2nd Thematic Workshop

on Water-Related Disaster and Its Management in Asian Countries

Laguna Lake Development Authority

Philippine Atmospheric, Geophysical, Astronomical and Seismology Administration

Philippine Institute of Volcanology and Seismology



- **Disasters, whether natural or human-made, affect everyone, especially the poor, children, women and elderly who have the least capability to deal with disasters.**


INTRODUCTION

- From 1994 to 2003, some 2.5 billion people were affected by natural disasters alone worldwide, which is an increase of 60% over the past decade.
- More than 478,000 people were killed during this period.

INTRODUCTION

- Floods and Earthquakes are the deadliest accounting for more than half of the casualties.

RP DISASTER RISK PROFILE

- **From 1970 to 2000, the Philippines incurred an average annual damage of PHP 15 Billion or US$ 300 Million due to disasters which have caused major setback in the country's socio-economic development.**

RP DISASTER RISK PROFILE

- In 2004, the country experienced twenty-five (25) weather disturbances, four of these occurring successively in November and first week of December which brought massive landslides and flooding in Southern and Central Luzon. Also last year, RP ranked number 4 worldwide in terms of frequency of disaster occurrence (25) and death toll.

MATERIAL 00: Primary Roles and Functions of Organization related to DRM - PHIVOLCS

Pre-disaster			Disaster/ Emergency	Post-disaster	
Prevention	**Mitigation**	**Preparedness**	**Response**	**Recovery**	**Development**
Recommend setting of 5-meter buffer zone along mapped traces of active faults Recommend setting of X-kilometer Permanent Danger Zone (PDZ, specific to a volcano)	Operation of Philippine Seismic and Volcano Monitoring Network Seismic Hazards Mapping and Risk Assessment	Generation and Production of Seismic Hazards Maps Generation and Production of Volcanic Hazards Maps Training of LGU workers on the use of REDAS Production of printed Technical Information resources for general use	Earthquake and Volcano bulletin during periods of activities – alert and notification Tsunami Bulletin – alert and notification, include cancellation of tsunami warning PHIVOLCS Quick Response Team deployed to investigate	Rapid reconnaissance and recommendation for siting of temporary evacuation areas	Hazards assessment and recommendations for long-term rehabilitation

MATERIAL 00: Primary Roles and Functions of Organization related to DRM - PHIVOLCS

Pre-disaster			Disaster/ Emergency	Post-disaster	
Prevention	**Mitigation**	**Preparedness**	**Response**	**Recovery**	**Development**
that remains off-limits when an active volcano is showing signs of restlessness	Volcanic Hazards Mapping and Risk Assessment Issuance of PHIVOLCS certification for presence or absence of seismic and/or volcanic hazards as required by bank/ loan institution or major construction works	Maintenance of website for Technical Information resources for general use Science publication of volcano and earthquake researches for special-interest use	and document impacts of seismic hazards		

MATERIAL 00: Primary Roles and Functions of Organization related to DRM - PHIVOLCS

Pre-disaster			Disaster/ Emergency	Post-disaster	
Prevention	**Mitigation**	**Preparedness**	**Response**	**Recovery**	**Development**
	Building risk database as input to REDAS and other risk assessment Volcano Bulletin – update on status of volcanic activity Volcano Alert System	Presentation of results of volcano and earthquake monitoring and researches in popular and scientific fora Distribution of Hazard Maps to stakeholders			

MATERIAL 00: Primary Roles and Functions of Organization related to DRM - PHIVOLCS

Pre-disaster			Disaster/ Emergency	Post-disaster	
Prevention	**Mitigation**	**Preparedness**	**Response**	**Recovery**	**Development**
		Strengthening capacities of public science school educators to teach basic volcano and earthquake information Earthquake Drill in schools and buldings Building Earthquake Emergency Planning Community-based Early Warning System for Tsunami – Public education on tsunami, Evacuation Planning, Drills, Signage/Marker			

