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Asian Disaster Preparedness Center

Community-Based Disaster Management Indonesia
Program for Hydro-meteorological Disaster Mitigation in Secondary Cities in Asia

Safer Cities 27

Case studies on mitigating disasters in Asia and the Pacific

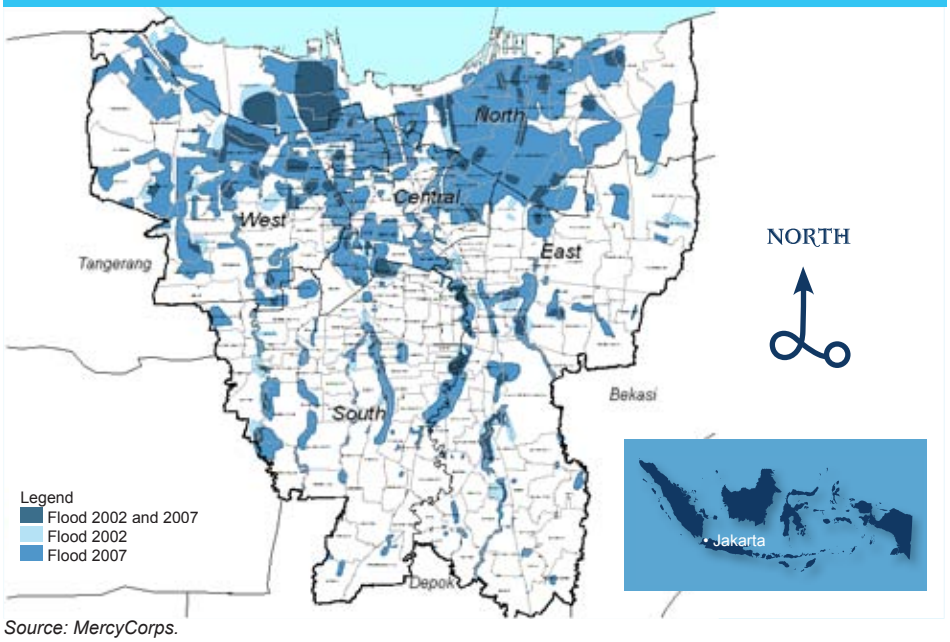
Flood preparedness initiatives of high-risk communities of Jakarta

Flooding has become a significant urban problem for Indonesia this past decade. Excessive rainfall caused extreme events such as five-year floods, torrential floods and flash floods, and extreme tidal backflows have inundated the low-lying coastal area. Uncontrolled population growth in urban areas, poor land use planning, the lack of understanding among city stakeholders and communities about floods and its disaster risk, and a poor level of knowledge about disaster reduction initiatives and preparedness are the important reasons for the flood events becoming disasters. What steps can a megapolis like Jakarta take to be prepared for the worsening floods?

Jakarta is probably the best example of how challenging it is to attempt to lower the disaster risk of flooding. Jakarta Metropolitan City as the capital of the Republic Indonesia is the country's economic power house. The economic growth of Jakarta in 2006, for example, contributed more than 17% to the national GDP, and 60% of the nation's money circulation is in Jakarta. However, it is very prone to flood disasters from annual floods and five-year inundation due to excessive rainfall and flash floods along the rivers systems that pass through the mainland. The flood of 2007, for example, inundated about 30% of the Jakarta mainland area and paralyzed life in many places.

How can flooding be so severe in such an important city in Indonesia? Part of the reason has to do with geography. Indonesia is in the tropics, stretching from 6°08' N latitude to 11°15' S latitude. It gets year-round rainfall from the warm water surrounding the world's largest archipelago, with additional rainfall coming from climate phenomena such as the Asian monsoon, the Australian monsoon, the Inter-Tropical Convergence Zone, and the El Niño/La Niña Southern Oscillation (ADPC, 2000). The other part of the potential for disaster comes from the vulnerability of settlements located in high-risk areas.

2002 and 2007 flood extent map **Figure 1**



Source: MercyCorps.

A simple color-coded flood warning pole

Abstract

Disaster preparedness of a megacity is enhanced by disaster preparedness of its communities. This case study shows how flood preparedness in the high-risk communities of Jakarta can be achieved through a combination of understanding their risks, preparing for disasters, and by improving the early warning of incoming inundation.

