inadequate matters are conducted for each group of activities, taking account of current situation. The result is summarized in the table below.

Table 2.1.3.2 Evaluation of Current Situation

Group of Activities	Evaluation of Current Situation
1) Developing a system for collecting, transmitting and sharing information	
(1) Sharing information among disaster- related organizations at national and regional levels	- As for a system for transmission and sharing disaster information among central disaster-related organizations centering on BNPB, a network connecting relevant organizations are only partially developed and it is not insufficient to clarify responsibility of each organization for information collection and correspondence as well as to recognize responsibility of each organization mutually. Besides, multiplexing routes to transmit information securely even in a time of emergency are not established yet. - Development of information transmission system between BNPB and local governments (BPBD / SATKORLAK / SATLAK), which, even in a time of disaster, is rather inadequate. Overall, basic information transmission equipments are scanty in local governments (provinces and districts) though EOCs were established and are being established in several provinces. - BNPB proceeds to formulate relevant regulations including various formats for reporting in disaster occurrence, but it is not yet enough. Also, a system that can aggregate information from various organizations including relevant departments and institutions is not yet developed.
(2) Developing a system for collecting and transmitting information	- Development of fundamental information infrastructure is not enough to enable transmission of high-volume data like images, to be effectively used for grasping detailed situation in affected area. - A System for collecting disaster-related information from various sources is not developed at either national or local level.
(3) Developing a system for observation and analysis of disaster information	- BMKG and other organizations develop a system for observation and analysis of various data such as earthquake, meteorology and hydrology, whereas timely warning is still challenging especially for flood and forest fire. Continuous further activities are necessary.
(4) Developing a system for	- Various activities including installation of tsunami siren towers,

information dissemination to people	development of a system for information dissemination and a drill using loudspeaker in Mosque and traditional equipment (Kenthongan) in community, information dissemination through electric media, and project for information dissemination using mobile phones, have been conducted; however it is not yet sufficient. For example, it is not enough to give consideration to disaster vulnerable groups and foreign tourists. Continuous further activities are necessary.
(5) Developing communication facilities and their operation system	- Many local governments are equipped with radio transmissions and satellite phones but not all. Few local governments implement measures to avoid electrical power outage of communication system, and even BNPB does not do it adequately. There are a number of satellite phones not utilized due to shortage of operation cost. Fixed line telephone, fax and mobile phone are still major communication means in local governments as well as central organizations; however measures against communication congestion in a time of disaster are not implemented. Development of a standardized basic communication system is crucial.
2) Collecting, accumulating and sharing disaster-related information	- BNPB proceeds to develop a database of disaster records and makes it open source and networked. However, especially in local governments, information such as disaster record and natural and social conditions are not collected and aggregated at a level which enables such information to be used for formulating concrete disaster management plans as well as an effective emergency response operation. Besides, hazard and risk maps, which can be used for investigating concrete measures at district level, are hardly developed. The major reasons of a few numbers of developed hazard and risk maps are not only technical reasons but also a limitation of available data. Activities of collecting, accumulating and sharing information and a system are critical.

(3) Issues/Necessary Actions

Based on the above evaluation, issues/necessary actions regarding disaster information/disaster information network field are listed as follows:

a. Design of an overall system of disaster information network*: Response to 1) and 2)*
b. Clarification of responsibility of each organization for information collection and correspondence*: Response to 1) (1)*
c. Establishment of multiplexing routes to transmit information securely in a time of emergency*: Response to 1) (1) and (5)*
d. Design of a system for collecting and sharing standardized information*: Response to 1) (1)*
e. Development of a system in BNPB for collecting, transmitting and sharing information, and capacity development for effective and sustainable use of it*: Response to 1) (1) and (5)*

f. Development of a network system for transmitting and sharing information among central disaster-related organizations, and capacity development for effective and sustainable use of it*: Response to 1) (1)*

g. Development of communication equipments and facilities in local governments, and capacity development for effective and sustainable use of them*: Response to 1) (1) and (5)*

h. Development of a network system among central disaster-related organizations, local governments and community, and capacity development for effective and sustainable use of it*: Response to 1) (1) and (4)*

i. Development and reinforcement of basic communication infrastructure*: Response to 1) (2)*

j. Reinforcement of capacity for information collection in a time of disaster*: Response to 1) (2)*

k. Development and reinforcement of a system for observation and analysis of disaster information*: Response to 1) (3)*

l. Activities for collecting, accumulating and sharing disaster information, including their digitizing and networking*: Response to 2)*

m. Utilization of disaster information, such as making hazard and risk maps and designating evacuation sites*: Response to 2)*

The above items are arranged in time frame of short-, medium- and long-term taking into account of importance and gradualness of completion as shown below.

Table 2.1.3.3 Time Frame of Activities for Disaster Information/Disaster Information Network

Items		Short term (within 5 yrs.)	Medium term (within 10 yrs.)	Long term (within 15 yrs.)
No.	Contents			
a	Design an overall system	▬		
b	Clarify responsibility	▬		
c	Establish multiplexing routes	▬	▬	
d	Design standardized information	▬		
e	Develop a system in BNPB	▬	▬	
f	Develop a central network system	▬	▬	
g	Develop a local system	▬	▬	▬
h	Develop a network to community	▬	▬	▬
i	Develop communication infrastructure	▬	▬	▬
j	Reinforce collection capacity		▬	
k	Reinforce an observation system	▬	▬	▬
l	Collect, accumulate and share info.	▬	▬	▬
m	Utilize information	▬	▬	▬

2.1.4 Earthquake Disaster Management

1) Review of the Past Achievements by the Government of Indonesia in Earthquake Disaster Management

Even a long-time resident in the region cannot personally experience a devastating earthquake disaster, because a return period of large earthquake is longer than human life. Therefore, the analysis based on scientific procedure and database is indispensable for estimating the requirement of necessary earthquake disaster management. In this section, Indonesia's recognition of the above-mentioned matter is explained. Strengthening of buildings greatly contribute in mitigating earthquake disaster losses, because cause of death is mostly by collapse of buildings. Therefore, it is necessary to obligate earthquake-resistance of building by the law strictly together with enhancement of public awareness. This section also describes the relevant laws concerning building construction in Indonesia.

(1) Recognition of Earthquake Motion as Target of Disaster Management

Earthquake disaster management in Indonesia is dominated by emergency response action just after the occurrence of an earthquake rather than mitigation and preparedness. Mitigation and preparedness measures for earthquake disaster management, such as assessment of damage against earthquake and dissemination of result, had not been implemented in the past.

Earthquake intensity must be estimated in a scientific manner for designing comparatively medium to high rise buildings. A technical committee[5] for active tectonics investigated a distribution of expected earthquake motion value covering areas across Indonesian. Result was shown in Figure 2.1.4.1 in reference to SNI 03-1726-2002[6] (Tata cara perencanaan ketahanan gempa untuk bangunan gedung). This technical data shows peak ground acceleration (PGA) value that is expected for each different location in Indonesia. It was analyzed as an expected value for a 500-year return period referring to the existing Indonesian earthquake catalog.[7]

[5] Advisory committee by Dr. Wiratman Wangsadinata
[6] SNI is not a law but the books by which an architectural academy supervises building design.
[7] The database which sequentially arranges the location of epicenter, magnitude, date and time parameters of the post earthquake is called earthquake catalog.

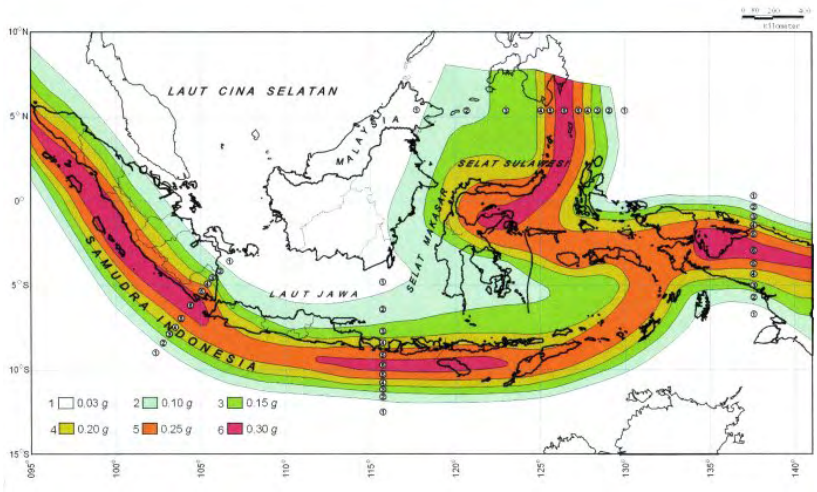


Figure 2.1.4.1 PGA Map in SNI 03-1726-2002

The existing Indonesian earthquake catalog was composed of the data instrumentally measured by BMG and the data published by foreign research institutes, such as USGS. In a probability theory, long term trend of earthquake occurrences was extrapolated utilizing the Richter law, because research of historical event in Indonesia is not sufficient. The above mentioned procedure is standing on a probabilistic angle. The result shown in Figure 2.1.4.1 is earthquake motion with a 10% probability of exceedance in 50 years (i.e. return period is about 500 years)[8]

On the other hand, a target earthquake in Japanese disaster management plan is usually set a motion generated by the individual and specific earthquake fault that is most effective for the region. This theory is standing on a deterministic angle.

Previously, doubts had been shown in the approach which stood in a deterministic theory at ITB. However, some result obtained by utilizing the earthquake source of deterministic theory besides some result obtained by utilizing the PGA Map of probabilistic theory were found in the exhibits in Center for Disaster Mitigation established in ITB.[9]. It is thought that the discussion about the concept of target earthquake in disaster management will be advanced in National Platform, which is established in Indonesia.

(2) Legal System for Building Construction

In Japan, there is a law called “Building Standard Law” that is uniformly effective at imposing the standard of earthquake resistance in building design. In Indonesia, a law that allows the Central Government to regulate structural safety is the “UNDANG-UNDANG NOMOR 28 TAHUN 2002” (Law No.28 / 2002). However, the corresponding part 18(3) of the law “U-U 28 / 2002”

[8] The Kawasumi map in Japan and NEHRP in the United States were generated utilizing the probability theory approach.
[9] Some hazard maps were generated utilizing the method of seismic-microzoning by I Wayan Sengara etc.

stipulates, “The provisions on the loading, resistance against earthquake and/or storm as referred to in paragraphs (1) and (2) shall be laid down further by Government Regulation”. Government Regulation means Peraturan Pemerintah 36/2005（PP 36/2005） in this context. Article PP33(5) in PP 36/2005 is the part in which the loading resistance against earthquake and/or storm must be defined, but this article just stipulates this: “Further stipulation regarding loadings, resistance toward earthquake and/ or wind, and structural calculations conform to prevailing guidelines and technical standards”[10]. Provincial or Kabupaten regulations can provide individual article that is different from central government law but an effective description regarding structural design is not indicated in these regulations. A practical way to estimate safety for earthquake resistance is described in “STANDAR NASIONAL INDONESIA 03-1726-2002” (SNI 03-1726-2002), but this standard is not law but a technological material of architectural academy or licensure examination committee.

Consequently, there is no law that can control the way to design earthquake resistant buildings by means of enforceable article. In some cases, such as in Jakarta, in order to construct high rise buildings, the technical committee for evaluating building permission is functional and investigates structure in the process of construction; however, in other cases, it is not compulsory to confirm safety by calculating stress and strain.

Practical guidebooks such as “Safer Housing Handbook”[11] and “Pocket book for step by step construction of safer buildings” were distributed in Yogyakarta, but these books do not obtain mandatory power. In addition, these books are not sold commercially in ordinary bookstores.

As a result, it can be said that there is no uniform legal system, which has mandatory power to control earthquake resistant design in Indonesia. However, a building permission committee exists in limited areas where the demand of high rise building exists such as in Jakarta and in Yogyakarta where severe damage from earthquake has been experienced. In this case, residents recognize the importance of having their houses build to earthquake-resistance standards.

(3) Encouragement of New Housing for Low Income Persons

The granting of loans to low income persons and the promotion of State Ministry of Public Housing (MENPERA) Financial Scheme are executed with a budget of IDR 1.4 trillion in Indonesia by 2009. (MFS)

[10] Further stipulation regarding loadings, resistance toward earthquake and/ or wind, and structural calculations conform to prevailing guidelines and technical standards.
Ketentuan lebih lanjut mengenai pembebanan, ketahanan terhadap gempa bumi dan/atau angin, dan perhitungan strukturnya mengikuti pedoman dan standar teknis yang berlaku.
[11] PEMERINTAH KABUPATEN BANTUL POSYANIS KECAMATAN

This scheme is summarized as follows:

1. In MFS, a person with a monthly income of IDR 2.5 million or less is defined as the low income person separately for three kinds of groups, which can be supported by three different conditions.
2. There are two kinds of support. One is pure aid and another is lending.
3. There is a system that is called KPRS lending IDR 20-40 million.
4. MENPERA allocated a sum of budget (IDR 1.4 trillion until 2009) for this Self-Help program in form of stimulus fund through the Ministry of Finance. This allocation is only about 10% from the total targeted needed fund, which hopefully can be sourced from local governments, philanthropic institutions and other non-bank financial institutions.
5. The government will give a grant to finance the difference between market interest rate with the government fix interest rate.
6. There is another finance program called Micro KPRS. The difference between KPRS and Micro KPRS is the duration of Loan period and the total Loan.
7. The recipient should satisfy the following conditions:

- The recipient must have a certain amount of money before he/she can access this fund.
- The recipient must open a savings account and deposit the money in this particular bank.
- The recipient must be the one who will own a house for the first time
- The recipient has never been a recipient of this house subsidized scheme before.

Table 2.1.4.1 Summary of Scheme by Target Group

Target Group	Maximum monthly Income (IDR million)	Maximum Loan (IDR million)	Maximum subsidized • interest rate • first payment (in IDR million)
I	1.7 – 2.5	42	5
II	1 – below 1.7	30	7
III	below 1 million	20	9

The following problems are observed in this scheme:

1. This program will be implemented in another two years in the schedule of the Ministry of Finance. It is not clear whether the plan continues or not.
2. Quality of the residential buildings that are built applying this program is usually not confirmed by MENPERA, and local government or community organization does not have the capacity to control building quality. As a result, many low quality buildings are built.

2) Issues of Earthquake Disaster Management

In this section, an insufficient matter in current earthquake disaster management activity in Indonesia is analyzed and necessary actions to be taken are indicated to solve issues raised.

(1) Understanding of Seismicity

It is necessary to know which extent of earthquake motion may occur in Indonesia. Sufficient discussion on the intensity of the target earthquake motion for disaster management plan should be implemented.

Issues found in understanding of seismicity are as follows:

1) Earthquake catalog, which includes the location of the epicenter, magnitude, and the date, time parameters of the post earthquake, is not organized sufficiently.
2) Evaluation of each earthquake source in Indonesia was not completed yet.
3) Target earthquake for disaster management plan for each location has not been discussed sufficiently.

In order to solve the above issues, the following action should be taken:

a) Start-up of committee on earthquake disaster management plan*: Response to 1), 2), and 3)*

(2) Legal System for Building Construction

It is necessary to obligate the incorporation of earthquake-resistance features in the building by the law concretely. The law concerning building design and construction in Indonesia does not concretely describe a structural design requirement and/or procedure. Also, the guideline for building inspection by building administration is not established yet.

Issues found in the legal system for building construction are as follows:

1) Building law is incomplete,
2) Building permission system is incomplete and not executed properly.

In order to solve the above issues, the following actions should be taken:

b) Improvement of building law*: Response to 1)*

c) Development of building permission system and its enforcement*: Response to 2)*

(3) Earthquake-resistance in Building

"SNI 03-1726-2002" was explained with an example of the technical provision for building design. However, this technical provision is applied only for high rise buildings. In most part of the region, the buildings are so called "non-engineered buildings", because they are usually designed without any quantitative structural analysis. The construction method of

non-engineered buildings built in Indonesia recently is "Confined Masonry". For this construction method, the brick masonry walls are reinforced slightly by the confining effect given by surrounding RC made columns and beams. This type of structure looks like the combination of reinforced concrete moment-resistant frame structure and the brick masonry partition wall on the face, but the structural mechanism is quite different.

Most of non-engineered buildings in Indonesia are not designed by specially educated experts. Those buildings are hardly checked on their structural qualitative safety by building permission system. It is indispensable to secure the structural safety of non-engineered buildings because many people are affected due to the collapse of this type of buildings because of an earthquake. The development of a well-organized building permission system is one of the most needed issues in order to reduce loss of life due to large earthquake.

Issues found in earthquake-resistance in building are:

1) Lack of Earthquake-resistance in Non-engineered building
2) Lack of Earthquake-resistance in low income group housing
3) Structural diagnosis system for existing buildings does not exist in Indonesia (as for earthquake resistant capacity)
4) Method of seismic retrofitting as for earthquake resistant capacity in existing building does not exist in Indonesia
5) Method of "Post-Earthquake Quick Damage Assessment" does not exist in Indonesia

The above mentioned issue *2) Lack of Earthquake-resistance in low income group housing* can be solved by linking with other key issues. Following is a consideration of an example of linking.

The project *Financial System for Improvement of Self-help Housing Quality in Disaster-Prone Area* was proposed by MENPERA. The purpose of this project is to improve the quality in the housing built applying the grant and loan scheme of MENPERA. The grant and loan scheme have already been applied and will end in another two years. What is requested is support in investigating present situation and proposing a guidance system for improving the quality of housing built applying this grant and loan scheme. It is very much essential to link this project with that of "*The project on Building Administration and Enforcement Capacity Development for Seismic Resilience"* currently implemented by JICA.

The advantage by linking these projects is as follows.

- Earthquake resistance of the housing built applying the Grant and Loan scheme of MENPERA can be improved by applying "Key Requirement" proposed in "The project on

Building Administration and Enforcement Capacity Development for Seismic Resilience".

- It is possible to obligate the achievement of a higher quality than usual in the case of the house that is built utilizing this scheme that Japanese system similarly applied.

The controversial point by linking is as follows:

- The quantitative level of the earthquake-resistance guaranteed by observing "Key Requirement" is not clear enough.
- The current state of Indonesia has not reached at the stage where the in-process check can be executed although some "Key Requirement" cannot be confirmed without in-process check.
- Key Requirement is not necessarily compatible for every different type of building in Indonesia.

  Earthquake resistance of the buildings depends on the material and construction method. The house is usually built by using the material that can be easily obtained in that region. Therefore, an individual investigation and consideration are needed for the specific situation of each region if improvement of the building quality is required. Moreover, a relatively long period is needed for the investigation of each region. Four regions (Padang, Tasikmalaya, Pekalongan, and Maumere) are listed in the request document. If those study areas are going to be covered, the whole scale of investigation shall become considerably large and should limit the pilot region.
- This grant and loan program will be implemented in another two fiscal years in the schedule of the Ministry of Finance. It is not clear whether the plan continues.

In order to solve the above issues, the following actions should be taken:

d) Formulation of construction guideline of non-engineered building and applied for SNI*: Response to 1))*

e) Technical guidance linked with housing loan system for low income persons*: Response to 2)*

f) Technical examination, discussion, and formulation of guideline of structural diagnosis system for existing buildings*: Response to 3)*

g) Technical examination, discussion, and formulation of guideline of seismic retrofitting for existing building*: Response to 4)*

h) Technical examination, discussion, and formulation of guideline of Post-Earthquake Quick Damage Assessment system for buildings*: Response to 5)*

(4) Disaster Risk Mitigation for Megacities

A. General Impact to Megacities

Earthquake causes big damage once it occurs. However, the return period of the earthquake which can bring large damage is longer than an individual's life time. It is rare to experience the large earthquake even if the person lives in that region for a long time. However, once a devastating earthquake occurs, impact of damage becomes extremely high. Especially it is known that the effect of the earthquake disaster that occurs in megacities could be serious because damage in high density of facility area accompanies the enormous amount of economic and human loss. The area will have to rely on a huge amount of support goods and labor supplied from another region. The disaster of that kind of big city decreases economic power in the surrounding wider region.

Only the analysis based on scientific procedure and well organized database can provide accurate recognition concerning the disaster situation of that area.

B. Impact to Road and Bridge

The earthquake damage of the civil engineering structures such as bridges is obviously little in the past earthquake disaster compared to building damage. In other words, it can be said that the civil engineering structure is stronger in the earthquake compared with individually owned buildings. Therefore, fundamental revision of civil engineering structure is not required if some adverse point is found as for emergency activity after an earthquake shock. However, even if there is damage to one bridge in emergency road network, the network cannot be functioned and interrupt emergency response activities. This small damage could seriously affect the whole function of network, so every bridge should be strictly for emergency use only. The situation of bridges in Indonesia is as follows:

1. Management system of bridges in Indonesian was developed from 1992 using financial assistance of Australia.
2. The international cooperation bank in Japan received the request of the Indonesian Government in 2006 and "Road and harbors sector Asset management SAPROF (follow up) investigation" was carried out.

The database for the management system of above-mentioned program needs improvement but it could not be sufficiently implemented because of budget problems. In addition, inadequacy in operation is pointed out further in the SAPROF investigation. Maintenance of bridges, which is an immediate requirement, has been postponed because of the insufficient maintenance policy. Insufficient maintenance of bridges causes collapse and creates traffic bottleneck between

neighboring regions after the earthquake. Therefore, further examination is needed for using above-mentioned results of 1 and 2 because they are not aimed at earthquake safety.

C. Impact to Port Facility

The main route used to carry emergency/relief goods from the vicinity area after the earthquake is usually road or rail routes. However, water transportation can be second priority when the road becomes interrupted due to collapse of bridges. Indonesia depends on water transportation even at normal time because it consists of many islands. There are about 671 public ports in Indonesia, and it is assumed that about 117 are commercial ports, and the container freight handling ports are about 22. However, the earthquake-resistance of the waterside structure such as harbor quays is lower than that of other civil engineering structures in general. Special measure is needed to use the quays certainly after earthquake occurrence. Therefore, it is necessary to prepare a specially designed quay, which is chosen as the first priority part in corresponding port, similar to the project carried out by transport ministry in Japan.

Issues found in Disaster risk mitigation for megacities are:

1) Low awareness level about earthquake hazard potential
2) Low awareness level about the aspect of earthquake hazard in megacity
3) Vulnerability of megacity for earthquake hazard
4) Lack of urgent support and relief and revival capacity in megacity

In order to solve the above issues, the following action should be taken:

i) Damage assessment of megacities utilizing seismic-microzoning method*: Response to 1) and 2)*

j) Improving an emergency response base facility (Reinforcement of schools, hospital buildings)*: Response to 3)*

k) Maintenance and reinforcement of infrastructure for post earthquake emergency response activities (Roads and bridges)*: Response to 4)*

l) Maintenance and reinforcement of infrastructure for post earthquake emergency response activities (Port facilities)*: Response to 4)*

2.1.5 Integrated Water Resources Management

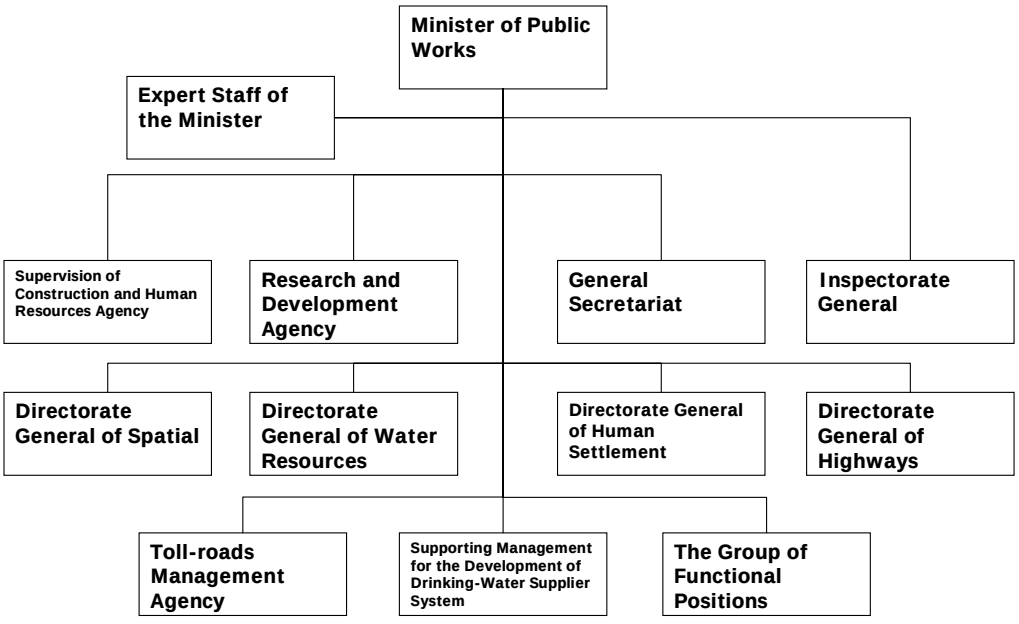
1) Review of the Past Achievements by the Government of Indonesia in Integrated Water Resources Management

(1) Institution

Directorate General of Water Resources (DJSDA: Direktorat Jenderal Sumber Daya Air), Ministry of Public Works (DPU: Departemen Pekerjaan Umum) has been playing crucial roles in the field of integrated water resources management, while Ministry of Forestry has responsibility for forest conservation in upstream region in a river basin or flora conservation (for example, conservation of mangrove forests in coastal area). Based on the interview survey conducted with the concerned officials of DJSDA-DPU by the study team, it is found that DJSDA has responsibility in disaster risk management for the following fields:

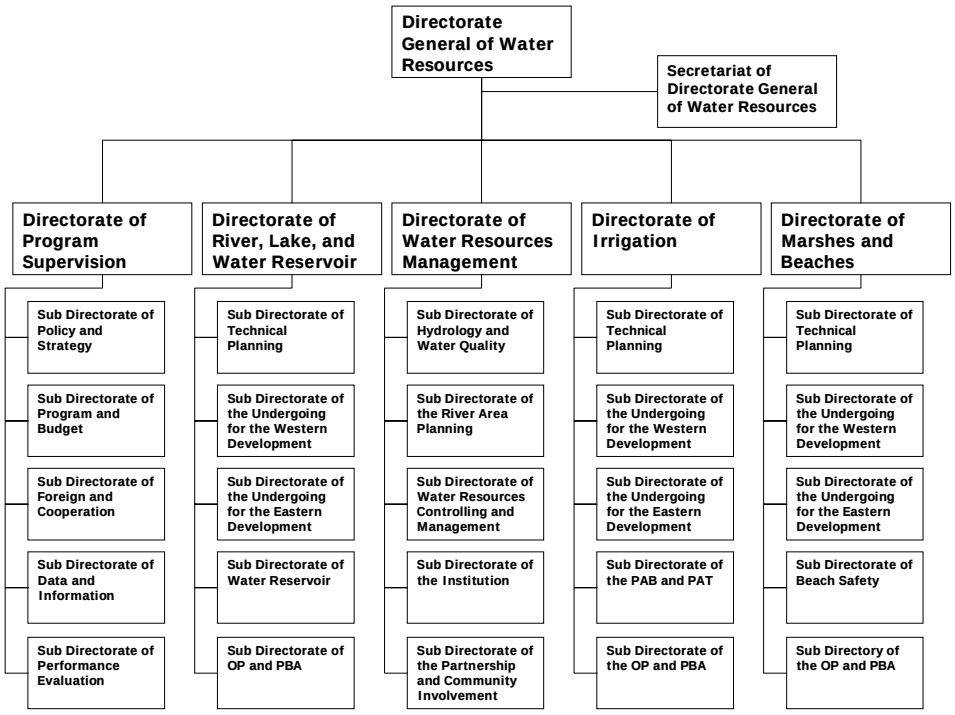
- Preparation (Planning) and Mitigation
- Emergency Response
- Rehabilitation and Reconstruction of Damaged Water Resources Facility & Infrastructure

Figures 2.1.5.1 and 2.1.5.2 show the organizational charts of DPU and DJSDA-DPU, respectively.



Source: Ministry of Public Works (DPU)

Figure 2.1.5.1 Organization Chart of Ministry of Public Works (DPU)



Source: Ministry of Public Works (DPU)

Figure 2.1.5.2 Organization Chart of Directorate General of Water Resources Ministry of Public Works (DJSDA-DPU)

(2) Relevant Laws in terms of Integrated Water Resources Management

The Water Resources Law (No.7/2004), River Law (No.35/1991) and Forestry Law (No. 41/1991) are main laws in terms of Integrated Water Resources Management. The profiles of the laws are indicated in Tables 2.1.5.1 to 2.1.5.3. Water Resources Law No.7/2004 stipulates the provisions concerning conservation, exploitation, disaster management, planning, O&M, information system, etc. in terms of Water Resources. River Law No. 35/1991 stipulates the provisions concerning river management such as function of river, authority, planning, infrastructure, flood management monitoring, etc. And Forestry Law No. 41/1991 stipulates the provisions concerning forest conservation and management including water management and disaster prevention (flood, erosion, brine water intrusion).

Table 2.1.5.1 Contents of Water Resources Law (No. 7/2004)

Profile
Water Resources Law No.7/2004 stipulates the provisions concerning conservation, exploitation, disaster management, planning, O&M, information system, etc. in terms of Water Resources.

Contents	
CHAPTER I	GENERAL PROVISIONS
CHAPTER II	AUTHORITIES AND RESPONSIBILITIES
CHAPTER III	CONSERVATION OF WATER RESOURCES
CHAPTER IV	EXPLOITATION OF THE WATER RESOURCES
CHAPTER V	MANAGEMENT OF THE DESTRUCTIVE FORCE OF WATER
CHAPTER VI	PLANNING
CHAPTER VII	IMPLEMENTATION OF THE CONSTRUCTION, OPERATION AND MAINTENANCE
CHAPTER VIII	WATER RESOURCES INFORMATION SYSTEM
CHAPTER IX	GOVERNMENT SUPERVISION
CHAPTER X	FINANCING
CHAPTER XI	RIGHTS, OBLIGATIONS, AND ROLES OF THE COMMUNITY
CHAPTER XII	COORDINATION
CHAPTER XIII	SETTLEMENT OF DISPUTE
CHAPTER XIV	LAW SUITS FROM THE COMMUNITY AND ORGANIZATION
CHAPTER XV	INVESTIGATION
CHAPTER XVI	CRIMINAL PROVISIONS
CHAPTER XVII	TRANSITORY PROVISIONS
CHAPTER XVIII	CLOSING PROVISIONS

Source: Water Resources Law (No.7/2004)

Table 2.1.5.2 Contents of River Law (No. 35/1991)

Profile
River Law No.35/1991 stipulates the provisions concerning river management such as function of river, authority, planning, infrastructure, flood management monitoring, etc.

Contents	
CHAPTER I	GENERAL PROVISIONS
CHAPTER II	OWNERSHIP OF RIVER
CHAPTER III	RIVER'S FUNCTION
CHAPTER IV	AUTHORITY AND OBLIGATION OF SUPERVISION
CHAPTER V	PLANNING
CHAPTER VI	DEVELOPMENT OF RIVER INFRASTRUCTURE
CHAPTER VII	EXPLOITATION & RESERVATION OF RIVERS AND RIVER INFRASTRUCTURE
CHAPTER VIII	OWNERSHIP OF RIVER & RIVER INFRASTRUCTURE
CHAPTER IX	DEVELOPMENT, MANAGEMENT AND SECURITY OF WATER RESERVOIR
CHAPTER X	FLOOD MANAGEMENT
CHAPTER XI	SECURITY OF RIVER AND INFRASTRUCTURE
CHAPTER XII	OBLIGATION AND PROHIBITION
CHAPTER XIII	FINANCE
CHAPTER XIV	MONITORING
CHAPTER XV	LEGAL PROVISION
CHAPTER XVI	OTHER PROVISION
CHAPTER XVII	CLOSING PROVISION

Source: River Law (No.35/1991)

Table 2.1.5.3 Contents of Forestry Law (No.41/1999)

Profile	
Forestry Law No.41/1999 stipulates the provisions concerning forest conservation and management including water management and disaster prevention (flood, erosion, brine water intrusion).	
Contents	
CHAPTER I	GENERAL
CHAPTER II	FOREST STATUS AND FUNCTION
CHAPTER III	FOREST MANAGEMENT
CHAPTER IV	FORESTRY PLANNING
CHAPTER V	FOREST MANAGEMENT
CHAPTER VI	RESEARCH AND DEVELOPMENT, EDUCATION AND TRAINING AS WELL AS EXTENSION ON FORESTRY
CHAPTER VII	SUPERVISION
CHAPTER VIII	DELEGATION OF AUTHORITY
CHAPTER IX	INDIGENOUS LAW COMMUNITY
CHAPTER X	COMMUNITY PARTICIPATION
CHAPTER XI	CLASS ACTION
CHAPTER XII	SETTLEMENT OF FORESTRY DISPUTE
CHAPTER XIII	INVESTIGATION
CHAPTER XIV	PENAL PROVISIONS
CHAPTER XV	COMPENSATION AND ADMINISTRATIVE SANCTION
CHAPTER XVI	TRANSITIONAL PROVISIONS
CHAPTER XVII	CLOSING

Source: Forestry Law (No.41/1999)

(3) Past Achievements

The past achievements in the field of Integrated Water Resources Management are indicated in Table 2.1.5.4 based on the draft version of the National Mid-term Development Plan (RPJM) for 2010 -2014, which has been prepared by BAPPENAS and DPU. The achievements cover the followings fields:

- National food security
- Raw water provision
- Flood control and coastal protection
- Sustainable water and water availability

Table 2.1.5.5 shows the performance in the field of Water Resources Management from 2005 -2009 on the basis of "Concept of National Strategic Development Plan of Water Resources 2010-2014 (Konsep RENCANA STRATEGIS, BIDANG SUMBER DAYA AIR 2010-2014)" drafted by DJSDA-DPU. Some of the corresponding numerical values of Table 2.1.5.4 and Table 2.1.5.5 indicate different values, which may be attributed to draft versions of RPJM and RENCANA STRATEGIS (RENSTRA).

Table 2.1.5.4 Past Achievements in Water Resources Development, 2005 - 2009

- National food security
  a. Development of irrigation network: 490,600 ha
  b. Rehabilitation of irrigation network: 1.52 million ha
  c. Operation and Maintenance of irrigation network: 2.1 million ha
  d. Development and Rehabilitation of swamp irrigation: 593,000 ha
  e. Operation and Maintenance of swamp irrigation: 536,000 ha

- Raw water provision
  a. Development conveyance canal with 9.64 m3/sec capacity in West Kalimantan, Central, Eastern and Southern Kalimantan, South Sulawesi, Bali, Palembang, Lampung, Banten, West Java, Yogyakarta, Central and Eastern Java
  b. Development of small reservoir, weir and raw water storage
  c. Rehabilitation of raw water infrastructure throughout Indonesia

- Flood control and coastal protection
  a. Flood control development along 1,224 km
  b. Installation of flood forecasting and early warning system in 8 river basins (Citanduy, Jeneberang, Bengawan Solo, Pemali-Juana, Cimanuk-Cisanggarung, Progo-Opak-Serang, Citarum and Mahakam)
  c. Development of coastal protection infrastructures along 222 km throughout Indonesia

- Sustainable water and water availability
  a. Development of 350 small reservoirs
  b. Development of several reservoir such as Keuliling Reservoir (NAD), Telaga Tunjung Reservoir (Bali), Ponre-Ponre Reservoir (South Sulawesi), Binalatung Reservoir (East Kalimantan), Panohan and Lodan Reservoir (Central Java), Kedung Brubus and Nipah (East Java)
  c. Operation and Maintenance of 121 reservoirs throughout Indonesia

Source: Draft Version of the National Mid-term Development Plan (RPJM) for 2010- 2014

Table 2.1.5.5 Performance of Water Resources Management, 2005 - 2009

- The increase of total plantation area and the level of irrigation system service at the total area of 521,600 ha; irrigation system that has been rehabilitated at the total area of 1,500,000 ha; the working and maintenance of irrigation system at the total area of 2,100,000 ha.
- The increase and rehabilitation of swamp system to support the planting area at the total area of 1,000,000 ha; the maintenance of the total area and the service improvement of swamp system at the total area of 637,000 ha.
- The coastal security infrastructure that has been built at the length of 149 km to protect the coastline area from erosion. The increase of potable water supply is from the water pipe construction with capacity around 12.6 m^3 per second.
- The construction of 11 dams caused the increase of water supply. The dams are Keuliling (NAD), Panohan, Lodan (Jateng), Kedungbrubus, Nipah (Jatim), Telaga Tunjung (Bali), Ponre-Ponre (Sulsel), Bilal, Binalatung (Kalimantan) [the construction has been done], and Gonggang (Jatim), Benel (Bali) (The construction process will be finished in 2009).
- The observation activity of dams keeps the 119 dams/water reservoir working well.
- The early flood warning system has been installed in 10 river basins (WS) areas. Those are: WS Jeneberang, WS Bengawan Solo, WS Jratun Seluna, WS Cimanuk, WS Citanduy, WS Progo-Opak-Serang, WS Mahakam, WS Brantas, WS Citarum, WS Sesayap.
- The handling of the flood control infrastructure supply at the length of 1,000 km causes the reduction of potential flood hazard areas.
- Riverways and flood control infrastructure at the length of 225 km are well-maintained.
- Supervision and the improvement of community involvement regarding the management of water resources infrastructure (P3A, GNKPA, community empowerment around the dam, etc).
- The completion of some sub regulations of UU No. 7/2004. Those are: PP No. 20/2006 (Irrigation); Government Regulations (PP) 42/2008 (Water Resources management); Presidential Regulation (Perpres) 12/2008 (Dewan SDA).

Source: Concept of National Strategic Development Plan of Water Resources 2010-2014 (Konsep RENCANA STRATEGIS, BIDANG SUMBER DAYA AIR 2010-2014)

2) Current Situation and Issues of Integrated Water Resources Management

(1) Current Situation

A. Current Status of Draft Version of National Medium-Term Development Plan (RPJM) 2010 – 2014

The National Medium-term Development Plan (RPJM) for 2010-2014 in the field of water resources is under preparation to be finalized by January 2010 by BAPPENAS and DPU. The contents of draft RPJM are shown in Table 2.1.5.6.

Table 2.1.5.6 Contents of Draft Version of RPJM (2010 - 2014) in Water Resources

I. **GENERAL CONDITIONS**	Achievements (See Table 2.1.5.4) • National Food Security • Raw Water Provision • Flood Control and Coastal Protection • Sustainable Water and Water availability
II. **PROBLEMS IN WATER RESOURCES**	• Decreasing function and sustainability of water resources capacity • Reducing of water supply provision • Non delivery of optimum irrigation services • Increasing potential water conflict • Increasing threat of flood and drought due to unbalance between water availability and water requirement • Coastal abrasion • Poor coordination and optimum function of institutional management of water resources
III. **GOAL IN WATER RESOURCES DEVELOPMENT**	• To increase the capacity of water storage supported by the sustainable watershed area • To optimize water allocation with the fulfillment of basic needs of society and productive activities fairly and develop the utilization of water effectively and efficiently. • To optimize the prevention efforts to water power, reduce the impact of the disaster due to water power and restore the environment and infrastructure systems of water resources post-disaster. • To increase the capacity of institutions in managing water resources and the empowerment of stakeholder to improve the performance management of water resources. • To increase the availability and transparency of data and information of water resources
IV. **POLICY DIRECTION IN WATER RESOURCES DEVELOPMENT**	• Improvement and sustainability of the function of water resources to ensure water availability • Utilization of water in a sustainable manner and increasing raw water requirement • Utilization of water resources to ensure raw water requirement for household, municipality and industry • Control and reduction of the impact of damage due to water power • Increasing the performance of water resources management through the establishment of institutions related to the management of water resources and human resources capacity • Increasing the provision and accessibility of data and information of water resources

Source: Draft Version of the National Mid-term Development Plan (RPJM) for the years of 2010- 2014

RPJM is the national medium-term development plan covering a period of 5 years, while RENSTRA is a 5-year national strategic development plan for relevant agencies. RENSTRA for water resources sector is supposed to be prepared by DJSDA-DPU. RENSTRA for water resources sector is closely related with not only RPJM but also the long term vision of DPU and Water Resources Law (No.7/2004). The relation among RENSTRA, vision of DPU and the law is indicated in Figure 2.1.5.3. The proposed program for 2010 to 2014 is shown in Table 2.1.5.7.