MATERIAL 02 : Indicators under DPSIR Framework on FLOODS - PHIVOLCS

DPSIR Framework	Implication	Indicator
Driving Force (D)	Floods associated with LAHARS - decrease in channel capacity of lahar channels and enhanced flooding in previously low-lying areas	- increase in siltation of the rivers - reclamation of portions of the channel
Pressures (P)	- Land tenure of agricultural tracks private ownership of lands around lahar-affected rivers - Relocation of communities affected by lahar inundation	- real estate development in previously lahar-inundated areas; implementation of agrarian-reforms on lands, including lahar-inundated areas - informal settler clusters along river proximities
State (S)	Lahar channels have significant change in elevation	- Shallow and braided river system - Hanging river (river bed higher than surrounding flood plain) as a result of lahar-containment structure - Increased exposure of communities in flood-prone areas - change in river peak discharge - Damaging dam-break flashflood at Pinatubo Volcano, 2002 - Catastrophic dam-break flashflood at Parker Volcano, 1995;

MATERIAL 02 : Indicators under DPSIR Framework on FLOODS - PHIVOLCS

DPSIR Framework	Implication	Indicator
Impact (I)	Social, economic, environmental changes	- displaced communities - losses in human life and properties during early lahar years - economic damages (agriculture and commerce) - adaptive design and architecture of post-lahar event houses - seasonal economic, livelihood activities in lahar-affected areas
Response (R)	(of PHIVOLCS) - Mitigation Program - Preparedness program	- National Lahar Hazard Mapping Program (1992 to 1998), and Volcanic Hazards Mapping (1999 onwards) generated and updated the Lahar Hazard Zonation (roughly 4-year cycle) - issuance of Lahar Hazard Certification as a requirement for loan or development application - institutional capacity building of researchers on lahars and other volcano-related hazards - development and maintenance of lahar-monitoring network and lahar impact assessment - lahar and flood updates to stakeholders, especially after large, damaging events - inclusion of hazards in general in school science curricula - strengthening educators' capacity to teach science as a subject

MATERIAL 02 : Indicators under DPSIR Framework on FLOODING- PHIVOLCS

DPSIR Framework	Implication	Indicator
Response (R)	-Preparedness Program	- IEC in lahar affected communities - Inclusion of hazards in general in school science curricula - strengthening educators' capacity to teach science as a subject - Technical information materials

MATERIAL 02 : Indicators under DPSIR Framework on Landslides and Mudflows - PHIVOLCS

DPSIR Framework	Implication	Indicator
Driving Force (D)	Land use of critical slopes for settlement, agriculture, tourism, mining	- settlements in areas at high-risk to earthquake-induced landslides - Also, settlements along slopes of volcanoes
Pressures (P)	- Increasing population, - demand for agricultural lands, - narrow economies, - Some forms of mining and logging activities	- development of areas for various land uses with little consideration for hazard or risk; - limited or narrow range of livelihood activities like small-scale mining, logging
State (S)	- deeply weathered, deforested slopes, moderate to dense settlements, high-risk agricultural activities	

MATERIAL 02 : Indicators under DPSIR Framework on Landslides and Mudflows - PHIVOLCS

DPSIR Framework	Implication	Indicator
Impact (I)	- Social, environmental, economic losses - Increased risk to landslide hazard	Occasional but devastating occurrences of landslides; Communities exposed to landslide hazard also aggravate the hazard
Response (R)	- Mitigation Program - Preparedness Program	- Earthquake-induced landslide mapping program - Technical information material - IEC in landslide-prone areas

MATERIAL 02 : Indicators under DPSIR Framework on Tsunamis- PHIVOLCS

DPSIR Framework	Implication	Indicator
Driving Force (D)	Utilization of coastal and marine areas for settlement, land agriculture, aqua-culture, tourism	- Land reclamation, aquaculture, mangrove deforestation, near-shore high-risk fishing activities - Shoreline developments for tourism
Pressures (P)	- Increasing population, - diminishing marine harvest, - competition from large fishing vessels - narrow economies	- Settlements intruding into swash zones on beaches and within mangrove areas; - Small marine harvest - Limited livelihood opportunities
State (S)	Coastal areas have moderate to dense settlements exposed to tsunami hazard	

MATERIAL 02 : Indicators under DPSIR Framework on Tsunamis- PHIVOLCS

DPSIR Framework	Implication	Indicator
Impact (I)	Increased risk to tsunami hazard	- Communities exposed to tsunami hazard
Response (R)	Mitigation Program	- Tsunami hazard mapping; - Operation and maintenance of national earthquake monitoring network; - installation of tsunami sensor offshore of Lubang Island for local tsunami in Manila Bay area - Linkage with international tsunami warning centers for notification of distant tsunami - Local Tsunami Alert System and notification
	Preparedness Program	- Technical Information; IEC - community-based tsunami early warning system - tsunami evacuation drill