What's inside

June 2010

Jakarta's 13 rivers **Figure 2**

Source: PROMISE Indonesia.

Hazard Profile of Jakarta

Modern-day Jakarta has 661.52 km^2 of land area and 6,977.5 km^2 of sea, with about 110 islands spread over Jakarta Bay. About 40% of the land falls below sea level because most of the Jakarta mainland is stretching across alluvial lowland with a mean elevation of 7 m above sea level. The city's southern and eastern sections consist of lake and swamp land with a total area of 121.49 hectares (in 2006) used as a water reserve, but also for sites for new residential areas.

Its 27 water systems are comprised of 13 rivers, drains and canals that collects surface run-off exits into Jakarta Bay through Jakarta's 35-km coast. In the monsoon season, any coastal inundation is often aggravated by waves that could reach up to 2 to 4m during storms. Other influences on inundation include sea level rise, land subsidence, and high tide during full moon (locally called *rob*).

Jakarta has had a recorded history of fighting floods since the 1600s. The megacity had experienced severe flooding in recent times such as the flood events of 1996, 2002 and 2007, with the 2007 flood being the worst in its recorded history (Texier, 2008). This has happened in spite of efforts to reduce the flood problem since the 1600s, such as the Manggarai and Karet Floodgates and West Flood Canal projects in 1922, a Master Plan for Drainage and Flood Control of Jakarta developed in 1973, flood assessments, and the East Canal Flood Project designed in 1918 by a Dutch engineer Herman van Breen to form a semi-circular system with the West Canal for accommodating the runoff from the 13 major rivers (Caljouw, Nas and Pratiwo, 2004). The 23.5km East Canal was finally completed in 2010, after a delay of 90 years and the combined efforts of several national and local governments ("The yet-completed flood canal," *Jakarta Post*, 16 Jan. 2010).

Over time, the flood disaster risk increased with subsidence that further lowers the ground in some areas (Caljouw, Nas and Pratiwo, 2004). Ground water extraction, the weight of the built-up area pressing upon the land, as well as subsidence due to geologic processes (Abidin et al., 2008).

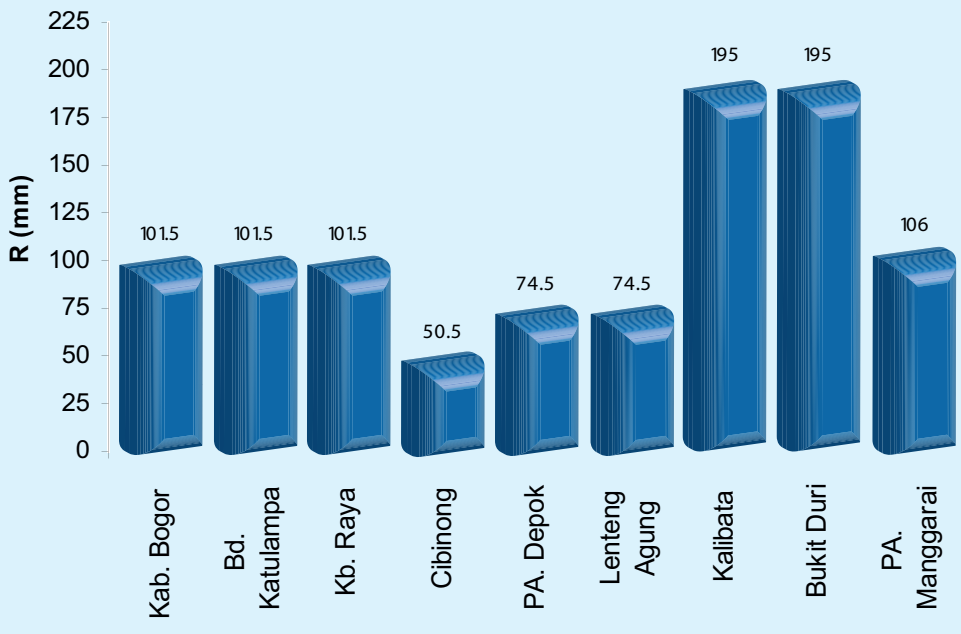
Socio-Economic Profile of Jakarta

The economic growth of Jakarta was 5.90% in 2006, and represents more than 17% of the national gross domestic product (GDP). Approximately 60% of national money circulation is in Jakarta. Manufacturing activities are mostly located in the Northern and Eastern part of Jakarta, while commercial activities are mostly in Western, Central and Southern Jakarta. The economic growth of Jakarta was accompanied by the uncontrolled construction of high buildings that cemented the downstream area (Texier, 2004), thereby reducing penetration of surface water into the ground.