Source: Concept of National Strategic Development Plan of Water Resources 2010-2014 (Konsep RENCANA STRATEGIS, BIDANG SUMBER DAYA AIR 2010-2014)

Figure 2.1.5.3 The Relation among RENSTRA, Vision of DPU and Water Resources Law

Table 2.1.5.7 Proposed Program for 2010 to 2014 (2010 - 2014) in Water Resources

Program	Purpose
Water Resources Conservation	To maintain and improve the continuous function and the existence of water sources and water resources infrastructure
Water Resources Empowerment	To utilize water resources continuously and improve the fulfillment of the raw water.
Water Destructive Power Management	To reduce risk, area coverage and flood period as well as reduce coastal abrasion disaster
Role improvement and empowerment of water resources stakeholders	To increase the involvement of stakeholders and the capacity of Water Resources Institutions in Water Resources Management
Water Resources Information System Management	To increase the accessibility of the Water Resources Information System to enable the fulfillment of water resources information in a timely and accurate manner.

Source: Concept of National Strategic Development Plan of Water Resources 2010-2014 (Konsep RENCANA STRATEGIS, BIDANG SUMBER DAYA AIR 2010-2014)

B. Establishment of River Basin Organization and Water Resources Management Council

It can be pointed out that the establishment of "River Basin Organization (RBO)" and "Water Resources Management Council" have been the main movements in the field of integrated water resources management after the enforcement of Water Resources Law (No.7/2004). It is based on the concept that the operation of integrated water resources management has to be changed from project-oriented basis into organization-oriented basis. The Ministerial Regulation No.11A/PRT/M/2006 concerning "Criteria and Decision of River Basin Area" stipulates the river basin areas in which RBOs are supposed to manage integrated water resources. According to the regulation, the total of 133 river basin groups can be classified into the following based on the criteria in the regulation:

- Code "A1": Cross-Countries Basin Group (5 groups),
- Code "A2": Cross-Provinces Basin Group (27 groups),
- Code "A3": for National Strategic Basin Group (37 groups),
- Code "B": for Cross-Districts Basin Group (51 groups), and
- Code "C": for Basin Group in district (13 groups).

The 69 river basin groups, which are classified as "A1", "A2" and "A3", are directly controlled and managed by 31UPTs (Technical Implementation Unit) established by DPU. The UPTs have been established consisting of 11 offices of Balai Besar Wilayah Sungai (BBWS) and 19 offices of Balai Wilayah Sungai (BWS) all over the country. Table 2.1.5.8 shows the list of 69 river basin groups with Balai Besar Wilayah Sungai (BBWS) offices or Balai Wilayah Sungai (BWS).

As for establishment of "Water Resources Management Council", the first meeting was held in July 2009. The system of "Water Resources Management Council" in Indonesia corresponds to that of "River Council" in Japan which was established in 1964. The membership of "Water Resources Management Council" consists of 20 to 30 councilors including the relevant Ministers from academic, public and private sectors. The council is expected to discuss national water resources policy such as designation of river area, establishment of provincial councils, councils for river area, etc.

Table 2.1.5.8 List of 69 River Basin Groups with Balai Besar Wilayah Sungai (BBWS) or Balai Wilayah Sungai (BWS)

No.	Name list of BBWS/BWS offices which plan policy for Integrated Water Resources Management		Name of River Area	Code
1	BWS SUMATERA I	1	Meureudu - Baro	A3-1
		2	Jambo - Aye	A3-2
		3	Woyla - Seunagan	A3-3
		4	Tripa - Bateue	A3-4
		5	Alas - Singkil	A2-1
2	BWS SUMATERA II	6	Belawan - Ular - Padang	A3-5
		7	Batang Angkola - Batang Gadis	A3-7
		8	Batang Natal - Batang Batahan	A2-2
		9	Toba-Asahan	A3-6
3	BWS SUMATERA III	10	Indragiri	A2-5
		11	Kampar	A2-4
		12	Rokan	A2-3
		13	Siak	A3-8
		14	Reteh	A3-9
4	BWS SUMATERA IV	15	P. Batam	A3-10
			P. Bintan	
5	BWS SUMATERA V	16	Anai - Kuranji - Arau - Mangau - Antokan	A3-11
6	BWS SUMATERA VI	17	Batanghari	A2-6
7	BWS SUMATERA VII	18	Air Majunto - Sebelat	A2-9
		19	Nasal - Padang Guci	A2-10
8	BBWS SUMATERA VIII	20	Sugihan	A3-12
		21	Musi	A2-7
		22	Banyuasin	A3-13
9	BBWS MESUJI-SEKAMPUNG	23	Mesuji Tulang Bawang	A2-8
		24	Way Seputih - Way Sekampung	A3-14
10	BBWS CIDANAU-CIUJUNG-CIDURIAN	25	Cidanau - Ciujung - Cidurian	A2-12
11	BBWS CILIWUNG-CISADANE		Ciliwung - Cisadane	
		26	Kep. Seribu	A2-11
12	BBWS CITARUM		Citarum	
13	BBWS CIMANUK-CISANGGARUNG	27	Cimanuk Cisanggarung	A2-14
14	BBWS CITANDUY	28	Citanduy	A2-13
15	BBWS PEMALI - JUANA	29	Pemali Comal	A3-15
		30	Jratunseluna	A3-16
16	BBWS BENGAWAN SOLO	31	WS. Bengawan Solo	A2-16
17	BBWS SERAYU-OPAK	32	Serayu Bogowonto	A3-17
		33	Progo - Opak - Serang	A2-15
18	BBWS BRANTAS	34	Brantas	A3-18
19	BWS KALIMANTAN I	35	Kapuas	A3-22
		36	Pawan	A3-23
		37	Jelai Kendawangan	A2-17
20	BWS KALIMANTAN II	38	Kahayan	A3-25
		39	Seruyan	A3-24
		40	Barito - Kapuas	A2-18
21	BWS KALIMANTAN III	41	Mahakam	A3-26
		42	Sesayap	A1-3
22	BWS SULAWESI I	43	Sangihe Talaud	A3-27
		44	Tondano Likupang	A3-28
		45	Dumoga Sangkup	A2-19
23	BWS SULAWESI II	46	Limboto Bolango Bone	A2-20
		47	Paguyaman	A3-29
		48	Randangan	A2-21
24	BWS SULAWESI III	49	Palu Lariang	A2-22
		50	Laa Tambalako	A3-31
		51	Parigi Poso	A3-30
		52	Kaluku Karama	A2-23
25	BWS SULAWESI IV (Sultra)	53	Lasolo - Sampara	A2-26
26	BWS POMPENGAN-JENEBERANG	54	Pompengan - Larona	A2-24
		55	Saddang	A2-25
		56	Walanae Cenranae	A3-32
		57	Jeneberang	A3-33
27	BWS MALUKU	58	Buru	A3-34
		59	Ambon - Seram	A3-35
		60	Kep. Kei Aru	A3-36
		61	Kep. Yamdena - Wetar	A3-37
28	BWS BALI-PENIDA	62	Bali-Penida	A3-19
29	BWS NUSA TENGGARA I	63	P. Lombok	A3-20
30	BWS NUSA TENGGARA II	64	Aesesa	A3-21
		65	Benanain	A1-1
		66	Noelmina	A1-2
31	BWS PAPUA	67	Mamberamo Tami Apauvur	A1-4
		68	Einlanden - Digul - Bikuma	A1-5
		69	Omba	A2-27

Source: Directorate General of Water Resources, Ministry of Public Works (DJSDA-DPU)

C. Formulation of Policy and Plan for Integrated Water Resources Management by RBO

The 69 RBOs under the supervision of DPU are supposed to formulate a policy on Water Resources Management. Based on the policy, the RBOs are to formulate Master Plan. Each RBO has finished the formulation of the policy and submitted it to DPU for approval. Out of 69 policies submitted from the RBOs, 10 policies will be approved by DPU within this year (refer to Table 2.1.5.9).

Table 2.1.5.9 List of RBOs whose Policy for WRM will be Approved

- Cimanuk Cisanggarung (A2-14)
- Citanduy (A2-13)
- Pemali Comal (A3-15)
- Jratunseluna (A3-16)
- Bengawan Solo (A2-16)
- Progo - Opak – Serang (A2-15)
- Brantas (A3-18)
- Laa Tambalako (A3-31)
- Parigi Poso (A3-30)
- Bali-Penida (A3-19)

Source: Directorate General of Water Resources, Ministry of Public Works (DJSDA-DPU)

D. Problems Clarified through Interview Survey, Questionnaire Survey and Review of the Relevant Documents

The problems in the field of integrated water resources management in Indonesia were clarified through an interview survey, a questionnaire survey and the review of relevant documents. The survey were conducted for various relevant organizations and individuals such as BAPPENAS, DPU, JICA Long Term Experts, etc. Refer to APPENDIX for meeting memo and survey sheets. The BAPPENAS officials mainly pointed out the issues in terms of IWRM such as 1) Necessity of RBO capacity strengthening, 2) Insufficient coordination among relevant organizations, 3) Necessity of flood control project in Citarum river basin in relation to IWRM including DKI Jakarta, 4) Necessity of development of water resources for DKI Jakarta, etc. The officials of DPU emphasized the issues such as 1) Insufficient coordination among relevant organizations, 2) Climate Change Adaptation, etc. The JICA Long Term Experts mentioned the issues such as 1) Water-related problems in or around DKI Jakarta, 2) Necessity of RBO capacity development on a nationwide scale. The problems, which were clarified through the survey, can be classified into twofold. Since River Basin Organization (RBO) has been newly established, a numbers of

problems were pointed out related to RBO. It was also pointed out that DKI Jakarta has been suffered from a number of water-related disasters, especially flood disaster. It is indispensable to focus on coping with flood disaster in DKI Jakarta, which is the capital city of Indonesia and population and property are very densely concentrated compared to the other areas. It is also important to support the regions in which population and property are concentrated in high risk flood area. In addition, as indicated in Section 2.1.1, the frequency of flood disaster tends to increase over time, which may be caused by growing human activities in urbanized area with insufficient structural and non-structural measures. Countermeasures against flood disaster in a comprehensive and practical manner are indispensable. The main points are described below.

a) Problems related to River Basin Organization for Water Resources Management

- Formulation of Policy and Master Plan of Integrated Water Resources Management at RBO level is still in progress
- Insufficient Institutional Management of Water Resources
- Insufficient Coordination among Relevant Organizations
- Poor Information/Data Sharing among Relevant Organizations
- Rapid Increase of Water Demand
- Insufficient Structural and Non-Structural Measures
- Need for Climate Change Adaptation

b) Problems in terms of Integrated Water Resources Management for DKI Jakarta

- Land Subsidence due to Overuse of Ground Water Causing Serious Inundation Problem
- Insufficient Coordination among Relevant Organizations
- Insufficient Institutional Management of Water Resources
- Poor Information/Data Sharing among Relevant Organizations
- Rapid Change of Land Use due to Population Increase
- Increasing Flood Peak Discharge due to Urbanization
- Rapid Increase of Water Demand
- Insufficient Structural and Non-Structural Measures
- Poor Conveyance of Drainage Channel due to Clogged Garbage or Sedimentation
- Need for Climate Change Adaptation

(2) Issues/Actions to be Taken

Based on the past achievements and existing condition in Indonesia regarding integrated water resources management, plenty of activities were carried out.

Hereunder are the actions to be taken (or issues) corresponding to the problems stated above.

A. Actions to be Taken for RBO Capacity Strengthening and Implementation of Structural and Non-Structural Measures

a) Capacity Strengthening of RBO

- Training of engineers
- Assistance for formulation of policy and master plan of integrated water resources management (River improvement, Water use, Water quality, Sedimentation, etc.)
- Strengthening of coordination among relevant stakeholders
- Increase of budget for RBOs
- Strengthening of early warning system and coordination with BPBD for emergency response

b) Establishment and Operation of Information Sharing System

- Facilitation of sharing of measurement data (rainfall, discharge, water level, tide level, etc.)
- Establishment and operation of database of water-related disaster
- Establishment and operation of information sharing system among stakeholders

c) Facilitation of Infrastructure

- Implementation of prioritized construction of infrastructural facilities (River improvement, Water use, Water quality, Sedimentation, etc.) based on policy and master plan of integrated water resources management
- Improvement/Rehabilitation of existing facilities

d) Development or Strengthening of Early Warning System for Emergency Response

- Development or strengthening of early warning system for emergency response
- Increasing the number of measurement stations (rainfall, discharge, water level, tide level, etc.)
- Strengthening of Community-Based Disaster Risk Reduction

e) Climate Change Adaptation

- Assessment of rainfall, discharge, water level, tidal level, etc. based on future scenarios due to climate change
- Analysis on impact of climate change on disaster measures
- Revision of water resources management plan for the necessary implementation of measures

B. Actions to be Taken for Integrated Water Resources Management for DKI Jakarta

a) Strengthening of Regulations of Ground Water Use

- Survey the details of ground water use and land subsidence
- Strengthening of regulations of ground water use
- Monitoring of ground water use and land subsidence

b) Implementation of Comprehensive Management Plan for River Basins related to DKI Jakarta

- Review of the existing plan and identifying all of the problems for river basins related to DKI Jakarta
- Strengthening of coordination activity among relevant stakeholders
- Implementation of comprehensive flood control in DKI Jakarta
- Effective utilization of reservoirs for multi-purpose water resources management
- Strengthening of early warning system and coordination with BNPB & BPBD for emergency response in case of catastrophic disaster

c) Strengthening of Conveyance of Channel or River Network

- Strengthening of conveyance of channel or river network (Improvement, Dredging, *etc*.)
- Rehabilitation of degraded flood control facility
- Rehabilitation of degraded small-sized ponds and maintenance

d) Strengthening of Early Warning System for Emergency Response

- Development or strengthening of early warning system for emergency response
- Increasing the number of measurement stations (rainfall, discharge, water level, tide level, etc.)

e) Strengthening of Activities at Community Level

- Strengthening of Community-Based Disaster Risk Reduction
- Reduction of sediment discharge from upstream area based on forest conservation activities at community level

f) Climate Change Adaptation

- Assessment of rainfall, discharge, water level, tidal level, etc. based on future scenarios due to climate change
- Analysis on impact of climate change on disaster measures
- Revision of water resources management plan for the necessary implementation of measures

2.1.6 Meteorological/Seismic Observation and Data Analysis

1) Review of the Past Achievements by the Government of Indonesia in Meteorological/Seismic Observation and Data Analysis

As a national meteorological, hydrological and geophysical agency, and one of disaster management sectors of government, BMKG is setting targets on establishment of the meteorological, climatological and geophysical (earthquake and tsunami) early warning system. BMKG has a definite goal and it is trying to enhance the facilities and human resource.

The current conditions of data processing flow and data dissemination flow in each department of BMKG are shown in the figure 2.1.6.1 and 2.1.6.2.

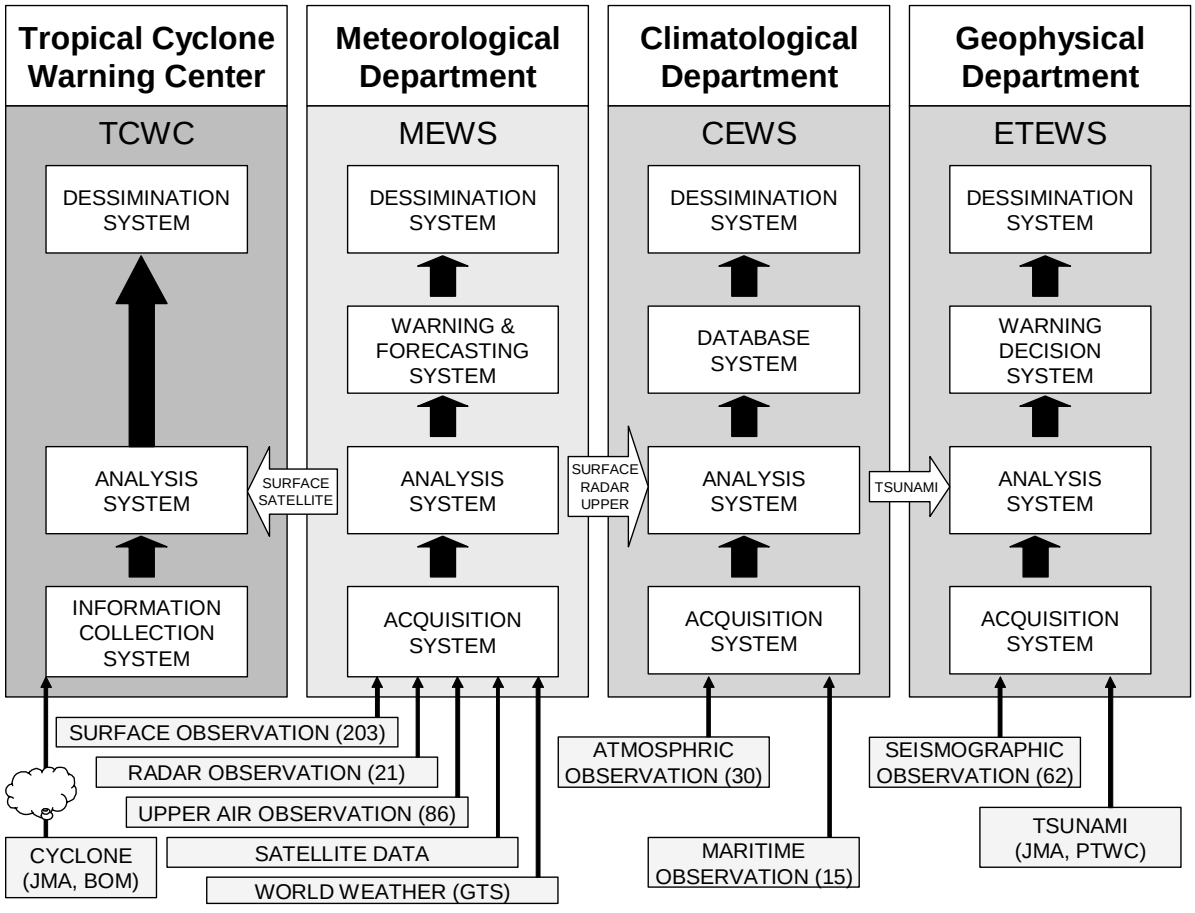


Figure 2.1.6.1 Data Processing Flow in BMKG

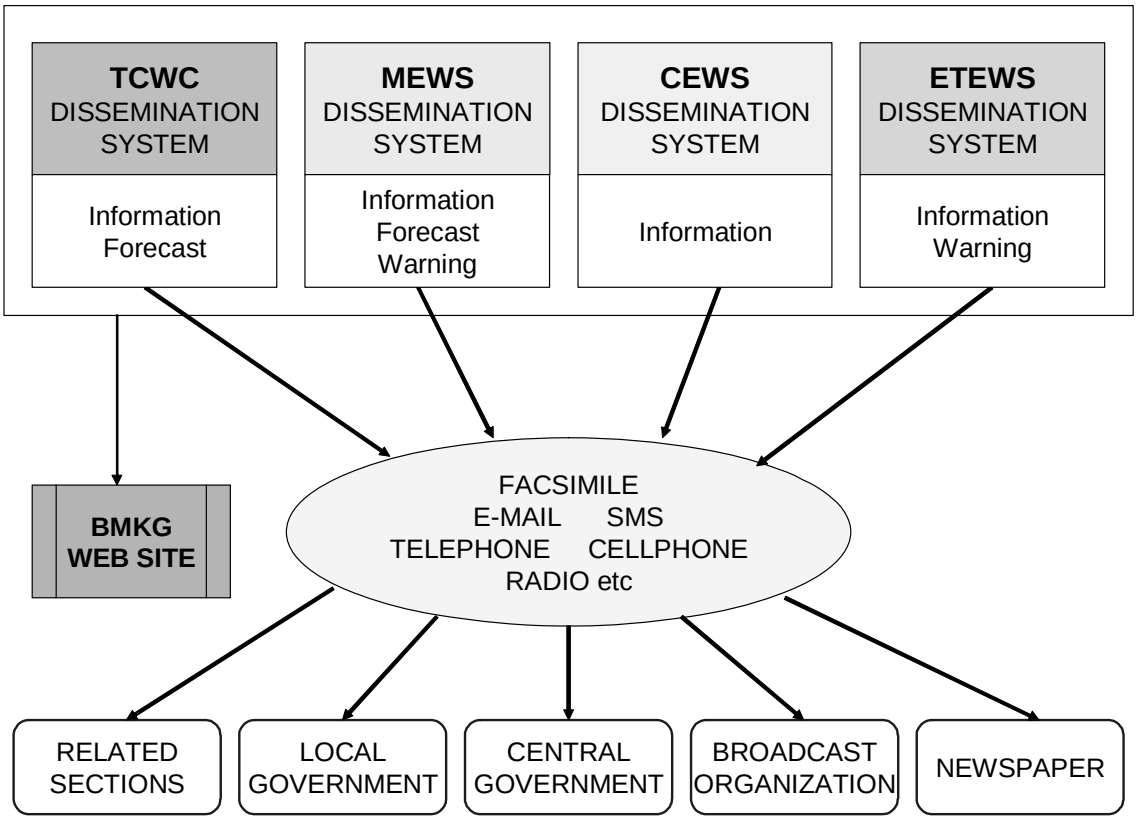


Figure 2.1.6.2 Data Dissemination Flow in BMKG

(1) Meteorological Early Warning System (MEWS)

The Meteorological Early Warning System targets the early warning system for general meteorology, or weather warnings for the general public. It consists of Observation system, Acquisition system, Analysis system, Weather forecasting system, Warning decision system and Dissemination system.

A. Meteorological Observation System

a) Surface Weather Observation

BMKG has 173 weather stations in the country, but the number of Automated Weather Stations (AWS) is only 73, and BMKG has 20 automated rain stations and 10 airport automated stations. The number of automated weather stations is 103. However, the automated weather stations are concentrated around Java Island, especially around Jakarta. The number of observatories is not enough to monitor the meteorological condition in the whole country. It is desirable to install

additional weather stations and to automate them much more for the meteorological disaster prevention.

As for the weather observation system, the number of the weather observatories is very few as against the wide area of the country. If BMKG wants to observe the meteorological condition, mainly rainfall, with the same intensity as in Japan, it is needed to install approximately 6,400 stations. In Japan, the Japan Meteorological Agency (JMA) operates Automated Meteorological Data Acquisition System (AMeDAS); the covered area per AMeDAS station is 17 km2. If BMKG wants to cover an area of 30 km2 per station, it is needed to install approximately 2,000 stations. Anyway, it is needed to install observation stations and improve the Automated Weather Stations.

b) Radar Observation

BMKG has 21 radar sites in the country. Seven radars are conventional type and the other 14 radars are Doppler type. But one conventional and four Doppler type radars have broken down and are out of service.

B. Acquisition System

a) Surface Weather Observation

Automated observation data is transmitted to the Central Operation System at BMKG headquarters through the VSAT system, LAN and SMS and displayed on the large monitor in the forecasting room in BMKG.

b) Radar Observation

The radar observation data is transmitted to the observation division in BMKG through VSAT and VPN system and displayed on the monitor in the forecasting room.

With regards to satellite observation, BMKG has its own satellite data receiving system in headquarters. The data received is transmitted to the tropical cyclone warning center for tropical cyclone monitoring. The data is displayed on the monitor directly.

C. Analysis System

a) Surface Weather Observation

Acquired data is displayed on the large monitor after it has been quality-controlled. It is utilized for monitoring of actual conditions.

b) Radar Observation

Acquired data is displayed on the monitor individually. In Japan, JMA operates 20 radar sites and makes a composite image with all radar data and analyzed precipitation data. But in Indonesia, all

radars are operated individually and BMKG does not make a composite image nor has it analyzed precipitation data yet.

An effective utilization of radar data is extremely important to the disaster prevention. As mentioned above, JMA has already used the precipitation analysis method all over the country. Generally, weather radars can observe the intensity of rainfall extensively, but cannot measure the amount of rainfall quantitatively. So, by calibrating the intensity data of rainfall with the observation rainfall data at AMeDAS stations, the amount of rainfall can be estimated extensively. It is necessary to utilize the precipitation analysis method in Indonesia.

c) Satellite Observation

Some personnel in BMKG who took a JICA meteorological training course in Japan can operate the satellite image data utility software named SATAID (Satellite Animation and Interactive Diagnosis: Satellite viewer program developed by JMA). However, the data used for SATAID does not come from BMKG's own satellite data receiving system but rather from the satellite images of MTSAT, which are taken from the databases of Japan Meteorological Agency (JMA) and Bureau of Meteorology in Australia (BOM) through the Internet.

D. Weather Forecasting System

a) Numeric Weather Prediction (NWP) System

BMKG does not operate its own NWP system. BMKG obtains the results of Global Scale Model (GSM) data from JMA, Météo France and BOM. Meteorologists use the best result as the occasion warrants.

The satellite data and Numerical Weather Prediction model result are indispensable to issue a more accurate weather forecast. BMKG receives MTSAT (Japanese satellite) data directly and operates SATAID. SATAID is a very useful viewer program to display satellite images, result of NWP, observation data and radar data. But BMKG does not have NWP data and observation data for SATAID, so BMKG does not bring out the best potential of SATAID.

b) Radar Observation

Radar data is very useful for weather forecasting. JMA makes not only composite images but also does precipitation data analysis and precipitation short-term forecast. But BMKG does not do precipitation data analysis and precipitation short term forecast yet.

c) Weather Chart

BMKG meteorologists prepare some weather charts of surface level and several upper levels using synop data through GTS.

E. Warning Decision System

BMKG does not have an automated warning decision system. A meteorologist's duty is to analyze meteorological data such, as those mentioned above, and make a weather forecast and issue warnings. At this moment BMKG does not have warning criteria segmentalized spatially and temporarily.

Because the improvement of the automated observation system is not enough, the skill of meteorological warning issue is not developed yet. The criteria of meteorological warning will be fractionated temporarily and spatially according to the development of meteorological observation method.

F. Dissemination System

Weather information such as observation data, weather forecast and warning is disseminated to central government, local government, broadcasting organizations and related sections using facsimile, e-mail, SMS, fixed land telephone, cell phone, radio transmission and website because a dissemination procedure of meteorological warning and information between BMKG and organizations concerned, and a communication network is not improved enough.

(2) Climatological Early Warning System (CEWS)

The Climatological Early Warning System is now developed and still there is no concrete system in place because the Climatological Department was only established last year. CEWS will consist of Observation system, Acquisition system, Analysis system, Warning decision system and Dissemination system. At present, this department is also in charge of atmospheric observation (air quality monitoring) and maritime observation (ocean weather monitoring),

A. Observation System

a) Atmospheric Observation

BMKG has about 30 air quality monitoring stations in the country. The observation data is transmitted to the headquarters of BMKG automatically and displayed on the monitor in the central operation room.

b) Maritime Observation

BKMG divides the country into 5 areas and has 5 marine meteorological centers and 10 marine stations. BMKG observes maritime meteorological conditions, such as wind direction and speed, temperature, pressure and rainfall, and oceanographic conditions, such as tidal level and wave height and period. Meteorological conditions are observed with conventional manual instruments tidal level is measured with tidal gauge manually and wave height and period are observed by eye.

B. Historical Database

The historical meteorological data has been stored for more than 100 years from colonial period. BMKG has already input almost 40 years of data into the database, starting from the most recent and then working backward. But the analysis of historical data is not done yet. Therefore, BMKG does not evaluate the climate change characteristics in Indonesia.

From the viewpoint of the climate change countermeasure, it is very important to define an annual pace of temperature rising and sea water level rising. Especially the change of rainfall pattern and rising of temperature, BMKG should announce the information to the public, but at this moment, BMKG has not announced this basic information yet. This is a very sensitive issue and BMKG has not finished the preparation of data quality control.

(3) Earthquake and Tsunami Early Warning System (ETEWS)

The Earthquake and Tsunami Early Warning System consists of the Earthquake Information System (EIS) and the Tsunami Early Warning System (TEWS), and operations under the National Earthquake Information and Tsunami Early Warning Center (NEITEWC) in BMKG. EIS consists of Observation system, Acquisition system, Analysis system, Warning decision system and Dissemination system. TEWS is connected closely to EIS and provides earthquake information by EIS; it consists of Acquisition system, Analysis system, Warning decision system and Dissemination system. ETEWS has been carried out as the Indonesian Tsunami Early Warning System (InaTEWS) project in NEITEWC in BMKG with the cooperation of Germany, Japan and other countries. There are some standing problems, but this project has been executed step by step.

A. Observation System

a) Seismographic Observation

BMKG has 44 seismographic stations and acquires the seismographic data with 20 collaboration station data. Furthermore, 160 broadband seismometers and 500 accelerometers are planned to be installed in the InaTEWS project. Actually, some of them are already installed and connected to the NEITEWS.

b) Tsunami Observation

As mentioned above, BMKG has almost 10 tidal stations, but they are not automated yet. So they are not suited for TEWS. Eighty (80) tidal gauges will be installed in InaTEWS project in the near future, but they will be operated by BAKOSURTANAL. But then, when a tsunami tidal wave is observed, the tsunami has already reached the coast. So it is said they do not make sense for TEWS. but tsunami observation data is useful for verification of TEWS.

B. Acquisition System

a) Seismographic Observation

BMKG has already acquired the seismographic data of 44 stations to EIS in NEITEWC with 20 collaboration station data. They are transmitted through VSAT, MPLS (Multi Protocol Label Switching) and the Internet.

b) Tsunami Observation

BMKG does not have a tidal data online acquisition system.

C. Analysis System

a) Seismographic Observation

The acquired data is processed and immediately the earthquake information is analyzed, such as epicenter position and depth, occurring time and magnitude. The data is displayed on the large monitor in the NEITEWC. In this sense, EIS works well. But the earthquake information decision procedure is JMA method, so it is not suited to Indonesian land condition. Concretely JMA method sometimes overestimates the magnitude for a small scale earthquake. It is not a fatal error but it will be improved. BMKG is trying to develop its own method, but it has not finished yet.

b) Tsunami Observation

The probability of tsunami is decided by the earthquake information in the TEWS. As mentioned above, the earthquake information decision procedure is not completed yet and the Decision Support System (DSS) of tsunami is not also completed. Tsunami early warning is not issued yet.

D. Warning Decision System

a) Seismographic Observation

As the earthquake information decision procedure is not completed yet, the warning decision system does not work well. At this moment it is possible to issue the earthquake information based on the current system.

b) Tsunami Observation

As DSS of tsunami is not completed yet, the tsunami information, such as expected tsunami height and arrival time, is not issued yet. But it is possible to issue the probability of tsunami decided by the current earthquake information.

E. Dissemination System

Earthquake information is disseminated to central government, local government, broadcasting organizations and related sections using facsimile, e-mail, SMS, fixed land telephone, cell phone, radio transmission and website because a dissemination procedure of meteorological warning and

information between BMKG and organizations concerned, and a communication network is not improved enough.

(4) Tropical Cyclone Warning Center (TCWC)

The Tropical Cyclone Warning Center targets the early warning system for tropical cyclones. It is the only forecasting center for tropical cyclone in Indonesia and in charge of area 90 minus 125 degrees East and Equator minus 10 degrees South, as mandated by the World Meteorological Organization. It consists of Information collection system and Dissemination system. As for the tropical cyclone, BMKG has already established TCWC in BMKG and announces the tropical cyclone information.

A. Information collection System

The movement of tropical cyclones is monitored by satellite images of MTSAT.

The satellite images are received in BMKG. BMKG obtains the typhoon information, such as center position of typhoon, moving direction and speed and future position announced by JMA and the tropical cyclone information announced BOM through the Internet.

B. Dissemination System

Tropical cyclone information, such as center position of typhoon, moving direction and speed and future position are disseminated to organizations concerned using facsimile, e-mail, SMS, fixed land telephone, cell phone, radio transmission and website.

2) Current Situation and Critical Issues of Meteorological/Seismic Observation and Data Analysis

(1) Overall Picture of Early Warning System

It is important to take a look at the overall picture of the early warning systems before considering the critical issue. The tables below show the contents of early warning system (Meteorological, Climatological and Earthquake and Tsunami).

As can be easily understood from the tables, all systems are working automatically and man should be the final decision maker.

As for the Earthquake and Tsunami early warning system, almost all of EWS establishment is in execution under InaTEWS project.

Table 2.1.6.1 (1) Overall Picture of MEWS in BMKG

	Meteorological Early Warning System (MEWS)			
	Public Weather	Tropical Cyclone Warning Center	Atmospheric Environment	Oceanographic Weather
Observation System	Surface Upper air Radar Satellite (MTSAT)	Satellite (MTSAT)	Air quality	Maritime weather Oceanographic items
Acquisition System	Automated system	Receiver/ Internet	Automated system	Automated system
Analysis System	Automated QC Radar analysis SATAID	Tropical cyclone specification	Automated QC	Automated QC
Forecasting System	NWP system Radar analysis	Future position Future potential	NWP system for air pollution	NWP system for oceanographic items
Warning Decision System	Warning criteria Automated decision Manual check	Manual check	Warning criteria Automated decision Manual check	Warning criteria Automated decision Manual check
Dissemination System	Integrated dissemination system of information and warning			

Table 2.1.6.1 (2) Overall Picture of CEWS in BMKG

	Climatological Early Warning System (CEWS)		
	Public Weather	Atmospheric Environment	Oceanographic Weather
Observation System	Same as MEWS	Same as MEWS	Same as MEWS
Acquisition System	Same as MEWS	Same as MEWS	Same as MEWS
Analysis System	Variety analysis	Variety analysis	Variety analysis
Forecasting System	Climate model	Climate model	Climate model
Warning Decision System	Warning criteria Variety monitoring Manual check	Warning criteria Variety monitoring Manual check	Warning criteria Variety monitoring Manual check
Dissemination System	Integrated dissemination system of information and warning		

Table 2.1.6.1(3) Overall Picture of ETEWS in BMKG

	Earthquake and Tsunami Early Warning System (ETEWS)	
	Seismology (Earthquake Information System)	Tsunami (Tsunami Early Warning System)
Observation System	Seismograph (In execution under InaTEWS project)	Tidal level (In execution under InaTEWS project)
Acquisition System	Automated system (In execution under InaTEWS project)	Automated system (In execution under InaTEWS project)
Analysis System	Earthquake specification (In execution under InaTEWS project)	Unusual variance analysis (In execution under InaTEWS project)
Forecasting System	-- Difficult to predict --	Tsunami determination system Tsunami estimation system (In execution under InaTEWS project)
Warning Decision System	Warning criteria Manual check (In execution under InaTEWS project)	Warning criteria Manual check (In execution under InaTEWS project)
Dissemination System	Integrated dissemination system of information and warning (In execution under InaTEWS project)	

(2) Evaluation of Current Situation

The evaluation of current situation yielded critical issues existing within the current systems in BMKG. The result of evaluation is shown in the following tables.

Table 2.1.6.2 (1) Evaluation of Current Situation of MEWS

Type	Category	Item	Evaluation of current situation
MEWS	Public Weather	Observation System	- Insufficient number of observation stations as against the area to be covered - Insufficient number of automated observation stations - Basic understanding of the observation data quality through the increasing number of station and improvement of data quantity is not discussed and shared sufficiently
		Acquisition System	- Stable and large volumetric line is needed - Replacement of existing satellite data receiving system
		Analysis System	- Automatic QC system is needed - Introduction of radar image composition skill - Radar AWS analyzed precipitation skill - Improvement of SATAID operation skill
		Forecasting System	- Precipitation now-cast using radar data - Introduction of guidance skill of NWP - Introduction of NWP Meso Scale Model
		Warning Decision	- Establishment of segmentalized warning criteria

		System	- Automatic decision system of unusual condition
		Dissemination System	- Development of disaster information products - Integrated dissemination system - Discussion for communication of disaster information among the organizations concerned
	Tropical Cyclone Warning Center	Observation System	- (MTSAT Japan)
		Acquisition System	- Replacement of existing satellite data receiving system
		Analysis System	- Tropical cyclone specification analysis method
		Forecasting System	- It is enough to obtain the information from JMA and BOM through the Internet - Numerical prediction Model in far future
		Warning Decision System	- Nothing special
		Dissemination System	- Same as “Public Weather”
	Atmospheric Environment	Observation System	- Insufficient number of observation stations as against the area to be covered - Insufficient number of automated observation stations - Basic understanding of the observation data quality through the increasing number of station and improvement of data quantity is not discussed and shared sufficiently
		Acquisition System	- Stable and large volumetric line is needed
		Analysis System	- Automatic QC system is needed
		Forecasting System	- Introduction of NWP Meso Scale Model
		Warning Decision System	- Establishment of segmentalized warning criteria - Automatic decision system of unusual condition
		Dissemination System	- Same as “Public Weather”
	Oceanographic Weather	Observation System	- Insufficient number of observation stations as against the to be covered - Lack of automated observation stations - Basic understanding of the observation data quality through the increasing number of station and improvement of data quantity is not discussed and shared sufficiently
		Acquisition System	- Stable and large volumetric line is needed
		Analysis System	- Automatic QC system is needed
		Forecasting System	- Numeric Model named WAVE05 is operated now
		Warning Decision System	- Establishment of segmentalized warning criteria - Automatic decision system of unusual condition
		Dissemination System	- Same as “Public Weather”

Table 2.1.6.2(2) Evaluation of Current Situation of CEWS

Type	Category	Item	Evaluation of current situation
CEWS	Public Weather	Observation System	- Same as MEWS
		Acquisition System	- Same as MEWS
		Analysis System	- Same as MEWS - Improvement of statistical analysis skill - Introduction of variety of analysis methods
		Forecasting System	- Introduction of statistical prediction method - Introduction of Climate Change Model
		Warning Decision System	- Establishment of segmentalized warning criteria - Variety of monitoring systems - Automatic decision system of unusual condition

		Dissemination System	- Same as MEWS
	Atmospheric Environment	Observation System	- Same as MEWS
		Acquisition System	- Same as MEWS
		Analysis System	- Same as “Public Weather”
		Forecasting System	- Same as “Public Weather”
		Warning Decision System	- Same as “Public Weather”
		Dissemination System	- Same as “Public Weather”
	Oceanographic Weather	Observation System	- Same as MEWS
		Acquisition System	- Same as MEWS
		Analysis System	- Same as “Public Weather”
		Forecasting System	- Same as “Public Weather”
		Warning Decision System	- Same as “Public Weather”
		Dissemination System	- Same as “Public Weather”

Table 2.1.6.2(3) Evaluation of Current Situation of ETEWS

Type	Category	Item	Evaluation of current situation
ETEWS	Earthquake Information System	Observation System	- Implementation of existing InaTEWS project
		Acquisition System	- Implementation of existing InaTEWS project
		Analysis System	- Implementation of existing InaTEWS project
		Forecasting System	- Difficult to predict
		Warning Decision System	- Implementation of existing InaTEWS project
		Dissemination System	- Implementation of existing InaTEWS project - Development of disaster information products - Integrated dissemination system - Discussion for communization of disaster information among the organizations concerned
	Tsunami Early Warning System	Observation System	- Implementation of existing InaTEWS project
		Acquisition System	- Implementation of existing InaTEWS project
		Analysis System	- Implementation of existing InaTEWS project
		Forecasting System	- Implementation of existing InaTEWS project
		Warning Decision System	- Implementation of existing InaTEWS project
		Dissemination System	- Same as “Earthquake Information System”

(3) Issues/ Necessary Actions

Based on the above evaluation, there are many issues/necessary actions regarding meteorological/ seismic observation and data analysis field.

