INVENTORY OF INFORMATION ON DISASTER MANAGEMENT

DATA COLLECTION SURVEY ON ASEAN REGIONAL COLLABORATION IN DISASTER MANAGEMENT

DECEMBER 2012

JAPAN INTERNATIONAL COOPERATION AGENCY

NIPPON KOEI CO., LTD.
ALMEC CORPORATION
MITSUBISHI RESEARCH INSTITUTE, INC.

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List of Abbreviations and Acronyms

A

AADMER	:	ASEAN Agreement on Disaster Management and Emergency Response
AAL	:	Average Annual Loss
AASHTO	:	American Association of State Highway and Transportation Officials
ABaDRM	:	Aceh Barat Disaster Risk Map
ACDM	:	ASEAN Committee for Disaster Management
ADMIS	:	ASEAN Disaster Management Information System
ADPC	:	Asian Disaster Preparedness Center
ADRC	:	Asian Disaster Reduction Centre
ADRM	:	Aceh Disaster Risk Map
AED	:	Automated External Defibrillator
AEIC	:	ASEAN Earthquake Information Center
AHA Center	:	ASEAN Coordination Center for Humanitarian Assistance on Disaster Management
AIFDR	:	Australia-Indonesia Facility for Disaster Reduction
ANDMON	:	ASEAN Natural Disaster Monitoring Network
ARDEX	:	ASEAN Regional Disaster Emergency Response Simulation Exercise
ASEAN	:	Association of South East Asian Nations
ATaDRM	:	Aceh Tamiang Disaster Risk Map
AusAID	:	Australian Agency for International Development

B

BAKORNAS PB	:	Badan Koordinasi Nasional Penanggulangan Bencana (National Coordinating Board for Disaster Management)
BAKOSURTANAL	:	Badan Koordinasi Survei dan Pemetaan Nasional (National Coordination Agency for Surveys and Mapping)
BBWS	:	Balai Besar Wilayah Sungai (River Basin Development Agency)
BCP	:	Business Continuity Plan
BDMS	:	Brunei Darussalam Meteorological Service
BDRRMC	:	Barangay Disaster Risk Reduction Management Council
BIG	:	Badan Informasi Geospasial (Geospatial Information Agency)
BMA	:	Bangkok Metropolitan Administration
BMA	:	Bangkok Metropolitan Area
BMKG	:	Badan Meteorologi, Klimatologi, dan Geofisika (Meteorological, Climatological and Geophysical Agency)
BNPB	:	National Agency for Disaster Management
BPBA	:	Badan Penanggulangan Bencana Aceh (Aceh Disaster Management Agency)
BPBD	:	Badan Penanggulangan Bencana Daerah (Regional Disaster Management Agency)
BPBK	:	Fire and Disaster Management Agency
BPPT	:	Badan Pengkajian dan Penerapan Teknologi (Agency for the Assessment and Application of Technology)

C

CBDRM	:	Community-Based Disaster Risk Management
CCA	:	Climate Change Adaptation
CCDM	:	Commune Committee for Disaster Management