Waterways have also been clogged by solid waste from riverbank communities both from within Jakarta and the upstream provinces of Bandung, Bogor and Cianjur.

Jakarta Special Administrative Region (DKI Jakarta) is composed of five cities and the islands in the bay. By 2006, its population of 8.96 million residents swells to 12 million during the day as millions commute into the area. The government is under pressure to match housing stock to its high population density of 13,000 to 15,000 people/km^2, reaching as high as 20,000 people/km^2 in some areas. The lack of housing on safe land contributed to the encroachment of settlements in some of the planned water catchment areas designated to be polders during the Dutch colonial period (Caljouw, Nas and Pratiwo, 2004) as a result of limited regulation over private housing construction (Texier, 2004).

Rainfall data from Ciliwung river recording stations (3 February 2007) **Figure 3**



Source: BMG

PROMISE-Indonesia Intervention

The Bandung Institute of Technology (ITB) undertook the Indonesia demonstration project under the "Program for Hydro-Meteorological Disaster Mitigation in Secondary Cities in Asia" (PROMISE Indonesia). The goal of the PROMISE Indonesia is to reduce vulnerability of urban communities through enhanced preparedness and mitigation of hydro-meteorological disasters in South and South East Asia. The project team was composed of

Jakarta Provincial Government as the local partner, ITB as the technical partner, the Asian Disaster Preparedness Center (ADPC) as the regional coordinating organization, and the U.S. Agency for International Development – Office for Foreign Disaster Assistance (USAID/OFDA) as donor.

PROMISE-Indonesia focused its work in several community units (called *Rukun Warga* or RW) in *Kelurahan* Kebon Baru and a school in *Kelurahan* Bukit Duri. Both *kelurahan* are in Tebet, one of the 10 *kecamatan* or sub-districts of South Jakarta. The decision to focus in these two places was based on inputs obtained during a technical scoping workshop conducted on 4 February 2008 and attended by 40 officials of JPG's agencies and its stakeholders, and from subsequent meetings of JPG's Technical Working Group for PROMISE.

Developing a Common Understanding of the Flood Disaster Risks in Jakarta

At the start of the project, efforts for mapping the flood hazard and flood disaster mitigation in Jakarta were already done at Metro Jakarta level. There was a felt need in the Jakarta Provincial Government (JPG) to work on Community-Based Disaster Risk Management in its high-risk communities.

At the time that PROMISE Indonesia began its work, JPG did not have a flood hazard map. Any flood disaster mitigation effort has to begin with an assessment of the flood hazard, so the project team from ITB collected existing data, base maps and flood assessments that could help in mapping the flood hazard. The 2007 flood in Jakarta was the worst experienced in recent history, so its flood extent maps and rainfall data collected from rainfall stations in the middle section of the Ciliwung River were collected. Other data used in the hazard mapping included the 2002 flood extent map, the map of 78 flood prone area in Jakarta, street maps, topographic maps, and information on the Water System Management of Jakarta . The maps and data came from many government agencies, including the Badan Meteorologi, Klimatologi dan Geofisika (BMKG) and the departments of JPG.

The data were integrated into a flood model that was used to generate a flood scenario for use during risk mapping and action planning. Using the rainfall levels measured during the 2007 flood event, the model projected that riverbank areas will be flooded up to more than 2m in depth. A flood hazard map generated from the flood model was used to index the flood hazard's severity in every community in the project area, using as a basis the percentage of the land area of the RW that was flooded.

A vulnerability analysis was made for these flood-prone RW, based on five parameters: 1) extent of exposure of infrastructure to floods; 2) the type of building based on the quality of the construction of houses; 3) population by gender; 4) population by age; and 5) the possibility for the flood scenario to cause collateral hazards. Field observations were made to determine the degree of exposure of houses, buildings and infrastructure to floods given the same level of flooding in 2007. Secondary data were also collected for the vulnerability analysis, specifically: city spatial plan, land use plan, infrastructure and lifelines, poverty distribution, demographic map, building density.