Issues/necessary actions regarding MEWS are listed from A. to E. as follows:

A. Improvement of Observation System

This subject includes an observation system in the station, data acquisition system and data processing system in the Central Operation System. It is concerned with meteorological observation, maritime observation and seismic observation.

a. Automated Observatory: Appropriate allocation of observatory and introduction of more automated station system
b. Data transmission: Establishment of stable and large volumetric transmission method
c. Central Operation System: Introduction of proper central operation system (Software/ Hardware)

B. Introduction of Radar Data Analysis

d. Radar analysis: Introduction of radar composition method and radar AWS analyzed precipitation method

C. Improvement of Forecasting Skill

e. Precipitation now-cast: Introduction of precipitation now-cast method
f. SATAID operation: Improvement of SATAID operation skill
g. NWP Guidance: Introduction of guidance skill of NWP
h. Meso Scale Model: Introduction of NWP Meso Scale Model
i. Wave Model Upgrade: Improvement of wave prediction model named WAVE05

D. Improvement of Warning Issue Skill

j. Warning criteria: Establishment of segmentalized warning criteria for meteorological disaster
k. Automatic decision system: Development of automatic decision system of unusual condition

E. Improvement of Information Dissemination

l. Warning products: Development of disaster information/ warning products
m. Discussion and demarcation: Discussion for communication of disaster information/ warning and demarcation among organizations concerned.

In addition, issues/necessary actions regarding CEWS are listed as follows:

F. Study on Climate Change Vulnerability

n. Statistical analysis of climate: Data inventory and statistical analysis
o. Climate change index: Identify each climate change index using statistical analysis
p. Climate change vulnerability: Study on climate change vulnerability and climate change prediction method
q. Climate change monitoring: Introduction of proper climate change monitoring system (Software/ Hardware)
r. Numerical climate model: Introduction of climate change prediction method based on a numerical climate model

Issues/necessary actions regarding ETEWS are mentioned below.

G. Earthquake and Tsunami Early Warning System

As for issues/necessary actions regarding EIS and TEWS, when the currently ongoing InaTEWS project is finished, an excellent earthquake and tsunami early warning system will be established.

The issues/necessary actions are allocated in time frame of short, middle and long term taking into account of importance and gradualness as shown below:

Table 2.1.6.3 The Frame of Activities for Meteorological/ Seismic Observation and Data Analysis

No.	Contents	Short term Within 5 years	Middle term Within 10 years	Long term Within 15 years
	Improvement of Observation System			
a	Automated Observatory	———	———	·····
b	Data transmission	———	———	·····
c	Central Operation System	———	·····	·····
	Introduction of Radar data analysis			
d	Radar analysis	———		
	Improvement of Forecasting Skill			
e	Precipitation now-cast		———	
f	SATAID operation	———		
g	NWP Guidance	———	———	
h	Meso Scale Model		———	———
i	Wave Model Upgrade		———	
	Improvement of Warning Issue Skill			
j	Warning criteria	———	———	———
k	Automatic decision system		———	———
	Improvement of Information Dissemination			
l	Warning product	———		
m	Discussion and demarcation	———	———	———
	Study on Climate Change Vulnerability			
n	Statistical analysis of climate	———		
o	Climate change index	———	———	
p	Climate change vulnerability	———		
q	Climate change monitoring	———	———	———
r	Numerical climate model			———

2.1.7 Coastal Protection

1) Review of the Past Achievements by the Government of Indonesia in Coastal Protection

(1) Natural Disasters of Coastal Area

Indonesia is the largest archipelagic state in the world ─ more than 75% of Indonesia's national area is sea and the 24% land area is fragmented with more than 17,000 islands. Indonesia has 81,000 km of coast line, which is the world second longest (after Canada), and suffers from various coastal disasters and/or environmental problems in the coastal area such as tsunami, beach erosion, devastation of coral reefs and mangrove forests, river-mouth clogging, and contamination of water.

A. Tsunami

Indonesia is located geographically in the meeting area of three plates (Indo-Australian Plate, Eurasian Plate and Pacific Plate). Most of tsunami occurrences (around 90%) that took place in the Indonesian waters were caused by tectonic quakes along areas of subduction and other seismic activities, while 9% were caused by volcanic eruptions and 1%, by submarine landslide.

Groups of coasts in Indonesia that have tsunami disaster potential are West Coast of Sumatra, South Coast of Java Island, North and South Coasts of Nusa Tenggara, coasts of Sulawesi, islands of Mlauku and North Maluku, and North Coast of Irian Jaya and Papua.

The largest tsunami in Indonesia ever recorded is the tsunami on 26 December 2004 (M_W = 9.1). More than 300,000 lives were lost. Tsunami run-up has reached up to 35 m at the Lhok Nga coast, Aceh.

Indonesia has experienced over 23 tsunamis since 1961 hitting the coastal regions of Indonesia. Other major tsunamis in the recent years which have caused human casualties and property loss are Flores Tsunami (1992: 1,952 deaths, 2,126 injured), South East Java Tsunami (1994: 38 deaths, 400 injured), Irian Jaya Tsunami (1996: 107 deaths), and Pangandaran Tsunami (2006, West Java: 668 deaths).

B. Beach Erosion

There are long stretches of beaches experiencing beach erosion and requiring immediate treatment on the coast in more than 15 provinces and over 100 locations in Indonesia.

Stability of beaches is maintained by the balance between sediment transport on the coast (affected mainly by wave action, longshore current) and supply of sediment to the coast (from river mouth or other sources). Imbalance of sediment may have occurred caused by various human activities such as sand mining or coral mining for construction materials, construction of fishery harbors on the coast and devastation of mangrove forest by coastal development.

Beach erosion in the coast of Indonesia has become a serious concern in the various regions after those human activities became significant as economic activities.

For example, Candidasa, found on the southeast coast of Bali Island, was just a tiny fishing village until late 1970s. After a time, as Bali became more and more renowned as an international tourism destination, *losmen* (accommodations) started to be built on the beach, fancy restaurants flourished around, and a building boom took place. Coral blocks were mined at the offshore beach in order to produce lime and cement necessary for building and/or to obtain materials for road bed, and foreshore beaches disappeared in late 1980s.

Although shore protections were constructed on the beach and various countermeasure works (detached breakwaters, groins, etc.) were constructed by the Government to cope with the progression of beach erosion, restoration of the sand beach to its original condition has not been achieved yet.

(2) Roles and Past Achievements of Ministry of Public Works

Historically the main player in the Central Government to cope with the problems like coastal erosion, to plan and to supervise the construction of countermeasures has been the Ministry of Public Works (PU). The projects of coastal protection have been realized under the administration and budget of PU (Directorate of Swamps and Coastal / Directorate General of Water Resources).

Maintenance of the coastal protection works in the post-construction stage is transferred under the control of Balai (regional unit of PU established for the purpose of water resources management which jurisdiction covers the whole area of a river system) or Dinas PSDA (a bureau of the provincial government for the purpose of water resources management).

The governance of Indonesia has made a big step toward political democratization and decentralization under the Habibie Administration (President B.J. Habibie; 21 May 1998 ~ 20 October 1999), and established the Law No. 22 of 1999 (Regional Governance or Regional Autonomy) and the Law No. 25 of 1999 (Financial Balance between Central Government and Regional Government).

According to the Law No. 22/1999, the regional government has the authority to manage and administer its land area including the sea area as far as 4 nautical miles from the shoreline. However, the actual preparedness of the local government side has not been established sufficiently for the maintenance and management of the coastal protection works. The budget and power for the coastal management and maintenance of the coastal protection works depend on the financial capability of the province (only the governments of DKI Jakarta and Bali Province can secure the ample amount of budget to cover their demands of public works).

(3) Establishment of DKP

Formation of a new ministry was conducted in the reformation process of the government organization under the Wahid Administration (President Abdurrahman Wahid; 20 October 1999 ~ 23 July 2001). The Ministry of Marine Affairs and Fisheries (DKP) is a very new department of the Central Government which was established in November 2000, and was expected to support the decentralization process and also to help the district government to manage the maritime and coastal area that previously had been under the domain of the Department of Transportation (Perhubungan).

These changes of Indonesian policies had influenced the implementation on related policies and regulations such as Environmental Impact Assessment (EIA). In Indonesia, since 1982, EIA has become a legal requirement, embedded in the permit system for an economic development. EIA process is now considered as an important tool in the context of Integrated Coastal Zone Management (ICZM), and expected to lead to a more sustainable use of natural resources and coastal management.

The new administration of DKP under the concept of ICZM is stipulated in the Law No. 27 of 2007 concerning the Management of Coastal Zones and Small Islands.

The public services on the disaster prevention, coastal protection, and the policy formulation on the Mitigation and Adaptation to Climate Change belong to the administration of Directorate of Coastal and Ocean, Directorate General of Marine, Coastal and Small Islands of DKP.

There are some duplication of jurisdiction between DKP and PU, which historically has been in charge of coastal management and coastal protection under the concept of Integrated Water Resources Management. Actually, these two ministries have had frequent opportunities of discussion for the coordination of demarcation and allocation of project and budget.

(4) Law Bases of Disaster Mitigation on Management of Coastal Areas

There are two laws in Indonesia dealing with issues of disaster mitigation; the first is Law No. 24 of 2007 (UU No.24/2007) on Disaster Management, and the second is Law No.27 of 2007 (UU No.27/2007) on Management of Coastal Zones and Small Islands.

A. Law No. 24 of 2007 on Disaster Management

According to the Law No. 27 of 2007, the Central Government and regional government are responsible for organization of disaster management (Article 5). Article 6(a) and Article 8(c) stipulate that the responsibilities of the Central Government and regional government in conducting disaster management shall be reducing disaster risk and incorporating disaster risk into development programs.

In Article 31, it says that disaster management is implemented based on the four aspects of (1) social, economic and cultural aspects of community, (2) conservation of living environment, (3) usability and effectiveness, and (4) areas of coverage.

Meanwhile, Article 47 states that disaster management aims to reduce the disaster risks for the communities in the disaster prone areas through the following activities : (a) implementation of spatial planning, (b) regulation of development, construction of infrastructure, arrangement of building, (c) conducting education, guidance, and training whether in conventional or modern way.

Those prescriptions stipulated in the Law No. 24 of 2007 are very much equivalent to the concept of so called Comprehensive Disaster Management in Japan.

B. Law No.27 of 2007 on Management of Coastal Zones and Small Islands

The Law No. 27 of 2007 stipulates the responsibilities and roles of the Central Government and regional government on coastal management including preservation and exploitation of coastal zone and guaranteeing the existing ecosystem and sustainability of coastal zone.

Article 31 stipulates that the regional government shall determine the boundary of Coastal Belt in conformity with the following provisions: (a) protection against earthquakes or tsunamis, (b) protection against coastal erosion, (c) protection of coastal man-made resources from storm, flooding and other natural disasters, (d) protection of coastal ecosystems, and (e) regulation of public access.

In Article 56 of Chapter X (Disaster Mitigation), it states that, in formulation of an Integrated Management Plan and exploitation of coastal areas and small islands, the Central Government and/or regional government shall include and partly perform the disaster mitigation of coastal areas and small islands in accordance with the type, level and region of disaster.

In Article 57, it says that disaster mitigation for coastal areas and small islands shall be carried out involving the Central Government and the regional government and/or community concerned.

Article 59 stipulates the following:

a) Every person in coastal areas and small islands has the obligation to conduct disaster mitigation on the activities which have potential to cause damage to the coastal area and small islands.
b) Disaster mitigation shall be carried out through structural/physical and/or non-structural/non-physical activities.
c) Provisions on disaster and damage mitigation to the coastal area and small islands shall be stipulated in more detail by Government Regulation.

It is stipulated that disaster mitigation in coastal areas and/or small islands (through structural or non-structural activities) shall be conducted with the participation of all the stakeholders in the coastal area in accordance with the specific requirement of the target area.

According to the Government Regulation (PP) No. 38/2007, the authority of the Government for policy making and decision of norms, standard, procedure, coastal reclamation criteria and disaster mitigation in coastal areas and sea is assigned to DKP (Ministry of Marine Affairs and Fisheries).

(5) Roles of Government in Efforts of Disaster Mitigation

The present policies of DKP in the efforts for disaster mitigation and environmental pollution are sourced from "Means of Adaptation and Mitigation of Climate Change and Disaster at Coastal Areas and Small Islands", prepared in March 2009 by DKP. These policies are described below.

a) Reducing risk/impact/damage caused by disaster or pollution in coastal areas whether in form of human casualty, social and economic losses, or even damage on natural resource, human activity, and environment.
b) Increase knowledge of coastal community on reducing impact/risk of environmental damage whether caused by disaster, human activity or environmental pollution.
c) Increase capability and role of the Central Government and regional government, and community in mitigation of coastal environmental damage whether caused by disaster, human activity or pollution.
d) Increase function of coastal ecosystem and infrastructure facility of maritime and fisheries (fishing harbor, jetty, pier, waste treatment facility, etc.) in mitigation of coastal environmental damage whether caused by disaster, human activity or pollution.

To realize these policies, the strategy will be taken through preparation and supplying tools in the following forms:

(1) Data and information including:
   - Data on potential disaster for every coastal area
   - Analysis of damage risk
   - Fundamental data on coastal environmental damage and mitigation conducted
(2) Zoning and planning which is based on mitigation
(3) Dissemination, socialization, and training materials of coastal environment and mitigation
(4) Policy, strategy and mitigation manual whether of national or local-specific
(5) Mitigation planning document whether caused by disaster, human activity or pollution
(6) Partnership with related institution/organization whether national or international

(7) Rehabilitation of coastal ecosystem and marine and fishery facility infrastructure for the purpose of mitigating damage which may be caused by disaster, human activity or pollution.

2) Current Situation and Issues of Coastal Protection

In order to extract the current issues on coastal protection and coastal management, members of the study team visited relevant government agencies and conducted interviews with the officials concerned.

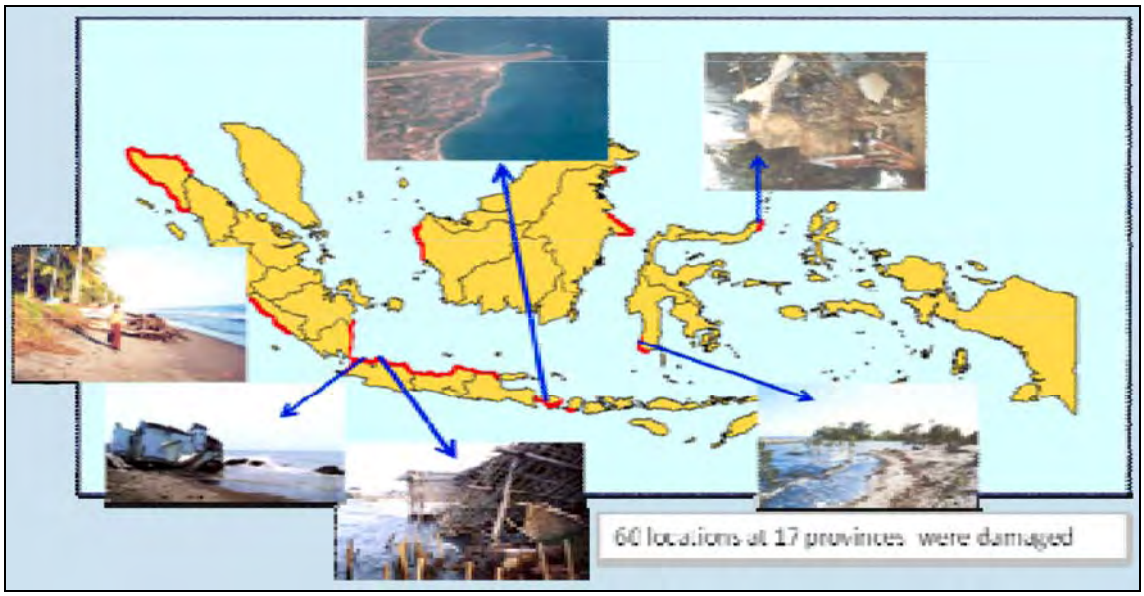
The current issues and tasks are summarized as follows according to the findings in the interviews.

(1) Beach Erosion

The coastal area of Indonesia is now highly developed and utilized as industrial area, residential area and tourism area. In proportion to development of the coastal area, serious problems of beach erosion have been taking place in many coastal areas such that the coastal infrastructures have become seriously threatened.

Figure 2.1.7.1 presents the 60 locations of coastal areas in 17 provinces which are exposed to beach erosion and are potential disaster areas.

Table 2.1.7.1, (1) and (2), shows the present situation of the beach erosion at the 37 coastal areas in 6 provinces for which PUs have requested urgent countermeasures to cope with the potential disasters threatening the coastal infrastructures and local industries.



Source: DKP, March 2009

Figure 2.1.7.1 Coastal Areas Exposed to Coastal Erosion and Potential Disaster

According to the PU officials, they assumed that the main reason of the beach erosion taking place in Indonesia is climate change, the sea level rise and increase of wave height, especially after the 2004 tsunami. However, it is well-known that those beach erosions in the coast of Indonesia have worsened in the various regions after human activities became significant in proportion to the development in the coastal areas and exploitation of the coastal resources.

Further investigation and study shall be carried out to identify the real and actual causes of the coastal erosion taking into consideration the Climate Change and the accompanying factors as well.

If a problem arises, at the first stage, temporary treatment for shore protection is carried out by the local government or municipality. PU's main office in Jakarta receives data and reports from Local PU or Balai in order to coordinate Balai (or PU of local government) to cope with the problem.

After planning and budgeting for the coastal protection works, the construction will be carried out by Balai, while the local PU is responsible for the maintenance and monitoring. For the budget matter, if the construction is done by Balai, the budgeting is under PU main office, if the construction is done by the local PU, the budget can be settled in two ways: cooperation with PU main office, or fully taken care of by the local PU.

(2) Degradation of Coastal Environment

Members of the study team that conducted interviews in DKP were told that degradation of coastal environment is significant throughout Indonesia; the degradation of coastal environment ranges across the appearances of environmental quality that include beach erosion, land subsidence, devastation of coral reefs and mangrove forests, river-mouth clogging, contamination of water quality, etc. The team members were further informed that the situation is critical in North Coast of Java Island (Pantai Utara Jawa) and West Coast of Sumatra (Pantai Barat Sumatera).

While they have an understanding of the critical condition of the coastal environment, they do not have detail information to evaluate the current condition and environmental qualities yet, that is, locations and extent of the degradation of coastal environment, evaluation indices of the environmental qualities, level of degradation in the coastal area, etc.

So far DKP (Central Government) does not have any information management system connecting with local governments to exchange information as to which area shall be treated or rehabilitated urgently.

As initial steps toward disaster preparedness, DKP wants to conduct mapping and to develop an online database of the coastal environment covering the northern coast of Java Island and the

western coast of Sumatra and accessible to local governments, which would function as the platform of information exchange.

(3) Disaster Risk Map

Another critical issue from the viewpoint of disaster mitigation in Indonesia is adaptation to climate change and disaster in the coastal area and small islands.

Impacts of climate change that are of much concern in the coastal area of Indonesia are Sea Level Rise and accompanying Tidal Flood. Tidal flood is considered as the sea water inundation to take place in the coastal area as the combination of sea level rise and meteorological deviation concurring on high tide.

Coastal areas that have potential of tidal flood in Indonesia are North Coast of Java Island, Lampung and Palembang of South Sumatra, Aceh, West Coast and East Coast of Sumatra, and South Kalimantan. Most of the coastal areas where exposed to the danger of tidal flood are the lowland swamp area. Tidal flood may take place not only due to intense rainfall but also due to human factors such as poor arrangement of drainage system and low capacity of river flow owing to sedimentation and garbage. In addition, excessive use of ground water has caused chronic land subsidence in those areas.

DKP (Directorate of Coastal and Ocean) has developed two types of Disaster Risk Maps on the following areas with the help of researchers in Indonesian universities such as University of Diponegoro and Gajah Mada University.

a) Tsunami Maps of West Coast of Sumatra

b) Tidal Flood Maps (Climate Change Map) of North Coast of Java Island (Banten ~ Central Java)

DKP plans to expand the coverage area of the Disaster Risk Map to the coasts of Sumatra, South Java Island, East Java, NTT and NTB (Nusa Tenggara Timur, Nusa Tenggara Barat) and Bali.

Those studies have been carried out by DKP independently without any coordination or collaboration with either the National Meteorological, Geophysical and Climatology Agency (BMKG) or the National Agency for Disaster Management (BNPB). Members of the study team advised that those mapping effort should cover not only tsunami or tidal flood but also the issues of beach erosion, degradation of coastal environment, and other environmental issues caused by Climate Change.

Table 2.1.7.1 (1) Coasts Requiring Preventive Measures to Cope with Beach Erosion (1/2)

	Name of Beaches	Location (Kabupaten)	Beach Length	Eroded Length	Proposed Contermeasures against Beach Erosion	Remarks
Bengkulu Province					**375 billion Rp. (37.5 million USD)**	
1	Lais-Serangai Beach	Bengkulu Utara	10 km	5 km	Groins, revetment; 125 billion Rp.	To secure trans-West Sumatra main road; sand mining in the estuary is supposed to have caused the long coastal erosion.
2	Air Punggur Beach	Mukomuko	16 km	10 km	Groins, revetment; 250 billion Rp.	
Jawa Barat Province (Balai Besar Wilayah Sungai Citarum)					**392.4 billion Rp. (39.2 million USD)**	
1	Bakti Jaya Beach	Bekasi	3.8 km	2.5 km	Sea dyke; 11.3 billion Rp.	To control beach erosion and to secure residences, rice fields, fishponds and infrastructure.
2	Bahagia Beach	Bekasi	4 km	2 km	Sea dyke; 9.9 billion Rp.	
3	Sederhana Beach	Bekasi	4.8 km	2 km	Sea dyke; 9.9 billion Rp.	
4	Pisangan Beach	Karawang	22 km	22 km	Sea dyke; 245.6 billion Rp.	Connecting road between villages is almost impassible.
5	Ciderwak Beach	Karawang	3 km	2.5 km	Sea dyke; 12.4 billion Rp.	To control beach erosion and to secure residences, rice fields, fishponds and infrastructure.
6	Tanjung Baru Beach	Karawang	4 km	3 km	Sea dyke; 13.6 billion Rp.	
7	Tangkolak Estuary	Karawang	4 km	1 km	Breakwater; 2.7 billion Rp.	
8	Sungai Buntu Beach	Karawang	6 km	1.5 km	Sea dyke; 6.8 billion Rp.	
9	Pantai Ciparage	Karawang	4 km	3.5 km	Sea dyke; 15.8 billion Rp.	
10	Wadas Beach	Karawang	2.5 km	1 km	Sea dyke; 7.9 billion Rp.	
11	Tarumtum Beach	Subang	3.65 km	1.5 km	Sea dyke; 6.1 billion Rp.	To control beach erosion and to secure residences, rice fields, fishponds and infrastructure.
12	Pondok Bali Beach	Subang	1.7 km	0.5 km	Sea dyke; 3.7 billion Rp.	
13	Muara Kali Asem Beach	Subang	2 km	1 km	Jetty; 4.8 billion Rp.	
14	Eretan Beach	Indramayu	5.4 km	3.5 km	Sea dyke; 15.7 billion Rp.	To control beach erosion and to secure residences, rice fields, fishponds and infrastructure.
15	Legok Barat Beach	Indramayu	1 km	1 km	Sea dyke; 4.8 billion Rp.	
16	Bugel Beach	Indramayu	2 km	2 km	Sea dyke; 9.5 billion Rp.	
17	Ujung Gebang Beach	Indramayu	4 km	2.5 km	Sea dyke; 11.9 billion Rp.	
Jawa Tengah Province (Northern Beach)					**227.5 billion Rp. (22.8 million USD)**	
1	Sendang Mulyo Beach	Rembang	5 km	3 km	Revetment; 52.5 billion Rp.	To secure residences and coastal roads; there are threats of high tide and high waves causing beach erosion.
2	Manggar Blimbing Beach	Rembang	3 km	2 km	Revetment; 35 billion Rp.	
3	Tegal Mulyo Beach	Rembang	6 km	4 km	Revetment; 70 billion Rp.	
4	Kalipang Beach	Rembang	3 km	2 km	Revetment; 35 billion Rp.	
5	Sarang Beach	Rembang	3 km	2 km	Detached breakwater, revetment; 35 billion Rp.	
Kalimantan Selatan Province					**50 billion Rp. (5 million USD)**	
1	Pagatan Beach	Tanah Bumbu	21 km	2.5 km	Breakwater; 50 billion Rp.	To secure trans-South Kalimantan ~ East Kalimantan main road and other infrastructure.

Source: Directorate of Swamps and Coastal, Ministry of Public Works (PU)

Table 2.1.7.1 (2) Coasts Requiring Preventive Measures to Cope with Beach Erosion (2/2)

	Name of Beaches	Location (Kabupaten)	Beach Length	Eroded Length	Proposed Contermeasures against Beach Erosion	Remarks
Bali Province (Balai Wilayah Sungai Bali Penida)					**930 billion Rp. (93 million USD)**	
1	Saba Beach Masceti Beach Lebih Beach Siyut Beach	Gianyar	5.0 km	3.0 km	Groins, revetment, detached breakwaters 300 billion Rp.	Tourism area, local fisheries, ritual ceremony for the local Hindu people.
2	Pengambengan Beach Cupel Beach	Jembrana	10.0 km	4.1 km	Groins, revetment, sand-bypass; 25 billion Rp.	Local fisheries, fish processing, public buildings; Fishery Harbor construction blocked sediment transport.
3	Candidasa Beach	Karangasem	5.0 km	5.0 km	Groins, revetment, detached breakwaters, sand nourishment; 195 billion Rp.	Tourism area, local fisheries, agriculture; coral mining caused damages to wave damping over shoal.
4	Purnama Beach ~ Gumicik Beach	Gianyar	6.0 km	6.0 km	Revetment; 80 billion Rp.	Tourism area and main road, agriculture, public buildings
5	Tejakula Beach	Buleleng	10.0 km	6.5 km	Revetment; 80 billion Rp.	Tourism area and main road, agriculture, public buildings
6	Klating Beach Yeh Gangga Beach	Tabanan	16.0 km	7.5 km	Revetment; 150 billion Rp.	Tourism area and main road, agriculture, public buildings
7	Pantai Gerokgak	Buleleng	3.0 km	1.0 km	Revetment, groins; 25 billion Rp.	Shrine, shrimp pond, area of pearl farm
8	Pantai Batu Bolong	Tabanan	0.5 km	0.5 km	Revetment, submerged breakwater, imitation rock armor; 75 billion Rp.	Shrine on the rock, tourism area; situated close to Tanah Lot beach.
Maluku Utara Province					**241.2 billion Rp. (24 million USD)**	
1	Ternate Coast	Ternate Island	N/A	N/A	Detached breakwater with concrete blocks 100 m x 41 units; 71.75 billion Rp.	To protect local residences and other public facilities of 7 villages scattered along the island coast
2	Sofifi Coast	Tidore Island	N/A	N/A	Detached breakwater with concrete blocks 100 m x 12 units; 21 billion Rp.	To protect local residences and other public facilities of 4 villages scattered in Sofifi area of the island
3	Sanana Coast	Kepulauan Sula	N/A	N/A	Detached breakwater with concrete blocks 100 m x 49 units; 88.2 billion Rp.	To protect local residences and other public facilities of 9 villages scattered in Sanana area of the island
4	Weda Coast	Halmahera Teng	N/A	19.07 km	Revetment; 57.21 billion Rp.	To protect local residences and other public facilities of 8 villages scattered in Weda area of the island
5	Northern Coast Database Compiling		North Maluku Province		1.5 billion Rp.	To collect basic data of the coast and compile database
6	Southern Coast Database Compiling				1.5 billion Rp.	

Source: Directorate of Swamps and Coastal, Ministry of Public Works (PU)

2.2 Review of Assistance Policy and Past Achievements by International Aid Agencies

Especially in recent years after the occurrence of disaster in Ache in 2004, international donors give continuous and enormous amount of assistance on disaster rehabilitation and reconstruction of Ache, as well as mitigation measures in the field of disaster risk reduction. Ideally, the assistances should be closely coordinated among relevant stakeholders; however, due to the enactment of disaster management law and transition of BAKORNAS PB to new BNPB, these coordination efforts have just started. Therefore, there is difficulty of assessing overall achievements of past assistance by international donors. Recently, UN agencies with several donors started coordination efforts by exchanging information on contents and progress of each project. Also, in this project starting from major donors such as AusAID, JICA, UNDP, and the World Bank, informal coordination has started to support BNPB effectively. However, it is very much expected that BNPB takes leadership on all disaster management efforts. And it is expected that the result of coordination will clarify the strategy of disaster risk reduction measures in Indonesia.

This section explains assistant policy and past achievement in disaster management sector by international aid agencies such as Japan International Cooperation Agency (JICA), Asian Development Bank (ADB), Australian Agency for International Development (AusAID), United Nations Development Program (UNDP) and World Bank (WB).

2.2.1 Formulation of Project List

In order to understand projects implemented by each donor, a list of the projects is prepared, as shown in Table 2.2.1.1. In this table, priorities of the Hyogo Framework for Action 2005-2015 are included; however, activities in each priority need to be clarified. In this study, priorities for the Hyogo Framework for Action are interpreted as shown in Table 2.2.1.2 and the projects are formulated.

Table 2.2.1.1 List of Past and Present Achievements by Field Category

Name of Project		Hyogo Frame for Action	HFA 1
			HFA 2
Scheme			HFA 3
Status			HFA 4
Present Situation and Future Plan			HFA 5
Schedule	2009		PD
	2010	Disaster Type	Earthquake
	2011		Tsunami
	2012		Flood
	2013		Landslide
Project Status	Finished		DestructiveWind
	Ongoing		Forestfire
	Unde rrequest		VolcanicEruption
	Consideration as ideas		Drought
Category	Comprehensive Disaster Management	Main Actor	Pulic Aid (National)
	Integrated Water Resources Management		Pulic Aid (Province)
Disaster Mngt. Cycle	Pre-Disaster		Pulic Aid (Kab.&Kota)
	Emergency Response		Mutual Aid
	Post Disaster		Self Aid

Source: JICA Study Team

Table 2.2.1.2 Activities in Hyogo Framework for Action

DM Cycle	HFA			Activities (Major Activities)
Pre-Disaster	HFA1	Make Disaster Risk Reduction Priority	Development of Legislation and Formulation of Plan	Development of Legislative Framework (Law No.24 on DM, relevant Regulations, and etc.)
				Formulation of Plan (NDMP, NAP-DRR, RPJM, RDMP, and etc.)
			Establishment and Enhancement of Disaster Management Institution	Establishment of Organizational Framework (BNPB, PBPD, and etc.)
				Coordination and Arrangement among Organizations (Steering Committee, and etc.)
				Capacity Development of Officials on DM (BNPB, PBPD, and relevant Organizations)
			Promotion of Community Participation in DRR	Promotion of Community Participation through CBDRM Activities
	HFA2	Know the Risks and Take Action	Understanding Disaster Risk and Publication of Risk Area	Creation of Hazard and Risk Maps
				Publication of Risk Area utilizing Maps, and others
			Establishment of Early Warning System	Establishment of Framework for Metrological and Seismic Data Acquisition and Analysis
				Development of System for Announcement and Transmission of Early Warning and Alert
			Promotion of Research on DRR	Promotion of Scientific and Technological Research and Development
				Utilization of Research on DRR
	HFA3	Build Understanding and Awareness	Promotion of Information Management and Exchange	Establishment of Coordination and Cooperation Framework (such as National Platform for DRR)
			Promotion of DRR Education	Establishment of Continuous DRR Education Framework, and DRR Community Activities
				Incorporation of DRR into School Curriculum and Education Program
	HFA4	Reduce Risks	Enhancement of Structural /Non-structural Measures to mitigate impact of disasters	Promotion of Structural Measures
				Promotion of Control by Legislation (Improvement of deterrence by Building Code, Land-use planning)
Emergency Response	HFA5	Be Prepared and Ready to Act	Establishment of Emergency Response Framework	Grasping Damage Condition and Needs Assessment for Effective Emergency Response
				Establishment of Emergency Operation Center and its functions
			Implementation of Lifesaving Activities	Implementation of search and rescue activities
				Implementation of Emergency Medical Treatment
			Assistance for Disaster Victims	Provision of Food, Water, and Daily Commodities
				Preparation of Health and Medical Measures
				Pre-designation of Evacuation Area
			Implementation of DM Drill	Implementation of variety of Disaster Management Drills (National, Province, Kabupaten/Kota, community, and others)
Post Disaster	PD	—	—	Establishment of Assistance System for Disaster Victims
				Pre-consideration of Rehabilitation and Reconstruction Plans

Source: JICA Study Team

Table 2.2.1.2 is formulated to support filling category of HFA, clarifying which priority each project covers. In this table, HFA Priority 5 is included in “Emergency Response” but not in “Pre-Disaster” for convenience; however, it is actually supposed to be included in “Pre-disaster phase”, since all activities are about preparedness for smooth and prompt emergency response. Due to space limitation, HFA Priority 5 is categorized in emergency response in this study.

2.2.2 Comprehensive Disaster Management

Most of donor activities that need coordination are concentrated on comprehensive disaster management sector. In the course of the study, members of the study team frequently visited and held discussions with relevant officials from major donors.

Information on major donors' assistance policy and their achievements on comprehensive disaster management in Indonesia were collected through interview survey and survey sheets to be filled out. Survey respondents included international organizations and international cooperation agencies, such as AusAID, UNDP, and the World Bank. Information was clarified to check the coverage field of disaster risk reduction measures by these major donors.

1) Japan International Cooperation Agency (JICA)

The Government of Japan has stated its policy in the Assistance Plan for Indonesia since November 2004 to provide support for improvement of living environment, including disaster measures, for the realization of "a fair and democratic social framework".

In July 2005, the President of Indonesia H.E. Susilo Bambang Yudhoyono and the Prime Minister of Japan Junichiro Koizumi recognized that capacity development for reducing damage by natural disaster including earthquakes and tsunamis are priority issues for Indonesia, and agreed to establish the "Committee on Disaster Reduction" in order to mitigate natural disasters in Indonesia and strengthen cooperation to develop a disaster reduction system.

Under these circumstances, the Government of Japan agreed to the request of the Government of Indonesia, and decided to implement the Study for formulation of comprehensive disaster management plan on national and regional levels of Indonesia and development of capacity for disaster management, and implemented "The Study on Natural Disaster Management in Indonesia", which was completed in March 2009.

The Japanese Government has implemented many projects relevant to disaster management especially on engineering components for a number of years now; however, support for disaster administration, institution, and planning is rather new in many countries even though this field is very much a priority in Japan.

This section summarizes the assistance policy and strategy of JICA and its past and present achievements in Indonesia.

(1) Assistance Policy and Strategy

Policy of the Government of Japan
1) The Japan Country Assistance Program for Indonesia (established in November, 2004) has set the goal of providing assistance for the creation of a democratic and just society as one of the priority areas and issues. It also stipulates that Japan will provide assistance for (1) the development of measures to combat natural disasters such as frequent flooding, to facilitate sustainable local development for the purpose of improving basic public services, and (2) to develop the urban living environment (including measures to combat natural disasters) for the purpose of environmental conservation and disaster prevention. 2) Report of the Japan-Indonesia Joint Committee on Disaster Reduction regarding Building Resilience of Indonesia and its communities to Disasters for the Next Generation based on the Hyogo Framework for Action 2005-2015 recommends (1) establishment of an agency that coordinates the disaster prevention and increase in coordination among related agencies; (2) building an environment for promoting administrative efforts for disaster reduction and preparedness; (3) participation of all stakeholders in disaster reduction and preparedness; and (4) reforming government policies and institutions involved in strengthening the capacity for disaster reduction and preparedness at the community level.
JICA Strategy
JICA Country Assistance Strategy stipulates that Disaster Management is one of the important assistance programs for Indonesia, and especially policy and institutional improvement, investment contributing to climate change adaptation and mitigation, and structural and non-structural measures against natural disasters will be addressed by JICA in coordination with ODA loan, Technical Assistance(T/A) and Grant.

(2) Past and Present Achievements

In recent years, JICA has supported the implementation of the following projects, shown in Table 2.2.2.1, on disaster management and related fields.

Table 2.2.2.1 Past and Present Achievements by JICA

No	Name of Project	Scheme	Status	Present Situation and future plan	Schedule					Project Status				Cate-gory	Disaster Mngt. Cycle			Hyogo Framework for Action						Disaster Type										Main Actor				
					2009	2010	2011	2012	2013	Finished	On going	Under request	Consideration as ideas	Comprehensive Disaster Management	Integrated Water Resources Management	Pre Disaster	Emergency Response	Post Disaster	HFA 1	HFA 2	HFA 3	HFA 4	HFA 5	PD	Earthquake	Tsunami	Volcanic Eruption	Landslide	Flood	Drought	Forest Fire	Destructive Wind	Public Aid (National)	Public Aid (Province)	Public Aid (Kab. & Kota)	Mutual Aid	Self Aid
J-1	The Study on Disaster Management in Indonesia	DS	Finished		→					x				x	x	x			x	x	x				x	x		x	x					x		x	x	
J-2	Multi-discliplinary Hazard Reduction Program from Earthquake and Volcanoes in Indonesia	TA	On going		→	→	→				x			x		x				x	x				x	x	x				x				x	
J-3	Disaster Recovery and Management Sector Program Loan	LA	Under monitoring	additional actions will be incooperated into CCPL	→	→					x			x	x			x	x					x	x	x	x	x	x	x	x	x					
J-4	Project on Capacity Development for Tsunami Early Warning	TA	Finished		→					x				x	x	x	x		x	x			x			x						x					
J-5	Tsunami Early Warning Advisor	EXP	Adopted	under selecting							x			x	x	x	x		x	x						x						x					
J-6	Project on Building Administration and Enforcement Capacity Development for Seismic Resilience	TA	On going		→	→					x			x		x			x			x			x							x	x	x	x	x	
J-7	Integrated Disaster Mitigation Management for "Banjir Bandang"	TA	On going		→	→					x			x	x	x	x		x	x	x		x					x	x				x	x	x	x	x	
J-8	Urgent Disaster Reduction Project for Mt. Merapi / Progo River Basin and Mt. Bawakaraeng	LA	On going		→	→	→	→	～2014.7		x			x	x	x		x				x		x				x	x	x				x	x				
J-9	Water Resources Policy Adviser	EXP	On going		→	→					x				x	x	x		x									x	x	x				x				
J-10	Project on Capacity Development for RBOs Practical Water Resources Management and Technology	TA	On going		→	→					x				x	x	x		x									x	x	x				x	x			
J-11	Water Resources Existing Facilities Rehabilitation and Capacity Improvement Project	LA	On going		→						x				x			x				x		x					x	x				x	x			
J-12	The Institutional Revitalization Project for Flood Management in JABODETABEK	TA	On going		→	→					x			x	x	x			x										x	x				x	x			
J-13	Lower Solo River Improvement Project(2)	LA	On going		→	→	→	→	～2015.7		x				x	x						x							x					x	x				
J-14	Urban Flood Control System Improvement in Selected Cities	LA	On going		→	→	→	→	～2014.5		x			x	x	x						x							x					x	x	x			
J-15	Integrated Water Resources and Flood Management Project for Semarang	LA	On going		→	→	→	→	～2015.7		x			x	x	x						x							x	x				x	x				
J-16	Contermeasure for Sediment in Wonogiri Multipurpose Dam Reservoir (1)	LA	On going		→	→	→	→			x				x	x						x						x	x	x				x	x			
J-17	Seriously Damaged, by Gigantic Earthquake, Main Bridges, Urgent Reconstruction Project in Nias Island, North Sumatera Province	GA	Basic design study in on going		→	→	→				x			x				x						x								x					
J-18	Aceh Reconstruction Project	LA	On going		→	→	→				x			x				x						x	x							x					

After the completion of the JICA study and considering the time it took to finalize support for Ache and Yogyakarta rehabilitation and reconstruction projects, JICA considers its "Disaster Management Program" as one of the priority programs contributing to peace and prosperity in Indonesia, and sets its target as "to contribute to peace and prosperity in Indonesia through strengthening the comprehensive disaster risk management framework, which will increase the country's ability to cope with disasters at any stage of disaster risk management cycle (Preparedness, Mitigation, Emergency Response, Rehabilitation / Reconstruction)".

(3) Summary of Major Project

A brief description of the recently concluded project called "Study on Natural Disaster Management in Indonesia" is given below.