CCFSC	:	Central Committee for Flood and Storm Control
CCFSC&SR	:	Commune Committee for Flood and Storm Control & Search and Rescue
CCTV	:	Closed Circuit Television
CDMRC	:	Central Disaster Management and Relief Committee
CEA	:	China Earthquake Administration
CEPP	:	Community Emergency Preparedness Programme
CERT	:	Country emergency Rescue Team
CEWS	:	Climatological Early Warning System
COD	:	Chief of officer on duty
CPR	:	Cardio-Pulmonary Resuscitation
CRED	:	Center for Research on the Epidemiology of Disasters
CVGHM	:	Centre for Volcanology and Geological Hazard Mitigation
D		
DARD	:	Department of Agriculture and Rural Development
DART	:	Deep-ocean Assessment and Reporting of Tsunamis
DART	:	Disaster Assistance and Rescue Team
DCA	:	Department of Civil Aviation
DCC	:	Disaster Command Center
DCDM	:	District Committee for Disaster Management
DCFSC&SR	:	District Committee for Flood and Storm Control & Search and Rescue
DDMC	:	District Disaster Management Committee
DDMFSC	:	Department of Dyke Management, Flood and Storm Control
DDMRC	:	District Disaster Management and Relief Committee
DDPM	:	Department of Disaster Prevention and Mitigation
DEOC	:	District Emergency Operation Centers
DEPT	:	Department of Educational Planning and Training
DGM	:	Department of Geology and Mining
DGWR	:	Directorate General of Water Resources
DHRW	:	Department of Hydrology and River Works
DIBA	:	Data dan informasi bencana aceh
DIBI	:	Data dan Informasi Bencana Indonesia (Indonesian Disaster Information and Data)
DID	:	Department of Irrigation and Drainage
DIPECHO	:	Disaster Preparedness ECHO
DKI	:	Daerah Khusus Ibukota (Special Capital Territory)
DMC	:	Disaster Management Center
DMD	:	Disaster Management Division
DMH	:	Department of Meteorology and Hydrology
DMIS	:	Disaster Management Information System
DMO	:	Disaster Management Order
DMR	:	Department of Mineral Resources
DMRS	:	Disaster Monitoring and Response System
DND	:	Department of National Defence
DOCC	:	Disaster Operations Control Centre
DOE	:	Department Of Environment
DOR	:	Department of Road
DOST	:	Department of Science and Technology

DPRE	:	Disaster Preparedness and Response Education
DPWH	:	Department of Public Works and Highways
DPWT	:	Department of Public Works and Transportation
DREAM	:	Disaster Risk Exposure and Assessment for Mitigation
DRR	:	Disaster Risk Reduction
DRSC	:	Building Disaster Resilient Societies in Central Region in Vietnam
DSS	:	Decision Support System
DVB	:	Digital Video Broadcasting
DWR	:	Department of Water Resources
E		
ECHO	:	The Humanitarian Aid and Civil Protection department of European Commission
EDIS	:	Establishment of Disaster Information Management System
EDM	:	electro-optical distance measurement
EGAT	:	Electricity Generation Authority of Thailand
EM-DAT	:	Emergency Disaster Database
EOC	:	Emergency Operations Center
EOP	:	Emergency Operating Procedures
EOS	:	Emergency Operating System
EP	:	Emergency Preparedness
EP Day	:	Emergency Preparedness Day
EWS	:	Early Warning System
F		
FCC	:	Flood Control Center
FCIC	:	Flood Control Information Center
FFWS	:	Flood Forecasting and Warning System
FLAS	:	Fixed-Line Disaster Alert System
FMRDS	:	FM Radio Data System
G		
GDP	:	Gross Domestic Product
GFDRR	:	Global Facility for Disaster Reduction and Recovery
GIRN	:	Government Integrated Radio Network
GIS	:	Geographic Information System
GIZ	:	Deutsche Gesellschaft für Internationale Zusammenarbeit (German Agency for International Cooperation)
GLIDE	:	GLobal IDEntifier Number
GMS	:	Greater Mekong Sub-region
GPS	:	Global Positioning System
GRDC	:	Geology Research Development Centre
GTS	:	Global Telecommunication System
GTZ	:	Deutsche Gesellschaft für Internationale Zusammenarbeit (German Agency for International Cooperation)
H		
HAII	:	Hydro and Agro Informatic Institute
HFA	:	Hyogo Framework for Actions
HMD	:	Hydro- Meteorological Division
I		
ICHARM	:	International Centre for Water Hazard and Risk Management