The data were analyzed and a simple vulnerability index was developed for each parameter using a similar approach as that for the flood hazard map. Several parameters were combined to generate a composite vulnerability index. The parameters considered for assessing vulnerability were: quality of infrastructure index, building type, gender, age distribution of the population, and possible sources of collateral hazards.

The third step was to analyze the capacity for flood disaster management in the project site based on the flood mitigation measures that were put in place (e.g. pumps and levees). Data collected for this included: the flood management plan of Jakarta; the flood early warning map of the Ciliwung catchment; the map of flood gates; and the map of water pumps. Separate capacity maps were made using separate indices for each parameter, based on the number of pumps/levees that were in good condition in each RW. Capacity is an important concept to capture because the project's intervention was expected to raise the community's capacity due to greater awareness of flood disaster preparedness, from skills training on flood disaster preparedness, and from the planned establishment of a community-level early warning system. All of these should lead to a higher chance of survival.

Finally, a risk map was developed by combining the hazard, vulnerability and capacity indices.

Process followed to develop the flood risk map of the project site — **Box 1**

Basic Data
- Hydrology
- Contour (Topography)
- Population (Demography): Density, Gender and Age
- Base Map (Geographical, Infrastructure, Administrative, Boundary Map)
- Flood control system/hydraulic structure

FHM Analysis
- Flood simulation using the 2007 flood data
- Calibrated and verified by survey

Vulnerability Analysis
- Population by age
- Population by gender
- Building quality/ poverty
- Infrastructure lifeline
- Possible source of collateral hazard

Capacity Analysis
- Flood control system
- Hydraulic structure
- Intervention

Risk Map Analysis (GIS)

Raising Public Awareness

The flood risk assessment was shared with as wide an audience as possible, and in different forms to maximize the use of the information.

The flood risk maps of *Kelurahan* Kebon Baru and Bukit Duri were presented at a JPG Technical Working Group meeting on 11 July 2008. Representatives of the related departments of JPG and of the BMKG attended the briefing. Not only did they validate the assessments, but also showed interest to replicate the development of detailed risk maps throughout the entire Jakarta province.

The technical content of the assessments of the severity of floods, vulnerability, capacity and overall risk are not immediately understandable, so a variety of as IEC materials were developed using the findings, and promoting the theme of flood preparedness.

Posters explaining flood mitigation, the disaster mitigation efforts done by the government of Indonesia, and the disaster risk reduction measures that can be taken by the community members.

Among the materials are posters for training events on CBDRM, for special events such as Disaster Awareness Day in Indonesia, and for distribution to the RWs and the public school selected for disaster mitigation activities under the project. The posters covered themes such as understanding the flood hazard, emergency preparedness, flood disaster mitigation and disaster risk reduction.

The flood hazard and risk maps were also used within training materials developed for the officials of JPG, and for the communities of the selected RWs.

Community Preparedness

The PROMISE Indonesia had a strong commitment to the communities in the selected RWs to help them prepare for disasters. This was manifested in three activities that were designed to increase their involvement in disaster risk management: 1) town watching for assessing their risk and community action planning in the selected RWs; 2) school safety action planning; and 3) developing and installing a flood early warning system in the at-risk communities. This is a critical point that was meant to address the risks and priorities identified in the assessment and action planning processes. In the end, the PROMISE communities will be facing floods similar to the ones they experienced in 2002 and 2007, and should no longer be caught unaware and helpless in the waters.

Town watching for DRR is a training methodology that is a variant of the regional watching methodology for increasing community participation in development planning through experiential learning processes. Similar to participatory risk assessment, the methodology is flexible, so that it can be applied in a variety of contexts: mountain environments, coastal communities, in urban areas (towns and cities), and in small social groupings such as schools. A disaster management professional guides the community members through a series of activities to understand different elements of the land and town that are linked to disasters and environmental issues. This implies that the latter is expected to come closer to the understanding of the expert.