Project Title	Study on Natural Disaster Management in Indonesia
Duration	2 years (April 2007 – March 2009)
Budget	355 million Yen(approximately US$3.8 million)
Counterpart	BNPB
Scheme	☒ Development Study ☐ Technical Assistance ☐ Grant Aid ☐ Loan ☐ Others ( )
Target Disaster	☒ Flood ☒ Landslide ☒ Earthquake ☐ Volcanic Eruption ☒ Tsunami ☐ (All)
Disaster Risk Management Cycle	☒ Preparedness ☒ Mitigation ☐ Emergency Response ☐ Rehabilitation/Reconstruction
Coordination with Other Donors	☒ No
Project Background and Objective	The overall goal of the Study is to enhance the natural disaster management capacities in Indonesia and to facilitate the creation of necessary institutional mechanisms through the formulation of Disaster Management Plan at all levels. Aiming at achieving the overall goal, the following activities against natural disasters targeting flood, sediment disasters, earthquake and tsunami, were implemented in this Study: -To formulate comprehensive disaster management plan in national and regional levels of Indonesia -To develop capacity of national and regional organizations concerned and communities. **MAIN COMPONENTS** (1) Formulation of the Natural Disaster Management Plan (2) Capacity development of the organizations concerned (3) Preparation of the general guideline for the formulation of the Regional Disaster Management Plan **ACTIVITIES** (1) Formulation of the Natural Disaster Management Plan ◆ Formulation of the Natural Disaster Management Plan 1-1 Review of the existing disaster management framework 1-2 Seminar on the disaster management plan formulation 1-3 Formulation of the National Disaster Management Plan 1-4 Formulation of the Action Plan for the National Disaster Management ◆ Formulation of the Regional Disaster Management Plan for Pilot Regions 1-1 Review of the existing disaster management framework at regional level 1-2 Formulation of the comprehensive Regional Disaster Management Plan 1-3 Study on the Regional Disaster Management Plan on Priority Disaster (2) Capacity Development of the organizations concerned ◆ Capacity Development of the BNPB 2-1 Needs assessment for BNPB and provision of technical advice to the staff members 2-2 Recommendation of Institutional Strengthening 2-3 On-the-Job Training (OJT) through formulation of the National Disaster Management Plan 2-4 Workshops and Seminars for the staff members of the organization

	2-5 Disaster Management Training for counterparts ◆ Capacity Development of regional organizations concerned: 2-1 Needs assessment for the organizations and provision of technical advice to the staff members of the organizations concerned 2-2 On-the-Job Training (OJT) through formulation of the Regional Disaster Management Plan 2-3 Workshops and Seminars for the staff members of the organizations concerned 2-4 Disaster Management Training for counterparts ◆ Capacity Development of the communities: 2-1 Public education and community awareness campaign 2-2 Recommendation on community based disaster management 2-3 Implementation of evacuation training (3) Preparation of the general guideline for the formulation of the Regional Disaster Management Plan for the other regions in Indonesia **STUDY AREA** ◆ National level Entire country ◆ Provincial level Activities are limited to preparing guidelines for the formulation of the Disaster Management Plan i) East Java ii) West Sumatra ◆ Regency/Municipality level Two pilot regions selected for the comprehensive Disaster Management Plan at Regency and Municipality level: i) Jember Regency (East Java) ii) Padang Pariaman Regency and Pariaman Municipality (West Sumatra) These regency and municipality were selected only as "Model Area", the first step for the regional disaster management planning conducted all over Indonesia.

Main outputs from the project are:

1) Draft National Disaster Management Plan

2) Draft Regional Disaster Management Plan

3) Kota/Kabupaten Hazard Map and Risk Maps

4) Guideline for formulation of Regional Disaster Management Plan and Hazard/Risk Maps, as well as Community Based Disaster Risk Management Activities

These outputs can be utilized as reference for all Indonesia together with major donors to share knowledge on disaster management planning and hazard/risk mapping. Also, CBDRM activities to be supported by local government are indicated in the guideline and methodologies and tools can be utilized in other projects.

2) Australian Agency for International Development (Aus AID)

This section summarizes the assistance policy and strategy of AusAID and its past and present achievements in Indonesia.

(1) Assistance Policy and Strategy

Policy of the Government of Australia
Since the adoption of the Hyogo Framework for Action in 2005, there has been growing international conviction that response alone is not enough. Proactive efforts to reduce disaster risk are needed. Recently (June 2009), the Australian Government published the document "Investing in a safer future: A Disaster Risk Reduction Policy for the Australian Aid Program", which provides the policy framework for the full integration of disaster risk reduction into Australia's aid program. The goal of this policy is to reduce vulnerability and enhance resilience of countries and communities to disasters. There are four outcomes: 1) DRR is integrated into the Australian aid program - to ensure measures are taken to reduce disaster risk through all development and humanitarian programs. This will also ensure that development is safeguarded from disasters, and development and humanitarian programs do not create new forms of vulnerability 2) The Capacity of partner countries to reduce disaster risks is strengthened in line with the Hyogo Framework for Action - to ensure continued support to international and regional organizations, partner governments and NGOs to prioritize, coordinate, support and facilitate DRR programs. 3) Leadership and advocacy on DRR are supported and enhanced - to promote leadership for DRR within AusAID and with key partners, including governments and civil society, and to advocate for greater prioritization of DRR. 4) Policies and programming for DRR and climate change adaptation are coherent and coordinated - to ensure AusAID's approaches to DRR and climate change adaptation are strongly aligned with other programs. This will also ensure that development is safeguarded from disasters, and development and humanitarian programs do not create new forms of vulnerability
AusAID Strategy
Aligned with the AIFDR project, for the next five years AusAID will be focusing on following activities: 1) to improve the quality of disaster risk reduction and work to increase capacity for risk and vulnerability identification and risk mitigation in disaster planning and implementation, 2) to work collaboratively with other key DRR-focused stakeholders, and 3) to link and integrate scientific risk and hazard identification, DRR research and information generation, training and mentoring programs.

(2) Past and Present Achievements

In recent years, AusAID has supported the implementation of the following projects shown in Table 2.2.2.2.

Table 2.2.2.2 Past and Present Achievements by AusAID

No	Name of Project	Scheme	Status	Present Situation and future plan	Schedule					Project Status				Cate-gory		Disaster Mngt. Cycle			Hyogo Framework for Action						Disaster Type										Main Actor				
					2009	2010	2011	2012	2013	Finished	On going	Under request	Consideration as ideas	Comprehensive Disaster Management	Integrated Water Resources Management	Pre-Disaster	Emergency Response	Post Disaster	HFA 1	HFA 2	HFA 3	HFA 4	HFA 5	PD	Earthquake	Tsunami	Volcanic Eruption	Landslide	Flood	Drought	Forest Fire	Destructive Wind	Public Aid (National)	Public Aid (Province)	Public Aid (Kab. & Kota)	Mutual Aid	Self Aid
A1	AIFDR (Australia-Indonesia Facility for Disaster Reduction)	TA	On going		→	→	→	→	→2014		x			x		x			x	x	x				x	x	x	x	x	x	x	x	x		x		
	A1.1 Developing Risk Map										x			x		x				x					x	x	x	x	x	x	x	x	x				
	A1.2 Forming a Scientist Group to support BNPB (experts from technical ministries and universities)										x			x		x			x	x	x				x	x	x	x	x	x	x	x					
	A1.3 Developing a standardize training Program (moduls, kits,etc).										x			x		x			x						x	x	x	x	x	x	x	x	x				
	A1.4 Coordination with other donors & leverage Indonesia experience into the region										x			x		x					x				x	x	x	x	x	x	x					x	
A2	Hospital Preparedness for Emergencies (HOPE), including 4 distinct components: 1) Equiping a number of Muhammadiyah Hospitals to cope with Mass Casualty Events 2) Equiping Muhammadiyah medical teams for emergency field deployments 3) Community health outreach programs 4) A Community based disaster preparedness program	TA & Grant	On going		→	→	→				x			x		x	x				x		x		x	x	x	x	x	x	x	x				x	x
A3	Muhammadiyah Child Disaster Awareness for Schools and Communities (CDASC), including 3 components: 1) School Disaster Awareness & Planning 2) Campaign Material 3) Local mechanism for implementing CBDRM Each component aims to take a child centred approach, based on a range of theoretical frameworks. Other major stakeholders are teachers & community volunteers.	TA	On going		→	→	→	→	→		x			x		x					x				x	x	x	x	x	x	x	x				x	x
A4	Building Resilience in Eastern Indonesia - The project proposed a holistic approach to local level DM which emphasises the capacity building of local governments and civil society organisations (CSOs) to mobilise community action for DRR. The project addresses DRR vertically (from national to local) and horizontally (all sectors across the disaster management cycle). It will reduce potential for disaster losses in 80 villages in 15 disaster prone districts of Eastern Indonesia.	TA	On going		→	→	→	→	→		x			x		x				x		x				x	x	x	x	x	x	x	x	x	x	x	x	x
A5	Community Based Disaster Risk Management (CBDRM) through Pesantren (Islamic Boarding School) - Phase 1 & 2 - The project aims to empower pesantren with sufficient knowledge and skills on DM to further improve community resilience to disasters. It is also to develop capacity and knowledge of NU officials and members in disaster management. At present NU administers approx. 10,000 pesantren throughout Indonesia.	TA	On going		→	→	→				x			x		x				x		x				x	x	x	x	x	x	x	x	x	x	x	x	x
A6	Community Based Disaster Preparedness for Western Islands of Sumatera - The program works with key government stakeholders and local organisations in 58 villages in Nias and Mentawai Islands to raise community awareness, develop community contingency plan, as well as build local capacity for disaster and risk mitigation.	TA	On going		→	→	→	→	→		x			x		x				x		x				x	x	x	x	x	x	x	x	x	x	x	x	x
A7	Nabire Health and Disaster Management (NHDM) Project - The project is intended to prepare communities to minimise risks caused by natural disasters, to improve health of women and children, and to improve community water and sanitation facilities. The target areas are 30 villages in Nabire district, Papua province.	TA	On going		→	→	→	→	→		x			x		x					x				x	x	x	x	x	x	x	x			x	x	x
A8	AusAID Jakarta's Emergency Response Capacity - To enhance AusAID's capacity to rapidly respond to emergencies by developing staff capacity in disaster assessment and fundamentals of deployment to a field. This includes Emergency Duty Phone, Rapid Response Teams, IFRC Pre-positioned Funds, Logistical Support, Pre-positioned Supplies, Risk Management Advisory (RMA) Security Services, etc.	-	On going		→	→	→	→	→		x			x		x								x		x	x	x	x	x	x	x				x		
A9	Support to UN-OCHA - This support maintains the presence of OCHA in Indonesia with the objective of strengthening Disaster Risk Management (DRM) coordination and preparedness, and engagement with government coordination agency in disaster management (DM).	Grant	On going		→	→	→	→	→		x			x		x				x						x	x	x	x	x	x	x	x					
A10	IFRC Annual Appeal 2008-2009 for Indonesia - This support for the Annual Appeal for Indonesia for 2008-2009 aims to strengthen the capacity of Indonesian Red Cross in disaster preparedness and post-disaster response and to increase its institutional capacity to coordinate and respond to public health emergencies.	Grant	On going		→	→	→	→	→		x			x		x					x				x	x	x	x	x	x	x	x	x			x	x
A11	WFP Protracted Relief and Rehabilitation Operation (PRRO) 10069.2-2 - This supports recovery and nutrition rehabilitation in NTT and NTB. The program includes capacity building of local government, food security monitoring, support of WFP Offices, and the purchase of food commodities.	Grant	On going		→	→	→	→	→		x			x		x	x	x	x				x	x								x	x	x	x	x	x
A12	UNICEF Phase II - The program assists local government and community in Belu District, NTT through initiating and increasing the coverage and quality of essential high impact nutrition interventions, including infant and young children feeding, community based management of acute malnutrition, micronutrient supplementation for pregnant and lactating mothers and home-based fortification of under-five children.	Grant	On going		→	→	→	→	→		x			x			x	x					x	x										x	x	x	x
A13	FAO Project (Belu - NTT) -This is an emergency response activity against locust outbreaks in Belu District and to support food security assessment as a joint program with WFP and UNICEF.	Grant	On going		→	→	→	→	→		x			x			x						x											x	x	x	x
A14	Safer Communities through Disaster Risk Reduction (SCDRR) - *refer to UNDP*	Grant	On going		→	→	→	→	→		x			x		x	x		x	x	x		x		x	x	x	x	x	x	x	x	x	x	x	x	x
A15	Aceh Rehabilitation Projects	TA & Grant	finished							x				x				x						x		x	x							x	x	x	x	x

(3) Summary of Major Project

A brief description of major ongoing project by AusAID called "Australia-Indonesia Facility for Disaster Reduction" is provided below.

Project Title	Australia Indonesia Facility for Disaster Reduction (AIFDR)
Duration	5 years (start April 2009)
Budget	A$67 million (approximately US$42 million)
Counterpart	BNPB
Scheme	☐ Development Study ☒ Technical Assistance ☐ Grant Aid ☐ Loan ☐ Others ( )
Target Disaster	☐ Flood ☐ Landslide ☐ Earthquake ☐ Volcanic Eruption ☐ Tsunami ☒ (All)
Disaster Risk Management Cycle	☒ Preparedness ☒ Mitigation ☐ Emergency Response ☐ Rehabilitation/Reconstruction
Coordination with Other Donors	☒ No
Project Background and Objective	In late 2008, the Prime Minister of Australia and the President of Indonesia agreed to form a A$67 million Partnership for regional disaster reduction that will involve Australian and Indonesian collaboration on innovative scientific solutions and forward-looking analysis to build more effective disaster mitigation, preparedness and response in Indonesia and regionally through APEC and ASEAN The Facility will support Indonesia's and the region's efforts to reduce the impact of disasters and to improve self-management capabilities through training and outreach, risk and vulnerability assessment; and research and analysis on emerging regional threats. **The Goal :** To strengthen national and local capacity in disaster management in Indonesia, and promote a more disaster resilient region **Operating Principles** 1. Disaster Risk Reduction – AIFDR will work to improve the quality of disaster risk reduction and work to increase capacity for risk and vulnerability identification and risk mitigation in disaster planning and implementation. 2. Relationships – AIFDR will work collaboratively through the fostering of strong relationships with other key DRR-focused stakeholders. 3. Capacity Development – AIFDR recognizes the transient nature of development assistance initiatives and seeks to work with Indonesian colleagues and institutions in a sustainable manner. 4. Gap-Filling – AIFDR will seek to avoid duplication of the efforts by others, by focusing on identifying gaps in the current DRR capacity. 5. Alignment – AIFDR recognizes the excellent work being undertaken by government, bilateral, multilateral and civil society entities, in DRR. It will seek to align its own efforts within existing framework and agreements. 6. Integration – AIFDR will seek to link and integrate scientific risk and hazard identification, DRR research and information generation, training and mentoring programs and DRR policy and planning tasks. **How does it operate?** The design of the AIFDR is flexible. Its work programs are developed annually by AIFDR staff in consultation with its main partner BNPB. These are reviewed and amended by a senior level Executive Committee with Indonesian and Australian membership. The committee will be supported by a Steering Committee that will provide detailed oversight and guidance. Further support will be provided by annual visits from a Joint Monitoring Group and

	independent International Advisory Panel.

3) United Nations Development Programme (UNDP)

This section summarizes the assistance policy and strategy of UNDP and its past and present achievements in Indonesia.

(1) Assistance Policy and Strategy

Policy of UNDP
1) UNDP Country Programme for Indonesia (2006-2010) stipulates that reduction of vulnerability against natural disasters is one of the important issues. 2) Currently, UNDP provides assistance for Safer Communities through Disaster Risk Reduction, Disaster Risk Reduction for Ache, Disaster Risk Reduction and Recovery and Rehabilitation; through implementation of these projects, UNDP will support the Indonesian Government for DRR. 3) UNDP activities for supporting the Indonesian Government for DRR follow to achieve the Hyogo Framework for Action 2005-2015.
UNDP Strategy
UNDP Strategy in Indonesia for 2006 - 2010 are: (1) Strengthening human development to achieve the MDGs (2) Promoting sustainable environmental management (3) Improving the governance environment for local development (4) Reducing the risks of crisis (5)Supporting the reconstruction process in Aceh and North Sumatra

(2) Past and Present Achievements

In recent years, UNDP has supported the implementation of the following projects shown in Table 2.2.2.3.

Table 2.2.2.3 Past and Present Achievements by UNDP

No.	Name of Project	Scheme	Status	Present Situation and future plan	Schedule					Project Status				Cate-gory		Disaster Mngt. Cycle			Hyogo Framework for Action						Disaster Type									Main Actor				
					2009	2010	2011	2012	2013	Finished	On going	Under request	Consideration as ideas	Comprehensive Disaster Management	Integrated Water Resources Management	Pre-Disaster	Emergency Response	Post Disaster	HFA 1	HFA 2	HFA 3	HFA 4	HFA 5	PD	Earthquake	Tsunami	Volcanic Eruption	Landslide	Flood	Drought	Forest Fire	Destructive Wind	Public Aid (National)	Public Aid (Province)	Public Aid (Kab. & Kota)	Mutual Aid	Self Aid
U.1	SC-DRR (Safer Community through Disaster Risk Reduction)	GA	On going		→	→	→	→			x			x		x	x		x	x	x		x		x	x	x	x	x	x	x	x	x	x	x	x
U.2	DR4 (Disaster Risk Reduction Based Rehabilitaion and Reconstruction)	GA	Proposed		→	→	→	→				x		x				x						x	×	×	×	x	x	x	x	x	×	x	x	x	x
U.3	DRR - A (Making Aceh Safer Through Disaster Risk Reduction)	GA	On going		→	→	→	→			x			x		x	x		x	x	x		x		x	x	x	x	x	x	x		x	x	x	x
U.4	ERA (Early Recovery Assistance Programme for Jogja and Central Java)	GA	Finished		→					x				x			x	x					x	x	x									x	x	x	x
U.5	Aceh & North Sumatera Recovery Programs	GA	Various																																			
	U.5.1 ERTR (Emergency Response and Transitional Recovery)	GA	Finished		→					x				x			x	x					x	x	x	x								x	x	x	x
	U.5.2 Technical Assistance to BRR-Phase I and II: Support to Transition in Aceh and Nias	GA	Finished		→					x				x				x					x	x	x	x								x	x		
	U.5.3 Support to Strengthen the Capacity and Role of CSOs in the Recovery of Communities in Aceh and Nias	GA	On going		→						x			x				x					x	x	x	x								x	x	x	x
	U.5.4 UNDP Tsunami Recovery Waste Management Programme (TRWMP)	GA	On going		→	→					x			x				x					x	x	x	x								x	x	x	x
	U.5.5 Strengthening Access to Justice for Peace and Development in Aceh	GA	Finished		→					x				x				x					x	x	x	x								x	x		
	U.5.6 Aceh Government Transformation Programme (AGTP)	GA	On going		→	→	→				x			x				x					x	x	x	x								x	x		
	U.5.7 Aceh Partnerships for Economic Development (APED)	GA	On going		→	→	→	→			x			x				x					x	x	x	x								x	x	x	x
	U.5.8 Creating Jobs: Capacity Building for Local Resource-based Road Works in NAD and Nias	GA	On going		→	→	→	→			x			x				x					x	x	x	x								x	x	x	x
	U.5.9 Strengthening Sustainable Peace and Development in Aceh (SSPDA)	GA	Finished		→					x				x				x					x	x	x	x								x	x		
	U.5.10 Disaster Risk Reduction in Aceh	GA	On going		→	→	→				x			x										x	x	x											

(3) Summary of Major Projects

A brief description of major ongoing projects is given below.

A. Safer Community through Disaster Risk Reduction in Development (SCDRR)

Project Title	SC-DRR (Safer Community through Disaster Risk Reduction)
Duration	5 Years (Sept 2007 – 2012)
Budget	USD 18 million
Implementation Organization	The implementation of this project will be undertaken through National Development Planning Agency (BAPPENAS) in close partnership with the National Disaster Management Coordination Agency (BAKORNAS PB). When the new *BNPB* (National Disaster Management Agency) is operational and ready, as decided by the Project Executive Board, the new agency will take over the implementation of the project
Scheme	☐ Development Study ☒ Technical Assistance ☐ Grant Aid ☐ Loan ☐ Others ( )
Target Disaster	☐ Flood ☐ Landslide ☐ Earthquake ☐ Volcanic Eruption ☐ Tsunami ☒ Others (General Disaster Management)
Disaster Risk Management Cycle	☒ Preparedness ☒ Mitigation ☐ Emergency Response ☐ Rehabilitation/Reconstruction
Coordination with Other Donors	☒Yes (Name of Donor: UNDP, AusAID)
Project Background and Objective	It is intended to attain four key outputs: 1) Disaster risk reduction policy, legal and regulatory framework integrated with the development decision- making process at national, provincial/district levels; 2) Institutional systems that support decentralized disaster risk reduction; 3) Education and awareness programs to make disaster/ development linkages; 4) Demonstration of how the disaster risk reduction actions can be taken to make communities safer.
Lessons Learned	**1. Legal Reform** • Professional networks born of the tragic circumstances of previous disasters meant that high levels of trust and a willingness to coordinate were fundamental pillars of DM Reform. Political capital is as important as intellectual capital • DM Reform in Indonesia occurred at "the right time and the right place". • Expedience at the cost of comprehensive and exhaustive inclusiveness. • CSOs can lead the reform process: leadership is essential, supported by coordination. • Imperfect Law can be refined by subsequent regulation and strong institutional structures. **2. Partnership for DRR** *(Planas PRB[12])* • Established collaborative networks at the international and domestic level prior to the establishment of Planas PRB were fundamental to the Planas PRB. • Planas PRB is being led by the Forum PT13, illustrating that a non-government entity can lead multi-stakeholder policy discussions. • Strategies to engage different stakeholders need to be appropriate to the target. • Successful models for National Platforms sometimes are first evident at the sub-national level.

[12] National Platform for DRR is a multi-stakeholder mechanism serving as an advocate for DRR at all levels of government.
[13] Higher Education (university) forum for DRR activities

B. Making Ache Safer Through Disaster Risk Reduction (DRR-A)

Project Title	DRR – A (Making Aceh Safer Through Disaster Risk Reduction)
Duration	3 Years (2009 – 2011)
Budget	USD 9.87 million
Implementation Organization	It will be implemented by the National Government (MOHA) and Provincial Government of NAD involving agencies at provincial and district levels in collaboration with BRR and related national authorities with support from UNDP. Strategic partnerships will be established with other relevant Government ministries and agencies and with public and private partners at international, national, provincial, district levels, sub-district and village levels.
Scheme	☐ Development Study ☒ Technical Assistance ☐ Grant Aid ☐ Loan ☐ Others ( )
Target Disaster	☐ Flood ☐ Landslide ☐ Earthquake ☐ Volcanic Eruption ☐ Tsunami ☒ Others (General Disaster Management)
Disaster Risk Management Cycle	☒ Preparedness ☒ Mitigation ☒ Emergency Response ☐ Rehabilitation/Reconstruction
Coordination with Other Donors	☒No
Project Background and Objective	It is designed to make disaster risk reduction a normal part of the development process established in core functions of Aceh's local government and its public and private partners especially in Aceh's local communities where the most effective and direct actions can be taken to reduce physical, economic and social vulnerability to disasters. The above aim is to be attained through five main outputs of the project, namely : 1. Institutional arrangement and enabling environment established to facilitate participatory and concerted implementation of DRR measures 2. Demonstration gender – sensitive projects implemented in selected locations to test and improve measures for reducing risks from natural disasters 3. TDMRC-UNSYIAH strenghtened to provide science-based information, service and knowledge assistance to the local government and other DRR proponents in implementing their DRR-Activities 4. DRR public awareness programmes implemented to promote gender sensitive "Culture of Safety" among the people and institutions of Aceh 5. Project effevtively and efficiently managed, monitored, evaluated, and audited.

C. Disaster Risk Reduction Based Rehabilitation and Reconstruction (DR-4)

Project Title	DR4 (Disaster Risk Reduction Based Rehabilitation and Reconstruction)
Duration	3 Years (1 January 2009 – 31 December 2011)
Budget	USD 1.000.000
Implementation Organization	DR4 will be nationally executed by the National Disaster Management Agency (BNPB) under the guidance of a Project Board (PB) consisting of BNPB as Chair, the National Development Planning Agency (BAPPENAS) as Vice-Chair, Ministry of Home Affairs (MOHA) and UNDP as initial board members. Board membership may be expanded to include other Government or public/private agencies as agreed to by the board.
Scheme	☐ Development Study ☒ Technical Assistance ☐ Grant Aid ☐ Loan ☐ Others ( )
Target Disaster	☐ Flood ☐ Landslide ☐ Earthquake ☐ Volcanic Eruption ☐ Tsunami ☒ Others (General Disaster Management)
Disaster Risk Management Cycle	☐ Preparedness ☐ Mitigation ☐ Emergency Response ☒ Rehabilitation/Reconstruction
Coordination with Other Donors	☒Yes (World Bank and other donors)
Project Background and Objective	The DR4 project is designed to support the Government of Indonesia (GOI) establish rehabilitation and reconstruction planning and implementation processes that are guided by a disaster risk reduction principles and in line with the GOI adopted HFA-DRR. The overall development objective is to "*strengthen the capacity of GOI national and local government agencies to coordinate and implement gender sensitive, pre and post disaster recovery planning processes and practices based on disaster risk reduction principles*". The project aim is to support the GOI in its efforts to ensure that rehabilitation and reconstruction planning take place in a way that better considers the needs of any given disaster affected community. This will be attempted through establishment of adequate pre-disaster information systems, recovery planning and needs analysis systems as well as pre-established agency relationships. It will also support the identification of the underlying causes of a given disaster so that these causes are considered and accounted for as a part of rehabilitation and reconstruction programme design so that affected communities and local governments make disaster risk reduction a normal part of their development planning and governance processes.

4) World Bank (WB)

This section summarizes the assistance policy and strategy of WB and its past and present achievements in Indonesia.

(1) Assistance Policy and Strategy

Policy of the World Bank
1) Strengthen the capacity of the country to adapt to climate change and address environmental challenges to ensure sustainability 2) Enhance capabilities to improve disaster risk preparedness, mitigation measures, and post-disaster recovery and reconstruction responsiveness to strengthen sustainability, Also, 1) The Bank has a new policy on Rapid Response to Crisis and Emergencies (OP/BP 8.00, January 2007). The last two years have provided the World Bank in Indonesia with intensive experience in responding to a range of emergencies and crisis (Aceh and Nias tsunami & earthquake, Yogyakarta/ Central Java earthquake, avian flu, Jakarta floods, etc.). The Bank needs to capitalize on the new policy and existing resources to ensure that the Bank can effectively respond to future disasters and integrate disaster risk reduction as part of the lending and grant portfolio (this could be done in tandem with the integration of adaptation to climate change). Planned Key Outputs: (1) creation of virtual disaster management team, drawing on field and headquarters expertise, for knowledge sharing, coordination and rapid response; (2) training and raising awareness about OP/BP 8.00 and disaster risk reduction; (3) facilitation of disaster risk reduction expertise and resources for task teams that are actively interested in including disaster preparedness and mitigation as part of their ongoing and planned operations; 2) The OPCS paper, "Toward a New Framework for Rapid Bank Response to Crises and Emergencies," calls on the Bank to promote a proactive approach to reducing disaster risk in high-risk countries and to work with all development partners to mainstream risk reduction. The Government of Indonesia has recently issued a National Action Plan for Disaster Reduction (2006-2009) and the House of Representatives (DPR) is deliberating on a bill concerning disaster management. UNDP, with support from DfID, is developing a program on "Safer Communities through Disaster Risk Reduction in Development." Thus, there is a mandate and opportunities to support external partners in reducing and managing disasters. Planned Key Outputs: (1) mobilization of resources from the Global Fund for Disaster Reduction and Response (GFDRR); (2) specific support for preparation of the new National Action Plan 2010-2014 (BAPPENAS), capacity building for disaster management agencies and developing a framework for catastrophic risk insurance (Ministry of Finance); and (3) coordination with development partners, e.g., active participation in the UN Technical Working Group on Disaster Risk Reduction.
WB Strategy
1) Mainstreaming of risk reduction in the development process will include strengthening Bappenas capacity in preparing the national action plan, strengthening the capability of BNPB and designing a framework for disaster-risk insurance with the MoF. A key upcoming disaster risk reduction initiative is the Jakarta municipality's (DKI Jakarta) three-year river dredging program, the Jakarta Emergency Dredging Initiative (JEDI). The WBG will assist DKI Jakarta to locate grant financing for capacity-building within the municipal administration for the effective operation and management of the flood-management system. 2) The WBG will continue deepening the relationships established with Bappenas and the local governments of Aceh, Nias and Yogyakarta in supporting selected elements of the Government's actions to strengthen natural disaster resiliency. The rebuilding of Aceh and Nias will continue for the CPS period through the MDF, as will the JRF activities for Yogyakarta and Central Java. A second-phase MDF will support the Aceh region to transition from post-tsunami reconstruction towards sustainable economic development, an important part of which will be through strengthening local capacity. Over the CPS period, the WBG will – in consultation with Government and other partners – also provide requisite support to Indonesia to respond to other natural challenges.

(2) Past and Present Achievements

In recent years, following projects, shown in Table 2.2.2.4, have been implemented by World Bank

Table 2.2.2.4 Past and Present Achievements by WB

No	Name of Project	Scheme	Status	Present Situation and future plan	Schedule					Project Status				Cate-gory	Disaster Mngt. Cycle			Hyogo Framework for Action						Disaster Type									Main Actor				
					2009	2010	2011	2012	2013	Finished	On going	Under request	Consideration as ideas	Comprehensive Disaster Management	Integrated Water Resources Management	Pre-Disaster	Emergency Response	Post Disaster	HFA 1	HFA 2	HFA 3	HFA 4	HFA 5	PD	Earthquake	Tsunami	Volcanic Eruption	Landslide	Flood	Drought	Forest Fire	Destructive Wind	Public Aid (National)	Public Aid (Province)	Public Aid (Kab. & Kota)	Mutual Aid	Self Aid
W.1	GFDRR (Global Facility for Disaster Reduction and Recovery) Phase 1	TA	On going								x			x		x			x	x	x				x	x	x	x	x	x	x	x	x	x	x	x
	W.1.1. Preparation of National Action Plan for DRR (2010-2014)	TA	On going								x			x		x			x	x					x	x	x	x	x	x	x	x			x	
	W.1.2.. Capacity building for DRR	TA	On going								x			x		x			x						x	x	x	x	x	x	x	x			x	
	W.1.3. Strengthening the World Bank's Role	TA	On going								x			x		x					x				x	x	x	x	x	x					x	
	W.1.4. Preparation of Catastrophic Insurance Framework	TA	On going								x			x		x			x						x	x	x	x	x	x	x	x	x	x	x	x
W.2	GFDRR (Global Facility for Disaster Reduction and Recovery) Phase 2	TA	On going								x			x		x			x	X	x	x		X	x	x	x	x	x	x	x	x	x		x	
	W.2.1. Mainstreaming DRR in regular development and through post disaster recovery	TA	On going								x			x		x			x		x			X	x	x	x	x	x	x	x	x	x		x	
	W.2.2. Capacity Building of national and local DRM agencies, including risk assesment and risk response	TA	On going								x			x		x			x	x					x	x	x	x	x	x	x	x	x			
	W.2.3. Support to comprehensive risk financing strategy linked to DRR actions	TA	On going								x			x		x			x						x	x	x	x	x	x	x	x				
	W.2.4. Linking Disaster Risk Reduction and Climate Adaptation	TA	On going								x			x		x			x			x			x	x	x	x	x	x	x	x			x	
W.3	JEDI (Jakarta Emergency Dredging Iniative)	TA	Basic design study is on going/requested									x	x		x	x			x				x						x			x	x			x	
W.4	MDF (Multi Donor Fund) - (Aceh&Nias Reconstruction)	Various	Finished							x				x				x			x			x	x	x							x	x	x	
W.5	JRF (Java Reconstruction Program) - (Yogya Reconstruction)	GA	Possible Extension								x			x				x			x			x	x								x	x	x	

(3) Summary of Major Project

A brief description of major ongoing project by World Bank called "Global Facility for Disaster Reduction and Recovery (GFDRR)" is shown below.

Project Title	Global Facility for Disaster Reduction and Recovery (GFDRR): Mainstreaming DRR in Indonesia
Duration	Multi years
Budget	USD 1,2 million
Counterpart	BAPPENAS, BNPB, Government of DKI, Semarang, Jogjakarta and Surabaya and other included as the program implementation develops
Scheme	☐ Development Study ☒ Technical Assistance ☐ Grant Aid ☐ Loan ☐ Others ( )
Target Disaster	☐ Flood ☐ Landslide ☐ Earthquake ☐ Volcanic Eruption ☐ Tsunami ☒ Others (all)
Disaster Risk Management Cycle	☐ Preparedness ☐ Mitigation ☐ Emergency Response ☐ Rehabilitation/Reconstruction
Coordination with Other Donors	☒ Yes (Name of Donor: UNDP, AusAID, JICA) ☐No
Project Background and Objective	The formulation of project is primarily based on Indonesia Disaster Risk Profile as follows: 1. Indonesia ranks 12th among countries at relatively high mortality risks from multiple hazards 2. Increasing frequency of disaster impacting public expenditures 3. Situated in the earthquake belt and pacific-ring of fire, Indonesia is highly vulnerable to earthquakes and volcanic eruptions 4. High rainfall regime in the west and dry zone in some eastern provinces are subject to recurring floods and drought 5. Deforestation and prolonged drought intensify the occurrence of forest fires Based on the fact above, Indonesia needs the comprehensive and collaborative efforts with objective to minimize the impact of the disaster, to minimize the financial loss and to reduce the casualties. The efforts also will do the sustainable works on assessment, mitigation and adaptation to avoid the cost when a disaster event occurs.
Project Result	Project is still underway, and the existing results cannot be used as measurement yet.
Recommendations	The efforts need a broader collaboration as the issue is a cross-cutting one which must be incorporated in every sector of the development.
Learning	From the process of seeking the collaboration with the government, the mechanism and culture of the local government and their institutional habits need to be identified and recognized to smoothen the penetration and to obtain the acceptance from their side.
Issues	The donor has to clearly identify the need of the beneficiary. As an example, Government of Jakarta issues are not financial in nature but more on the coordination and the mechanism of the administration on the district and sub-district up to village level. But others, such as Semarang, financial capability is an issue while the plan and program have been in place.
Others	For the community-based project, besides the direct engagement of the beneficiaries from the planning to implementation, there is an emerging issue regarding the expectation toward the project which is that the beneficiaries (community) expect the tangible, expeditious and applicable activities.

5) Map of Disaster Risk Management Activities in Indonesia by International Aid Agencies

In Indonesia, most of reconstruction and rehabilitation projects for Ache and Yogyakarta have settled down and about to finish. And most of donors are shifting from recovery to disaster risk reduction project to mitigate disaster impact before occurrence of disaster.

However, these disaster risk reduction efforts by the Indonesian Government supported by international donors have not been coordinated, and sometimes duplication of projects does exist. In order to avoid such inconsistency, in this project, mapping of projects supported by international donors are initiated. This mapping effort will contribute further to better implementation of projects and avoid overlapping, and also utilize past efforts to standardize tools in disaster management activities.

(1) Procedure of Mapping

The project efforts of four international donors, namely, 1) JICA, 2) AusAID, 3) UNDP, and 4) WB, are mapped out in this study. The procedure of mapping is illustrated in Figure 2.2.2.1.

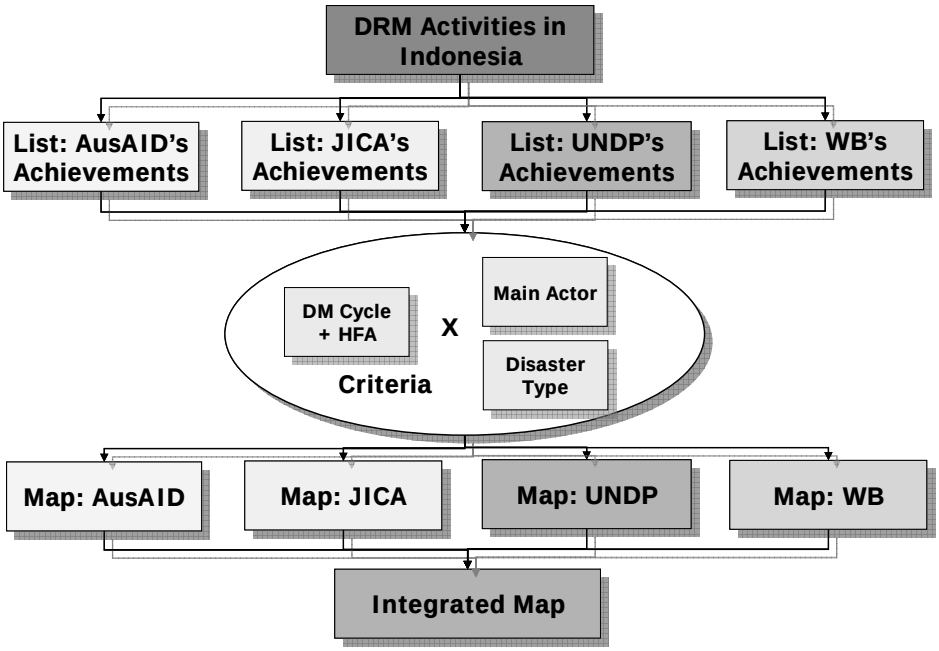


Figure 2.2.2.1 Procedure of Mapping

Utilizing the list of past and present achievements by each donor, the following 2 (two) Types of mapping format are prepared as shown below.

Mapping 1: Disaster Management Cycle (HFA) * Main Actors

Mapping 2: Disaster Management Cycle (HFA) * Disaster Type

First of all, based on the list of projects by each organization, the coverage area of each project is plotted on the map separately. And each plotted map is finally integrated into one map to clarify which area is covered by each organization.

(2) Result of Mapping

The outcome of the whole exercise of mapping out the donor projects is shown in Figure 2.2.2.2 and Figure 2.2.2.3.

Looking at the mapping out results, a clear picture is revealed of possible coordination among donors. This and other findings are explained in a later section.