MATERIAL 03 : Progress in Implementing DRM - PHIVOLCS

(**S**: Satisfactory, **I**: Inadequate or **P/NE**: Poor/Non Existent at each level)

Thematic Area	ISDR Indicators	National Level	Regional Level	Community Level
Institutional Framework	A legal framework for DRM exists with explicit responsibilities defined for all levels of government.	S	S	S
	Multi-sectoral platforms for DRM are operational across levels.	S	S	I
	A national policy framework for DRM exists that requires plans and activities at all administrative levels.	S	S	S
	Adequate resources are available to implement DRM plans at all administrative levels.	S	S	I
Risk Assessment and Early Warning	Risk assessments based on hazard data and vulnerability information are available and include risk assessments for key sectors.	S	S	I/S
	Systems are in place to monitor, maintain and disseminate data on key hazards and vulnerabilities.	S	S	I/P/NE
	Early warning systems are in place for all major hazards.	S	S	I/P
	Early warnings reach and serve people at the community level.			I/P/NE
Education and Awareness	Public awareness strategies for DRM exist and are implemented with vulnerable communities	S	S	S/I
	School curricula include DRM elements and instructors are trained in DRM.	S	S	S

Thematic Area	ISDR Indicators	National Level	Regional Level	Community Level
Reducing Risk in Key Sectors	Environmental protection, natural resource management (land and water) and climate change policies include DRM elements	S	?	?
	Sectoral development plans (agriculture, water resources, health, environment, forestry, tourism, industry etc.) include DRM elements	S	S/I	I/P
	Land-use zoning and plans, building codes and safety standards exist and include disaster risk-related elements which are rigorously enforced.	S/I	I	I
	Technology options for DRM are available and applied	S	I	I/P
	A long-term national programme is in place to protect critical infrastructure from common natural hazards	I/S	?	?
	A procedure is in place to assess the disaster risk implications of major infrastructure and development project proposals.	S	I/S	?
Disaster Preparedness and Response	An independent assessment of disaster preparedness capacities and mechanisms has been undertaken and the responsibility for the implementation of its recommendations has been assigned and resourced.	S	?	?
	Disaster preparedness plans and contingency plans are in place at all administrative levels, and regular training drills and rehearsals are held to test and develop disaster response programmes	S	I	I
	All organizations, personnel and volunteers responsible for maintaining preparedness are equipped and trained for effective disaster preparedness and response	S	I	I
	Financial reserves and contingency mechanisms are in place to support effective response and recovery.	S	S	I
	Procedures are in place to document experience during hazard events and disasters and to undertake post-event reviews.	S	I	I

MATERIAL 04 : Proposal for DRM Action Plan- PHIVOLCS

Expected Outcome	Communities made safer from water-related hazards in volcanoes or induced by earthquake events
Strategic Goals.	1. Hazard assessment and risk assessment of water-related hazards 2. R&D for improved monitoring, and hazards and risk assessment 3. Disaster awareness, preparedness and risk mitigation
Priorities for Action	1 Continue hazard and risk assessment assessment services at PHIVOLCS 2 Continue R&D for improved monitoring, and hazards and risk assessment 3 Continue disaster awareness, preparedness and risk mitigation services 4 Continue human development program
Key Activities for Action corresponding to above priority	1. Continue hazard and risk assessment services at PHIVOLCS

MATERIAL 04 : Proposal for DRM Action Plan - PHIVOLCS

Key Activities for Action corresponding to above priority	a) Lahar hazards assessment of volcanic terrains b) Seismic hazards mapping and risk assessment – ground rupture, ground shaking, landslide, liquefaction, tsunami
	2. Continue R&D for improved monitoring, and hazards and risk assessment a) Operation of Philippine Seismic and Volcano Monitoring Networks b) R&D on trigger for landslides and lahars in volcanic terrains c) R&D on hazard modeling/simulation
	3. Continue disaster awareness, preparedness and risk mitigation services a) Strengthen capacities of educators to teach basic volcano and earthquake hazards and preparedness b) Strengthen capacities of local government officials on preparedness and mitigation of natural hazards (includes water-related hazards)