The preparations for the town watching included several meetings with stakeholders, preparing a hazard profile of the selected sites, and conducting a Training of Trainers in June 2008 for local stakeholders such as members of community-based organizations, community leaders from Kebon Baru and Bukit Duri; teachers of SMAN 8 school, the Indonesian Red Cross (PMI) societies from provincial to *kelurahan* level, and officials from the Jakarta Disaster Coordination Unit.

School Safety Action Planning in SMA Negeri 8 (SMAN 8)

A school is one of the victims of flood disasters, with flood impacts ranging from damage to school buildings, to endangerment of the students and teachers, to the disruption of classes. At the same time, a school is an important member of a community because of its important role in providing education on reading, writing, arithmetic, as well as on disaster risk reduction. SMAN 8 school in Bukit Duri was assisted to develop and implement a School Action Plan to increase preparedness and capacity of school community in anticipating flood disaster.

SMAN 8 School Facts and Figures

SMAN 8 public school in Bukit Duri, Jakarta Selatan.
Image source: http://www.smun8.net

- total area: 6,600m^2
- building footprint area: 6,000m^2
- number of classroom: 50
- total student population: 2,000

Every year, SMAN 8 is badly affected by floods. For example, the school had to temporarily relocate its classes and after the heavy floods in Jakarta on January 2009. The school sees about 6m of water every five years or so. Several measures had already been taken to mitigate floods. The school grounds had been raised three times, and infrastructure was placed to anticipate flood waters such as placing holes and pipes in the school walls to channel water to Ciliwung River. Laboratories and electronics facilities are placed on

SMAN 8 students presenting their school flood risk map.

the second or third storey. The first storey is only for class activities and the school cafeteria, and their floors are made of ceramic tile to facilitate cleaning after floods. The school's science club has even won the national science competition by developing a flood detection tool.

After a briefing on floods and flood preparedness, 32 teachers, students and administrators went around the school and used the town watching methodology to survey or observe the school's flood hazard potential, recognize its vulnerability to floods and capacity for flood disaster risk reduction, and then gather observations required for the risk assessment and action plan. The aspects considered in the assessment are: the school layout and school structure; relevant mitigation infrastructure (condition of building damage and drainage, warning system, evacuation route, flood post coordination location, rescue Standard Operating Procedures or SOPs, location of their water supply); flood hazard profile and post-flood diseases; and flood preparedness efforts and measures. They developed the action plan shown in Box 2 that was subsequently adopted by the School Development Committee whose responsibilities include flood preparedness.

The process benefitted the school community in many ways. Not only was this group of teachers, students and administrators able to identify school-based flood disaster risk reduction measures, they also learned to build collaboration between students and teachers in order to reduce flood disaster risk, and increased their disaster risk reduction knowledge while developing their action plan.

Community Action Planning in Kebon Baru

Kebon Baru was established in 1972 as the first real estate development in Jakarta. The community is mixed, having households with very high incomes to very low incomes, to informal settlers attracted by life in the metropolis. The flood hazard map generated by the project indicated that several RWs would be flooded in Kebon Baru (RW 1, 2, 3, 4, 8, 9 and 10). This was validated by community members of the RWs in Kebon Baru.

One of the main objectives of PROMISE Indonesia is to enable the community members and other local stakeholders to conduct their own risk assessment and develop their own action plans. This capacity would contribute to the success of community-led flood disaster preparedness initiatives. Again, the approach used was to adopt the town watching methodology for promoting awareness or disaster risks.

The town watching workshops were held from August through November. Participants came from the selected RWs; they were divided into four groups and guided into developing flood risk maps, designating evacuation routes and evacuation shelters, and formulating community action plans. During the workshops, representatives of the communities identified several points for action based on their primary needs, such as training in water-based Search and Rescue (SAR), emergency response equipment,

Population distribution of flood-prone Rukun Wargas of Kebon Baru — **Table 2**

Name of Rukun Warga (RW)	Population (2008)
RW 1	2,675
RW 2	2,447
RW 4	2,669
RW 8	2,652
RW 9	2,539
RW 10	2,693
Total Population at Risk	15,675 (43% of population)
Total Population of Kelurahan (14 RWs)	36,496