ICL	:	International Consortium on Landslides
ICP	:	Incident Command Post
ICT	:	Information and Communication Technology
ID	:	Irrigation Department
I-DRMP	:	Integrated Disaster Risk Management Plan
IM	:	Incident Manager
InaTEWS	:	Indonesia Tsunami Early Warning System
INGO	:	International Non-government Organisation
INSARAG	:	International Search and Rescue Advisory Group
IOTWS	:	Indian Ocean Tsunami Warning and Mitigation System
IPOCM	:	Incident Preparedness and Operational Continuity Management
ISDR	:	International Strategy for Disaster Reduction
ITST	:	Institute of Transport Science and Technology
J		
JAIF	:	Japan-ASEAN Integration Fund
JAXA	:	Japan Aerospace Exploration Agency
JICA	:	Japan International Cooperation Agency
JMA	:	Japan Meteorological Agency
JMG	:	Minerals and Geoscience Department Malaysia
JPBBN	:	Jawatankuasa Pengurusan dan Bantuan Bencana Negeri (Disaster Aid and Management Committee)
JPT	:	Joint Project Team
JST	:	Japan Science and Technology Agency
K		
KOICA	:	Korea International Cooperation Agency
KOMINFO	:	Kementerian Komunikasi dan Informatika (Ministry of Communication and Information Technology)
L		
LANGOCA	:	Laos Australia NGO Cooperation Agreement
Lao PDR	:	Lao People's Democratic Republic
LAPAN	:	Lembaga Penerbangan dan Antariksa Nasional (National Institute of Aeronautics and Space)
LCD	:	Liquid Crystal Display
LDRRMC	:	Local Disaster Risk Reduction and Management Council
LDRRMF	:	Local Disaster Risk Reduction and Management Fund
LGU	:	Local Government Units
LIPI	:	National Institute of Science
LMAP	:	Land Management and Administration Project
LNMC	:	Lao National Mekong Committee
M		
MACRES	:	Malaysian Centre for Remote Sensing
MAI	:	Ministry of Agriculture and Irrigation
MAPDRR	:	Myanmar Action Plan on Disaster Risk Reduction
MARD	:	Ministry of Agriculture and Rural Development
MAS	:	Myanmar Agriculture Service
MDPA	:	Myanmar Disaster Preparedness Agency
MEC	:	Myanmar Earthquake Committee
MERS	:	Malaysia Emergency Response System

MES	:	Myanmar Engineering Society
MGB	:	Mines and Geosciences Bureau
MGS	:	Myanmar Geosciences Society
MHA	:	Ministry of Home Affairs
MIMU	:	Myanmar information Management Unit
MLSW	:	Ministry of Labour and Social Welfare
MMD	:	Malaysian Meteorological Department
MMDA	:	Metro Manila Development Authority
MNTEWC	:	Malaysian National Tsunami Early Warning Center
MOE	:	Ministry of Education
MOH	:	Ministry of Health
MONRE	:	Ministry of Natural Resources and Environment
MOSTI	:	Ministry of Science, Technology and Innovation
MOWRAM	:	Ministry of Water Resources and Meteorology
MPWT	:	Ministry of Public Works and Transportation
MRC	:	Mekong River Commission
MRCFFG	:	Mekong River Commission Flash Flood Guidance
MRCS	:	Mekong River Commission Secretariat
MRSA	:	Malaysia Remote Sensing Agency
MSS	:	Meteorological Service Singapore
MSWRR	:	Ministry of Social Welfare, Relief and Resettlement
MTSAT	:	Multi-functional Transport Satellite
N		
NADDI	:	National Disaster Data and Information Management System
NAMRIA	:	National Mapping and Resource Information Authority
NASOP	:	National standard operating procedure
NCDCC	:	National Civil Defence Cadet Corps
NCDM	:	National Committee for Disaster Management
NCSR	:	National Committee for Search and Rescue
NDC	:	National Disaster Council
NDMC	:	National Disaster Management Center
NDMC	:	National Disaster Management Committee
NDMO	:	National Disaster Management Office
NDPMC	:	National Disaster Prevention and Mitigation Committee
NDPMP	:	National Disaster Prevention and Mitigation Plan
NDRRMC	:	National Disaster Risk Reduction and Management Council
NDRRMP	:	National Disaster Risk Reduction and Management Plan
NDWC	:	National Disaster Warning Center
NEA	:	National Environment Agency
NFP	:	National Focal Point
NGDC	:	National Geophysical Data Center
NGO	:	Non-governmental Organization
NHMS	:	National Hydro- Meteorological Service
NOAA	:	National Oceanic and Atmospheric Administration
NSC	:	National Security Council
NWPTAC	:	Northwest pacific Tsunami Advisory Center
O		