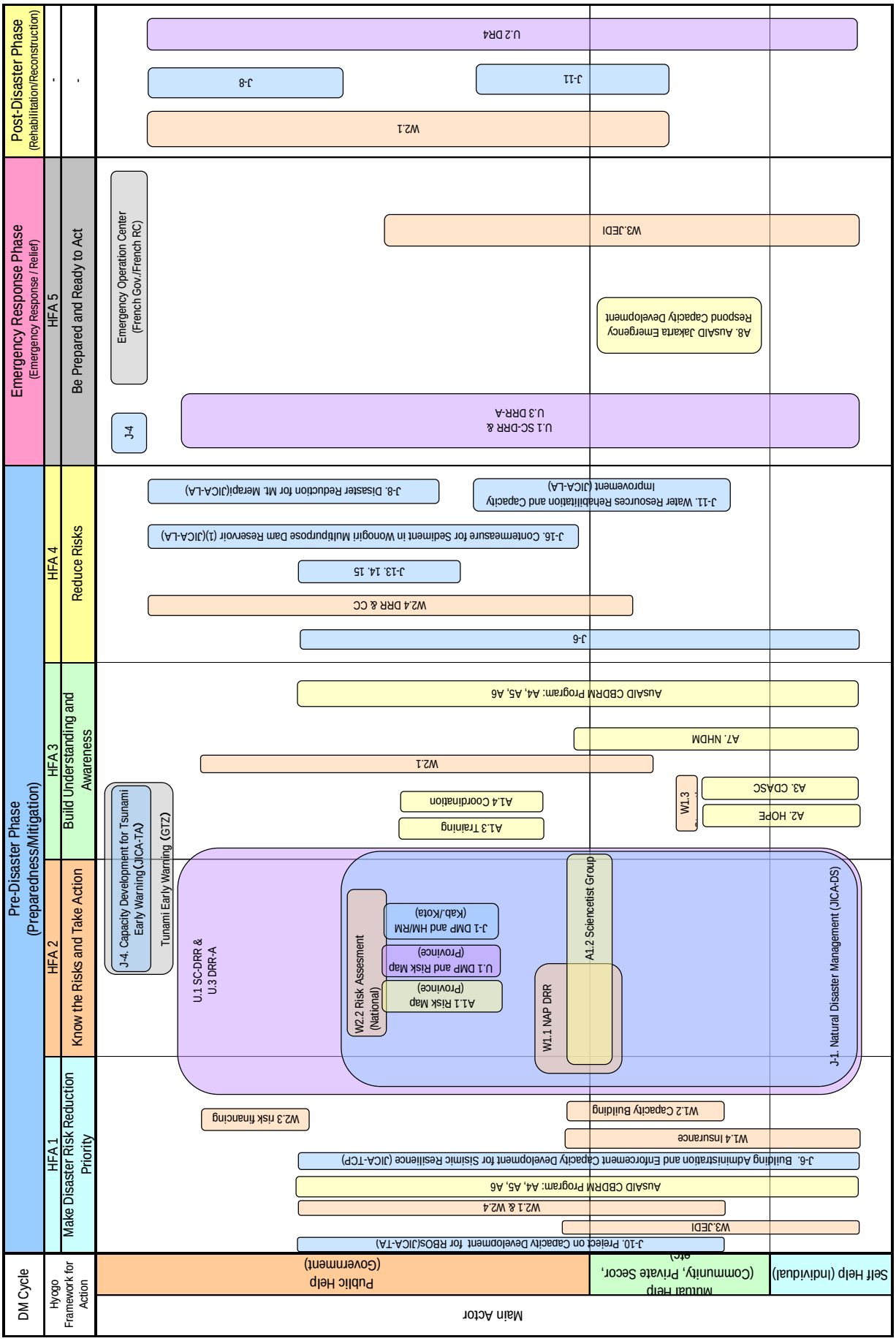


Figure 2.2.2.2 Result of Mapping 1 (Disaster Management Cycle (HFA) and Main Actor)

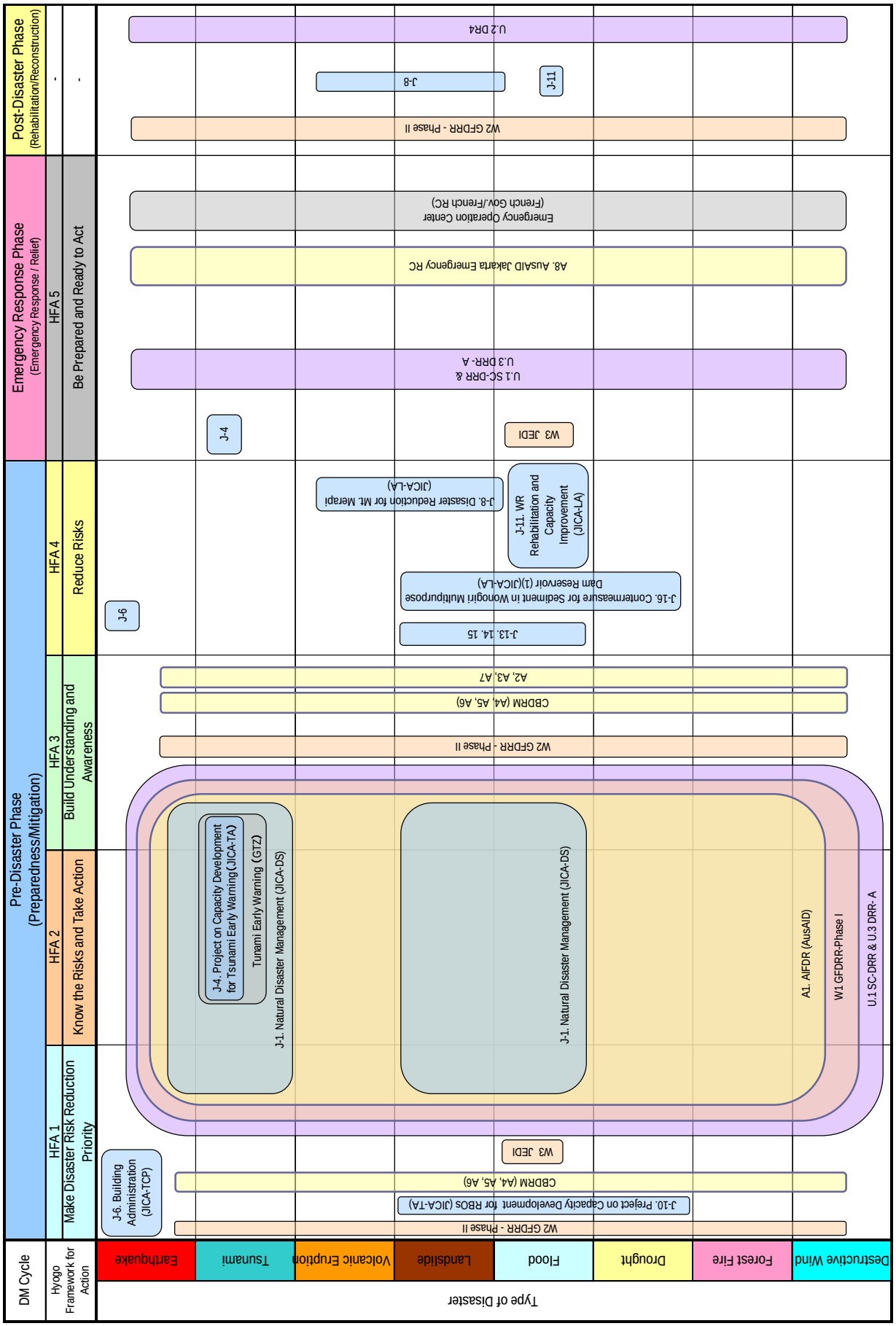


Figure 2.2.2.3 Result of Mapping 2 (Disaster Management Cycle (HFA) and Disaster Type)

(3) Findings from the Result of Mapping

A. Findings from Mapping 1

Looking at the result of mapping 1 focusing on HFA and Main Actors, one sees many implemented and ongoing projects and there seems to be no gap on these donor activities. However, focusing on 1) spatial coverage, which region the project covers, 2) tools and methodology applied in the project in similar projects, and 3) weather appropriate coordination and information sharing among donors, actual achievements implemented so far covers a very limited area.

For 1) Spatial coverage, due to the topography of Indonesia, a lot of time and resources are necessary to cover all of Indonesia, and for 2) tools and methodology, these are developed most of the time in each project and not utilized in other projects, and for 3) appropriate coordination among donors is not yet carried out resulting in duplication of projects. If standard tools and methodology are developed and introduced, other donors can utilize the result and if necessary, these results can be improved.

Most of donors implement general projects covering all actors, and in many areas of priorities in HFA, JICA implements very specific projects such as planning, risk assessment, community empowerment, and structural and non-structural measures to reduce risks, especially on HFA Priority 1 and HFA Priority 4.

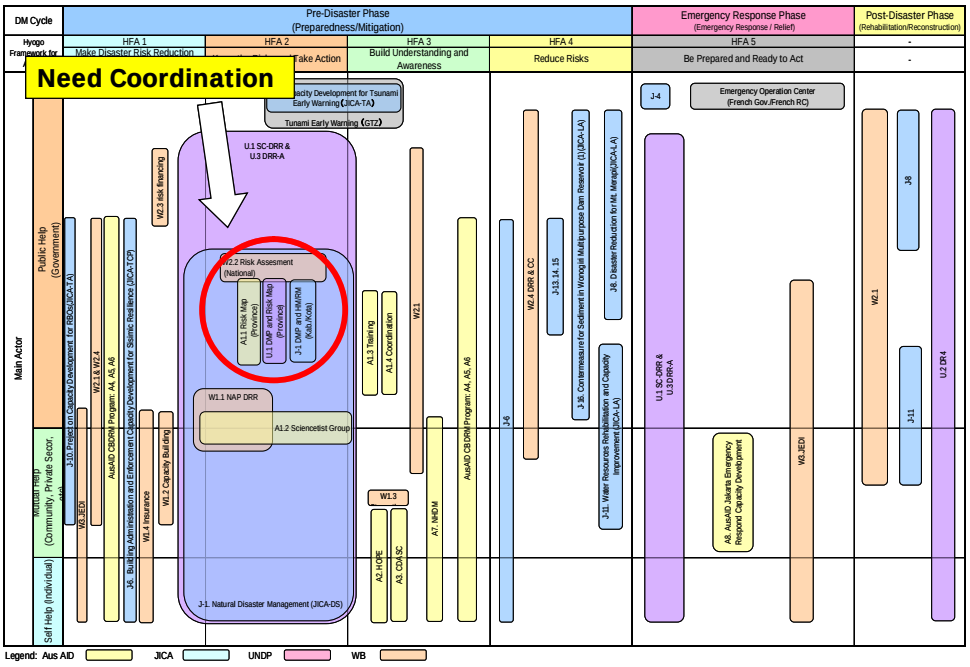


Figure 2.2.2.4 Findings from Mapping 1

In particular, many donors are interested in supporting risk assessment and this risk assessment is implemented in a variety of governmental levels including national, provincial and kota/Kabupaten level. If each donor utilizes a different source of data, such as natural and social condition data, the result will be different, and that will lead to misjudging of disaster management strategy in each region.

From this map, the following issues are identified.

1) There are so many projects implemented in recent years, so that result of each of the projects should be reviewed when the similar projects are planned to be implemented
2) Information and methodology of each project should be shared among the Indonesian Government and donors, and the result should also be disseminated to local level so that local governments can replicate the similar projects by themselves with minimum effort.
3) Activities that can be duplicated are risk assessment, disaster management planning, community based disaster risk management, etc.

B. Findings from Mapping 2

Looking at the result of mapping 2 focusing on HFA and Disaster Type, there are also many implemented and ongoing projects; however, most of the projects are covering general activities covering all types of disaster. In other words, they are not disaster specific projects. Most of the projects are focusing on legislation, institution, and planning and community activities and do not fulfill HFA priority 4 on risk reduction. JICA rather covers this field, however, earthquake disaster management sector is lacking. Among all disasters, earthquakes trigger the most devastating damage, and due to their frequency, actual physical enforcement is lagging behind. It is very much clear that pre-disaster measures cost less than the amount spent recovering after the occurrence of catastrophic disaster. Also, from this result, it is also clear that spatial coverage is not enough and donors need appropriate coordination.

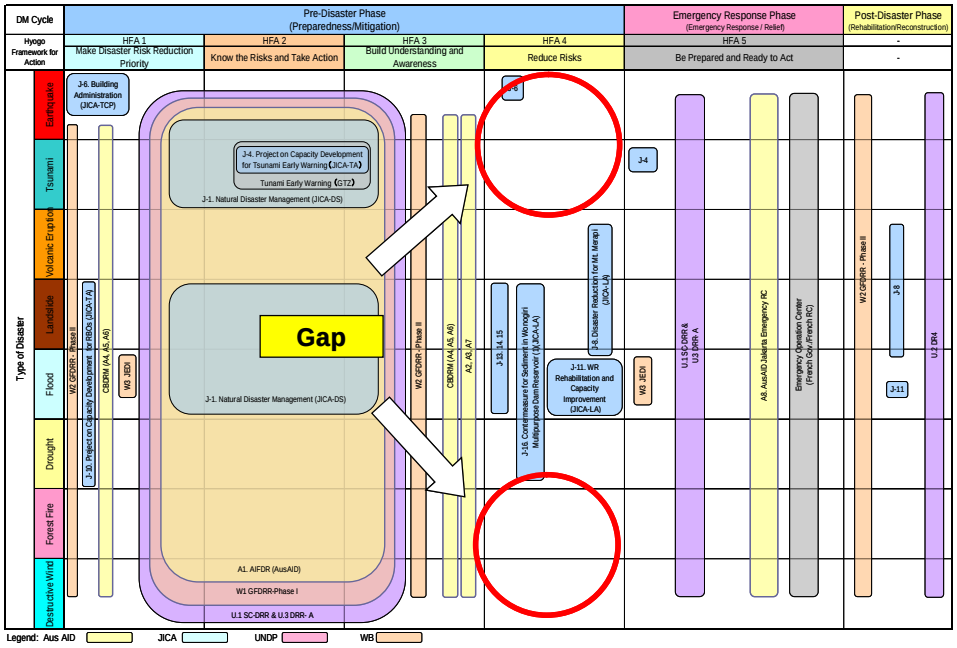


Figure 2.2.2.5 Findings from Mapping 2

From this map, the following issues are identified.

1) Many of donors cover HFA Priority 1, 2, and 3, and all types of disasters (not disaster specific)
2) Response is different from types of disasters, therefore, disaster specific projects need to be implemented or considered
3) Earthquake disaster especially in HFA Priority 4 on Risk Reduction is lacking
4) Also, Tsunami, Volcanic disaster in HFA Priority 4 is lacking

(4) Possible Coordination among Donors

As a result of the mapping, the following coordination among donors can be expected.

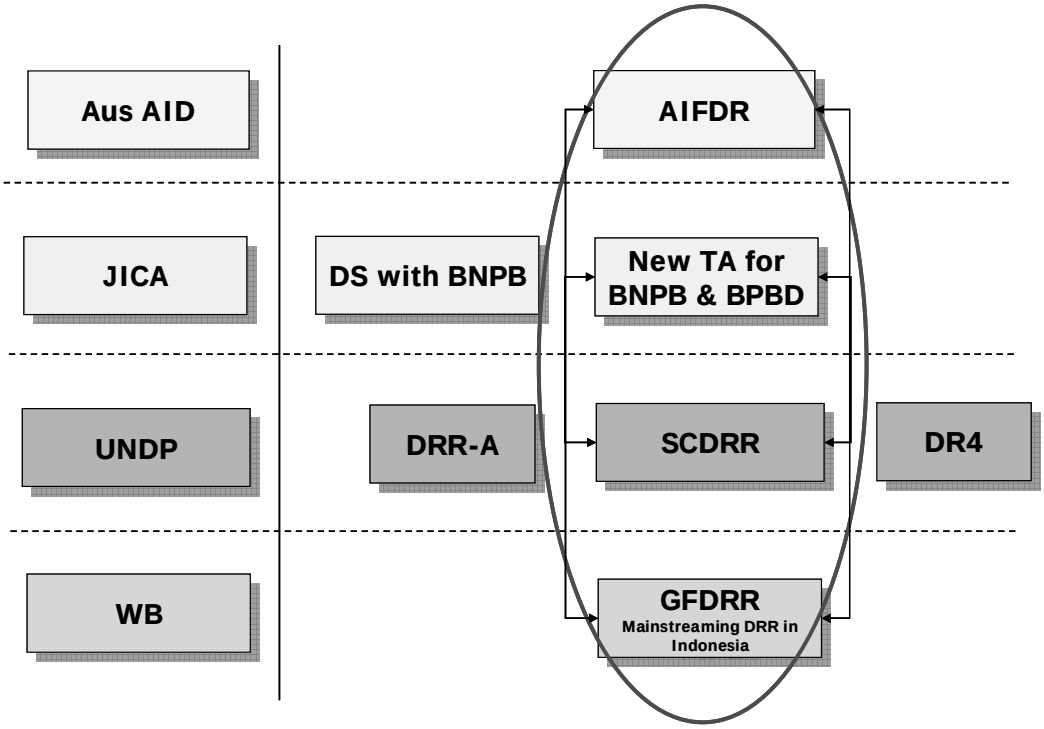


Figure 2.2.2.6 Need of Coordination of Four Donor Projects

There are many projects implemented by donors. As indicated in Figure 2.2.2.6, AIFDR by AusAID, Development Study with BNPB by JICA and following new proposed project, SCDRR by UNDP with support of AusAID, and GFDRR led by WB all need to be coordinated since quite many of their components are similar and information sharing among them will greatly contribute to aiding the Indonesian Government to efficiently and effectively implement DRR activities. This section describes specifically, what topics can be coordinated among donors.

A. Capacity Development of BNPB and BPBD

All of the four major donors are involved in capacity development of BNPB and BPBD, and AusAID, UNDP, and WB allocate experts in BNPB for their support and JICA plans to send an advisor to BNPB to support its capacity development. These experts and advisors definitely need to be coordinated and cooperated to avoid unnecessary duplication and misunderstanding of strategy by the Indonesian Government. Following activities can be coordinated and cooperated:

1) Education and Training of BNPB and BPBD Staffs

2) Establishment of BPBDs both at provincial and Kota/Kabupaten levels, and

3) Education and Training of BPBD Staff members

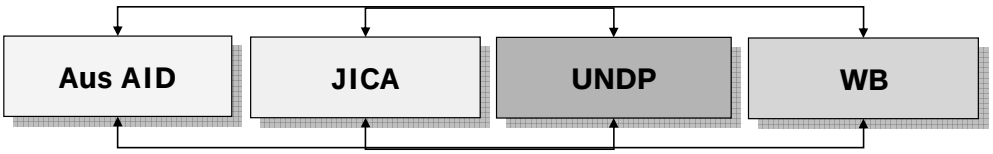


Figure 2.2.2.7 Coordination for Capacity Development of BNPB and BPBD

B. Risk Assessment

Implementation of Risk Assessment including Hazard and Risk Mapping is the first step for DRR efforts, and recently, most of donors are interested in this topic. As mentioned in Figure 2.2.2.8, WB support is at national level, AusAID plans to support both provincial and Kota/ Kabupaten levels, UNDP supports provinces, and JICA supports Kabupaten/Kota. Ideally, when these maps are integrated accumulating from Kabupaten/Kota level, the accumulated maps in provinces and then national level should be the same, in this regard; same type of data should be utilized together with accumulation of accurate data from local level. Therefore, the methodology and data should be considered carefully and coordinated among donors for these activities. In fact, these activities have just started and coordination can be made if these donors start sharing their ideas.

The following activities can be coordinated and cooperated:

1) Standardization of data format and enhancement of disaster data and information acquisition and accumulation system at local level

2) Unification of Data Source as much as possible

3) Involvement at all levels of the similar Researcher Group

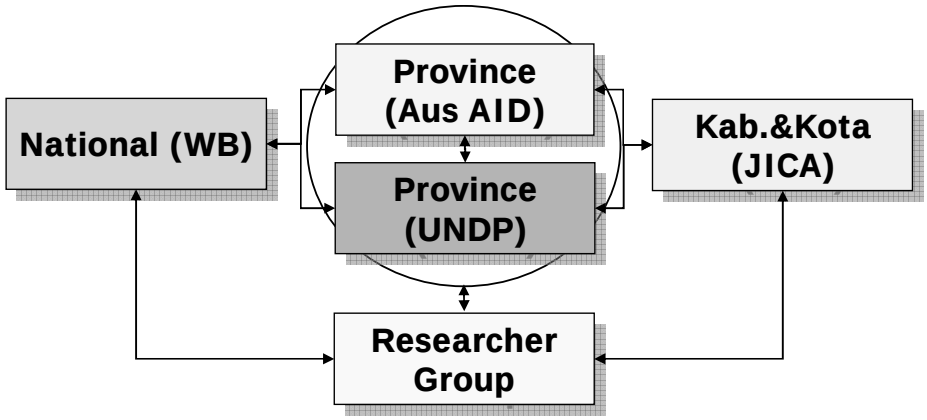


Figure 2.2.2.8 Coordination for Risk Assessment

C. Disaster Management Planning

Disaster management planning is a tool to systematically plan all activities necessary in disaster management cycle including pre-disaster, emergency response, and post-disaster activities. JICA supported these activities due to its rich experience on disaster management planning in Japan accumulated over more than 50 years of history. JICA supported plan formulations of national and Kabupaten/kota levels, and UNDP supported provincial level; thus the structure of the plans needs to be unified. And due to coverage of 8 types of natural disasters in Indonesia, these plans must be restructured.

The following activities can be coordinated and cooperated:

1) Unification of structure and contents of plans

2) Implementation of planned efforts must be activated with necessary budget allocation

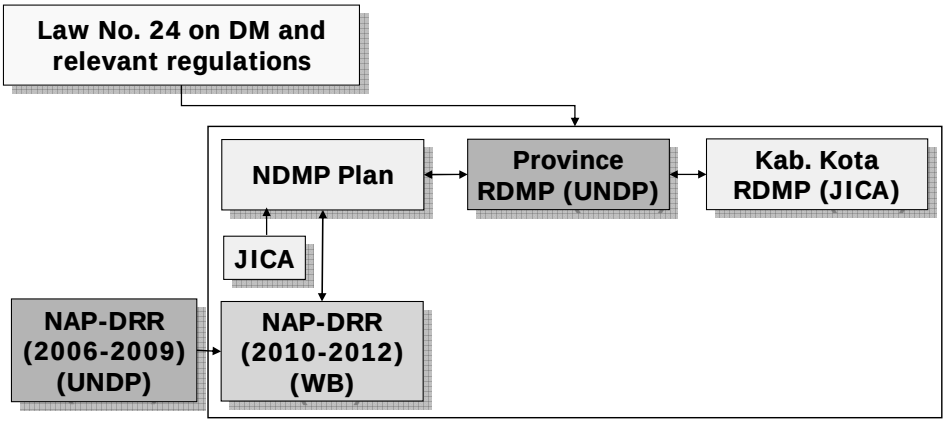


Figure 2.2.2.9 Coordination for Disaster Management Planning

2.2.3 Disaster Information Network

1) Japan International Cooperation Agency (JICA)

The study named "Consultants Service for Disaster Management Communication Networks Improvement" was conducted for about four months in 2007-2008. The objectives of the study were: 1) To collect data and information of the present status of communication infrastructure for disaster prevention (early warning) in terms of the role of concerned government organizations; 2) To display, after having been analyzed, the valuable information of the present status of communication infrastructure for early warning and reporting systems, which includes the internal central government communication network; communication between central and sample local government network; the internal sample local government network; and sample local government disaster reporting institutions and systems; and 3) To know the problems and possible alternatives for optimized communication related with disaster preparedness information for quick recovery actions.

Major items of conclusion from this study are as follows: 1) role and responsibility of each institution related with disaster are still needed to be clarified; 2) existing instruments related with disaster management communication networks are mostly used just for tsunami and earthquake disasters; and 3) conditions of communications facility in Indonesia are not adequate for handling disaster especially in emergency response phase.

Major items of recommendation from this study are as follows: 1) regulation or basic law about early warning system is required to clarify authority in decision making; 2) improvement for better communications infrastructure facility at local government level is necessary for disaster reporting; 3) communication via VSAT, satellite phone and mobile satellites are expected to guarantee fluency of communications; and 4) BNPB must have secure and reliable communication infrastructure.

2) French Government and French Red Cross

A project has been conducted based on the "Project Description Reinforcement of Disaster Management Capacity in Indonesia" signed by BAKORNAS PB, the Indonesian Red Cross (PMI), French Government and French Red Cross on August 25, 2005. According to the initial budget mentioned in the project description, the French Government and French Red Cross share 2.4 million Euro and 2.7 million Euro respectively, though present total budget of French Red Cross has increased to 3.2 million Euro. The French Government takes charge of 1) establishment of emergency operations center (EOC) in BAKORNAS PB (BNPB) and training to the staff and 2) establishment of EOCs in three provinces of DKI Jakarta, West Sumatra and Aceh as well as training to the staff. The French Red Cross takes charge of 1) establishment of EOCs in three provinces of Bali, Jambi and Yogyakarta, 2) formulation of guidelines and procedures for

EOC, 3) training of managers and operators and 4) community awareness-raising activities through PMI.

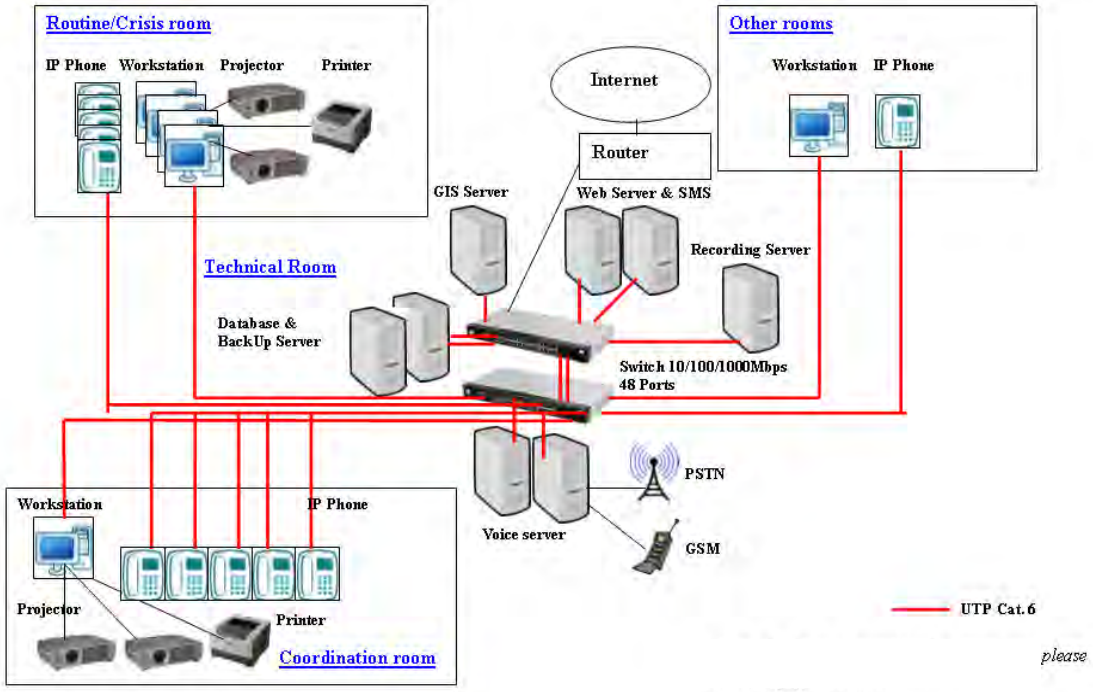
The project components for implementation by the French Government were completed in 2007. EOCs assisted by the French Government were established in existing governmental buildings and ready-made French software was adapted to software for database. The Indonesian government prepared the office space and the French government provided equipment and system.

The project components for implementation by the French Red Cross are still ongoing and will be completed in June 2010. Taking into account the lessons learned from the French Government, EOCs are newly established with earthquake-proof structure near provincial government office and equipped with electrical and water backups. As for installed software, free software is selected as much as possible, and software for database is newly developed and tailor-made, aiming at reducing operational cost. Communication devices of EOCs include IP telephone as a main communication device, fixed-line phone, mobile phones and satellite phone for securing communication function in disaster occurrence. Server for early warning such as by BMKG is installed in EOC and another system can be installed in EOC. Operation and maintenance cost will be borne by French Red Cross for one year after completion of the Project.

It is considered as future challenges of the project whether BNPB's existing system and the new systems put in place by the French Government as well as by the French Red Cross can connect and function properly.

Source: French Red Cross

Figure 2.2.3.1 Provincial Emergency Operations Center



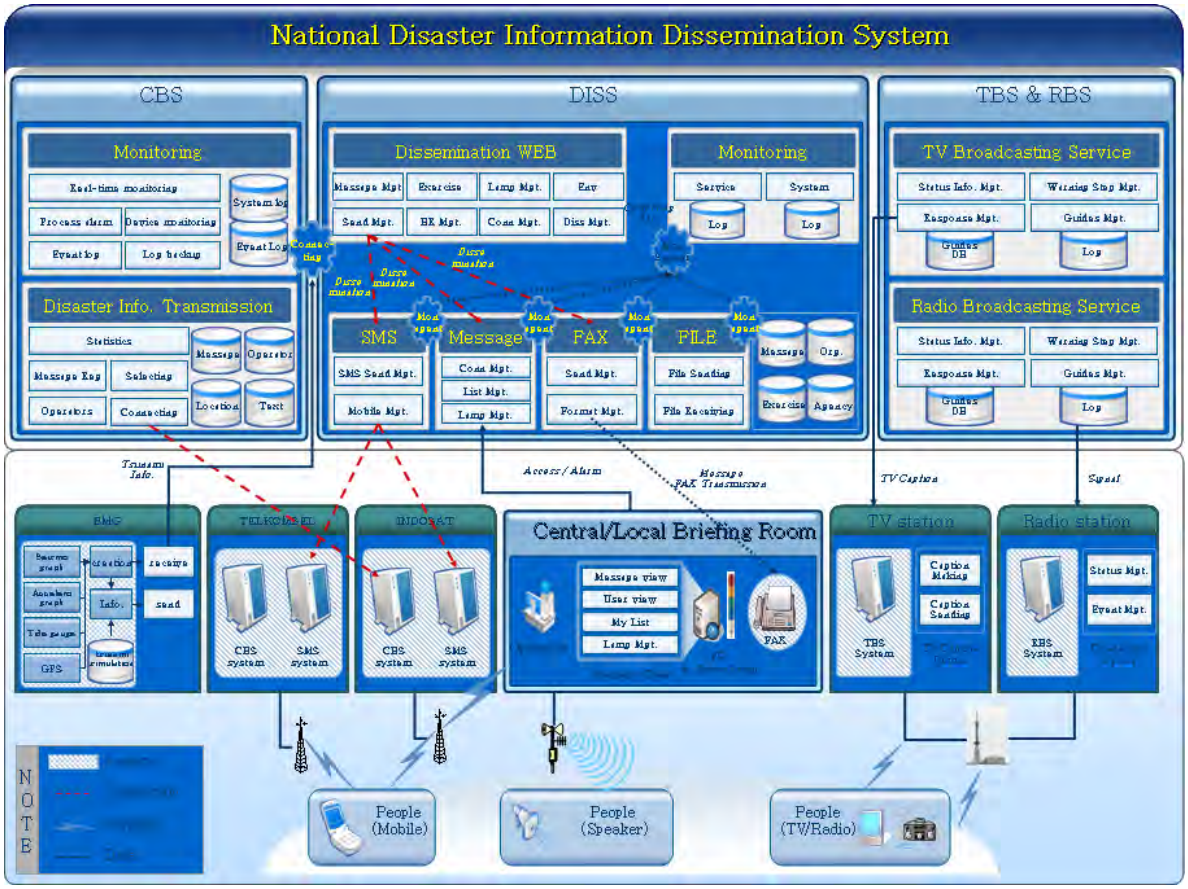
Source: BNPB

Figure 2.2.3.2 Equipment Planning for Emergency Operations Center in Provinces

3) Korean International Cooperation Agency (KOICA)

A project entitled “Establishment of a National Disaster Information Dissemination System in Indonesia" has been conducted with DEPKOMINFO as a counterpart for two years starting 2008. The budget allotted by KOICA for the project was US$3 million. The objective of the project is to disseminate disaster information such as earthquake and tsunami information to people through various ways like disaster information sharing system (DISS), cell broadcasting system (CBS) and TV & radio broadcast services. The project components consist of study and design of the system, installing the system and training. The study has already completed and successfully demonstrated the system which connects a main server installed in BMKG to electronic media such as TV & Radio companies, relevant governmental organizations like BNPB and six (6) pilot offices such as Aceh, Bengkulu and Banten through Virtual Private Network (VPN). BMKG has played a key role in this project for transmitting information since all the information handling in this project is transmitted from BMKG. CBS is the system used to disseminate the disaster information automatically to numerous people using mobile phones. In order to realize CBS and make it function, cooperation with telecommunication companies dealing with mobile phones is crucial. More steps still remain to realize this, therefore, CBS still presents some challenges at present. In addition, training program to the staffs of DEPKOMINFO and BMKG has already been done in Korea for about two weeks. Evaluation of the project will be done in September or

October 2009 and the project will be completed by December 2009, but technical service for operation and maintenance will continue for two (2) years.



Source: BNPB

Figure 2.2.3.3 Overview of National Disaster Information Dissemination System

4) Other Assistance and Projects being Conducted or to be Conducted

This study has no confirmation of any other future assistance or projects in disaster information network.

2.2.4 Earthquake Disaster Management

1) Japan International Cooperation Agency (JICA)

In earthquake disaster management, after the occurrence of earthquake disaster, to support rehabilitation and reconstruction activities, JICA dispatched teams to affected regions. Also, recently, to mitigate the damage from earthquake, building administration enforcement projects have been implemented.

A. Support for Building Administration

JICA is recently implementing a project to support building administration capacity to improve non-engineered houses, which, in most cases, cause serious damage due to earthquake disaster. This project is called "The Project on Building Administration and Enforcement Capacity Development for Seismic Resilience". In this project, building type "Confined Masonry" was especially paid attention to as a typical construction type in many regions. The Key Requirement, which consists of three items, is proposed to secure the minimum earthquake-resistance for the type of buildings. The project is making effort to spread these three items as standard check items that must be looked into when building permission is in process. Activities for capacity development are being carried out in selected pilot areas such as Yogyakarta, Bengkulu, Padang, and Manado.

B. Support for Producing Hazard Maps

First priority on earthquake disaster management is understanding hazard by implementing damage assessment, because measures cannot be planned without target scale of disaster that may occur in the region. JICA provided support to show the procedure of damage assessment in Kabupaten Jember, Kabupaten Padang Pariaman, and Kota Pariaman as pilot areas in the course of "The Project in Natural Disaster Management in Indonesia". In this project, hazard map and risk map were produced together with officials at the region to transfer technology. As a result, the maps produced are the best at the present situation However, there is still a need to exert effort to increase accuracy further in the future.

2) Australian Agency for International Development (AusAID)

In earthquake disaster management, AusAID has been providing support mainly for rehabilitation and reconstruction and does not support the sector for DRR. At present, AusAID plans to cooperate in school construction projects, which has a long history of support from AusAID. In the past, school construction projects mainly elementary school buildings did not consider seismic resistance; however, from now on, seismic resistant school buildings will be considered. AusAID will focus on new construction but not on existing structures that may need retrofitting.

3) World Bank (WB)

In earthquake disaster management, WB has been supporting mainly rehabilitation and reconstruction projects and does not support the sector for DRR. At present, WB plans to cooperate in retrofitting of schools, hospitals, and infrastructure in the scope of GFDRR Phase II, which is under preparation. Therefore, WB needs to conduct risk assessment; however, for retrofitting, risk assessment of each facility needs to be implemented to prioritize which facilities to be started. Risk Assessment of megacities needs to be implemented.

2.2.5 Integrated Water Resources Management

1) Japan International Cooperation Agency (JICA)

The Government of Japan has stated its policy in the Assistance Plan for Indonesia since November 2004 to provide support for improvement of living environment, including disaster measures, for the realization of "a fair and democratic social framework". JICA has implemented many projects relevant to the field of integrated water resources management especially on engineering components from the long past. In recent years, the following projects, shown in Table 2.2.5.1, have been implemented.

Table 2.2.5.1 Recent JICA Projects related to Integrated Water Resources Management

Name of Project	Scheme	Status	Present Situation and future plan	Schedule					Project Status				Category		Disaster Mngt. Cycle			Hyogo Framework for Action						Disaster Type									Main Actor					
				2009	2010	2011	2012	2013	Finished	On going	Under request	Consideration as ideas	Comprehensive Disaster Management	Integrated Water Resources Management	Pre-Disaster	Emergency Response	Post Disaster	HFA 1	HFA 2	HFA 3	HFA 4	HFA 5	PD	Earthquake	Tsunami	Volcanic Eruption	Landslide	Flood	Drought	Forest Fire	Destructive Wind	Public Aid (National)	Public Aid (Province)	Public Aid (Kab. & Kota)	Mutual Aid	Self Aid	
The Study on Disaster Management in Indonesia	DS	Finished		→					x				x	x	x			x	x	x				x	x		x	x				x			x	x	
Disaster Recovery and Management Sector Program Loan	LA	Under monitoring	additional actions will be incooperated into CCPL	→						x			x	x			x	x					x		x	x	x	x	x	x	x						
Project on Capacity Development for Tsunami Early Warning	TA	Finished		→					x				x	x	x	x		x	x			x			x						x						
Tsunami Early Warning Advisor	EXP	Adopted	under selecting							x			x	x	x	x		x	x						x							x					
Integrated Disaster Mitigation Management for "Banjir Bandang"	TA	On going		→						x			x	x	x	x		x	x	x		x					x	x				x	x	x	x	x	
Urgent Disaster Reduction Project for Mt. Merapi / Progo River Basin and Mt. Bawakaraeng	LA	On going		→				～2014.7		x			x	x	x		x				x		x				x	x	x				x	x				
Water Resources Policy Adviser	EXP	On going		→						x				x	x	x		x									x	x	x			x					
Project on Capacity Development for RBOs Practical Water Resources Management and Technology	TA	On going		→						x				x	x	x		x									x	x	x			x	x				
Water Resources Existing Facilities Rehabilitation and Capacity Improvement Project	LA	On going		→						x				x			x				x		x					x	x				x	x			
The Institutional Revitalization Project for Flood Management in JABODETABEK	TA	On going		→						x			x	x	x			x										x					x	x			
Lower Solo River Improvement Project(2)	LA	On going		→				～2015.7		x				x	x						x							x					x	x				
Urban Flood Control System Improvement in Selected Cities	LA	On going		→				～2014.5		x			x	x	x						x							x					x	x	x			
Integrated Water Resources and Flood Management Project for Semarang	LA	On going		→				～2015.7		x			x	x	x						x							x	x				x	x				
Contermeasure for Sediment in Wonogiri Multipurpose Dam Reservoir (1)	LA	On going		→						x				x	x						x						x	x	x				x	x			

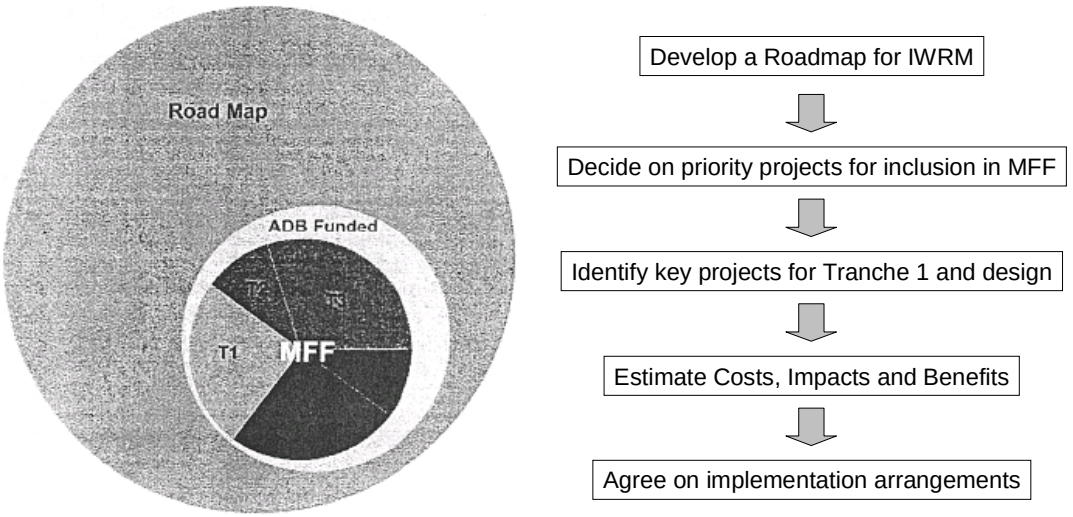
Source: JICA Study Team (Original Source is from JICA)

2) Asian Development Bank (ADB)

The Asian Development Bank stipulates in its Country Strategy and Program Update (2006-2009) that ADB will extend assistance for the establishment of an integrated water resource management structure taking into account the large-sized flood damage the country suffered recently. Currently, ADB has provided technical assistance for preparing Integrated River Basin Management Policy (POLA) and forming projects for strengthening water resource management and disaster management functions through Flood Management in Selected River Basins and Integrated Citarum Water Resources Management.

A. Integrated Citarum Water Resources Management

Through the implementation of the series of projects under the name of "Integrated Citarum Water Resources Management", the improved and more integrated water resource management in place will be achieved. Based on the road map, the necessary budget will be funded by ADB (refer to Figure 2.2.5.1).



Source: DPU and ADB, Final Report (Phase 3) – Roadmap and Program Development for Integrated Citarum Water Resources Management Project (2007) and ADB website

Figure 2.2.5.1 ADB Funding Profile

All of the projects will be implemented from 2007 to 2021, consisting of four (4) investments components (Tranche 1: 2007-2011, Tranche 2: 2009-2015, Tranche 3: 2013-2017, Tranche 4: 2017-2021). The total project cost is estimated to be US$830.13 million. The project components of Tranche 1 are shown in Table 2.2.5.2.