Source: DKI Jakarta Regional Planning and Development Agency

Excerpts from SMAN 8 School Action Plan

Box 2

Before a Flood

- Learn about flood preparedness
- Development of School Information Board and IEC materials
- Conduct flood evacuation drills
- Clear the flood drainage canals around the school
- Move school equipment and furniture from the ground level to higher floors
- Become a part of the JPG flood early warning system
- Coordinate with the POSKO to get the river levels

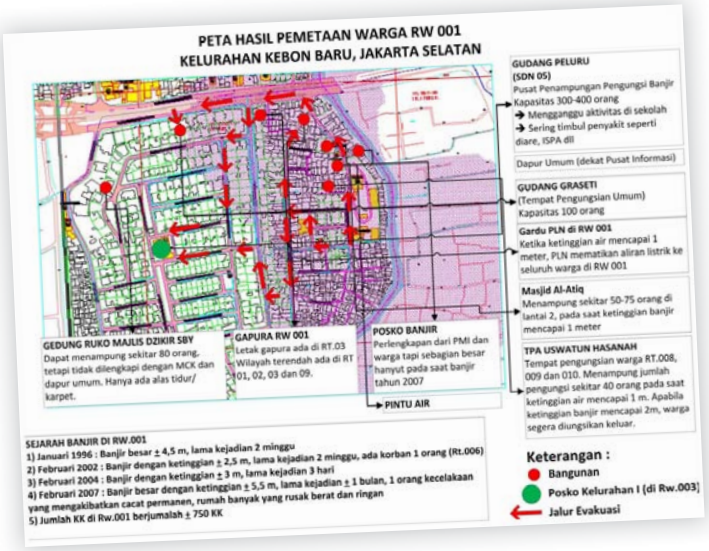
During a Flood

- Activate the flood early warning system
- Open the drainage canals
- Evacuate the students and teachers
- Help distribute relief goods to the community around the school
- Monitor the flood canals around the school
- Activate the security post

After a Flood

- Clean up the school and its environment
- Dispose of trash that accumulated during the flood
- Spray disinfectant
- Re-plant trees and repair school property
- Return the school equipment and furniture to their original places
- Return to normal school activities

and a flood early warning system (see Box 3). The action plans were authenticated by the chair of each RW, and later presented to the representatives of the kelurahan council and community organizations during a Focus Group Discussion in October 2008. A notable outcome of their action planning was the establishment of a community-based flood early warning system, discussed in the next section.



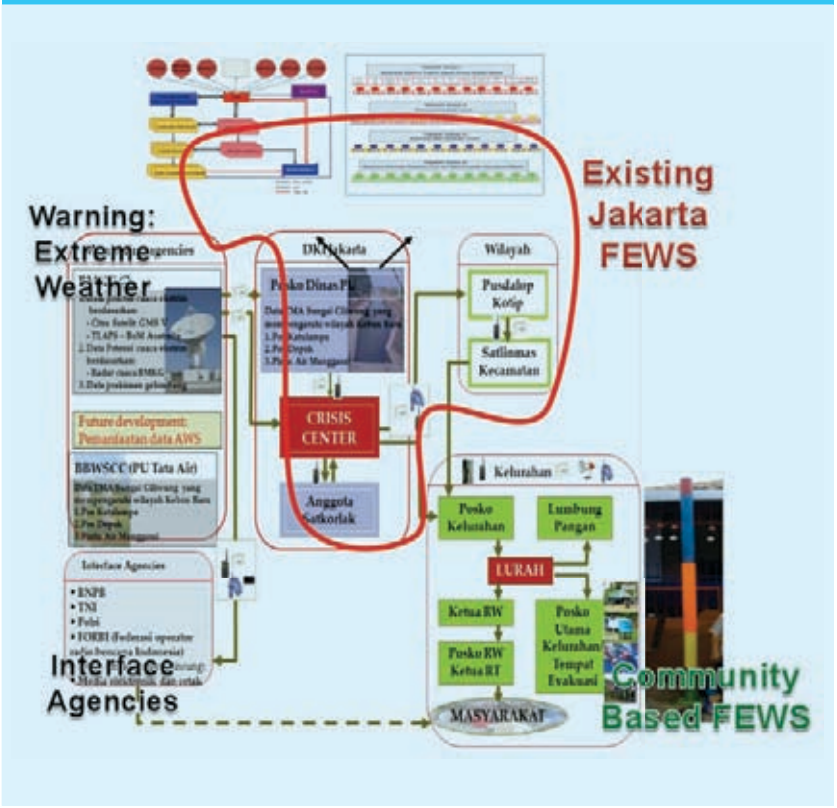
Objectives of the community action plans in Kelurahan Kebon Baru — **Box 3**