OCD	:	Office of Civil Defence
Ops CE	:	Operation Civil Emergency
OSCP	:	On Scene Command Post
OSPD	:	Outlines of Strategy and Policy for Development
P		
PAGASA	:	Philippine Atmospheric, Geophysical and Astronomical Services Administration
PCDM	:	Province Committee for Disaster Management
PCIEERD	:	Philippine Council for Industry, Energy and Emerging Technology Research and Development
PCFSC&SR	:	Provincial Committee for Flood and Storm Control & Search and Rescue
PDMC	:	Province Disaster Management Committee
PFI	:	Private Finance Initiative
PHIVOLCS	:	Philippine Institute of Volcanology and Seismology
PIA	:	Philippine Information Agency
PMO	:	Prime Minister's Office
POKOMAS	:	Kelompok Masyaraka (Flood operation Community Units)
PPT	:	PowerPoint
PTWC	:	Pacific Tsunami Warning Center
PU	:	Pekerjaan Umum (Ministry of Public Works)
PUB	:	Public Utilities Board
PWD	:	Public Works Department
PWS	:	Public Warning System
R		
RAEWM	:	Risk Assessment, Early Warning and Monitoring
RDRRMC	:	Regional Disaster Risk Reduction Management Council
READY	:	Hazards Mapping and Assessment for Effective Community-Based Disaster Risk Management
REDAS	:	Rapid Earthquake Damage Assessment System
RFS	:	River Forecasting Section
RID	:	Royal Irrigation Department
RIMES	:	Regional Integrated Multi-Hazard Early Warning System
RISTEK	:	Kementerian Riset dan Teknologi (Ministry of Research and Technology)
RRD	:	Relief and Resettlement Department (Division)
RSM	:	Regional Spectral Model
RTN	:	Royal Thai Navy
RTSP	:	Regional Tsunami Service Provider
S		
SATREPS	:	Science and Technology Research Partnership for Sustainable Development
SCDF	:	Singapore Civil Defence Force
SDMRC	:	State Disaster Management and Relief Committee
SEACAP	:	South East Asia Community Access Programme
SEZ	:	Special Economic Zone
SMART	:	Special Malaysia Disaster Assistance and Rescue Team
SMS	:	Short Message Service
SMS	:	Short Messaging System
SNAP	:	Strategic National Action Plan
SNS	:	Social Networking Service

SOP	:	Standard Operating Procedure
SSB	:	Single Side Band
T		
TDMRC	:	Tsunami and Disaster Mitigation Research Center
TMD	:	Thai Meteorological Department
U		
UN	:	United Nation
UN OCHA	:	United Nations Office for the Coordination of Humanitarian Affairs
UNDP	:	United Nations Development Programme
UNESCO	:	United Nations Educational, Scientific and Cultural Organization
UNHCR	:	United Nations High Commissioner for Refugees
UNISDR	:	United Nations International Strategy for Disaster Reduction
UPS	:	Uninterruptible power supply
USFS	:	United States Financial Services
USGS	:	United States Geological Survey
USTATF	:	United States Technical Assistance and Training Facility
V		
VDPU	:	Village Disaster Protection Unit
VNRC	:	Vietnam Red Cross
VSAT	:	Very Small Aperture Terminal
W		
WB	:	World Bank
WMO	:	World Meteorological Organization
WP	:	Work Program
Y		
YSB	:	Yunnan Seismic Bureau

Abbreviations of Measures

Length

mm	=	millimeter
cm	=	centimeter
m	=	meter
km	=	kilometer

Area

ha	=	hectare
m^2	=	square meter
km^2	=	square kilometer

Volume

1, lit	=	liter
m^3	=	cubic meter
m^3/s, cms	=	cubic meter per second
MCM	=	million cubic meter
m^3/d, cmd	=	cubic meter per day

Weight

mg	=	milligram
g	=	gram
kg	=	kilogram
t	=	ton
MT	=	metric ton

Time

sec	=	second
hr	=	hour
d	=	day
yr	=	year

Money

BND	=	Brunei dollar
IDR	=	Indonesia rupiah
LAK	=	Laos kip
MMK	=	Myanmar kyat
MYR	=	Malaysia ringgit
PHP	=	Philippine peso
SGD	=	Singapore dollar
THB	=	Thai baht
USD	=	U.S. dollar
VND	=	Vietnam dong