MATERIAL 04 : Proposal for DRM Action Plan - PHIVOLCS

Key Activities for Action corresponding to above priority	c) Increase capacity of communities on appropriate disaster preparedness and risk mitigation through information, education and communication, proper contingency planning, drills, and land use and development planning
	4. Continue human development program a) Attendance of PHIVOLCS staff to graduate study programs and technical training b) b) Project collaboration with local and foreign scientistS c) Attendance and presentation of results/activities in scientific fora
Cross Cutting Issues	1. Efforts in disaster risk reduction should be multi-hazards in approach, as water-related occur together with other hazards 2. Efforts in DRR is multi-sectoral, multi-disciplinary 3. Actions must involve the community

MATERIAL 00: Primary Roles and Functions of Organization related to DRM - PAGASA

Pre-disaster			Disaster/ Emergency	Post-disaster	
Preven -tion	**Mitiga- tion**	**Prepared- ness**	**Response**	**Recovery**	**Development**
IEC Programs	Flood Forecasting & Warning Systems (FFWS) / FFWSDO (Dam Opera- tions); estab- lishment of local / com- munity early warning sys- tems (floods, storm surge, etc.) for non- telemetered basins; Haz- zard Mapping	Issuance of weather & flood bulletins / advisories / gale warnings; Real- time hydromet monitoring (observing threshold limits) River & Dam water levels; Observer's training; Forums for quarterly climate outlook (El Nino- La Nina); Press-con	Deployment of the STRIDE Team (storm chasers) - Issuance of weather forecast specific for the affected area	-Post-flood surveys & analyses - Issuance of weather forecast specific for disaster area during recovery period	Maintenance of monitoring equipment / instruments; improvement / development of weather, flood and climate forecasting models; Hydrographic surveys & measurements; Maintain website info system; upgrading of facilities and monitoring equipment

MATERIAL 02 : Indicators under DPSIR Framework on Flooding - PAGASA

DPSIR Framework	Implication	Indicator
Driving Force (D)	Driving force of water use (e.g. poverty, population growth, urbanization, globalization, industrial expansion, agricultural development, energy production and use, recreation and tourism)	Increase of informal settlers along riverside areas of Angat river; land conversion (agri to subdivisions)
Pressures (P)	Pressures on water system as a result of human activities (e.g. use of natural resources, discharges of waste)	Garbage and waste disposal along the river channel;
State (S)	The quality / quantity change in the state of water as a result of the pressure	
Impact (I)	Impacts on ecosystems, resources, human health, social conditions and amenities caused by the change in state	
Response (R)	Societal response to these changes and coping mechanism, which are reflected in institutions, environmental, economic and sectoral policies. The response can be directed at different parts of the cause effect chain (e.g. Driving force, pressure, state or impact)	Local flood monitoring of Angat river in response to eventual Angat Dam releases and in support to the FFWSDO;

MATERIAL 03 :Progress in Implementing DRM

(**S**: Satisfactory, **I**: Inadequate or **P/NE**: Poor/Non Existent at each level) PAGASA

Thematic Area	ISDR Indicators	National Level	Regional Level	Community Level
Institutional Framework	A legal framework for DRM exists with explicit responsibilities defined for all levels of government.	I	I	S *
	Multi-sectoral platforms for DRM are operational across levels.	I	I	I
	A national policy framework for DRM exists that requires plans and activities at all administrative levels.	I	I	S *
	Adequate resources are available to implement DRM plans at all administrative levels.	I	I	I
Risk Assessment and Early Warning	Risk assessments based on hazard data and vulnerability information are available and include risk assessments for key sectors.	I	S *	I
	Systems are in place to monitor, maintain and disseminate data on key hazards and vulnerabilities.	I	S *	I
	Early warning systems are in place for all major hazards.	I	I	P/NE

MATERIAL 03 : Progress in Implementing DRM

(**S**: Satisfactory, **I**: Inadequate or **P/NE**: Poor/Non Existent at each level) PAGASA

Thematic Area	ISDR Indicators	National Level	Regional Level	Community Level
	Early warnings reach and serve people at the community level.	I	S *	S *
Education and Awareness	Public awareness strategies for DRM exist and are implemented with vulnerable communities	I	I	S *
	School curricula include DRM elements and instructors are trained in DRM.	I	I	S *
Reducing Risk in Key Sectors	Environmental protection, natural resource management (land and water) and climate change policies include DRM elements	I	I	I
	Sectoral development plans (agriculture, water resources, health, environment, forestry, tourism, industry etc.) include DRM elements	I	I	I
	Land-use zoning and plans, building codes and safety standards exist and include disaster risk-related elements, which are rigorously enforced.	I	I	S *
	Technology options for DRM are available and applied	I	I	S *