- Cleaning their neighborhood and the waterways
- Conducting training for first responders
- Acquiring emergency response equipment (such as life vests, electricity generator sets, public kitchen equipment, boats, tents etc.)
- Developing flood early warning system in their RW (flood reference and alert system)
- Conducting flood drills residents with raised awareness of disaster prevention

Flood Early Warning System

Even after all these preparations for flood emergencies, it was still necessary to augment Jakarta's flood countermeasures effectively by extending the existing flood early warning system (EWS) to the community level in the selected RWs. The JPG Technical Working Group had a series of workshops to develop a community-based action plan, and the emergency response SOPs for both the Jakarta Disaster Coordinating Unit and the Kebon Baru Disaster Coordinating Unit. Table top simulations were organized to test the system, and improve on the coordination by the different national and city agencies involved in flood response. The improvements were focused on: 1) integrating the flood EWS within the JPG Crisis Center and at the *kelurahan* disaster coordination unit; and 2) to increase the capacity of the community to understand the flood warning and react accordingly.

Schematic of the Flood EWS — **Figure 4**



Source: PROMISE Indonesia.

The involvement of Kebon Baru's high-risk communities in the flood EWS increased their readiness to anticipate flood disasters, and they set out for themselves clear roles and responsibilities before, during and after floods. Community workshops were organized to plan and develop a flood reference system in the waterways of Ciliwung river, SOPs for sending out alerts and preparing for evacuation, and to plan flood drills to improve response times of rescuers. PROMISE Indonesia provided basic flood emergency equipment for each RW: megaphones and fax machines for warning dissemination, life vests, boots, flashlights, emergency kits with standard medicine, ropes for rescue, as well as cooking implements for relief operations. PMI helped train "Air One", the volunteer emergency responders in the selected RWs. With the draft SOPs and flood EWS in place at community level and in JPG, their combined preparedness was tested in a flood drill on January 2009, and in flood simulation exercises on February, July and October 2009.

The drill and simulations tested the use of the equipment, the efficacy of the system, and the coordination among the main actors. Early warning dissemination began from BMKG who informed "public" and JPG about the potential for extreme weather, while the province's Public Works Department issued the river water level data to the designated agency such as the JPG Crisis Center, the community-level

Disaster Coordination Post (called *Posko*) of *Kelurahan* Kebon Baru, and Badan Nasional Penanggulangan Bencana (BNPB) or the national disaster management agency. The warning then set off a series of responses at the community level that are prescribed in the SOPs to corroborate the alert using their flood warning poles and disseminate it to all their people. These responses started from packing up and evacuation through a designated route, to refugee camp establishment, water-based SAR, relief management, and set-up of a field hospital.

The Jakarta Health Department, Social Welfare Department, and the PMI Jakarta Chapter were involved in the simulation of emergency responses such as: triage of the wounded, first aid, food preparation and distribution, water-based SAR, and providing first aid to the flood survivors alongside Air One volunteers.

The multi-stakeholder involvement in developing the flood EWS was later recognized as a good practice by the UNISDR (see Harkunti and Iglesias, 2010), and is documented in their series on good practices. Now, the system is able to accommodate the warning of extreme local precipitation for local flood, the warning of extreme rainfall at the upstream for the flash flood in Jakarta, and the need to increase the time for evacuation and response at the high-risk communities.

Community flood alert system — Box 4

Red
evacuate all residents

Blue
evacuate all the people living at the second and third storey levels

Orange
evacuate all the people living at the ground level

Yellow
start to evacuate children, elderly, the pregnant and ill

Green
secure valuables to higher places

Source: PROMISE Indonesia.

JPG Crisis Center

Rescuers practicing their skills during the October 2009 flood simulation.