Energy

Kcal	=	Kilocalorie
KW	=	kilowatt
MW	=	megawatt
KWh	=	kilowatt-hour
GWh	=	gigawatt-hour

Others

%	=	percent
o	=	degree
'	=	minute
"	=	second
°C	=	degree Celsius
cap.	=	capital
LU	=	livestock unit
md	=	man-day
mil.	=	million
no.	=	number
pers.	=	person
mmho	=	micromho
ppm	=	parts per million
ppb	=	parts per billion
lpcd	=	litter per capita per day
Mw	=	moment magnitude scale

Exchange Rate

Exchange Rate			**2012-8-18**
Country	Unit		Exchange rate to USD (1USD=79.55JY)
Brunei	BND	Dollar	1.2538
Cambodia	KHR	Riel	4,068
Indonesia	IDR	Rupiah	9,490
Lao PDR	LAK	Kip	7,982.5
Malaysia	MYR	Ringgit	3.1315
Myanmar	MMK	Kyat	875.5
Philippines	PHP	Peso	42.4
Singapore	SGD	Dollar	1.2538
Thailand	THB	Baht	31.51
Vietnam	VND	Dong	20,845

DATA COLLECTION SURVEY ON
ASEAN REGIONAL COLLABORATION IN
DISASTER MANAGEMENT

INVENTORY OF INFORMATION ON DISASTER MANAGEMENT

Abbreviation

Table of Contents

PART-3 INVENTORIES – Full Descriptions

INVENTORY OF INFORMATION ON DISASTER MANAGEMENT

NOTES ON INVENTORY

1 Inventory of Information on Disaster Management by Country

Inventory of disaster management related information of countries has been prepared by JICA head office in Tokyo as part of knowledge management. The items of inventory consist basically of 1) Characteristics of Disasters, 2) Administrative Structure, 3) Disaster Mitigation/ Preparedness, 4) Emergency Response, 5) Community Based Disaster Management, 6) Climate Change and Adaptation, and others; updated in 2007. The Study Team updated the inventory with the information collected through the survey conducted under this data collection survey.

2 HFA 2010-2015 and AADMER Work Program 2010-2015

The inventories will be helpful in understanding progress of disaster management of the Member States, which will facilitate organizations concerned to consider future regional cooperation and/or collaboration in disaster management.

There are two frameworks that have to be considered to monitor the progress of ASEAN Members; 1) Hyogo Framework for Action 2010-2015; and 2) AADMER Work program 2010-2015.

2.1 Hyogo Framework for Action 2005-2015

(1) Five Priorities for Action

The World Conference on Disaster Reduction was held in January 2005 in Kobe, Hyogo, Japan, and adopted “the Hyogo Framework for Action (HFA) 2005-2015: Building the Resilience of Nationals and Communities to Disasters”. The Conference provided a unique opportunity to promote a strategic and systematic approach to reduce vulnerability and risks to hazards. It underscores the need for, and identified ways of, building the resilience of nations and communities to disaster. The Conference of 2005 adopted the following priorities for action for disaster risk reduction[1].

1) Ensure that disaster risk reduction is a national and a local priority with a strong institutional basis for implementation (HFA-1).
2) Identify, access and monitor disaster risks and enhance early warning (HFA-2).
3) Use knowledge, innovation and education to build a culture of safety and resilience at all levels (HFA-3).
4) Reduce the underlying risk factors (HFA-4).
5) Strengthen disaster preparedness for effective response at all levels (HFA-5).

[1] The text largely refers to Hyogo Framework or Action 2005-2015; ISDR

Under each of these five priorities, key activities are listed for States, regional and international organization and other actors concerned to take into consideration to implement them, as appropriate, to their own circumstances and capacities. The key activities are shown in Table 2.1.