MATERIAL 03 : Progress in Implementing DRM

(**S**: Satisfactory, **I**: Inadequate or **P/NE**: Poor/Non Existent at each level) PAGASA

Thematic Area	ISDR Indicators	National Level	Regional Level	Community Level
	A long-term national programme is in place to protect critical infrastructure from common natural hazards	I	I	S *
	A procedure is in place to assess the disaster risk implications of major infrastructure and development project proposals.	I	I	S *
Disaster Preparedness and Response	An independent assessment of disaster preparedness capacities and mechanisms has been undertaken and the responsibility for the implementation of its recommendations has been assigned and resourced.	I	I	S *
	Disaster preparedness plans and contingency plans are in place at all administrative levels, and regular training drills and rehearsals are held to test and develop disaster response programmes	I	S *	S *
	All organizations, personnel and volunteers responsible for maintaining preparedness are equipped and trained for effective disaster preparedness and response	I	I	S *

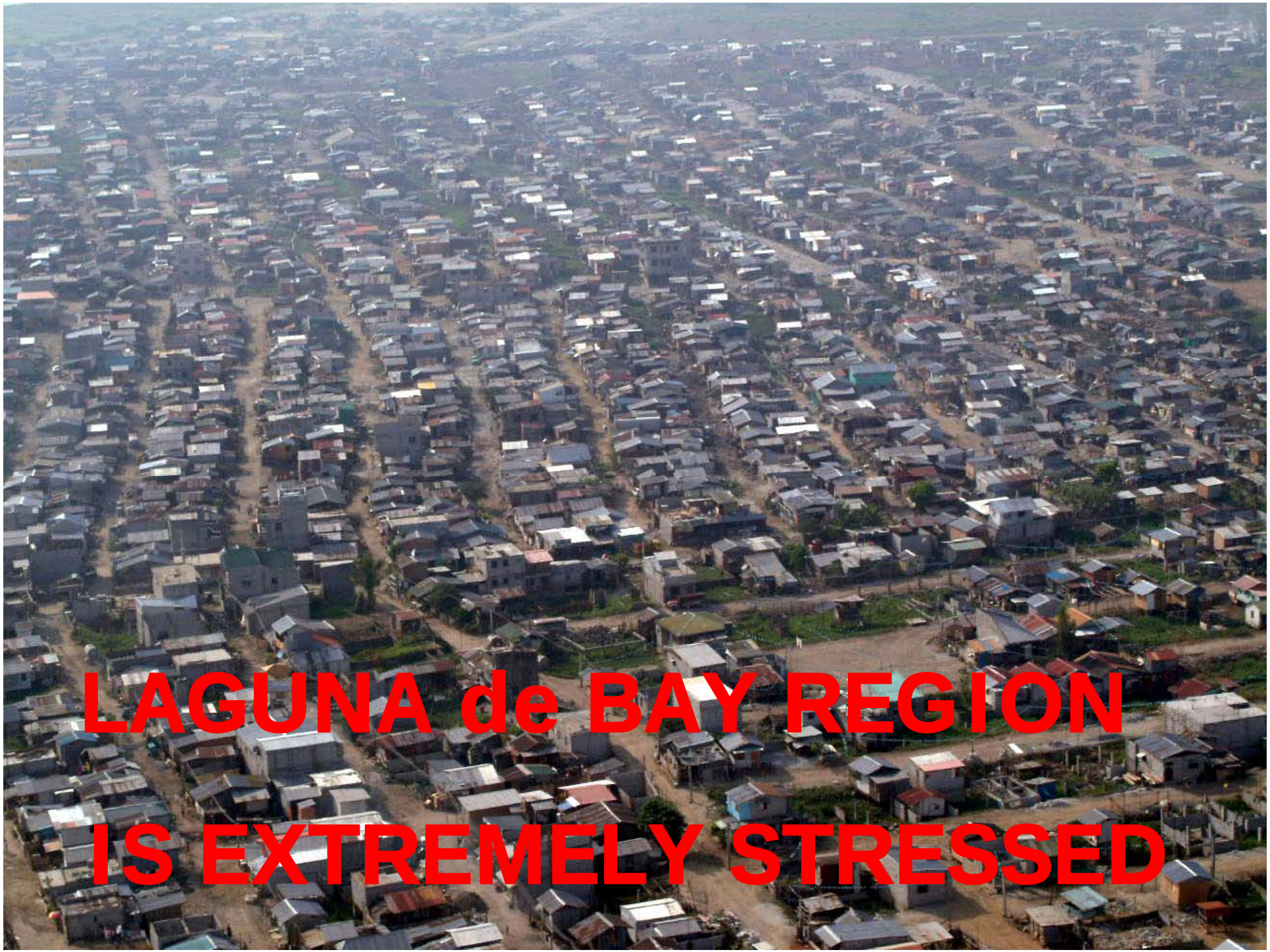
Thematic Area	ISDR Indicators	National Level	Regional Level	Community Level
Reducing Risk in Key Sectors	Environmental protection, natural resource management (land and water) and climate change policies include DRM elements	I	I	I
	Sectoral development plans (agriculture, water resources, health, environment, forestry, tourism, industry etc.) include DRM elements	I	I	I
	Land-use zoning and plans, building codes and safety standards exist and include disaster risk-related elements, which are rigorously enforced.	I	I	S *
	Technology options for DRM are available and applied	I	I	S *
	A long-term national programme is in place to protect critical infrastructure from common natural hazards	I	I	S *
	A procedure is in place to assess the disaster risk implications of major infrastructure and development project proposals.	I	I	S *
Disaster Preparedness and Response	An independent assessment of disaster preparedness capacities and mechanisms has been undertaken and the responsibility for the implementation of its recommendations has been assigned and resourced.	I	I	S *
	Disaster preparedness plans and contingency plans are in place at all administrative levels, and regular training drills and rehearsals are held to test and develop disaster response programmes	I	S *	S *
	All organizations, personnel and volunteers responsible for maintaining preparedness are equipped and trained for effective disaster preparedness and response	I	I	S *
	Financial reserves and contingency mechanisms are in place to support effective response and recovery.	I	I	S *
	Procedures are in place to document experience during hazard events and disasters and to undertake post-event reviews.	I	S *	S *