Table 2.2.5.2 Project Components in Tranche 1 Package

- Program Management
- Institutional Strengthening for IWRM
- Rehabilitation of West Tarum Canal
- Water Supply Options and Improved Groundwater Management for Bandung
- Roll-Out of System of Rice Intensification in Three Districts
- Support for Community and NGO-Driven Initiatives for Improved Water Supply and Sanitation
- Development and Implementation of a Basin River Quality Improvement Strategy and Action Plans
- Protected Area Management for Biodiversity
- Productive Reforestation of Degraded Catchments
- Project Preparation for Tranche 2

Source: DPU and ADB, Final Report (Phase 3) – Roadmap and Program Development for Integrated Citarum Water Resources Management Project (2007) and ADB website

B. Flood Management in Selected River Basins

Similar to "Integrated Citarum Water Resources Management Project", a project preparation technical assistance (PPTA), in which a road-map will be formulated, is to be implemented prior to MFF funding (up to $500 million over a period of 10 years). Activities during the PPTA are shown in Table 2.2.5.3.

Table 2.2.5.3 Activities during PPTA for Flood Management in Selected River Basins

- Phase 1 – Preparation of the Sector Road Map and Formulation of MFF Interventions
  Assessment of flood management needs for the island of Java and determination of overall scope of MFF program and Agreement on the Policy Framework, Sector Road Map and sequencing of proposed interventions (August 2009)
- Phase 2 – Detailed Formulation of the MFF and First Tranche Activities
  Feasibility studies for overall MFF and 1st tranche investment project completed (April 2010)
- Phase 3 – Preparation of MFF Documentation and Achieving Project Readiness (June 2010)

Source: ADB Project Profile of "Flood Management in Selected River Basins (FMSRB)"

3) World Bank (WB)

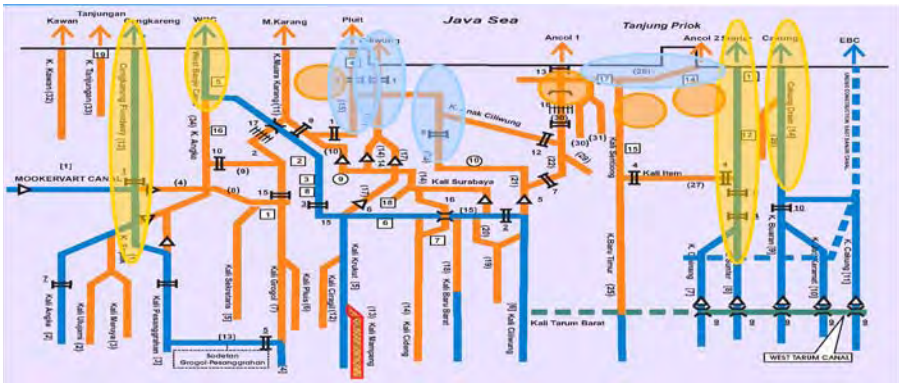
The World Bank stipulates in its CPS (2009-2012) that investment in public institutions is necessary to produce effects in country development, and in particular, the WB emphasizes assistance for environmental sustainability and disaster mitigation as one of five core engagements. For disaster mitigation, the WB considers it important to strengthen the capacity and capability of BAPPENAS and BNPB in preparing the national action plan and designing a framework for disaster-risk insurance. Currently, WB provides assistance for improvement of the management structure in the water control sector (transfer and enhancement of the management function to irrigation associations), Dam Operation in Safety Project (DOISP), and Jakarta Urgent Flood Mitigation Project as well as for the preparation of Implementation Plans based on each Integrated River Basin Management Policy (POLA).

A. Jakarta Urgent Flood Mitigation Project

The objectives of the Jakarta Emergency Dredging Initiative (JEDI) are to:

- alleviate the impacts of annual floods in DKI through the priority rehabilitation and dredging of existing floodways, drains and retention basins, in accordance with international best practices; and
- provide technical expertise through on-the-job training to strengthen the capacity of DKI and MoPW to operate and maintain its flood control system, in accordance with international standards.

The JEDI project consists of three components: (A) urgent dredging, rehabilitation of embankment and pump repairs; (B) construction of a disposal site for dredge spoil; and (C) capacity building and project implementation support (see Annex 8). The total project cost is about US$150.5 million. The Bank will seek bilateral grants for the capacity building and implementation support component.



Source: World Bank

Figure 2.2.5.2 River/Channel Network in DKI Jakarta

2.2.6 Meteorological/Seismic Observation and Data Analysis

1) Japan International Cooperation Agency (JICA)

The supporting activity of JICA for BMKG is performed in two ways. One is group training in Japan and the other is dispatch of experts.

(1) Group Training Course on Meteorology

A. Outline

The group training course in Meteorology has been held for more than 30 years. It is a 3-month training course in Japan for meteorologists. A meteorologist in BMKG attended this course in 2005.

B. Outcome

The course participants learned the latest meteorological techniques in weather forecasting mainly in JMA. Especially they gained new knowledge of NWP principle, Guidance (utilization of NWP results), SATAID operation (utilization of satellite data and other observation data) and Climate prediction.. The BMKG attendee who attended this course in 2005 now heads a satellite data section in BMKG.

(2) Group Training Course on Capacity Development

A. Outline

The group training course Capacity Development for Adaptation to Climate Change in Asia, Climate Change Analysis was held in 2008 and 2009. It is a training course designed for meteorologists to study the climate change analysis for about a month in Japan. A meteorologist in BMKG attended this course. This course will be held next year and another meteorologist will attend this course.

B. Outcome

The course participants learned the latest meteorological techniques in climate change prediction mainly at the Meteorological Research Institute under JMA and in Earth Simulator in JAMSTEC. They learned the principle of a numerical prediction model and utilization of the results. The participants also acquired a principle of climate change prediction scheme and learned how to apply it. Actually the BMKG attendee, who heads a sub division of climate early warning, was able to work out the long term prediction results of more than 100 years, and he is trying to downscale the grid size of the results to utilize climate change prediction data in Indonesia.

(3) Technical Cooperation Project

A. Outline

After the Indian Ocean tsunami disaster in 2004, many assistance activities were held by many international organizations and countries. JICA also carried out the Capacity Development Project for Tsunami Early Warning for 20 months from September 2007 to May 2009 for BMKG. In this project, three seismographic experts, two short-term experts and one long-term expert, were dispatched to BMKG for 3 years to establish InaTEWS. One short-term expert was in charge of analysis of seismographic data and dispatched for 12 days in September 2007. The other was in charge of Tsunami early warning system and dispatched for 12 days in December 2007. The long-term expert was in charge of capacity development of NEITWC through the training of operational procedure in InaTEWS and dispatched for 12 months from May 2008.

B. Outcome

NEITWC was established and started services. The earthquake information system (EIS) already started running but needs improvement. This system helps determine the magnitude of earthquake. It uses JMA method now, and, as mentioned earlier, there is still room for improvement. The tsunami early warning system (TEWS) is not yet operational, because the tsunami Decision Support System (DSS) has not been developed yet. The development of DSS is expected to finish by the end of 2009.

2) Deutsche Gesellschaft für Technische Zusammenarbeit (DTZ)

Many countries such as Germany, China, France and Japan showed interest in establishing InaTEWS. Especially Germany performs an important role to establish InaTEWS under the project called “Germany and Indonesia Tsunami Early Warning System (GITEWS)”. In this project, GFZ (Deutsches Geo Forschungs Zentrum) and DLR (Deutschen Zentrum fur Luft und Raumfahrt) are establishing the seismographic analyzing system and the tsunami analyzing system. Of course this is a nerve center of InaTEWS. However, the magnitude calculation system, which is the centric system of the seismographic system, and the DSS (Decision Support System) of Tsunami, which is the centric system of InaTEWS, are not completed, and a tsunami early warning cannot be issued yet.

2.2.7 Coastal Protection

1) Japan International Cooperation Agency (JICA)

(1) Bali Beach Conservation Project

The Bali Beach Conservation Project was implemented at the selected four beaches in Bali Province (Kuta, Nusa Dua, Sanur and Tanah Lot) with technical assistance from JICA and financial assistance of Yen Loan from JBIC (Loan amount: JYN9.506 billion, Loan Agreement on December 4, 1996; Executing agency: Directorate General of Water Resources / PU).

The project aimed at reduction of the damage caused by beach erosion and restoration of sand beaches at the internationally famous resort beaches and tourist destination by construction of groins, detached breakwaters and beach nourishment. Tanah Lot, which was famous for its landscape of a Hindu temple on the sea cliff, was conserved by construction of submerged artificial reefs (the wave-damper facility) and restoration of the sea cliff with artificial rock works.

The conservation works was completed at Tanah Lot in February 2003, at the beaches of Sanur and Nusa Dua in October 2004, and at Kuta Beach in December 2008.

The project showed positive and significant contribution to the development of tourism industry as the first and biggest beach conservation project in Indonesia.

Source: http://www.id.emb-japan.go.jp/oda/jp/projects/loan/

Bali Beach Conservation Project (Sanur)

Source: http://www.balibali.jp/place/noted/pura-tanalot.html

Bali Beach Conservation Project (Tanah Lot)

Figure 2.2.7.1 Sites of Bali Beach Conservation Project

(2) Padang Flood Control Project

The Padang Flood Control Project was implemented in two phases in the capital city of West Sumatra Province, Padang.

i) Phase 1: 1990 ~1996, Loan amount of JYN 8.063 billion, Loan Agreement in December 1990, and

ii) Phase 2: 1996 ~2001, Loan amount of JYN4.859 billion, Loan Agreement in December 1995.

In the Phase 2 project, a series of shore protection works around 5.3 km and groin works were constructed as the countermeasure for beach erosion, in addition to the works for river improvement and river-mouth treatment of the canals running down the newly developed urban areas.

The project was completed by December 2001, and the shore protection works was reported to have achieved the recovery of foreshore beaches.

(3) Coral Reef Rehabilitation and Management in North Sulawesi

Indonesia has received substantial assistances from foreign countries and international funding agencies in various ways such as human resources development, coastal resources inventory and mapping and coastal zone management. The Coral Reef Rehabilitation and Management Program (COREMAP) is one of such programs supported by the World Bank, ADB, AusAID and JICA.

The goal was aimed at the protection, rehabilitation, and sustainable utilization of coral reefs and associated ecosystems in Indonesia which will enhance the welfare of coastal communities.

The Study on the Coral Reef Rehabilitation and Management in North Sulawesi Province (December 1999 ~ November 2001) was executed with technical and financial assistance from JICA.

As the recommendation of the study project, 43 long-term, mid-term and short-term projects and programs were proposed including the following:

i) Creating a fundamental law for coastal zone management of the province,
ii) Establishment of Coastal Management Office on the levels of province, kabupaten and municipality,
iii) Training and capacity building of the personnel for coastal management,
iv) Formulation of spatial planning of coastal zone,
v) Establishment of the marine protective zones of the province,
vi) Establishment of the preferential right of the community for exploitation of marine and coastal resources,
vii) Assistance to the community-participating coastal zone management.

The mapping information of the marine and coastal preservation zones produced in the study has been used by DKP (the counterpart agency of this study project) as the basic data for its policy making and decision. The mapping has also been used as the reference information for establishing national parks and new marine and coastal preservation zones as well as for selection of World Heritage sites.

The creation of the fundamental law for coastal zone management of the province and establishment of Coastal Management Office of the province have been brought to reality for the first time in Indonesia in line with the recommendation of the study.

2.3 Critical Issues in Disaster Management Sector

2.3.1 Selection of Critical Issues

In order to recommend possible programs and projects which are to be assisted by JICA, critical issues (necessary actions) are to be selected among the issues identified through review of past achievements by the Government of Indonesia and the assistance by JICA. In this study, critical issues were selected from the viewpoint of "enhancing the ability of Indonesia for disaster measures", "categorization of short- to mid-term or long-term measures" and "appropriateness and effectiveness as Japanese assistance". The process for selection of critical issues is indicated in Figure 2.3.1.1.

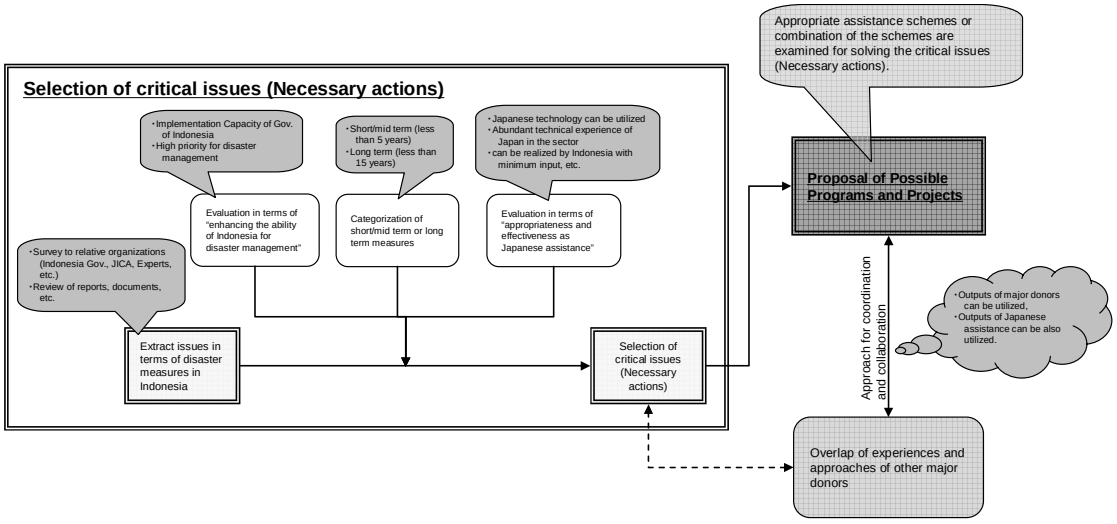


Figure 2.3.1.1 Method for Selection of Critical Issues (Necessary Actions)

The scores of each step described above are shown in the table below.

Table 2.3.1.1 Score for Selection of Critical Issues (Necessary Actions)

In view point of "enhancing the ability of Indonesia for disaster management	Implementation Capacity of GOI	◎(Point 3): As counterpart organization, government has enough capability in terms of Budget, Human Resources, Technology Level. ○(Point 2): Counterpart organization has capability, but there are some insufficiency of Budget, Human Resources, Technology Level. △(Point 1): As counterpart organization, government doesn't have enough capability in terms of Budget, Human Resources, Technology Level.
	High priority for disaster management	◎(Point 3): Highest priority in view of disaster risk reduction ○(Point 2): High priority in view of disaster risk reduction △(Point 1): Not higher prioritized issues in view of disaster risk reduction
In view point of "Implementation Schedule"	Short term (within 5 yrs)	◎(Point 3): The action should be implemented within 5 years.
	Long term (within 15 yrs)	○(Point 2): The action should be implemented within 15 years after the Short Term Period (5 years).
In view point of "appropriateness and effectiveness as Japanese Assistance"	Japanese technology can be utilized	◎(Point 3): The abundant experiences and know-how of Japanese Advanced Technology can be utilized. ○(Point 2): Some of Japanese Advanced Technology can be utilized. △(Point 1): There is no advantage of Japanese Technology. Or, it is difficult to apply Japanese Technology.
	Abundant technical experience of Japan	◎(Point 3): There are abundant assistant experiences in Indonesia. Thus, the experiences and know-how can be fully utilized. ○(Point 2): There are assistant experiences in Indonesia. And, some of the experiences and know-how can be utilized. △(Point 1): There are not much assistant experiences in the field in Indonesia.
	Can be realized by Indonesia with minimum input	◎(Point 3): Since government has enough capability, it is expected that Indonesia can handle necessary activities with minimum assistances. ○(Point 2): Certain assistances are required since activities in Indonesia are in progress. △(Point 1): Lots of assistances need to be implemented because of insufficient capability.

Issues extracted by investigation up to previous section are listed in the table below. From the next section, issues are evaluated in each field using the method described above.

Table 2.3.1.2 Issues in Disaster Management Sector in Indonesia (1/3)

Field	Issues/Necessary Actions	
	No.	**Contents**
Comprehensive Disaster Management	**1.Legislation**	
	a.	Holding Workshop to understand enacted law and regulations
	b.	Giving actual guidance to local gov. on establishment of BPBD and their DMP
	2.Institution	
	c.	Necessary training and understanding of knowledge on DM, Table Top Exercise, Drills
	d.	Training for new officials on DM
	e.	Capacity development together with necessary experiences on DM
	3.Risk Assessment	
	f.	Understanding Type of Risk Assessment and holding Coordination workshop
	g.	Data Acquisition and Accumulation System in local government
	h.	Guideline for formulation of HM and RM and training
	4. Planning	
	i.	Guideline for formulation of DMP
	j.	Formulation of sample plan in all 8 types of disaster
	k.	Workshop to formulate DMP in local government
Disaster Information Network	a.	Design of an overall system of disaster information network
	b.	Clarification of responsibility of each organization for information collection and correspondence
	c.	Establishment of multiplexing routes to transmit information securely in a time of emergency
	d.	Design of a system for collecting and sharing standardized information
	e.	Development of a system in BNPB for collecting, transmitting and sharing information, and capacity development for effective and sustainable use of it
	f.	Development of a network system for transmitting and sharing information among central disaster-related organizations, and capacity development for effective and sustainable use of it
	g.	Development of communication equipments and facilities in local governments, and capacity development for effective and sustainable use of them
	h.	Development of a network system among central disaster-related organizations, local governments and community, and capacity development for effective and sustainable use of it
	i.	Development and reinforcement of basic communication infrastructure
	j.	Reinforcement of capacity for information collection in a time of disaster
	k.	Development and reinforcement of a system for observation and analysis of disaster information
	l.	Activities for collecting, accumulating and sharing disaster information, including their digitizing and networking
	m.	Utilization of disaster information, such as making hazard and risk maps and designating evacuation site
Earthquake Disaster Management	**1.Seismicity**	
	a.	Start-up of committee on earthquake disaster management plan
	2. Legal system for building construction	
	b.	Improvement of building law
	c.	Development of building permission system and its enforcement
	3. Earthquake-resistance in building	
	d.	Formulation of construction guideline of Non-engineered building and applied for SNI
	e.	Technical guidance linked with housing loan system for low income person
	f.	Technical examination, discussion, and formulation of guideline of structural diagnosis system for existing buildings
	g.	Technical examination, discussion, and formulation of guideline of seismic retrofitting for existing building
	h.	Technical examination, discussion, and formulation of guideline of Post-Earthquake Quick Damage Assessment system of buildings
	4. Disaster mitigation for megacity	
	i.	Damage assessment of megacities utilizing seismic-microzoning method
	j.	Improving emergency response base facility (Reinforcement of school, hospital building)
	k.	Maintenance and reinforcement of infrastructure for post earthquake emergency response activities (Road and bridge)
	l.	Maintenance and reinforcement of infrastructure for post earthquake emergency response activities (Port facility)

Table 2.3.1.2 Issues in Disaster Management Sector in Indonesia (2/3)

Field	Issues/Necessary Actions		
	No.	Contents	
Integrated Water Resources Management	**A.**	**Actions to be taken for RBO capacity strengthening and implementation of structural and non-structural measures**	
	a.	Capacity strengthening of RBO	Training of engineers
			Assistance for formulations of policy and master plan of integrated water resources management (River improvement, Water use, Water quality, Sedimentation, etc.)
			Strengthening of coordination among relevant stakeholders
			Increase of budget for RBOs
			Strengthening of early warning system and coordination with BPBD for emergency response
	b.	Establishment and operation of information sharing system	Facilitation of sharing of measurement data (rainfall, discharge, water level, tide level, etc.)
			Establishment and operation of database of water-related disaster
			Establishment and operation of information sharing system among stakeholders
	c.	Facilitation of infrastructure	Implementation of prioritized construction of infrastructural facilities (River improvement, Water use, Water quality, Sedimentation, etc.) based on policy and master plan of integrated water resources management
			Improvement/Rehabilitation of existing facilities
	d.	Development or strengthening of early warning system for emergency response	Development or strengthening of early warning system for emergency response
			Increase the number of measurement stations (rainfall, discharge, water level, tide level, etc.)
			Strengthening of Community-Based Disaster Risk Reduction
	e.	Climate Change Adaptation	Assessment of rainfall, discharge, water level, tidal level, etc. based on future scenarios due to climate change
			Analysis on impact of climate change on disaster measures
			Revision of water resources management plan for the necessary implementation of measures
	B.	**Actions to be taken for integrated water resources management for DKI Jakarta**	
	a.	Strengthening of regulations of ground water use	Survey the details of ground water use and land subsidence
			Strengthening of regulations of ground water use
			Monitoring of ground water use and land subsidence
	b.	Implementation of comprehensive management plan for river basins related to DKI Jakarta	Review of the existing plan and identifying all of the problems for river basins related to DKI Jakarta
			Strengthening of coordination among relevant stakeholders
			Implementation of comprehensive flood control in DKI Jakarta
			Effective utilization of reservoirs for multi-purpose water resources management
			Strengthening of early warning system and coordination with BNPB & BPBD for emergency response in case of catastrophic disaster
	c.	Strengthening of conveyance of channel or river network	Strengthening of conveyance of channel or river network (Improvement, Dredging, etc.)
			Rehabilitation of degraded flood control facility
			Rehabilitation of degraded small-sized ponds and maintenance
	d.	Strengthening of early warning system for emergency response	Development or strengthening of early warning system for emergency response
			Increase the number of measurement stations (rainfall, discharge, water level, tide level, etc.)
	e.	Strengthening of activities at community level	Strengthening of Community-Based Disaster Risk Reduction
			Reduction of sediment discharge from upstream area based on forest conservation activities at community level
	f.	Climate Change Adaptation	Assessment of rainfall, discharge, water level, tidal level, etc. based on future scenarios due to climate change
			Analysis on impact of climate change on disaster measures
			Revision of water resources management plan for the necessary implementation of measures

Table 2.3.1.2 Issues in Disaster Management Sector in Indonesia (3/3)

Field	Issues/Necessary Actions	
	No.	**Contents**
Meteorological/Seismic observation and data analysis	a.	Automated Observatory
	b.	Data transmission
	c.	Central Operation System
	d.	Radar analysis
	e.	Precipitation now-cast
	f.	SATAID operation
	g.	NWP Guidance
	h.	Meso Scale Model
	i.	Wave Model Upgrade
	j.	Warning criteria
	k.	Automatic decision system
	l.	Warning products
	m.	Discussion and demarcation
	n.	Statistic climate analysis
	o.	Statistic climate index
	p.	Climate change vulnerability
	q.	Climate change monitoring
	r.	Numerical climate model
Coastal Protection	a.	Countermeasure to Beach Erosion
	b.	Maintenance of Shore Protection Facilities
	c.	Integrated Coastal Zone Management

2.3.2 Comprehensive Disaster Management

Issues/necessary actions listed in Section 2.1.2 are evaluated using the criteria explained above in order to clarify critical issues. The result is shown in the table below.

Table 2.3.2.1 Evaluation and Selection of Critical Issues

Field	Current Situation	Issues/Necessary Actions		In view point of "enhancing the ability of Indonesia for disaster management"		In view point of "Implementation Schedule"		In view point of "appropriateness and effectiveness as Japanese Assistance"			Evaluation Result				Assistance by Major Donors						
		No.	Contents	Implementation Capacity of GOI	High priority for disaster management	Short term (within 5 yrs)	Long term (within 15 yrs)	Japanese technology can be utilized	Abundant technical experience of Japan	Can be realized by Indonesia with minimum input	No. of ◎ (3 points)	No. of ○ (2 points)	No. of △ (1 point)	Total Evaluation	ADB	AusAID	French Gov. & FRC	GTZ	UNDP	WB	Others
Comprehensive Disaster Management	1.Legislation																				
	Dissemination of information on law and regulations to local government, Enforcement of law and regulations in local government	a.	Holding Workshop to understand enacted law and regulations	△	◎	◎		△	△	△	2	0	4	10		○			○		
	Actual implementation such as establishment of BPBD and their disaster management plans	b.	Giving actual guidance to local gov. on establishment of BPBD and their DMP	△	◎	◎		◎	◎	△	4	0	2	14		○			○		
	2.Institution																				
	Capacity development of officials is urgently necessary to be able to guide local government officials	c.	Necessary training and understanding of knowledge on DM, Table Top Exercise, Drills	△	◎	◎		◎	◎	△	4	0	2	14		○			○		
	Sufficient number of officials must be increased	d.	Training for new officials on DM	△	◎	◎		◎	○	△	3	1	2	13		○					
	BNPB needs to act as main institution and take the readership in Disaster Management in control of relevant organizations	e.	Capacity development together with necessary experiences on DM	○	◎	◎		◎	○	△	3	2	1	14		○			○	○	
	3.Risk Assessment																				
	Risk Assessment process has started without appropriate coordination, so that mismatching of result in each level could be observed.	f.	Understanding Type of Risk Assessment and holding Coordination workshop	○	○	◎		◎	◎	○	3	3	0	15		○			○	○	
	Quality of data which is stored in local government for risk assessment is lacking or poor in quality	g.	Data Acquisition and Accumulation System in local government	○	◎		◎	◎	◎	○	4	2	0	16					○		
	Methodology of risk assessment is not yet standardized and lack of capacity in all levels	h.	Guideline for formulation of HM and RM and training	○	○	◎		◎	◎	○	3	3	0	15		○				○	
	4. Planning																				
	Disaster Management Planning is new to Indonesia and there is luck of capacity of formulation in local level.	i.	Guideline for formulation of DMP	○	◎	◎		◎	◎	○	4	2	0	16					○		
	Head of BNPB Regulation No.4/2008 Guideline for formulation of disaster management plan does not contain sample of the plan and type of disaster to be covered, therefore, outputs from local level could be different in structure and contents	j.	Formulation of sample plan in all 8 types of disaster	○	◎	◎		◎	◎	○	4	2	0	16					○		
	Local government officials do not have capacity to implement activities indicated in the plan.	k.	Workshop to formulate DMP in local government	○	◎	◎		◎	◎	○	4	2	0	16					○		

As a result, the following issues have relatively high scores:

b. Giving actual guidance to local government on establishment of BPBDs and their disaster management plans
c. Necessary training and understanding of knowledge on disaster management, table top exercise, drills
e. Capacity development together with necessary experience on disaster management
f. Understanding type of risk assessment and holding coordination
g. Data acquisition and accumulation system in local government
h. Guideline for formulation of hazard map and risk map and their trainings
i. Guideline for formulation of disaster management plan
j. Formulation of sample plan in all 8 types of disasters
h. Workshop to formulate disaster management plan in local government

Most of the activities mentioned above can be solved by the result of "The Study on Natural Disaster Management in Indonesia" implemented by JICA. In the study, Hazard and Risk Maps are prepared and Regional Disaster Management Plan is formulated; the guidelines are also included so that these can be done by BPBD personnel themselves. However, BNPB needs to assist in these activities, so capacity development of BNPB staff members for these activities is necessary. In order to implement accurate risk assessment, data quality must be increased, and how to acquire and accumulate data need to be settled systematically; and to evaluate contents of disaster management plans, necessary drills should be implemented periodically. These activities can be put together and can be formulated in one project containing 4 outputs, 1) Data Acquisition and Accumulation System, 2) Hazard Map and Risk Maps, 3) Regional Disaster Management Plan, and 4) Comprehensive Disaster Management Drill.

Therefore, as a possible project in this field, a project dealing with the above issues integrally is proposed and described in Chapter 3.

2.3.3 Disaster Information Network

Issues/necessary actions listed in Section 2.1.3 are evaluated using the criteria explained in Section 2.3.1 in order to clarify critical issues. The result is shown in the table below.

Field	Current Situation	Issues/Necessary Actions		In view point of "enhancing the ability of Indonesia for disaster management"		In view point of "implementation Schedule"		In view point of "appropriateness and effectiveness as Japanese Assistance"			Evaluation Result				Assistance by Major Donors							
		No.	Contents	Implementation Capacity of GOI	High priority for disaster management	Short term (within 5 yrs)	Long term (within 15 yrs)	Japanese technology can be utilized	Abundant technical experience of Japan	Can be realized by Indonesia with minimum input	No. of ◎ (3 points)	No. of ○ (2 points)	No. of △ (1 point)	Total Evaluation	ADB	AusAID	French Gov. & FRC	GTZ	UNDP	WB	Others
Disaster Information Network	Refer to Section 2.1.3	a.	Design an overall system	○	◎	◎		◎	△	◎	4	1	1	15							
		b.	Clarify responsibility	○	◎	◎		○	○	○	2	4	0	14							
		c.	Establish multiplexing routes	△	◎		○	○	△	○	1	3	2	11			△				△
		d.	Design standardized information	◎	◎	◎		○	△	◎	4	1	1	15							
		e.	Develop a system in BNPB	◎	◎		○	◎	△	○	3	2	1	14			○				
		f.	Develop a network system in central	○	◎		○	◎	△	○	2	3	1	13							△
		g.	Develop a system in local	△	◎		○	○	△	△	1	2	3	10			○				
		h.	Develop a network to community	△	◎		○	◎	△	○	2	2	2	12							○
		i.	Develop communication infrastructure	○	○		○	◎	△	○	1	4	1	12							
		j.	Reinforce collection capacity	○	◎		○	○	△	○	1	4	1	12							
		k.	Reinforce an observation system	○	◎		○	○	△	○	1	4	1	12				○			
		l.	Collect, accumulate and share info.	○	◎		○	○	△	○	1	4	1	12							
		m.	Utilize information	○	◎		○	○	△	△	1	3	2	11							

Table 2.3.3.1 Evaluation and Selection of Critical Issues

The following issues have relatively high scores:

a. Design of an overall system of disaster information network:
b. Clarification of responsibility of each organization for information collection and correspondence:
d. Design of a system for collecting and sharing standardized information
e. Development of a system in BNPB for collecting, transmitting and sharing information, and capacity development for effective and sustainable use of it

Common features of the above issues are that 1) their counterpart agencies are central government organizations such as BNPB, which have relatively high implementation capacities than local governments and 2) their early implementation is necessary.

Activities for each of the above issue have already been conducted by Indonesian organizations centering on BNPB to some extent and assistance projects by donors have also been conducted on a sporadic basis, but they are not enough. As problems and inadequate matters as the background of the above issues are described in Table 2.1.3.2 and relationship between such problems and the above issues are shown in Section 2.1.3 3) (3), some problems are found here and there in past and present Indonesian activities and assistances by donors; for example, EOC was established in BNPB assisted by the French Government but a linkage problem between an existing BNPB system and a newly installed system still remains. It is considered that this is because an overall plan or a master plan has not been developed. In reality, it is crucial that, for activities to be efficient and effective, it is important to formulate an overall plan first and then to implement the activities such as installing a communication system in local areas accepting foreign assistance.

Besides, the above issues of a, b, and d are a base of not only issue e but also other issues of this field and should be investigated systematically and integrally confirming present conditions of existing systems and regulations in Indonesia as well as confirming and coordinating outputs of projects assisted by donors like the French Red Cross and KOICA, which are ongoing and will be completed soon.

Therefore, as a possible program in this field, a program dealing with the above issues integrally is proposed and described in Chapter 3.

2.3.4 Earthquake Disaster Management

Issues/necessary actions listed in Section 2.1.4 are evaluated using the criteria explained in Section 2.3.1 in order to clarify critical issues. The result is shown in the table below.

Table 2.3.4.1 Evaluation and Selection of Critical Issues

Field	Current Situation	No.	Issues/Necessary Actions: Contents	In view point of "enhancing the ability of Indonesia for disaster management": Implementation Capacity of GOI	In view point of "enhancing the ability of Indonesia for disaster management": High priority for disaster management	In view point of "Implementation Schedule": Short term (within 5 yrs)	In view point of "Implementation Schedule": Long term (within 15 yrs)	In view point of "appropriateness and effectiveness as Japanese Assistance": Japanese technology can be utilized	In view point of "appropriateness and effectiveness as Japanese Assistance": Abundant technical experience of Japan	In view point of "appropriateness and effectiveness as Japanese Assistance": Can be realized by Indonesia with minimum input	Evaluation Result: No. of ◎ (3 points)	Evaluation Result: No. of ○ (2 points)	Evaluation Result: No. of △ (1 point)	Evaluation Result: Total Evaluation	Assistance by Major Donors: ADB	AusAID	French Gov. & FRC	GTZ	UNDP	WB	Others
Earthquake Disaster Management	1.Seismicity																				
	Earthquake catalog, which include the location of the epicenter, magnitude, and the date,time parameters of the post earthquake, is not organized sufficiently.	a.	Start-up of committee on earthquake disaster management plan	○	◎	◎		◎	△	△	3	1	2	13							
	Evaluation of each earthquake sources in Indonesia was not completed yet																				
	Target earthquake for disaster management plan for each location has not been discussed																				
	2. Legal system for building construction																				
	Building law is incomplete	b.	Improvement of building law	△	◎	◎		◎	○	△	3	1	2	13							
	Building permission system is incomplete and not executed properly	c.	Development of building permission system and its enforcement	△	◎	◎		◎	◎	△	4	0	2	14							
	3. Earthquake-resistance in building																				
	Lack of Earthquake-resistance in Non-engineered building	d.	Formulation of construction guideline of Non-engineered building and applied for SNI	△	◎	◎		◎	◎	○	4	1	1	15							
	Lack of Earthquake-resistance in low income group housing	e.	Technical guidance linked with housing loan system for low income person	△	◎	◎		◎	◎	△	4	0	2	14							
	Structural diagnosis system for existing buildings does not exist in Indonesia (as for earthquake resistant capacity)	f.	Technical examination, discussion, and formulation of guideline of structural diagnosis system for existing buildings	△	◎	◎		◎	◎	△	3	0	3	12							
	Method of seismic retrofitting as for earthquake resistant capacity in existing building does not exist in Indonesia	g.	Technical examination, discussion, and formulation of guideline of seismic retrofitting for existing building	△	◎	◎		◎	○	△	3	1	2	13							
	Method of "Post-Earthquake Quick Damage Assessment" does not exist in Indonesia	h.	Technical examination, discussion, and formulation of guideline of Post-Earthquake Quick Damage Assessment system of buildings	△	◎	◎		◎	◎	△	3	0	3	12							
	4. Disaster mitigation for megacity																				
	Low realization to earthquake hazard potential	i.	Damage assessment of megacities utilizing seismic-microzoning method	△	◎	◎		◎	◎	○	4	1	1	15							
	Low realization to aspect of earthquake hazard in megacity																				
	Vulnerability of megacity for earthquake hazard	j.	Improving emergency response base facility (Reinforcement of school, hospital building)	△	◎	◎		◎	△	△	3	0	3	12							
	Lack of urgent support and restoration and revival capacity in megacity	k.	Maintenance and reinforcement of infrastructure for post earthquake emergency response activities (Road and bridge)	△	○		○	◎	◎	○	2	3	1	13							
		l.	Maintenance and reinforcement of infrastructure for post earthquake emergency response activities (Port facility)	△	○		○	◎	◎	○	2	3	1	13							

The following issues have relatively high scores:

c. Development of building permission system and its enforcement (Corresponding to Current Situation of “Building permission system is incomplete and not executed properly")

d. Formulation of construction guideline of non-engineered building and applied for SNI (Corresponding to Current Situation of “Lack of Earthquake-resistance in Non-engineered building”)

e. Technical guidance linked with housing loan system for low income persons (Corresponding to Current Situation of “Lack of Earthquake-resistance in low income group housing”)

i. Damage assessment of megacities utilizing seismic-microzoning method (Corresponding to Current Situation of “Low awareness level about earthquake hazard potential”)

Corresponding to “c. Development of building administration and enforcement” and “d. Examination of construction guideline of non-engineered building”, these actions are indispensable for reducing human casualties caused by earthquakes. Considering such importance, the Ministry of Public Works and Research Institute for Human Settlement proposed a second phase of “The Project on Building Administration and Enforcement Capacity Development for Seismic Resilience”. Details of the project will not be indicated in this report. However, the project is very much necessary and will be effective to reduce risks against earthquake disaster, therefore, implementation should be promoted.

Corresponding to “e. Technological guidance linked with housing loan system for low income persons” and “i. Damage assessment of megacity area utilizing seismic-microzoning method”, these are very much necessary in earthquake disaster management, and project components are described in Chapter 3.

Corresponding to “k. Maintenance and reinforcement of infrastructure for post earthquake emergency response activities (Road and bridge)” and “l. Maintenance and reinforcement of infrastructure for post earthquake emergency response activities (Port facility)”, these shall be executed when damage assessment of megacity is implemented and the result is estimated as severe.

2.3.5 Integrated Water Resources Management

Issues (or necessary actions) listed in Section 2.1.5 are evaluated using the criteria explained in Section 2.3.1 in order to clarify critical issues. The result is shown in the table below.