Table 2.1 HFA Five Priority Actions and their Key Activities; and Indicator of Progress

Five Priority Actions		Key Activities	Indicators of Progress
HFA-1	Ensure that Disaster Risk Reduction is a National and a Local Priority with Strong Institutional Basis for Implementation	(i) National institutional and legislative frameworks	(i) National institutional and legal frameworks for disaster risk reduction exist with decentralized responsibilities and capacities at all levels.
		(ii) Resources	(ii) Dedicated and adequate resources are available to implement disaster risk reduction plans at all administrative levels
		(iii) Community Participation	(iii) Community participation and decentralization is ensured through the delegation of authority and resources to local levels.
			(iv) A national multi-sectoral platform for disaster risk reduction is functioning.
HFA-2	Identify, Assess and Monitor Risk and Enhance Early Warning	(i) National and Local Risk Assessments	(i) National and local risk assessments based on hazard data and vulnerability information are available and include risk assessments for key sectors.
		-	(ii) Systems are in place to monitor, archive and disseminate data on key hazards and vulnerabilities.
		(ii) Early Warning	(iii) Early warning systems are in place for all major hazards, with outreach to communities.
		(iii) Capacity	-
		(iv) Regional and emerging risks	(iv) National and local risk assessments take account of regional/ trans-boundary risks, with a view to regional cooperation on risk reduction.
HFA-3	Use Knowledge, Innovation and Education to Build a Culture of Safety and Resilience at All Level	(i) information management and exchange	(i) Relevant information on disasters is available and accessible at all levels, to all stakeholders (through networks, development of information sharing system)
		(ii) Education and training	(ii) School curricula, education material and relevant trainings include risk reduction and recovery concepts and practices.
		(iii) Research	(iii) Research methods and tools for multi-risk assessments and cost benefit analysis are developed and strengthened
		(iv) Public awareness	(iv) Country wide public awareness strategy exists to stimulate a culture of disaster resilience, with outreach to urban and rural communities.
HFA-4	Reduce the underlying Risk Factors	(i) Environmental and natural resource management	(i) Disaster risk reduction is an integral objective of environment-related policies and plans, including for land use, natural resource management and climate change adaptation
		(ii) Social and economic development Practices	(ii) Social development policies and plans are being implemented to reduce the vulnerability of populations most at risk
			(iii) Economic and productive sectoral policies and plans have been implemented to reduce the vulnerability of economic activities.
		(iii) Land-use planning and other technical measures	(iv) Planning and management of human settlements incorporate disaster risk reduction elements, including enforcement of building codes.
			(v) Disaster risk reduction measures are integrated into post-disaster recovery and rehabilitation processes.
			(vi) Procedures are in place to assess disaster risk impacts of all major development projects, especially infrastructure
HFA-5	Strengthen Disaster Preparedness	-	(i) Strong policy, technical and institutional capacities and mechanisms for disaster management, with a disaster risk reduction perspective are in place
			(ii) 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 programs
			(iii) Financial reserves and contingency mechanisms are in place to enable effective response and recovery when required.
			(iv) Procedures are in place to exchange relevant information during disasters and to undertake post-event reviews.

Source: - Hyogo Framework for action 2005 – 2015 (ISDR), - Indictors of Progress (ISDR)
Combined by JICA Study Team (2012)

(2) Indicator of Progress: Guidance of Measuring the Reduction of Disaster Risk and the Implementation of the Hyogo Framework for Action

In the preparatory negotiations on the Frameworks, participated States stressed the need for specific means, including indicators, to measure progress toward the reduction of disaster risks. In particular, it was requested that ISDR system coordinates the development of "generic, realistic and measurable indicators" for disaster risk reduction. The "Indictor of Progress" has thus been proposed[2] for the five Hyogo Framework's Priorities for Actions. The indicators are attached as Table 2.2.

Based on the Indicator of Progress, States undertake the preparation of its National Progress Report within the framework of the biennial HFA Monitoring and Progress Review process, facilitated by UNISDR and ISDR System partners.