MATERIAL 04 : Proposal for DRM Action Plan-PAGASA

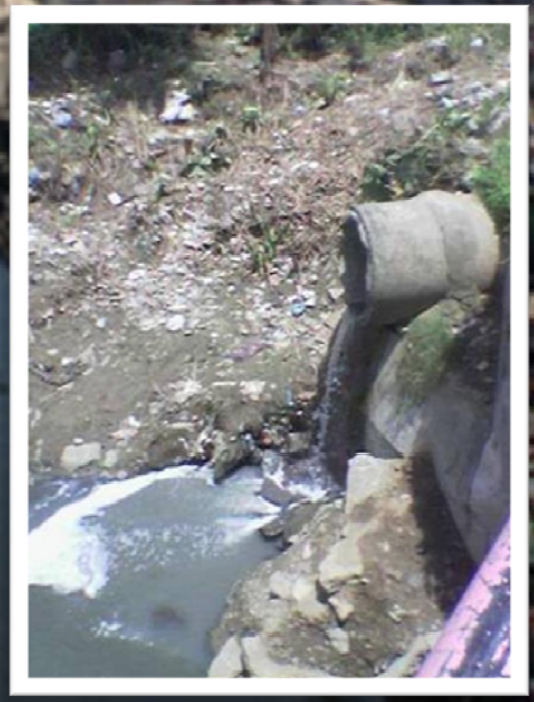
Expected Outcome	Reduce loss of lives and properties due to floods
Strategic Goals.	1. To provide effective flood information and warnings to the target basin 2. To strengthen target area's awareness and resiliency to flood disasters 3. To undertake sustainable programs within the target area.
Priorities for Action	1 Develop and improve flood forecasting models 2 Establish network of hydrological data monitoring and collection within the target area as support to the existing flood forecasting & warning system 3 School hydrological information network program
Key Activities for Action corresponding to above priority	1. Develop and improve flood forecasting models a) quality-controlled database b) incorporate flood hazard map c) post-flood surveys and investigation

MATERIAL 04 : Proposal for DRM Action Plan - PAGASA

Expected Outcome	
Key Activities for Action corresponding to above priority	2. Establish network of hydrological data monitoring and collection (Community-based flood monitoring) a) set-up hydrological monitoring stations b) establish threshold values to monitor c) re-evaluation of threshold values
	3. School hydrological information network program a) coordinate with schools (secondary level) b) orientation workshop on the program c) school monitoring project; research & development; etc.