Field	Current Situation	Issues/Necessary Actions		In view point of "enhancing the ability of Indonesia for disaster management"		In view point of "Implementation Schedule"		In view point of "appropriateness and effectiveness as Japanese Assistance"				Evaluation Result				Assistance by Major Donors							
		No.	Contents	Implementation Capacity of GOI	High priority for disaster management	Short term (within 5 yrs)	Long term (within 15 yrs)	Japanese technology can be utilized	Abundant technical experience of Japan	Can be realized by Indonesia with minimum input		No. of ◎ (3 points)	No. of ○ (2 points)	No. of △ (1 point)	Total Evaluation	ADB	AusAID	French Gov. & FRC	GTZ	UNDP	WB	Others
Integrated Water Resources Management	A. Problems related to River Basin Organization for water resources management	A.	RBO capacity strengthening and implementation of structural and non-structural measures	○	◎	◎	○	◎	◎	△		4	2	1	17	○							
	Formulation of Policy and Master Plan of Integrated Water Resources Management at RBO level are in progress. Insufficient Institutional Management of Water Resources Insufficient Coordination among Relevant Organizations Poor Information/Data Sharing among Relevant Organizations Rapid Increase of Water Demand Insufficient Structural and Non-Structural Measures Need for Climate Change Adaptation	a. Capacity strengthening of RBO	Training of engineers	○	◎	◎	○	◎	◎	△	○	3	1	16	○							
			Assistance for formulations of policy and master plan of integrated water resources management (River improvement, Water use, Water quality, Sedimentation, etc.)	○	◎	◎	○	◎	△	○		3	1	16	○							
			Strengthening of coordination among relevant stakeholders	△	◎	◎	○	◎	△	○		2	3	2	14	○						
			Increase of budget for RBOs	○	○	◎	○	△	△	△		1	3	3	12							
			Strengthening of early warning system and coordination with BPBD for emergency response	△	◎		○	○	△	△		1	2	3	10							
		b. Establishment and operation of information sharing system	Facilitation of sharing of measurement data (rainfall, discharge, water level, tide level, etc.)	△	◎	◎	○	○	△	△		2	2	3	13	○						
			Establishment and operation of database of water-related disaster	○	◎	◎		◎	○	○		3	3	0	15	○						
			Establishment and operation of information sharing system among stakeholders	○	◎	◎		◎	○	○		3	3	0	15	○						
		c. Facilitation of infrastructure	Implementation of prioritized construction of infrastructural facilities (River improvement, Water use, Water quality, Sedimentation, etc.) based on policy and master plan of integrated water resources management	○	◎		○	○	○	○		1	5	0	13	○				○		
			Improvement/Rehabilitation of existing facilities	○	◎		○	○	○	○		1	5	0	13	○					○	
		d. Development or strengthening of early warning system for emergency response	Development or strengthening of early warning system for emergency response	○	◎	◎		◎	○	○		3	3	0	15	○						
			Increase the number of measurement stations (rainfall, discharge, water level, tide level, etc.)	○	◎	◎	○	○	○	○		2	5	0	16	○						
			Strengthening of Community-Based Disaster Risk Reduction	○	○	◎	○	○	○	△		1	5	1	14							
		e. Climate Change Adaptation	Assessment of rainfall, discharge, water level, tidal level, etc. based on future scenarios due to climate change	○	○		○	◎	○	○		1	5	0	13							
			Analysis on impact of climate change on disaster measures	○	○		○	○	○	○		0	6	0	12							
			Revision of water resources management plan for the necessary implementation of measures	○	○		○	○	△	△		0	4	2	10							

Table 2.3.5.1(1) Evaluation and Selection of Critical Issues

Field	Current Situation	Issues/Necessary Actions			In view point of "enhancing the ability of Indonesia for disaster management"		In view point of "Implementation Schedule"		In view point of "appropriateness and effectivemenss as Japanese Assistance"			Evaluation Result				Assistance by Major Donors						
		No.	Contents		Implementation Capacity of GOI	High priority for disaster management	Short term (within 5 yrs)	Long term (within 15 yrs)	Japanese technology can be utilized	Abundant technical experience of Japan	Can be realized by Indonesia with minimum input	No. of ◎ (3 points)	No. of ○ (2 points)	No. of △ (1 point)	Total Evaluation	ADB	AusAID	French Gov. & FRC	GTZ	UNDP	WB	Others
Integrated Water Resouces Management	B. Problems in terms of integrated water resources management for DKI Jakarta	B.	Actions to be taken for integrated water resources management for DKI Jakarta																		
	Land Subsidence due to Overuse of Ground Water Causing Serious Inundation Problem Insufficient Coordination among Relevant Organizations Insufficient Institutional Management of Water Resources Poor Information/Data Sharing among Relevant Organizations Rapid Change of Land Use due to Population Increasing Increasing Flood Peak Discharge due to Urbanization Rapid Increase of Water Demand Insufficient Structural and Non-Structural Measures Poor Conveyance of Drainage Channel due to Clogged Garbage or Sedimentation Need for Climate Change Adaptation	a.	Strengthening of regulations of ground water use	Survey the details of ground water use and land subsidence	△	◎	◎	○	○	△	△	2	2	3	13							
				Strengthening of regulations of ground water use	△	◎	◎	○	○	△	△	2	2	3	13							
				Monitoring of ground water use and land subsidence	△	◎	◎	○	○	△	△	2	2	3	13							
		b.	Implementation of comprehensive management plan for river basins related to DKI Jakarta	Review of the existing plan and identifying all of the problems for river basins related to DKI Jakarta	○	◎	◎		◎	○	○	3	3	0	15	○					○	
				Strengthening of coordination among relevant stakeholders	△	◎	◎	○	○	△	○	2	3	2	14	○					○	
				Implementation of comprehensive flood control in DKI Jakarta	◎	◎	◎	○	◎	◎	○	5	2	0	19	○					○	
				Effective utilization of reservoirs for multi-purpose water resources management	○	◎	◎		○	○	△	2	3	1	13	○					○	
				Strengthening of early warning system and coordination with BNPB & BPBD for emergency response in case of catastrophic disaster	△	◎		○	◎	○	○	2	3	1	13							
		c.	Strengthening of conveyance of channel or river network	Strengthening of conveyance of channel or river network (Improvement, Dredging, etc.)	◎	◎	◎	○	◎	◎	○	5	2	0	19	○					○	
				Rehabilitation of degraded flood control	○	◎	◎	○	◎	○	○	3	4	0	17						○	
				Rehabilitation of degraded small-sized ponds and maintenance	○	◎	◎		○	△	○	2	3	1	13						○	
		d.	Strengthening of early warning system for emergency response	Development or strengthening of early warning system for emergency response	○	◎	◎		◎	○	○	3	3	0	15	○						
				Increase the number of measurement stations (rainfall, discharge, water level, tide level, etc.)	○	◎	◎		◎	○	○	3	3	0	15	○						
		e.	Strengthening of activities at community level	Strengthening of Community-Based Disaster Risk Reduction	○	○	◎	○	○	○	△	1	5	1	14							
				Reduction of sediment discharge from upstream area based on forest conservation activities at community level	△	○		○	△	○	○	0	4	2	10							
		f.	Climate Change Adaptation	Assessment of rainfall, discharge, water level, tidal level, etc. based on future scenarios due to climate change	○	○		○	◎	○	○	1	5	0	13							
				Analysis on impact of climate change on disaster measures	○	○		○	○	○	○	0	6	0	12							
				Revision of water resources management plan for the necessary implementation of measures	○	○		○	○	△	△	0	4	2	10							

Table 2.3.5.1(2) Evaluation and Selection of Critical Issues

The following issues have relatively higher scores or considered as critical issues:

A. Actions to be Taken for RBO Capacity Strengthening and Implementation of Structural and Non-Structural Measures

a) Capacity Strengthening of RBO

- Training of engineers

The numbers of engineers with sufficient technical knowledge are indigent for almost all of the RBO offices, which impedes the smooth and steady implementation of integrated water resources management (IWRM) in river basin area of which RBO office has responsibility. Thus, it is necessary to enhance the capabilities of RBO office by means of a series of training for concerned engineers.

- Assistance for formulation of policy and master plan of integrated water resources management (River improvement, Water use, Water quality, Sedimentation, etc.)

Since RBO institutional system has started in recent years, the capacity of RBO offices are developing especially for formulation of policy (POLA) and master plan (M/P) of IWRM (River improvement, Water use, Water quality, Sedimentation, *etc.*), which are fundamentals of RBO activities. The assistances for formulation of policy (POLA) and master plan (M/P) are indispensable for RBO to strengthen the basic capacity of IWRM in order to implement RBO mission in a sustainable way.

b) Establishment and Operation of Information Sharing System

- Establishment and operation of database of water-related disaster

The robust database including water-related data (*e.g.* Rainfall, Discharge, Water Level, Water Quality, Disaster Data, *etc.*) should be established and operated in order to utilize for various activities of IWRM and share with related organizations or stakeholders. It is also necessary to strengthen the capability for database operation (*i.e.* Data collection, Validation, Storage and Maintenance).

- Establishment and operation of information sharing system among stakeholders

The data in the above-mentioned database should be shared widely among related organizations or stakeholders for various activities of IWRM for regular operation as well as emergency response through the sharing system. It is necessary to establish water related data management center at RBO offices and DPU.

d) Development or Strengthening of Early Warning System for Emergency Response

- Development or strengthening of early warning system for emergency response

Effective emergency response enables government, community and individuals to protect people's life, property, agricultural products and so on with quick and precise early warning prior to flood event. It is necessary to develop early warning system or strengthening the existing system for emergency response in order to reduce potential loss/damage to people's life, property, agricultural products and so on.

- Increase the number of measurement stations (rainfall, discharge, water level, tide level, *etc*.)

It is necessary to increase the number of measurement stations in order to release quick and precise early warning with high reliability. The appropriate number of the stations should be evaluated considering the level of reliability for emergency response as well as operation and maintenance. It may be necessary for some of the key stations to measure data at intervals of 10 minutes, 1 hour or 3 hours, *etc*. The reliability of early warning can be increased if such water-related data (*e.g.* Rainfall, Discharge, Water Level, Water Quality, Disaster Data, *etc.*) are reasonably collected, validated, accumulated and analyzed. The operation and maintenance of the whole system are also indispensable.

B. Actions to be taken for Integrated Water Resources Management for DKI Jakarta

b) Implementation of Comprehensive Management Plan for River Basins Related to DKI Jakarta

- Review of the existing plan and identification of all of the problems for river basins related to DKI Jakarta

As for the river basins (Cisadane-Cliwung, Citarum and Ciujung-Ciliman River Basins) around DKI Jakarta, a number of problems, such as land subsidence due to overuse of ground water and insufficient structural and non-structural countermeasures, have to be solved. However, such problems have not been clarified enough or fully understood in detail, thus, first of all, it is necessary to clarify existing plan and identify of all types of problems for the river basins related to DKI Jakarta systematically and comprehensively. Then, it will be a significant challenge for related stakeholders to make sufficient coordination in order to discuss thoroughly how to overcome a bunch of problems (e.g. road map, long term strategy, prioritization, methodology, responsible agency, etc.). It is considered that this critical issue should be deliberated in the "Water Resources Management Council" which has been established in Indonesia recently.

- Implementation of comprehensive flood control in DKI Jakarta

DKI Jakarta, the capital city and the most densely developed area in Indonesia, has been suffered from flood disaster every year for a long period. Fundamental revision for flood control policy should be taken into account without any loss of time. Japan has abundant know-how and experiences in regard to advanced flood control technology including "Comprehensive Flood Control" especially for densely urbanized area, which has been applied to Tsurumi river basin, *etc*. The "Comprehensive Flood Control" can be applied to DKI Jakarta as well as the surrounding river basins, referring to the advanced application success examples in Japan.

c) Strengthening of Conveyance of Channel or River Network

- Strengthening of conveyance of channel or river network (Improvement, Dredging, etc.)

The conveyance capacity of river/channel network in DKI Jakarta to discharge flood water is not sufficient. It is necessary to strengthen of conveyance to cope with flood discharge from upstream and to drain inundated water to the downstream sea side in order to reduce potential flood damage to DKI Jakarta.

- Rehabilitation of degraded flood control facility

There are a number of damaged/degraded sections in the existing flood control facilities (*e.g.* pumping station, channel, revetment, *etc*.). Some of the facilities are seriously damaged or degraded because of land subsidence due to overuse of prohibited underground water. Early implementation of rehabilitation is urgently necessary since it may malfunction resulting inundated flood water can not be pumped out efficiently to the sea side, paralyzing socio-economic activities in DKI Jakarta.

- Rehabilitation of degraded small-sized ponds and maintenance

In the upstream area of DKI Jakarta, there are more than two hundred (200) reservoirs (small-sized ponds) and the corresponding dams, the most of which were constructed during Dutch colonial period in 1930's. In recent years, the dams have been being seriously deteriorated. It is still fresh in our minds that the Situ Gintung reservoir was broken out which had caused severe damages in DKI Jakarta in March 2009. There are still numbers of the dams in the area which are suspected to be deteriorated resulting similar flood damage repeated again in the future. A series of rehabilitation works of degraded small-sized ponds is necessary after assessing vulnerability of all of the dams which are suspected to be deteriorated seriously.

d) Strengthening of Early Warning System for Emergency Response

- Development or strengthening of early warning system for emergency response

Effective emergency response enables government, community and individuals to protect people's life, property, agricultural products and so on with quick and precise early warning prior to flood event. It is necessary to develop early warning system or strengthening the existing system for emergency response in order to reduce potential loss/damage to people's life, property, agricultural products and so on.

- Increase the number of measurement stations (rainfall, discharge, water level, tide level, etc.)

It is necessary to increase the number of measurement stations in order to release quick and precise early warning with high reliability. The appropriate number of the stations should be evaluated considering the level of reliability for emergency response as well as operation and maintenance. It may be necessary for some of the key stations to measure data at intervals of 10 minutes, 1 hour, 3 hours, *etc*. The reliability of early warning can be increased if such water-related data (*e.g.* Rainfall, Discharge, Water Level, Water Quality, Disaster Data, *etc.*) are reasonably collected, validated, accumulated and analyzed. The operation and maintenance of the whole system are also indispensable.

e) Strengthening of Activities at Community Level

- Strengthening of Community-Based Disaster Risk Reduction

Since local community, especially Kelurahan, RT and RW, is the basis of disaster risk reduction activity that is the nearest to individuals/residents, community-based disaster risk reduction is strongly recommended to be strengthened. For instance, flood fighting (*e.g.* carrying sandbag or flood wall to minimize flood intrusion, *etc*.), strengthening of evacuation warning, cleaning of drainage ditch (*e.g.* getting rid of plastic bag, garbage, *etc*.) along road in community.

The issues above with higher scores can be regarded as critical issues. Common features of the above issues are the following:

1) Implementation capacity of related counterpart agency (e.g. DPU, RBO, etc.) is relatively high.
2) Indispensable actions for strengthening the capacity for disaster management and thus early implementations are necessary.
3) Japanese Technology is relatively advanced and can be utilized effectively.

Some of the activities mentioned above issues have already been conducted and achieved to some extent by the relevant organizations in Indonesia, which sometimes had been assisted by the donor organizations. However, it cannot be said that those activities have produced enough synergistic effects on water resources management.

In order to implement integrated water resources management in a more effective way, a comprehensive action plan should be prepared in which all the problems should be identified as well as how to solve these problems. In addition, it is a very important that there be sufficient coordination across the wide range of stakeholders (e.g. central government, regional government, private sector, community, NPOs, NGOs, donor agencies, etc.) in terms of water resources.

2.3.6 Meteorological/Seismic Observation and Data Analysis

Issues/necessary actions listed in Section 2.1.6 are evaluated using the criteria explained in Section 2.3.1 in order to clarify critical issues. The result is shown in the table below.

Table 2.3.6.1 Evaluation and Selection of Critical Issue

Field	Current Situation	Issues/Necessary Actions		In view point of "enhancing the ability of Indonesia for disaster management"		In view point of "Implementation Schedule"		In view point of "appropriateness and effectiveness as Japanese Assistance"			Evaluation Result				Assistance by Major Donors							
		No.	Contents	Implementation Capacity of GOI	High priority for disaster management	Short term (within 5 yrs)	Long term (within 15 yrs)	Japanese technology can be utilized	Abundant technical experience of Japan	Can be realized by Indonesia with minimum input	No. of ◎ (3 points)	No. of ○ (2 points)	No. of △ (1 point)	Total Evaluation	ADB	AusAID	French Gov. & FRC	GTZ	UNDP	WB	Others
Meteorological/ Seismic observation and data analysis	Improvement of Observation System	a.	Automated Observatory	△	○		○	◎	○	○	1	4	1	12							
		b.	Data transmission	△	○		○	○	○	◎	1	4	1	12							
		c.	Central Operation System	△	○		○	◎	○	△	1	3	2	11							
	Introduction of Radar data analysis	d.	Radar analysis	○	◎	◎		◎	△	○	3	2	1	14							
	Improvement of Forecasting Skill	e.	Precipitation now-cast	△	○	◎		◎	△	○	2	2	2	12							
		f.	SATAID operation	△	○		○	◎	◎	◎	3	2	1	14							
		g.	NWP Guidance	△	○	◎		◎	◎	○	3	2	1	14							
		h.	Meso Scale Model	△	○		○	◎	○	△	1	3	2	11							
		i.	Wave Model Upgrade	△	○		○	◎	◎	△	2	2	2	12							
	Improvement of Warning Issue Skill	j.	Warning criteria	△	◎	◎		◎	○	○	3	2	1	14							
		k.	Automatic decision system	△	○		○	◎	△	△	1	2	3	10							
	Improvement of Information Dissemination	l.	Warning products	△	◎	◎		○	△	○	2	2	2	12							
		m.	Discussion and demarcation	◎	◎	◎		△	△	○	3	1	2	13							
	Study on Climate Change Vulnerability	n.	Statistic climate analysis	◎	◎	◎		○	○	◎	4	2	0	16							
		o.	Statistic climate index	◎	◎	◎		○	○	◎	4	2	0	16							
		p.	Climate change vulnerability	○	○	◎		◎	○	○	2	4	0	14							
		q.	Climate change monitoring	△	○		○	◎	○	○	1	4	1	12							
		r.	Numerical climate model	△	○		○	◎	○	△	1	3	2	11							

The following issues are relatively scored high:

d. Radar analysis: In order to utilize radar data sufficiently and use for accurate weather forecast it is necessary to compose all radar images in the whole country and to calibrate radar data with rain gauge data. It is essential to introduce radar composition method and radar rain gauge analyzed precipitation method.

e. Precipitation now-cast: In order to make accurate rainfall forecast it is necessary to utilize radar rain gauge analyzed precipitation data and moving velocity of rain cloud analyzed from radar data. It is possible to issue accurate rainfall forecast, it is called 'precipitation now-cast', combining these data. It is essential to introduce precipitation now-cast method.

f. SATAID operation: Meteorological satellite images are very popular data as well as radar data for weather forecast recently in many developed countries. In order to utilize satellite image sufficiently it is one effective technique is to use satellite data application program called SATAID (Satellite Animation and Interactive Diagnosis: Satellite viewer program developed by JMA). Forecasters can use not only satellite data but also NWP data, international observation data, radar data and upper air observation data for weather forecast. In that mean it is very important to improve SATAID operation skill.

g. NWP Guidance: NWP result is very efficient for weather forecast recently in many developed countries. But it is not easy to operate NWP model by oneself. Meanwhile many developed countries, for example Japan, USA, EC, Australia and so on, operate NWP model and provide the result. It is only the result of the numerical calculation, but it is not weather forecast. So it is very important to interpret the result of calculation to the regional weather forecast. This skill is called 'guidance'. In order to utilize the NWP result, it is essential to introduce guidance skill of NWP.

j. Warning criteria: Detailed observation and accurate forecast are fundamental of meteorological service. In order to reduce the damage of meteorological disaster it is necessary to issue warning timely. In that mean it is needed to establish segmentalized warning criteria temporally and spatially.

n. Statistic climate analysis: In order to assess the impact of climate change it is basics to do statistical analysis of historical data. So data inventory, data quality control and statistical analysis are needed.

o. Climate change index: In order to evaluate the impact of climate change it is necessary to identify climate change index and to estimate the index using statistical analysis.

p. Climate change vulnerability: In order to adapt unprecedented variety caused by climate change it is important to evaluate climate change vulnerability and to estimate trend of change. It is important to study on climate change vulnerability and climate change prediction method.

Activities for each of the above issue are absolutely essential for the capacity development of BMKG.. The issues extracted by evaluation are relatively short term ones, but long term plans are also important to improve short-term problems.

1) Meteorological Observation and Weather Forecasting

Short-term perspective	Introduction of radar composition method and radar AWS analyzed precipitation method
	Introduction of precipitation now-cast method
	Improvement of SATAID operation skill
	Establishment of segmentalized warning criteria for meteorological disaster
Long-term perspective	Improvement of long-term plan for meteorological services
	Appropriate allocation of observatories and introduction of automated station system
	Introduction of proper central operation system (Software/ Hardware)
	Development of dissemination system

2) Climate Change

Short-term perspective	Data inventory and statistical analysis
	Identification of each climate change index using statistical analysis
	Study on Climate Change Vulnerability and climate change prediction method
Long-term perspective	Monitoring of Climate Change
	Study on Climate Change Prediction Method

2.3.7 Coastal Protection

1) Countermeasure to Beach Erosion

As mentioned in Section 2.1.7 and presented in Table 2.1.7.1 (1) and (2), the Central Government (PU) has received numerous requests from the local governments and municipalities for urgent countermeasures to cope with the beach erosion.

According to PU (Directorate of Swamps and Coastal), three areas among others, the coast of Bengkulu, the coast of Kalimantan Selatan, and the coast of Maluku Utara, should be given the priority for the construction of shore protection works.

As for the reasons of the rapidly progressing beach erosion in the recent years, PU assumes that sea level rise and increase of high waves are the main factors, and which are associated with Climate Change.

Although those factors should probably explain the beach erosion, other human factors should also be taken into consideration such as coral mining, sand mining, coastal development and sedimentation in dam reservoirs.

Whatever the reasons are, study and investigation are necessary at least to get close to and specify the real causes. Planning and design of the countermeasures shall be carried out based on those study and investigation. PU expects technical assistance from JICA, making good use of Japanese experience, technology and know-how. As for the assistance for implementation, PU expects an extension of Yen Loan.

2) Maintenance of Shore Protection Facilities

Under the present circumstances, there is no well-established system either in the Central Government or local governments for maintenance and management of coastal areas. Various case examples of the environmental degradation such as discarded garbage and sea grass on the beach, water quality contamination by wastewater from households, and illegal buildings have already been reported and seen along the post-project beaches (public spaces).

The maintenance and management of the post-project beaches should be conducted as the confirmation of the effects of protection works and the long-term and continuing monitoring of the effects.

It will be necessary for implementation of such monitoring (topographic and bathymetric surveys of the beach, water quality survey, soundness and stability survey of shore protection works, etc.) that appropriate budgetary measures and establishment of coastal management system, training and capacity building of maintenance personnel and preparation of software for the survey data analysis be executed. Technical assistance will be required to follow up these tasks.

3) Integrated Coastal Zone Management

Before the establishment of DKP, it is said that responsibilities of coastal and maritime management were divided among more than 12 national ministries and agencies, such as Public Works, Transportation, Fisheries, Forestry and BAKOSURTANAL

An earlier attempt to coordinate these activities by DKN (Dewan Kelautan Nasional, or National Maritime Council; established in 1995) was unsuccessful, and DKN was disbanded in 1999. Absence of the "bureaucratic home" of Integrated Coastal Zone Management (ICZM) retarded the development of the coastal resources management in Indonesia.

Key issues for the management will be addressed as follows, which are inter-related and overlap each other:

i) Lack of knowledge of coastal and marine resources and coastal processes
Current knowledge about the nature, distribution and significance of most coastal and marine resources is quite limited. Mapping efforts of the coastal resources will be necessary to monitor basic changes of the resource condition and distribution, and to assess the hazards or disasters on the coast.

ii) Undervaluation of coastal and marine resources
Undervaluation of coral reefs and associated coastal ecosystem has been a prime factor in their over-exploitation and degradation.

iii) Lack of empowerment of coastal communities and users of marine resources
Despite the considerable efforts of the government for poverty alleviation, many coastal communities in Indonesia have been marginalized or disempowered. Development of improved economic capability and generation of income from fisheries and alternative livelihood will be one of the key issues in the coastal resources management.

iv) Lack of institutional capacity to undertake ICZM
In spite of the national efforts and international assistances to date for development of ICZM in Indonesia, there remain lack of experienced staff to implement the programs and significant skill gaps among the existing local staff. These problems must be redressed systematically in the implementation process through broadening stakeholder participation and better utilization of the local capacity of resource users.

v) Lack of integration among programs
Historically, one of the most serious problems of the development of ICZM in Indonesia has been the apparent lack of coordination and cooperation among the programs resulting in very few programs sustained at the local level in Indonesia. The role of DKP as the "bureaucratic home" will be very important and expected.

CHAPTER 3 PROPOSAL OF POSSIBLE PROGRAMS AND PROJECT

Based on the Indonesian situations of policy, past achievements, current situation and issues, among other things, the assistant policy and past achievements by international aid agencies including JICA and the critical issues (or necessary actions) mentioned in CHAPTER 2, possible directions of the disaster management program and a series of new projects are proposed in this chapter.

3.1 Proposed Directions of JICA Disaster Management Program

Proposed directions of JICA disaster management program for Indonesia are shown in the following six items:

1) Continuous supports to BNPB (National Disaster Management Agency), as the core organization of comprehensive disaster management framework in Indonesia

2) Establishment of comprehensive disaster information network system, which assists quick and accurate information transmit and information sharing among related organizations in case of emergency

3) Continuous focusing on the measures against Earthquake Disaster and Water-Related Disaster , which are the most severe natural disasters in Indonesia

4) Assistances for “Improvement of vulnerable houses to earthquake disaster” and “Damage assessment of earthquake disaster in Mega-cities” are necessary as countermeasures against earthquake disaster.

5) “RBO capacity strengthening and implementation of structural and non-structural measures” and “Assisting in the solution of water-related problems for DKI Jakarta and related river basins” are necessary assistance as countermeasures against water-related disasters. The assistances for coastal protection as a coastal zone management may also be necessary.

6) In the field of Meteorological/Seismic observation and data analysis, “Improvement of meteorological observation and weather forecasting ability for disaster prevention” and “Vulnerability assessment due to climate change” are necessary assistance.

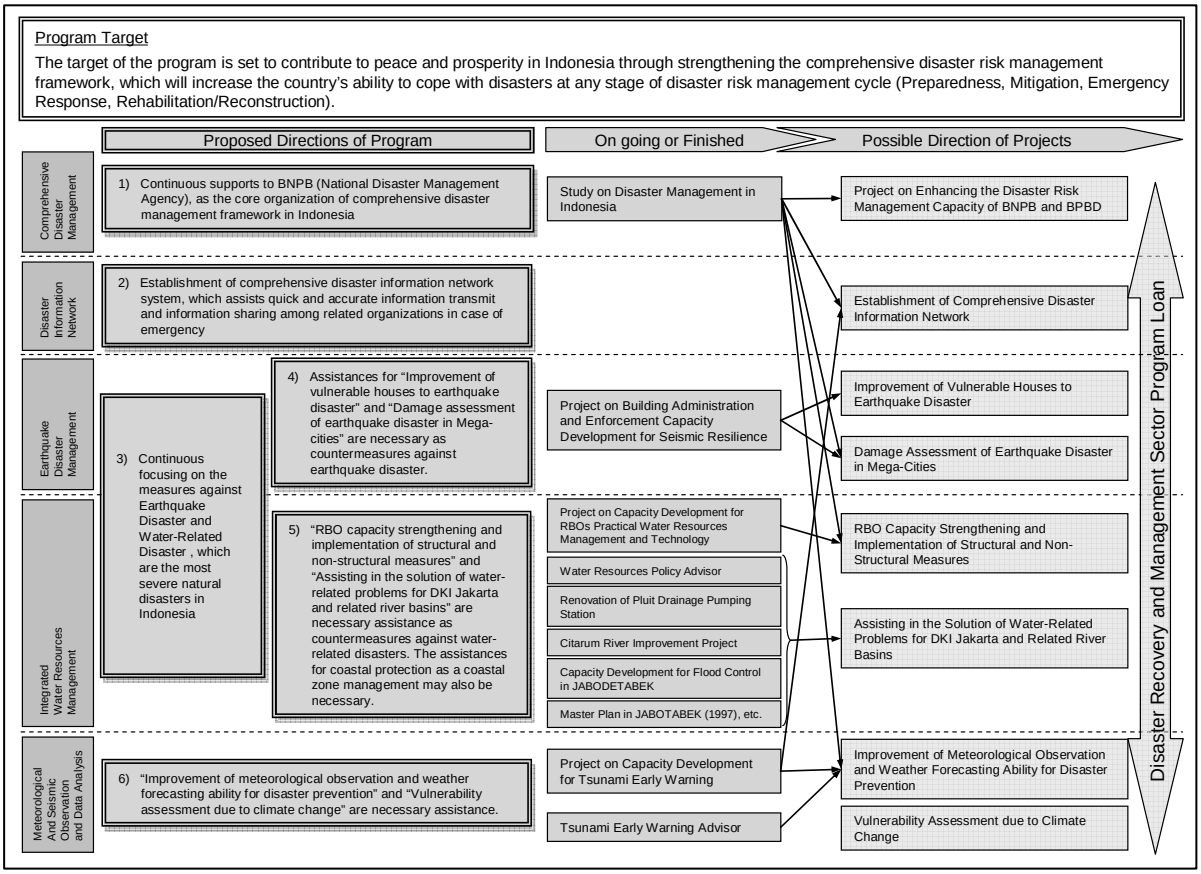


Figure 3.1.1 Proposed Directions of JICA Disaster Management Program

Each items above mentioned are described more in detail hereinafter.

1) Continuous supports to BNPB (National Disaster Management Agency), as the core organization of comprehensive disaster management framework in Indonesia

The National Disaster Management Agency (BNPB) was established in Jan. 2008 from the former organization which was called BAKORNAS PB as the coordination agency for disaster management at the national level. BNPB has been preparing its organizational structure through budget acquisition and gradual increase of staff, aiming to launch its activities as the head organization for disaster measures.

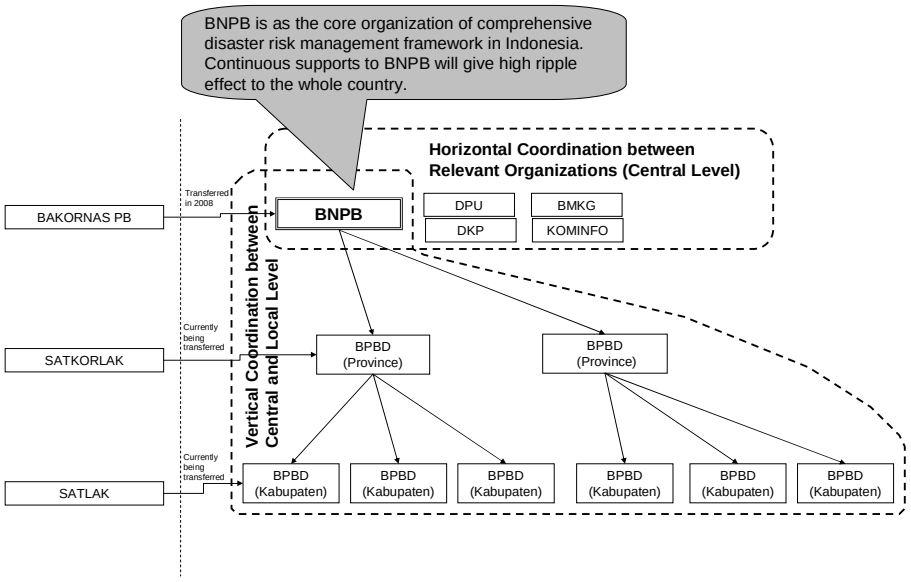


Figure 3.1.2 BNPB as the Core Organization for Comprehensive Disaster Management

One of the most important and difficult tasks for BNPB is assisting the capacity development of local governments. It is urgently required for local governments to be strengthened in terms of fundamentals of capacity for disaster management including initial responses, damage data accumulation and early warning, etc. In particular, it is also required to establish a Regional Disaster Management Agency (BPBD) in each Province, Kabupaten and Kota. However, the establishment of BPBD is still in the process and it takes time, especially for Kabupaten and Kota levels, due to the lack of capacity, human resources and know-how. In order for BNPB to implement the plans and disseminate the guidelines prepared under the JICA development study, the technical assistance for the capacity development of BNPB itself and local governments, particularly newly established BPBDs is indispensable.

2) Establishment of comprehensive disaster information network system, which assists quick and accurate information transmit and information sharing among related organizations in case of emergency

Since all the disaster management activities are determined and implemented based on information, the information is a core element of disaster management measures. Therefore, it is a central issue of disaster management measures to organize and incorporate the information from various sources including disaster-related agencies, citizens, NPOs and private companies and to share the information on disaster management for sure with a concrete strategy. Thus, it is necessary to establish comprehensive disaster information network system, which assists quick and accurate information transmit and information sharing among related organizations in case of emergency. The Indonesian Government, in cooperation with donor agencies, has conducted various activities regarding disaster information such as establishment of EOCs at national and regional levels, development of disaster information database, and development of information sharing network among central governmental organizations. However, activities have tended to be conducted on a sporadic basis, and some problems are found here and there. It is considered that this is because an overall plan or a master plan has not been developed in this field. Therefore, such a plan is crucial to develop for proper and effective disaster management.

3) Continuous focusing on the measures against Earthquake Disaster and Water-Related Disaster , which are the most severe natural disasters in Indonesia

Earthquake disaster and Water-related disaster, especially Flood disaster, have been the most frequent and severe natural disasters in Indonesia among the eight types of natural disasters (Earthquake, Tsunami, Volcanic Eruption, Landslide, Flood, Drought, Forest Fire and Destructive Wind) which are classified by BNPB. Then, continuous supports from JICA are indispensable in the field of Earthquake Disaster Management and Integrated Water Resources Management (IWRM), especially for water-related disaster and flood disaster. JICA has experienced a number of reconstruction/rehabilitation projects after severe earthquake disasters in Indonesia such as Ache, Jogjakarta, Padang, *etc*. The technical assistance project “Project on Building Administration and Enforcement Capacity Development for Seismic Resilience” has implemented for strengthening vulnerable non-engineered houses in Jogjakarta, West Sumatra, Bengkulu and Manado since 2007. JICA has also abundant experience in the field of IWRM including water-related disasters or flood disasters. “RBO capacity strengthening and implementation of structural and non-structural measures” and “Assisting in the solution of water-related problems for DKI Jakarta and related river basins” are necessary assistance as stated below.

4) Assistances for "Improvement of vulnerable houses to earthquake disaster" and "Damage assessment of earthquake disaster in Mega-cities" are necessary as countermeasures against earthquake disaster.

In recent years, Indonesia has been suffered from numbers of earthquake disasters (*e.g.* Banda Ache (2005), Jogjakarta (2006), Padang (2009), *etc.*). However, there are still rooms to continue to improve or enhance seismic countermeasure activities in Indonesia. Assistances for "Improvement of vulnerable houses to earthquake disaster" and "Damage assessment of earthquake disaster in Mega-cities" are necessary as countermeasures against earthquake disaster.

In general, quality of non-engineered residential buildings especially in suburbs are low and this fact causes devastating damages against earthquake disaster which is proved from the past earthquakes in Indonesia. Improvement of housing quality is indispensable to reduce risks against earthquake disaster, however, it needs long time to implement but one of the most important measures to be implemented. Main reasons of constructing low quality houses are 1) Lack of knowledge, and 2) Low income, and combination of knowledge dissemination and financial scheme will support improve quality of houses. Loans for low income persons and promotion of MENPERA Financial Scheme (MFS) are executed with the budget of IDR 1.4 trillion in Indonesia by 2009. However the quality of the residential buildings, which are built applying this scheme, is mostly not confirmed by MENPERA and local government or community organization, since those organizations do not have sufficient capacity to control the structural quality of the buildings. As a result, many low quality buildings were constructed. Therefore, guidelines and a financial scheme to support construction with higher quality which will not be totally collapsed against earthquake disaster are very much needed. In order to study, design, and propose sustainable financial scheme include seismic resistance of buildings, the project "Improvement of vulnerable houses to earthquake disaster" is proposed, so that the project will contribute to strengthening non-engineered buildings to reach minimum level that will not cause death against earthquake disaster. In addition, in order to assist poverty group to construct safer house against earthquake, it is necessary to consider not only application of MENPERA financial scheme but also formulation of nationwide financial system (e.g. Microfinance system or Grameen Bank). JICA's assistance for "Damage assessment of earthquake disaster in Mega-cities" is also necessary in order to estimate the requirements of necessary earthquake disaster management. The result may give basic information for which type of facility would be at risk, and where to start strengthening of these facilities, as well as identifies the amount necessary for rescue activities, and the result can be utilized to plan disaster management plans.

5) "RBO capacity strengthening and implementation of structural and non-structural measures" and "Assisting in the solution of water-related problems for DKI Jakarta and related river basins" are necessary assistance as countermeasures against water-related disasters. The assistances for coastal protection as a coastal zone management may also be necessary.

JICA has been contributing to numbers of projects in the field of IWRM including water-related disasters in Indonesia. However, there are still rooms to continue to improve or enhance. "RBO capacity strengthening and implementation of structural and non-structural measures" and "Assisting in the solution of water-related problems for DKI Jakarta and related river basins" are necessary assistance as countermeasures against water-related disasters. The assistances for coastal protection as a coastal zone management may also be necessary.

The establishments of "River Basin Organization (RBO)" and "Water Resources Management Council" have been the main movements in the field of IWRM. Since River Basin Organization (RBO) has been newly established, the capacity strengthening of RBO is crucial. Not only the capacity development but also structural and non-structural countermeasures are required for each river basin area in Indonesia. Necessary measures (Str. & Non-Str.) are to be implemented for the selected river basins in terms of IWRM. Capacity development should also be achieved in cooperation with RBO technical assistance project.

DKI Jakarta has been suffered from a number of water-related disasters, especially flood disaster. The frequency of flood disaster tends to increase over time, which may be caused by growing human activities in urbanized area with insufficient structural and non-structural measures. Land subsidence due to overuse of ground water has been causing serious flood problem. However, such problems have not been clarified enough or understood because of the numerous problems and insufficient coordination among relevant organizations. It is necessary to assist concerned agencies in Indonesia in the solution of water-related problems for DKI Jakarta and related river basins.

There are numbers of disasters due to coastal shore erosion, especially local road traffic interruption which may cause depression of social and economic activities, in the reports of DPU. Thus, the relevant organizations recognize the necessity of coastal zone management including coastal protection and request international aid for appropriate countermeasures. Some experts pointed out that the damages due to the coastal shore erosion were man-made disaster since such roads were constructed very close to coastal shore line to be eroded. It is necessary to investigate the suffered area to clarify the cause of the disaster and its influences to the regional social and economic activities. The assistances for coastal protection as a coastal zone management may be necessary. However, it is expected that assistance by ODA Loan might be difficult considering

cost-benefit performance except for the regions with salient positive economic effects such as Bali Island, etc.

6) In the field of Meteorological/Seismic observation and data analysis, “Improvement of meteorological observation and weather forecasting ability for disaster prevention” and “Vulnerability assessment due to climate change” are necessary assistance.

Most of meteorological disasters are based on heavy rainfall. Monitoring of actual rainfall condition and accurate prediction of rainfall are basics of all disaster prevention. Establishment of real time meteorological monitoring system and improvement of timely weather prediction will allow better countermeasure activities and poverty reduction. Thus, “Improvement of meteorological observation and weather forecasting ability for disaster prevention” is quite necessary.

Availability of vulnerability map in Indonesia against the thread of climate change in the form of climate hazard due to flood, drought, tropical cyclone, tornado, land slide, sea level rise and sea wave. Development of climate change prediction method based on the statistical analysis of historical data and future prospects for each hazard type. In this regard, “Study on Climate Change Vulnerability and Climate Change Prediction Method” is necessary.

Table 3.1.1 shows the list of the proposed projects, which will help to fill the gaps which is identified through analysis in Chapter 2 considering coverage field of donors and GOI efforts. As for “Coastal Protection”, the direction of JICA’s assistance is mentioned instead of proposal of new project.

Table 3.1.1 Proposed Project List

Field	Title
Comprehensive Disaster Management	The Project on Enhancing the Disaster Risk Management Capacity of BNPB and BPBD
Disaster Information Network	The Study on Disaster Information Network
Earthquake Disaster Management	Financial System for Improvement of Self-help Housing Quality in Disaster-Prone Areas
	The Study on Seismic Microzonation of Megacity in Indonesia
Integrated Water Resources Management	Implementation Program for Integrated Water Resources Management and Development

	JICA's Strategic Study on Enhancement of Inter-Basin Water Resources Management and Disaster Measures including Cisadane-Cliwung, Citarum and Ciujung-Ciliman River Basins
Meteorological/Seismic Observation and Data Analysis	Improvement of Meteorological Observation and Weather Forecasting Ability for Disaster Prevention
	The Study on Climate Change Vulnerability and Climate Change Prediction Method

3.2 Comprehensive Disaster Management

The following project is proposed to deal with critical issues in comprehensive disaster management.

Field	Comprehensive Disaster Management
Title	The Project on Enhancing the Disaster Risk Management Capacity of BNPB and BPBD

☐ Understanding/Background

The JICA development study entitled "The Study on Natural Disaster Management in Indonesia" was completed in March 2009. The Study formulated a draft of the National Disaster Management Plan and the Regional Disaster Management Plan based on disaster management plans in Japan. In addition, disaster hazard maps and risk maps in two (2) pilot areas as well as the general guidelines for disaster management plans, hazard and risk maps and community based disaster risk management activities were formulated which are indispensable for implementing disaster management activities in all levels.

BNPB was newly established in 2008 and is currently dealing with a wide range of responsibilities in relation with disaster management in Indonesia. One of the most important and difficult tasks for BNPB is assisting the capacity development of local governments. It is urgently required for local governments to be strengthened in terms of fundamentals of capacity for disaster management including initial responses, damage data accumulation and early warning, and others. In particular, it is also required to establish a Regional Disaster Management Agency (BPBD) in each Province, Kabupaten and Kota. However, the establishment of BPBD is still in the process and it takes some time, especially for Kabupaten and Kota levels, due to the lack of capacity, human resources and know-how.

In order for BNPB to implement activities indicated in the plans and disseminate the guidelines prepared under the JICA development study for formulation regional disaster management plan and hazard and Risk Maps, the technical assistance for the capacity development of BNPB itself and local governments, particularly newly established BPBDs is indispensable to increase comprehensive capacity of disaster management in Indonesia.

☐ Project Purpose

The purposes of the project are as follows.

1) Capacity development of BNPB and BPBD to improve accuracy of acquisition and accumulation of disaster data and information

2) Capacity development of BNPB to guide BPBD to formulate regional disaster management plans and hazard and risk maps, and unification of contents of PROTAP with Emergency Response Plan in Regional Disaster Management Plan

3) Capacity development of BPBD in selected disaster-prone Provinces and Kabupaten through the formulation of regional disaster management plans and hazard and risk maps, and assisting community level activities for disaster management

4) Technical transfer for conducting disaster drills by facilitating the coordination between BNPB and BPBD

☐ **Expected Output**

(1) Output 1

Accuracy of Acquisition and Accumulation of Disaster Data and Information is improved, which are fundamental for disaster risk management.