Table 2.2 AADMER WP (2010-2015) Strategic Como

Strategic Component	Sub-component
1. Risk Assessment, Early Warning and Monitoring	1.1 Risk Assessment
	2.2 Early Warning
	3.3 Monitoring
2. Prevention and Mitigation	2.1 Implementing National Plan and Strengthen Legal and Institutional Framework
	2.2 Mainstreaming DRR in National Development Plans
	2.3 Mainstreaming DRR in Education and Health Sector
	2.3.1 Integration DRR in School Curriculum
	2.3.2 Disaster Safety of Educational Facilities
	2.3.3 Disaster Safety of Health Facilities
	2.4 Public Education, Awareness and Advocacy
	2.5 Urban DRR
	2.6 Community-Based DRR
	2.7 Building Partnerships between DRR and Climate Change Adaptation Institutions and Programs
	2.8 Disaster Risk Financing including Microfinance
3. Preparedness and Response	
4. Recovery	

Source: AADMER Work Program 2010-2015
Note: DRR = Disaster Risk Reduction

2.2 AADMER Work Program 2010-2015

Recognizing that the ASEAN region was at high risk to natural disasters, ASEAN reached a number of mutual agreements at the highest level starting with ASEAN Declaration on Mutual Assistance on Natural Disasters in 1976. On December 24, 2009, the AADMER: "ASEAN Agreement on Disaster Management and Emergency Response" was entered into force, that firmly affirms ASEAN's commitment to the Hyogo framework for Action. To concretize this commitment and operationalize AADMER, "AADMER Work Program 2010-2015" was designed to support the national agenda and complement capacities of the Member States in

the different aspects of disaster management to attain the vision of disaster-resilient nations and safer communities within the region.

Being comprehensive, the AADMER WP covers all aspects of disaster management and thus outlines a detailed road map for four strategic components[3]:-

1) Risk Assessment, early Warning and Monitoring;
2) Prevention and Mitigation;
3) Preparedness and Response; and
4) Recovery

Sub-components are proposed under these four strategic components.

3 Items of the Inventory - Inventory as a Tool for Monitoring of Disaster Management Progress

(1) Relation between AADMER WP and HFA

Having considered the above mentioned background, the inventory was so designed that items in the inventory should correspond both to the priority activities and their key activities of HFA 2010-1015; and to components and sub-components of the AADMER WP; because the ASEAN Members are in a process to attain the disaster-resilient nations in accordance to the AADMER WP, while at the same time the Members prepare national progress report to UNISDR within the framework of the biennial HFA Monitoring and Progress Review process. However, as the AADMER WP is the program that firmly affirms ASEAN's commitment to the Hyogo framework for Action, individual activity correspond each other, thought categorization of individual activity may differ. Table 3.1 shows the relations between items among the HFA Key Activities, Indicators of Progress and the AADMER WP sub-components.

(2) Inventory for Disaster Management

The JICA Study Team has updated the inventory with information provided through the questionnaire survey, interview surveys in each Member States and survey on web-sites. Users may find necessary items that may be needed for updating the biennial Monitoring and Progress Review or for assessing progress of the AADMER WP.

At the same time, there were limitations that the Data Collection Survey could only access a limited number of institutions, persons in charge and therefore limited information source in each member countries, which may have resulted in limited information included in the Inventory.

As monitoring of progress toward building disaster resilient nations and communities is an essential activity to step up the stage to resilience, it is recommended to update the inventory

[2] The test largely refer to Indicator of Progress; ISDR
[3] The text largely refer to AADMER Work Program 2010-2015

by each State and to share the information with the other ASEAN Member States possibly through the AHA-Center.

Table 3.1 Relations between Items among HFA Key Activities, Indicators of Progress and AADMER WP sub-components