LAGUNA de BAY REGION
IS EXTREMELY STRESSED

The Lake has become the discharge point for human and industrial wastes from Metro Manila and other surrounding localities.



Of more than 10,000 small, medium, and large business establishments within the Laguna de Bay Region who produces wastes that ultimately settle in the lake

Sewerage canals in 61 cities and towns within Laguna de Bay Region empty into 21 tributary rivers which all drain into the lake. Manila Bay also channels polluted waters into the lake daily via the Pasig River due to tidal flows.


Fishkills due to pollution

Large shoreland areas to the western, southern and eastern parts of the lake remain vulnerable to flooding. A very long strip of shoreline of about half the lake perimeter requires protection from flood waters.

MATERIAL 00: Primary Roles and Functions of Organization related to DRM - LLDA

Pre-disaster			Disaster/ Emergency	Post-disaster	
Prevention	**Mitig ation**	**Prepared-ness**	**Response**	**Recovery**	**Development**
Establishment of Communication Links through LLDA Text Messaging IEC Programs Creation of Quick Response Team (QRT) Installation of telemetering devices to monitor river flow and lake level		Issuance of memoran-dum circulars	Immediate dispatch of the QRT (fishkills, oil spills, flooding along the shorelands	Post surveys and assessment/ analyses of damages	Develop sustainable programs for the affected area (i.e. In case of fishcages damaged by oil spills along the 200-m area, LLDA refers and recommends request for fingerlings replacement to relevant agencies(BFAR, etc…) Modifications of payment scheme of fishpen operators damaged by typhoon

MATERIAL 01 - Vulnerability related to the Disaster Risk

1-Phivolcs; 2 PAGASA; 3 LLDA; 4 MPE

1	2	3	4	
				1. Political-Institutional Factor
√	√	√		• Legislation is lacking in regional development, land use, etc.
√	√	√		• The human and financial resources are inadequate.
√	√	√		• The political culture is not matured for consistent disaster risk management
	√	√		• Proper mechanisms for financial risks are lacking.
	√			• A culture of prevention is insufficiently promoted.
	√			• Some duplication in functions /activites of various agencies; uncoordinated approach

MATERIAL 01 - Vulnerability related to the Disaster Risk

1-Phivolcs; 2 PAGASA; 3 LLDA; 4 MPE

1	2	3	4	
				2. Economic Factor
√	√	√		• Financial resources are insufficient
√		√		• Poverty limits the self-help capabilities
√		√		• The economies remain at the low level diversification and are vulnerable to disaster
√	√	√		• The influence of economic activities on disaster risk is not carefully considered
	√			• Disaster prone areas have relatively lesser calamity funds.

MATERIAL 01 - Vulnerability related to the Disaster Risk

1-Phivolcs; 2 PAGASA; 3 LLDA;

1	2	3		
				3. Socio-Cultural Factor
√		√		• People with poor education and insufficient knowledge of the cause-effect are less able to respond in a changing environment
√	√	√		• People tend to treat natural disasters as inevitable
√		√		• People are not prepared to engage in mutual support schemes and organize themselves
	√			• Passive attitude to disasters.

MATERIAL 02 : Indicators under DPSIR Framework on (Man-made) Water Pollution

DPSIR Framework	Implication	Indicator
Driving Force (D)	Driving force of water use (e.g. poverty, population growth, urbanization, globalization, industrial expansion, agricultural development, energy production and use, recreation and tourism)	• Increase in population growth/density. • Increase in the rate of land conversion for residential, industrial, and commercial use. • Increase in the rate of services to be provided for urbanization.
Pressures (P)	Pressures on water system as a result of human activities (e.g. use of natural resources, discharges of waste)	• Increase in the rate of use of water for various purposes. • Rate of watershed reduction due to urbanization and industrialization.
State (S)	The quality / quantity change in the state of water as a result of the pressure	• Change in the supply of water resources. • Depleting groundwater resources. • Deteriorating water quality in the rivers and the lake. While the lake still meets Class C based on the DENR standard, (i.e. for fishery use only), most of the rivers draining into it hardly meets Class D (for irrigation use)