(2) Output 2

Hazard and Risk Maps are created in Kota/Kabupaten, which are the preliminary activity to formulate the disaster management plan, based on "the guideline for creation of Hazard and Risk Maps" formulated by BNPB. And capacity of BNPB and BPBDs are enhanced through the activities.

(3) Output 3

Regional Disaster Management Plans are formulated in Kota/Kabupaten, based on "the guideline for formulation of Regional Disaster Management Plan" formulated by BNPB. Also, PROTAP is revised based on Emergency Response Plan formulated in Regional Disaster Management Plan. And capacity of BNPB and BPBDs are enhanced through the activities.

(4) Output 4

"Guideline for implementation of ***Comprehensive Disaster Risk Management Drills***" is formulated, which helps to implement emergency response activities efficiently. And drills are implemented based on the guideline.

☐ Activities

Activity for Output 1: Acquisition and Accumulation of Disaster Data and Information

[Activity 1 - 1] Contents of disaster data and information to be acquired and accumulated in regional level (Kota/Kabupaten) are considered and format is determined. (1st Year)

[Activity 1 - 2] Necessary data items and format for sharing and informing disaster data and information from Kota/Kabupaten BPBD to Provincial BPBD, and Provincial BPBD to BNPB are considered and methodology of accumulation is determined. (1st Year)

[Activity 1 - 3] "Guideline for acquisition and accumulation of disaster data and information" is formulated. (1st Year)

[Activity 1 - 4] Trial operation of acquisition and accumulation utilizing format for damage data and information in Pilot Kota/Kabupaten is commenced. (2nd Year, 3rd Year)

Activity for Output 2: Creation of Hazard and Risk Maps

[Activity 2 - 1] "Guideline for creation of Hazard and Risk Maps" is finalized by adding four (4) target disasters (volcanic eruption, drought, destructive wind, and forest fire) (Standardization of methodology) (1st Year)

[Activity 2 - 2] Basic Data for creation of HM and RM are collected and analyzed in Pilot Kota/Kabupaten. (2nd Year, 3rd Year)

[Activity 2 - 3] Hazard and Risk Maps are created in Pilot Kota/Kabupaten. (2nd Year, 3rd Year)

Activity for Output 3: Formulation of Regional Disaster Management Plan

[Activity 3 - 1] "Guideline for formulation of Disaster Management Plan" is finalized by adding four (4) target disasters (volcanic eruption, drought, destructive wind, and forest fire) (Standardization of methodology) (1st Year)

[Activity 3 - 2] Contents of Standard PROTAP considering contents of Emergency Response Plan in Regional Disaster Management Plan is considered and finalized (1st Year)

[Activity 3 - 3] Basic Data for formulation of Regional Disaster Management Plan are collected and clarified in Pilot Kota/Kabupaten. (2nd Year, 3rd Year)

[Activity 3 - 4] Regional Disaster Management Plans are formulated in Pilot Kota/Kabupaten. (2nd Year, 3rd Year)

[Activity 3 - 5] PROTAP are revised based on Emergency Response Plan in Regional Disaster Management Plan formulated in Activity 3 - 4 in Pilot Kota/Kabupaten. (2nd Year, 3rd Year)

Activity for Output 4: Implementation of Comprehensive Disaster Risk Management Drills

[Activity 4 - 1] "Guideline for implementation of comprehensive disaster risk management drills" is formulated (National, local, National and local combined). (1st Year)

[Activity 4 - 2] Comprehensive disaster risk management drill in national level is planned and implemented. (2nd Year)

[Activity 4 - 3] Comprehensive disaster risk management drills in pilot areas are planned and implemented. (3rd Year)

[Activity 4 - 4] Comprehensive disaster risk management drills in pilot areas with the participation of both National Government and local governments are planned and implemented. (3rd Year)

☐ **Input from Indonesian side**

Following inputs from Indonesia side are necessary to implement the project:

- Assignment of fulltime counterpart personnel from BNPB and pilot BPBD to implement the projects
- Provision of Project Office Space and necessary facilities both in BNPB and pilot BPBD
- Provision of necessary data and information
- Establishment of Joint Coordination Committee (JCC)

☐ **Responsible Agency / Counterpart Agency**

National Disaster Management Agency (BNPB)

☐ Project Site

BNPB (Jakarta)

BPBDs (Pilot Regions) Tentative

1. DKI Jakarta
2. East Java Province (Kabupaten Jember and other Kota/Kabupatens)
3. West Sumatra Province (Kabupaten Padang Pariaman/Kota Pariaman and other Kota/Kabupatens)
4. North Sulawesi Province (Kota Manado and other Kota/Kabupatens)
5. Bali Province

☐ Type of Cooperation Scheme

Technical Assistance

☐ Cost

Total cost will be USD 3.8 million.

3.3 Disaster Information Network

The following project is proposed to deal with critical issues in disaster information/disaster information network field.

Field	Disaster Information Network
Title	The Study on Disaster Information Network

☐ **Understanding/Background**

Since all the disaster management activities are determined and implemented based on information, the information is a core element of disaster management measures. Therefore, it is a central issue of disaster management measures to organize and incorporate the information from various sources including disaster-related agencies, citizens, NPOs and private companies and to share the information on disaster management for sure with a concrete strategy.

The Indonesian Government, in cooperation with donor agencies, has conducted various activities regarding disaster information such as establishment of EOCs at national and regional levels, development of disaster information database, and development of information sharing network among central governmental organizations. However, activities have tended to be conducted on a sporadic basis, and some problems are found here and there. It is considered that this is because an overall plan or a master plan has not been developed in this field. Therefore, such a plan is crucial to develop for proper and effective disaster management.

☐ **Project Purpose**

The purpose of the project is to formulate an overall plan/a master plan on disaster information network system for collecting, transmitting, accumulating, sharing and utilizing disaster information among central governmental organizations, local governments and community/people.

☐ **Expected Output**

Output of the Study is an overall plan / a master plan on disaster information network in Indonesia. It consists of:

i) Design of an overall system of disaster information network in Indonesia;

ii) Clarification of responsibility and role of disaster-related organizations from Central Government to local government and community;

iii) Concrete design of the system including routes of information transmission, types of information, database structure, program/software, equipment/hardware, typical design of equipment and facilities in regional EOC and others;

iv) Standardized information formats to be collected and shared;

v) Implementation plan for gradual development/installation of a network and communication system;

vi) Operation and maintenance plan; and

vii) Plan for capacity development and training.

☐ **Activities**

i) Review of Present Conditions

a. Review of actual conditions of information transmission and sharing among disaster-related organizations at both central and local levels in normal time and in time of disaster

b. Review of present disaster information transmission and sharing systems among central governmental organizations, between central organizations and local governments, from central governmental organizations to community/people

c. Review of present activities and responsibility of disaster-related organizations regarding disaster information, and relevant laws and regulations

d. Review of contents of information collected by disaster-related organizations

e. Review of present conditions of information collection and transmission equipment and facilities of central governmental organizations and local governments

f. Review of present disaster information systems such as BNPB's system, provincial EOC's system assisted by the French government and the French Red Cross, DEPKOMINFO and BMKG's system assisted by KOICA

ii) Design of Disaster Information Network

a. Design of an overall system of disaster information network

b. Clarification of responsibility of each organization for information collection and correspondence

c. Design of a system for collecting and sharing standardized information such as stereotyping various information formats

d. Design of a system in BNPB for collecting, transmitting and sharing information

e. Design of a network system for transmitting and sharing information among central disaster-related organizations

f. Design of communication equipment and facilities in local governments

g. Design of a network system among central disaster-related organizations, local governments and community, including multiplexing routes to transmit information

h. Design of a portable disaster information collection and transmission system (equipment) in disaster affected site.

iii) Investigation of implementation plan

a. Investigation of an implementation plan for gradual development/installation of a network and communication system

b. Investigation of an operation and maintenance plan

c. Investigation of a plan for capacity development and training

iv) Formulation of plan

To formulate an overall plan on disaster information network in Indonesia

☐ **Responsible Agency / Counterpart Agency**

National Disaster Management Agency (BNPB)

☐ **Project site**

Jakarta

☐ **Type of Cooperation Scheme**

Development Study

3.4 Earthquake Disaster Management

The following projects are proposed to deal with critical issues in the field of Earthquake Disaster Management.

Field	Earthquake Disaster Management
Title	Financial System for Improvement of Self-help Housing Quality in Disaster-Prone Areas

This is a project corresponding to “e. Technical guidance linked with housing loan system for low income person” of Issues/Necessary Actions selected in section 2.3.4. However, there are still some conditions which should be fulfilled before execution of this project, as mentioned below, to be able to obtain project result effectively.

- Results of phase 2 of "The project on Building Administration and Enforcement Capacity Development for Seismic Resilience", especially on experiment of key requirement set in phase 2 of the study, should be utilized before starting of the proposed project.
- Schedule of budget for grant and loan scheme must be secured by the Ministry of Finance, since the original schedule will finish in 2 years. There is a need to secure continuity of budget before starting of the project.

In this regard, priority of this project is high; however, it is recommended to start it in 2 to 3 years confirming the critical matters mentioned above.

☐ Understanding/Background

Quality of non-engineered residential buildings especially in suburb area is low and this fact causes devastating damages against earthquake disaster which is proved from the past earthquakes in Indonesia. Improvement of housing quality is indispensable to reduce risks against earthquake disaster, however, it needs long time to implement but one of the most important measures to be implemented. Main reasons of constructing low quality houses are 1) Lack of knowledge, and 2) Low income, and combination of knowledge dissemination and financial scheme will support improve quality of houses.

Loans for low income persons and promotion of MENPERA Financial Scheme (MFS) are executed with the budget of IDR 1.4 trillion in Indonesia by 2009. However the quality of the residential buildings, which are built applying this scheme, is mostly not confirmed by MENPERA and local government or community organization, since those organizations do not have sufficient capacity to control the structural quality of the buildings. As a result, many low quality buildings were constructed. Therefore, guidelines and a financial scheme to support

construction of quality buildings which will not totally collapse against earthquake disaster are very much needed.

In order to study, design, and propose sustainable financial scheme include seismic resistance of buildings, the project "Improvement of vulnerable houses to earthquake disaster" is proposed, so that the project will contribute to strengthening non-engineered buildings to reach minimum level that will not cause death against earthquake disaster.

☐ Project Purpose

The purpose of the project is:

1) To study, design, and propose sustainable financial scheme to improve quality of non-engineered housing in disaster-prone and /or post-disaster areas.

☐ Expected Output

Output of the "Project on Financial System for Improvement of Self-help Housing Quality in Disaster-Prone Areas" consists of:

i) Study/review of housing supply-demand (including delivery system, purchasing power, existing financial schemes), and housing condition in selected disaster-prone areas;

ii) Proposal of financial scheme for self-help housing quality improvement system in disaster-prone and post-disaster areas;

iii) Project design for implementation of financial scheme; and

iv) Transfer of knowledge for stakeholders supporting the above system.

☐ Activities

i) Review of Present Conditions

g. Gain an understanding of actual amount required to build a house (Examination of loan applicant's ability to repay the loan)

h. Investigation into the situation and vulnerability for earthquake hazard of the houses in selected pilot region

i. Review of present house supply system that supports low income person

j. Review of existing microcredit system in the financial institution that can participate in MENPERA project

ii) Suggestion for Improvement

a. Improvement of house supply system in selected pilot region

b. Improvement of financial system

c. Analysis of financial scheme and incentive aiming at quality improvement of loan applicant's house

d. Suggestion for enforcement of structural engineering regulations

iii) Capacity Building of parties concerned who include local government, financial institution, private sector, and community organization

a. Holding workshops

b. Formulation of guideline

☐ **Input from Indonesian side**

- Office space and equipment
- Counterpart personnel
  - Project Manager
  - Supporting Staff

☐ **Responsible Agency / Counterpart Agency**

State Ministry of Public Housing

Deputy for Self-Help Housing System Development

☐ **Project site (Tentative)**

1. Jakarta, DKI Province – Head Office
2. Padang City, West Sumatra (earthquake-prone area)
3. Tasikmalaya City, West Java (landslide-prone area)
4. Pekalongan City, Central Java (coastal area)
5. Maumere City, East Nusa Tenggara (earthquake and coastal area)

☐ **Type of Cooperation Scheme**

Technical Cooperation for Development Planning (for M/P) (TCDP)

Field	Earthquake Disaster Management
Title	The Study on Seismic Microzonation of Megacity in Indonesia

☐ **Understanding/Background**

Earthquake causes serious damage once it occurs. However, the return period of an earthquake of devastating proportion resulting in severe damage is longer than an individual's life. It is rare to experience such scale of earthquake even if the person lives in one region for a long time. Therefore, the analysis based on scientific procedure and effective database is indispensable for estimating the requirement of necessary earthquake disaster management. Especially, it is known that earthquake damage is amplified in the metropolitan area with high density of facilities, and the need to rely on a huge amount of support goods and the labor supplied from another region. It is necessary to select the megacity with high density of facilities as an investigation target, collect necessary data, and implement damage assessment analysis. As a result of damage assessment, the necessary amount of urgent measures after earthquake occurrence becomes clear. The result gives basic information for which type of facility would be at risk, and where to start strengthening of these facilities, as well as identifies the amount necessary for rescue activities, and the result can be utilized to plan disaster management plans.

☐ **Project Purpose**

The purposes of the project are:

1) To estimate damage against earthquake disaster in the region; and
2) To formulate disaster management plan to mitigate the estimated damage.

☐ **Expected Output**

i) Estimation of damages in Megacity (For instance, number of heavily damaged houses, number of casualties, damage to infrastructure, lifeline, important facility)

ii) Disaster Management Planning based on result of damage estimation

☐ **Activities**

i) Basic data collection for analysis

a. Earthquake source fault data collection
b. Geographical data collection
c. Geological data collection
d. Building statistics data collection
e. Population data collection

f. Zone restrictions data collection

ii) Analysis utilizing seismic microzoning method

a. Estimation of the earthquake motion at the surface of the base rock (Response spectrum)

b. Estimation of the amplification in surface layer of the ground

iii) Estimation of building damage

a. Formulation of vulnerability function for each type of building

b. Estimation of the building damage caused by the earthquake motion at the surface ground

iv) Estimation of the urgent demand for emergency and post-disaster activities

a. Demand of the emergency response assistance

b. Demand of the rehabilitation and reconstruction

v) Disaster Management Plan

a. Planning based on the estimated damage

☐ **Input from Indonesian side**

- Facilities such as office for activities
- Qualified researchers and engineers (as Counterparts)
- Committee for the project
- National Reference (Related information such as related institute, related regulations and so on)
- Local cost

☐ **Responsible Agency / Counterpart Agency**

National Disaster Management Agency (BNPB)

Ministry of Public Works

Research Institute for Human Settlements

☐ **Project Site**

Megacity（For instance, Jakarta, DKI Province）

☐ **Type of Cooperation Scheme**

Technical Cooperation for Development Planning (for M/P) (TCDP)

3.5 Integrated Water Resources Management

Based on the critical issues (or necessary actions) selected through the procedure described in the section 2.3, the following projects, shown in Table 3.4.1, are recommended in the field of IWRM.

Table 3.5.1 Recommended Projects for Integrated Water Resources Management

Title	Profile
Implementation Program for Integrated Water Resources Management and Development	Necessary measures (Str. & Non-Str.) are to be implemented for the selected river basins in terms of IWRM. Capacity development will also be achieved in cooperation with RBO technical assistance project.
JICA's Strategic Study on Enhancement of Inter-Basin Water Resources Management and Disaster Measures including Cisadane-Cliwung, Citarum and Ciujung-Ciliman River Basins	JICA's Strategic Plan will be formulated for Enhancement of Inter-Basin Water Resources Management and Disaster Measures including DKI Jakarta, Cisadane-Cliwung, Citarum and Ciujung-Ciliman River Basins.

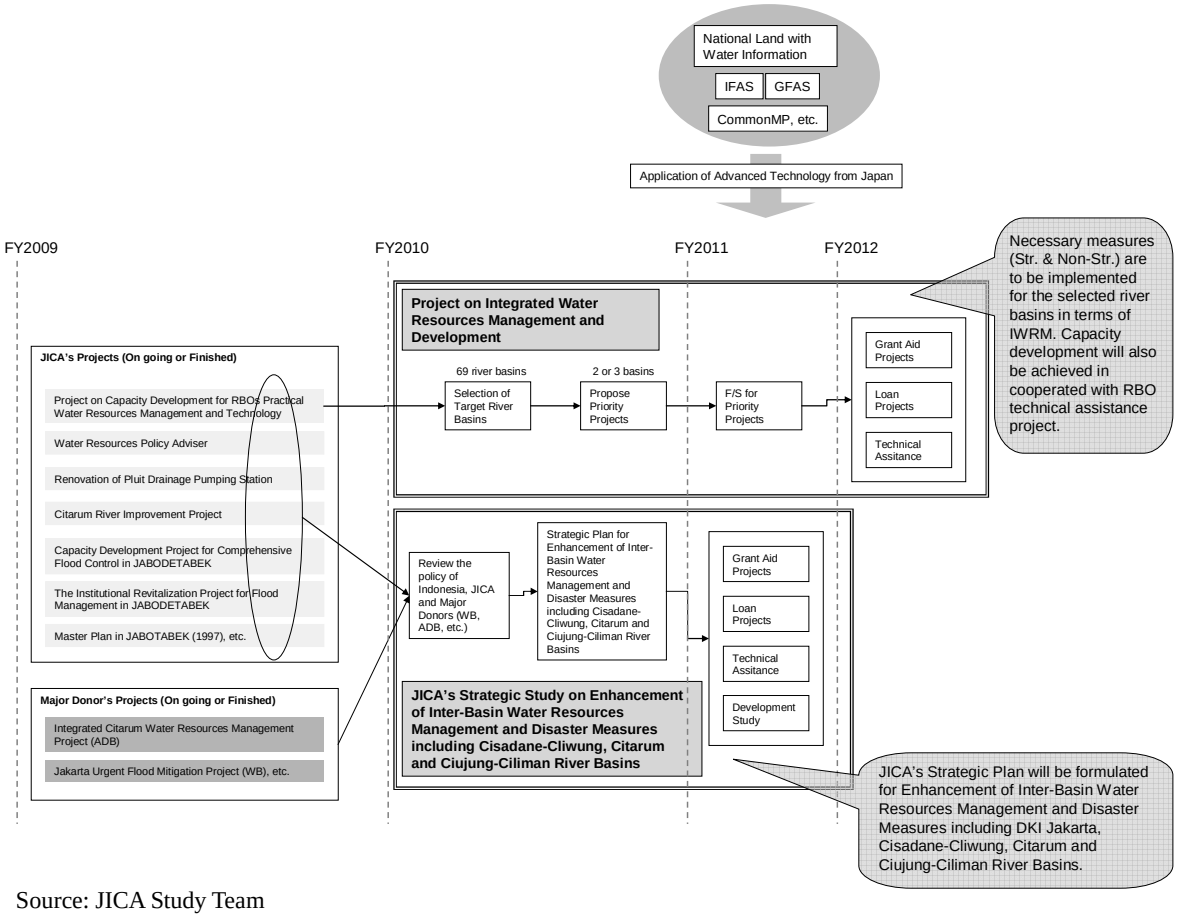
Source: JICA Study Team

It is important to develop the capacity of River Basic Organizations (RBOs). In fact, JICA's assistance efforts have been directed toward implementing the Project on Capacity Development for RBOs Practical Water Resources Management and Technology. Not only the capacity development but also structural and non-structural countermeasures are required for each river basin area in Indonesia. To achieve this requirement, "Implementation Program for Integrated Water Resources Management and Development" is proposed. After the selection of appropriate river basin, structural and non-structural countermeasures coordinated with capacity development will be implemented.

As for the river basins around DKI Jakarta, a number of problems, such as land subsidence due to overuse of ground water, and insufficient structural and non-structural counter measures, have to be solved. However, such problems have not been clarified enough or understood because of the numerous problems and insufficient coordination among relevant organizations. Asian Development Bank has been implementing "Integrated Citarum Water Resources Management Project" and "Flood Management in Selected River Basin Project", while World Bank has been implementing "Jakarta Urgent Flood Mitigation Project". It is necessary for JICA to formulate an action plan for assisting in the solution of water-related problems for DKI Jakarta including Cisadane-Cliwung, Citarum and Ciujung-Ciliman River Basins. It is also necessary for JICA to review the past or current project and draw up a strategy from a comprehensive and wide point of view. To achieve this requirement, "JICA's Strategic Study on Enhancement of Integrated Water

Resources Management and Disaster Measures for DKI Jakarta including Cisadane-Cliwung, Citarum and Ciujung-Ciliman River Basins" is proposed.

In addition, Application of Japanese Advanced Technology (for example, IFAS, GFAS, CommonMP, National Land with Water Information, etc.) should be considered as one of the components of these proposed projects.



Source: JICA Study Team

Figure 3.5.1 Proposed Projects for Integrated Water Resources Management

Field	Integrated Water Resources Management
Title	Implementation Program for Integrated Water Resources Management and Development

☐ **Understanding/Background**

RBOs have just been established. However, human resource at each RBO is seriously insufficient to implement the required activities for IWRM. In this regard, JICA's Project on Capacity Development for RBOs Practical Water Resources Management and Technology has started.

☐ **Basic Policy/Basic Concept of Framework**

Necessary measures, both structural and non-structural, are to be implemented for the selected river basins in terms of IWRM. Capacity development will also be achieved through the review and revision of water resources policy (POLA) and Master Plan in cooperation with the RBO technical assistance project. After this project, RBOs are expected to improve their capacity to cope with the required water resources management activity in a sustainable way.

☐ **Expected Output**

i) RBO has enough ability for formulation of policy (POLA) and Master Plan of IWRM including revisions and updating.

ii) RBO has enough ability for coordination among relevant organizations.

iii) RBO also can provide sufficient information/data to be shared with relevant organizations.

iv) RBO will be able to cope with climate change adaptation.

v) Damage due to flood disaster is prevented in prioritized area to some extent by means of structural and non-structural countermeasures.

vi) Appropriate water use system for multi-purpose use with sufficient water quality is to be installed.

☐ **Steps for the implementation**

i) Selection of Target River Basins

The target river basins (2 or 3 basins) are supposed to be selected from the 69 river basins that are under the management of an RBO office. There are three (3) criteria for the selection: 1) Formulation status of the policy (POLA) and master plan for integrated water resources management, 2) the Indonesian Government's policy on related field, and 3) Coordination with other donor's support.

ii) Proposing Priority Projects

The procedure for proposing priority projects in a selected river basin is as follows: 1) Reviewing the policy (POLA) and master plan, 2) Conducting additional survey for revising or updating the policy (POLA) and master plan, 3) Identifying current problems, 4) Coordinating with related stakeholders, 4) Examining countermeasures for multi-sector and 5) Proposing priority projects.

iii) F/S for the Priority Projects

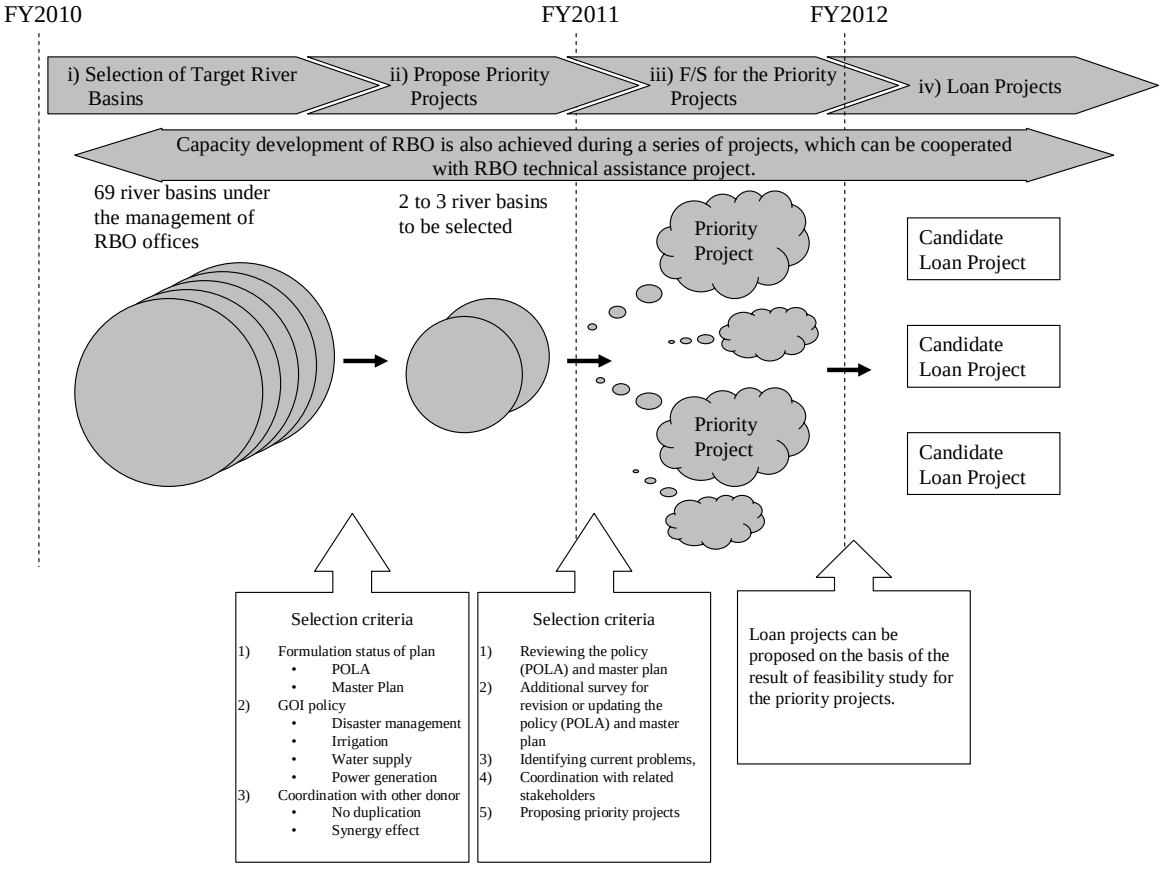
The feasibility is examined for the priority projects in terms of 1) Technical aspect, 2) Environmental aspect and 3) Economical aspect.

iv) Loan Projects

Loan projects can be proposed on the basis of the result of feasibility study for the priority projects.

☐ **Responsible Agency / Counterpart Agency**

Ministry of Public Works (PU) and River Basin Organization (RBO) at selected river basin



Source: JICA Study Team

Figure 3.5.2 Proposed Implementation Scheme for Integrated Water Resources Management and Development in Indonesia

Field	Integrated Water Resources Management
Title	JICA's Strategic Study on Enhancement of Inter-Basin Water Resources Management and Disaster Measures including DKI Jakarta, Cisadane-Cliwung, Citarum and Ciujung-Ciliman River Basins

☐ **Understanding/Background**

As for the river basins around DKI Jakarta, a number of problems, such as land subsidence due to overuse of ground water and insufficient structural and non-structural counter measures, have to be solved. However, such problems have not been clarified enough or understood because of the numerous problems and insufficient coordination among relevant organizations. Asian Development Bank (ADB) has been implementing "Integrated Citarum Water Resources Management Project" and "Flood Management in Selected River Basin Project", while World Bank (WB) has been implementing "Jakarta Urgent Flood Mitigation Project". It is necessary for JICA to formulate an action plan for assisting in the solution of water-related problems for DKI Jakarta including Cisadane-Cliwung, Citarum and Ciujung-Ciliman River Basins. It is also necessary for JICA to review the past or current project and draw up a strategy from a comprehensive and wide point of view. To achieve this requirement, "JICA's Strategic Study on Enhancement of Integrated Water Resources Management and Disaster Measures for DKI Jakarta including Cisadane-Cliwung, Citarum and Ciujung-Ciliman River Basins" is proposed.

☐ **Basic Policy/Basic Concept of Framework**

JICA's Strategic Plan will be formulated for Enhancement of Inter-Basin Water Resources Management and Disaster Measures including DKI Jakarta, Cisadane-Cliwung, Citarum and Ciujung-Ciliman River Basins. Included in the plan is coordination and demarcation with the projects of WB and ADB.

☐ **Activities**

i) Review the policy of Indonesia, JICA and Major Donors (WB, ADB, etc.)

ii) Identification of problems

iii) Formulation of action plan

iv) Strategic Plan for Enhancement of Inter-Basin Water Resources Management and Disaster Measures including Cisadane-Cliwung, Citarum and Ciujung-Ciliman River Basins

☐ **Concerned Agency**

Ministry of Public Works, West Java Province, DKI Jakarta, etc.

☐ **Project site**

DKI Jakarta, Cisadane-Cliwung, Citarum and Ciujung-Ciliman River Basins

3.6 Meteorological/Seismic Observation and Data Analysis

The following projects are proposed to deal with critical issues in this field.

Field	Meteorological Observation and Weather Forecasting
Title	Improvement of meteorological observation and weather forecasting ability for disaster prevention

☐ Purpose

Most of meteorological disasters are based on heavy rainfall. Monitoring of actual rainfall condition and accurate prediction of rainfall are basics of all disaster prevention. Establishment of real time meteorological monitoring system and improvement of timely weather prediction will allow better countermeasure activities and poverty reduction.

☐ Output

- Improvement of Observation System
- Introduction of Radar Data Analysis
- Improvement of Forecasting Skill
- Improvement of Warning Issue Skill

☐ Activities

- Development of automated weather station, acquisition system and central operating system
- Introduction of radar composition method and radar AWS analyzed precipitation method
- Introduction of precipitation now-cast method
- Improvement of SATAID operation skill
- Introduction of guidance skill of NWP
- Establishment of segmentalized warning criteria for meteorological disaster
- Development of disaster information/ warning products
- Discussion for communication of disaster information/ warning and demarcation among organizations concerned
- Human capacity building

☐ Responsible Agency / Counterpart Agency

Agency of Meteorology, Climatology and Geophysics (BMKG)

Field	Climate Change
Title	Study on Climate Change Vulnerability and Climate Change Prediction Method

☐ **Purpose**

- Availability of vulnerability map in Indonesia against the thread of climate change in the form of climate hazard due to flood, drought, tropical cyclone, tornado, land slide, sea level rise and sea wave.
- Development of climate change prediction method based on the statistical analysis of historical data and future prospects for each hazard type.

☐ **Output**

- Map of climate hazard in Indonesia (Each hazard type)
- Map of climate change of climate hazard (Trend of climate hazard)
- Map of adaptive capacity in Indonesia
- Map of vulnerability against climate change
- In situ verification
- Improvement of vulnerability map

☐ **Activities**

- Coordination and demarcation regarding activities for study in terms of climate change vulnerability and adaptive capacity with organizations concerned
- Data inventory and quality control of historical meteorological database
- Training on climate change vulnerability analysis and statistical analysis
- Assessment of climate variation trend, climate extreme trend analysis, climate sensitivity and climate adaptive capacity
- Identification of each climate risk and its relevant trend to define the rate of climate variability
- Identification and precursor analysis of climate extreme
- Evaluation of climate change vulnerability map
- Monitoring climate change
- Issuing annual report of climate change
- Human capacity building

☐ **Responsible Agency / Counterpart Agency**

Agency of Meteorology, Climatology and Geophysics (BMKG)

☐ **Concerned Agency**

Ministry of Public Works (PU), National Disaster Management Agency (BNPB), Regional Disaster Management Agency (BPBD)

3.7 Coastal Protection

3.7.1 Needs of Sustainable Coastal Resources Management

The problems of environment and disaster mitigation of coastal areas in Indonesia are conceived as the poverty of the community due to lack of effective utilization of the resources.

Exploitation and utilization of coastal resources have caused degradation of quality of coastal environment broadly. The current situations have mostly been caused by lack of:

i) integrated approach in planning and coastal zone management;
ii) information and data which should have been the basis of decision and policy making of resources management;
iii) openness in resources allocation; and
iv) involvement of regional government and local community in resources management.

Equally importantly, from an implementation point of view, there have been the issues such as:

v) few resources outside project funds to support integrated planning and coastal zone management;
vi) poorly developed vertical linkages between the program goals of key central policy institutions and provincial implementing agencies; and
vii) inadequate understanding of the potential for partnering with communities, industries and other coastal and marine resource users.

Enhancement of the organizational capacity of the government and restoration of the quality of the coastal environment will be achieved by:

(a) strengthening the capability of the Central Government as well as regional government in planning and sustainable management of marine and coastal resources;
(b) increase supply and access to information and data of environmental quality which are useful for planning and management of coastal resources;
(c) increase law governance, regulations and discipline in utilization of coastal resources; and
(d) small-scale investment for improvement of social economic conditions and quality of coastal environment.

Reference is made to Section 3.6.2 for the proposed programs/projects for the achievement of the goals mentioned above, and the expected assistance from JICA for the projects.

3.7.2 Proposed New Programs and Projects Expected to be Supported by Japan

The efforts and activities for mitigation of coastal disaster and environmental degradation in the coastal areas and small islands can be formulated in two ways at least, i.e., (i) non-physical (non-structural) efforts and (ii) physical (structural) efforts.

The following are the proposed programs for the efforts of disaster mitigation and adaptation to climate change in the coastal area which are requested through the interviews conducted with the DKP officials during the visit by team members.

1) Non-physical Disaster Mitigation Efforts

Non-physical efforts for disaster mitigation in the coastal areas and implementation of integrated coastal management are stipulated in Law No. 27 of 2007, and the responsibility to formulate those efforts belongs to the Central Government and regional government together with participation of the local community (Articles 56 and 57).

In order for the pre-disaster measures through risk management approach by prevention efforts, mitigation and preparedness, following programs and projects are proposed for the policy making and coastal management.

(1) Disaster Risk Mapping in the Coastal Areas

DKP (Department of Marine and Fisheries Affairs) has developed two (2) types of Disaster Risk Map on the following areas as mentioned in Section 2.1.6, 2). One is Tsunami Mapping, and another is Tidal Flood (Climate Change) Mapping. Tsunami Mapping will be described in the context of Tsunami Mitigation Information System below).

Tidal Flood Mapping

In the efforts of adaptation to the impact of climate change, DKP has carried out studies and analysis on Sea Level Rise on the northern coasts of Java Island covering the area from Banten to Central Java. The study results are obtained as the inundation areas of tidal flood including densely populated areas of North Jakarta and Semarang, and other low land areas and swamps.

Impacts of climate change are a cause for alarm not only on the Sea Level Rise but also on such phenomena as:

- Rise of sea water surface temperature,
- Drop of sea water pH,
- Change of ocean circulation pattern,
- Increasing frequency of storm occurrence, and
- Social and economic impacts of coral bleaching disaster.

DKP has plans to expand the coverage area of the climate change mapping to the coasts of East Java and other coastal areas in Indonesia.

The study and mapping results will be used for the strategic planning and policy making for adaptation to Climate Change in the coastal areas and small islands.

In order to make the study comprehensive, the study should be conducted in coordination and close collaboration with BMKG and BNPB. Technical assistance and funding assistance (grant aid) from the international funding agencies are expected.

(2) Tsunami Mitigation Information System

A **tsunami map** (2007) was produced in the coastal area of Painan (Kabupaten Pesisir Selatan, West Sumatra Province) based on the analysis of tsunami hazards, vulnerability, and risk.

Following the studies and production of the tsunami map, publicity activities were developed in the area of Painan in 2008 including:

- Publication of Tsunami Hazard Map
- Installation of Tsunami Signboards on the road informing Tsunami Risk Areas, evacuation routes
- Installation of Tsunami evacuation signs

Tsunami Evacuation Sign

In the 3rd year of the series of efforts, DKP plans to create a local-scale tsunami warning system including installation of a tsunami gauge (tsunami detection instrument) in the offshore area of Painan. Tsunami evacuation drills should also be conducted by the local community of Painan.

Technical assistance and funding assistance (grant aid) are expected for the realization and establishment of a Tsunami Mitigation Information System.

DKP has plans to expand the coverage area of the tsunami mapping and development of the Tsunami Mitigation Information System to the other areas of the West Sumatra coast, South Coast of Java Island, NTT and NTB (Nusa Tenggara Timur, Nusa Tenggara Barat) and Bali, which are facing the tsunami potential area along Sunda Trench.

(3) Coastal Environment Degradation Mapping

In response to the critical situation of the coastal environment in Indonesia, and in order to have detail information to evaluate the current condition and environmental qualities, DKP plans to conduct Coastal Environment Degradation Mapping, which will cover the degradation of coastal environment ranging over the appearances of environmental quality, which include beach erosion, land subsidence, devastation of coral reefs and mangrove forests, river-mouth clogging, contamination of water quality, etc.

According to the DKP's plan, the situation is at critical condition in North Coast of Java Island (Pantai Utara Jawa) and West Coast of Sumatra (Pantai Barat Sumatera), and mapping is urgently needed in those areas.

DKP (Central Government) also plans to manage the mapping, an online database of the coastal environment, which would function as the common platform of information exchange connecting the Central Government and local government.

DKP expects technical assistance and funding assistance (grant aid) for the Coastal Mapping and realization of the Information System.

(4) Formulation of Strategic Plan for Disaster Mitigation and Adaptation to Climate Change in the Coastal areas and Small Islands

According to the Law No. 27 of 2007, it is the obligation of the Central Government and the local government to formulate integrated management and exploitation plans of coastal zones and small islands, and the plan shall include and implement parts on disaster mitigation (Article 56). Further, in Article 58, it is stipulated that implementation of disaster mitigation for the coastal areas shall be conducted paying attention to the following aspects of:

a. social, economy and culture of the community,
b. preservation of the living environment,
c. benefit and effectiveness, and
d. coverage areas.

In line with those efforts of basic analysis and mapping on the impacts of climate change and tsunami mitigation, and environmental degradation in the coastal areas, it will be an urgent need for the government to formulate the strategic plan for the management of coastal areas. Especially, North Coast of Java Island (sea level rise, land subsidence, accumulation of residential population and industries) and South Coast of Java Island (disaster mitigation against tsunami) are the urgent targets of the plan.

DKP expects technical assistance and funding assistance (grant aid) for the formulation of Strategic Plans including dispatch of appropriate experts.

2) Physical Disaster Mitigation Efforts

(1) Rehabilitation of Coastal Environment

In line with those efforts of Mapping and Information System on the coastal environment degradation, physical mitigation efforts have been conducted in a natural manner including:

- Artificial Coral Reef (coral transplant)
  at Tjemeluk Amed Coast (Purwakerti, Kecamatan Abang, Karang Asem Regency, Bali) and at waters of Tengah Island and Angso Duo Island (Padang Pariaman Regency, West Sumatra)
- Planting Coastal Vegetation
  at Sidoarjo (East Java; pollution mitigation of fish cultivation area) and at Pangandaran (West Java; tsunami potential area) as the pilot project.

A Greenbelt Project is being planned in 2009 at Pamekasan (East Java) with cooperation from OISCA (a Japanese NGO) for mitigation efforts of coastal erosion and adaptation to climate change.

DKP expects JICA to dispatch an expert with a background n Coastal Environment and/or ecosystem, who will design the methods how to rehabilitate coastal ecosystem and to improve coastal environment, and will advise and support the local activities.

(2) Tsunami Shelter

In line with the efforts of tsunami mapping and Tsunami Mitigation Information System, DKP has a plan to build Tsunami Shelters in the project areas (Padang, West Sumatra). The idea is that the building can be used both as school and as tsunami shelter in case of emergency.

DKP expect technical assistance (engineering and design) and funding assistance (grant aid) for realization of this plan.

(3) Disaster-Friendly House

Development of Disaster-Friendly House has been conducted in several areas in the collaborative efforts among the Central Government, regional governments and the local communities. This activity aimed at providing the fishing community with hope to have a decent house and safety from the potential disaster.

Disaster-Friendly House

The Disaster-Friendly House is expected to become a model for development of housing at coastal areas which are exposed to disaster potential such as tsunami, sea level rise, high waves and other phenomena associated with Climate Change.

DKP has a plan to expand the project area in 51 regencies and cities in Indonesia from 2009 and onward. DKP expects technical assistance (engineering and design) and funding assistance (grant aid) for realization of this plan.