Lessons Learned

- Schools are a good community organization that can be transformed into a model of community flood preparedness. Children, teachers and administrators can be trained in CBDRM to help them assess and monitor their flood risks, develop preparedness plans, and teach their families and other members of their community about flood preparedness.
- Community participation can be integrated into flood preparedness efforts of city governments, with the end result of improving the system. The community can generate their own flood alert messages, learn SOPs and basic life-saving skills, and participate in flood preparedness drills.
- The early warning network must be extended into the high-risk communities in order to increase their response time to an incoming flood. Local wisdom can be harnessed for developing standard operating procedures (SOPs) for responding to flood events, and in designing flood alert messages to improve the clarity of the message for the recipient community.
- Officials and stakeholders of Jakarta recognized that flood preparedness generated many critical flood mitigation activities, and recommended that the approach be replicated in the other kelurahan of Jakarta.

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- Pemerintah Kecamatan Tebet
- Pemerintah Kelurahan Kebon Baru
- Palang Merah Indonesia-Jakarta
- Yayasan Empati Sesama
- Sekolah Menengah Atas Negeri 8, Bukit Duri
- Community Council members of Kebon Baru
- Residents of RW 1, 2, 3, 4, 8, 9 & 10 of Kebon Baru

About the Project

PROMISE Indonesia was implemented from 1 February 2008 to 31 July 2009 within a collaboration among Asian Disaster Preparedness Center Foundation (ADPC) and Center Disaster Mitigation – Institut Teknologi Bandung (CDM-ITB), funded by a grant from USAID OFDA. The objectives were:

1. Adoption of specific hydro-meteorological disaster preparedness and mitigation measures to manage hydro-meteorological disaster risk by stakeholders in targeted cities.
2. Increased stakeholder involvement and further enhancement of strategies, tools and methodologies related to community preparedness and mitigation of hydro-meteorological disasters in urban communities.
3. Enhanced coordination with USAID Missions to promote sustainability and ensure program activities accord with USAID country and regional strategies.
4. Strengthen networks and regional links among relevant risk management institutions/organizations for improving potential and capacity for application and dissemination of lessons learned.

About the Partner

The Center for Disaster Management (CDM) under the Bandung Institute of Technology is a government teaching and research institute. CDM conducts research and development activities in disaster risk reduction, including programs for the development of risk reduction technology, policy studies, public awareness campaigns, and advocating disaster risk management approach.

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Safer Cities is a series of case studies that illustrate how people, communities, cities, governments and businesses have been able to make cities safer before disasters strike. The series presents strategies and approaches to urban disaster mitigation derived from analyses of real-life experiences, good practices and lessons learned in Asia and the Pacific. This user-friendly resource is designed to provide decision-makers, planners, city and community leaders and trainers with an array of proven ideas, tools, policy options and strategies for urban disaster mitigation. The key principles emphasized throughout Safer Cities are broad-based participation, partnerships, sustainability and replication of success stories.

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PROMISE

During the implementation of the Asian Urban Disaster Mitigation Program (AUDMP), ADPC recognized the importance of interventions in urban areas and accordingly identified Urban Disaster Risk Management as one of its core thematic areas of work, experiences from which have also guided the selection of the target secondary cities. ADPC has developed 'Strategy 2020 for Urban Disaster Risk Mitigation in Asia' which aims to reach 200 cities by the year 2020.

The need to minimize the destructive impacts of these hydro-meteorological events on the vulnerable communities, particularly the urban communities and the economic infrastructure through enhanced preparedness and Mitigation is therefore the main trust of the present intervention in implementation of the Program for Hydro-Meteorological Disaster Mitigation in Secondary Cities in Asia (PROMISE).

ADPC considers PROMISE program as an opportunity to associate with many communities living in Asian cities vulnerable to hydro-meteorological hazards with the aim of reducing the impacts of such events and demonstrate innovative applications for community preparedness and mitigation.

This case study documents the efforts under a specific program objective to *increase stakeholder involvement and further enhancement of strategies, tools and methodologies related to community preparedness and mitigation of hydro-meteorological disasters in urban communities.*

USAID FROM THE AMERICAN PEOPLE

The Asian Disaster Preparedness Center (ADPC) is a regional resource center dedicated to safer communities and sustainable development through disaster risk reduction in Asia and the Pacific. Established in 1986 in Bangkok, Thailand, ADPC is recognized as an important focal point for promoting disaster awareness and developing capabilities to foster institutionalized disaster management and mitigation policies.

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