DPSIR Framework	Implication	Indicator
Impact (I)	Impacts on ecosystems, resources, human health, social conditions and amenities caused by the change in state	• Significant increase of watershed destruction, nutrient and pollutant loading in rivers and the lake. • Incidence of water related diseases and impacts on aquatic resources. • High incidence of fish kills. • Frequent occurrence of euthropication in the lake.
Response (R)	Societal response to these changes and coping mechanism, which are reflected in institutions, environmental, economic and sectoral policies. The response can be directed at different parts of the cause effect chain (e.g. Driving force, pressure, state or impact)	• Legal and institutional provisions to regulate man made water pollution. Examples: EUFS, Public Disclosure Programs, Quick Response Team, proposals for Effluent Trading. • Improvement of solid waste, sewerage/ waste water treatment and management. Example: assistance to LGUs in putting up material recovery facilities (MRF), river clean-ups, utilizing fisher folks, farmers as volunteers (known as environmental army) of about 400 of which 49 are women, among others. • Inclusion of civil societies' representative in the policy making board of the LLDA.

MATERIAL 03 :
Progress in Implementing DRM - LLDA

(**S**: Satisfactory, **I**: Inadequate or **P/NE**: Poor/Non Existent at each level)

Thematic Area	ISDR Indicators	Regional Level
Institutional Framework	A legal framework for DRM exists with explicit responsibilities defined for all levels of government.	I
	Multi-sectoral platforms for DRM are operational across levels.	S
	A national policy framework for DRM exists that requires plans and activities at all administrative levels.	NE
	Adequate resources are available to implement DRM plans at all administrative levels.	I
Risk Assessment and Early Warning	Risk assessments based on hazard data and vulnerability information are available and include risk assessments for key sectors.	NE
	Systems are in place to monitor, maintain and disseminate data on key hazards and vulnerabilities.	NE
	Early warning systems are in place for all major hazards.	NE
	Early warnings reach and serve people at the community level.	NE

Thematic Area	ISDR Indicators	Regional Level
Education and Awareness	Public awareness strategies for DRM exist and are implemented with vulnerable communities	P
	School curricula include DRM elements and instructors are trained in DRM.	P
Reducing Risk in Key Sectors	Environmental protection, natural resource management (land and water) and climate change policies include DRM elements	P
	Sectoral development plans (agriculture, water resources, health, environment, forestry, tourism, industry etc.) include DRM elements	P
	Land-use zoning and plans, building codes and safety standards exist and include disaster risk-related elements which are rigorously enforced.	P
	Technology options for DRM are available and applied	P
	A long-term national programme is in place to protect critical infrastructure from common natural hazards	P
	A procedure is in place to assess the disaster risk implications of major infrastructure and development project proposals.	P

Thematic Area	ISDR Indicators	Regional Level
Disaster Preparedness and Response	An independent assessment of disaster preparedness capacities and mechanisms has been undertaken and the responsibility for the implementation of its recommendations has been assigned and resourced.	S
	Disaster preparedness plans and contingency plans are in place at all administrative levels, and regular training drills and rehearsals are held to test and develop disaster response programmes	S
	All organizations, personnel and volunteers responsible for maintaining preparedness are equipped and trained for effective disaster preparedness and response	I
	Financial reserves and contingency mechanisms are in place to support effective response and recovery.	I
	Procedures are in place to document experience during hazard events and disasters and to undertake post-event reviews.	S

MATERIAL 04 : Proposal for DRM Action Plan-LLDA

Expected Outcome	**Improved environmental quality of the lake and its watershed and strengthened development governance for the Laguna de Bay Region**
Strategic Goals	1. To promptly and adequately respond to emergency situations in the Laguna de Bay Region 2. To address the emerging problems and issues due to fishkills, oil and chemical spills and other incidences in the lake, river systems and shoreland areas.
Priorities for Action	1 Provide appropriate guidelines and procedures for undertaking immediate steps to address the incidences
Key Activities for Action corresponding to above priority	1. Conduct field investigations and verifications a) interview key informant b) b) determine extent and magnitude of the affected area c) c) identify affected stakeholders

MATERIAL 04 : Proposal for DRM Action Plan - LLDA

Key Activities for Action corresponding to above priority	2.Establish cause of incidence/ source of pollutants a) utilize verified findings and results of investigation b) utilize laboratory analysis as basis for decision-making
	3.Assess value of damages
	4.Recommend short/long term measures to prevent recurrence of similar incident/s.