<table>
<tr><th colspan="3">HFA 2010 -2015</th><th colspan="2">AADMER WP 2010 -2015</th></tr>
<tr><th>Priorities for Action</th><th>Key Activities</th><th>Indicators of Progress</th><th>Component</th><th>Sub-components</th></tr>
<tr><td rowspan="4">1</td><td>(i)</td><td>(i)</td><td rowspan="4">2</td><td rowspan="2">2.1</td></tr>
<tr><td>(ii)</td><td>(ii)</td></tr>
<tr><td>(iii)</td><td>(iii)</td><td>2.6</td></tr>
<tr><td>-</td><td>(iv)</td><td>-</td></tr>
<tr><td rowspan="5">2</td><td>(i)</td><td>(i)</td><td rowspan="5">1</td><td>1.1</td></tr>
<tr><td>-</td><td>(ii)</td><td>1.3</td></tr>
<tr><td>(ii)</td><td>(iii)</td><td>1.2</td></tr>
<tr><td>(iii)</td><td>-</td><td>-</td></tr>
<tr><td>(iv)</td><td>(iv)</td><td>-</td></tr>
<tr><td rowspan="4">3</td><td>(i)</td><td>(i)</td><td rowspan="4">3</td><td>-</td></tr>
<tr><td>(ii)</td><td>(ii)</td><td>2.3.1</td></tr>
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<tr><td>(iv)</td><td>(iv)</td><td>2.4</td></tr>
<tr><td rowspan="6">4</td><td>(i)</td><td>(i)</td><td rowspan="6">2</td><td>2.7</td></tr>
<tr><td rowspan="2">(ii)</td><td>(ii)</td><td>2.3.2</td></tr>
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</table>

Source: JICA Study Team 2012

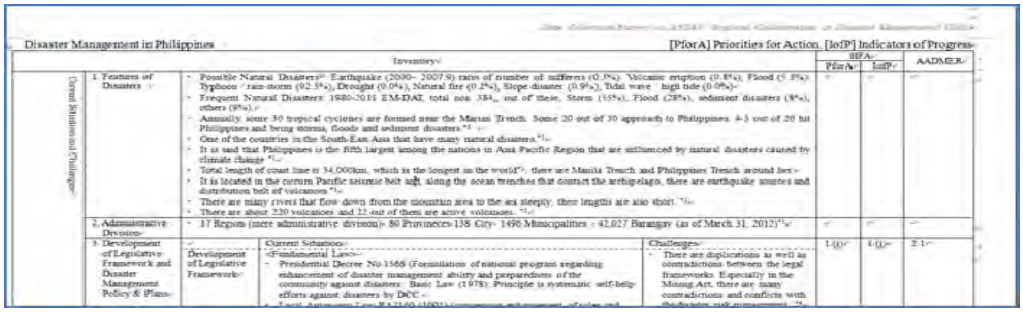
(3) Linkages to the JICA Project Reports in the Inventory

In the inventory, the reports of the JICA projects that appear on relevant web-sites were listed up under the item 8 "Records of Major Assistance by JICA."

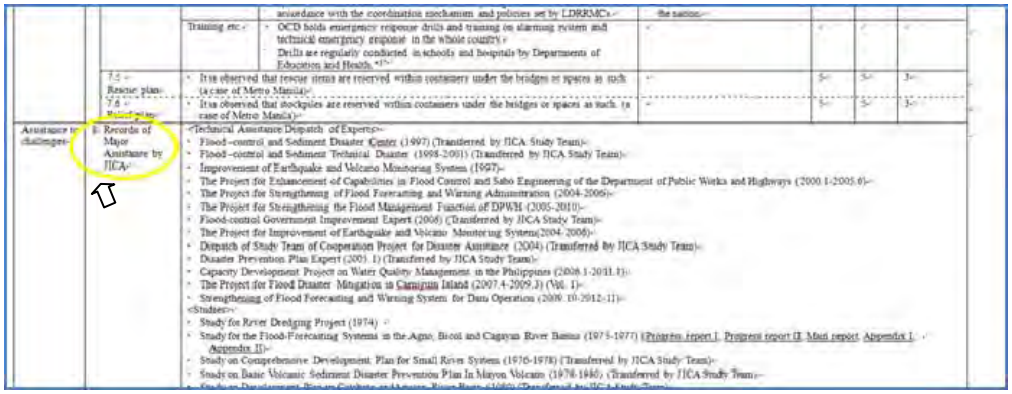
The inventory provides the users with linkages of the reports to the JICA digital library so that the PDFs of the reports that the users wish to refer to may be down loaded. The reports that have the PDFs stored in the JICA's library are underlined in the inventory.

Here follows how to download the files from the inventory.

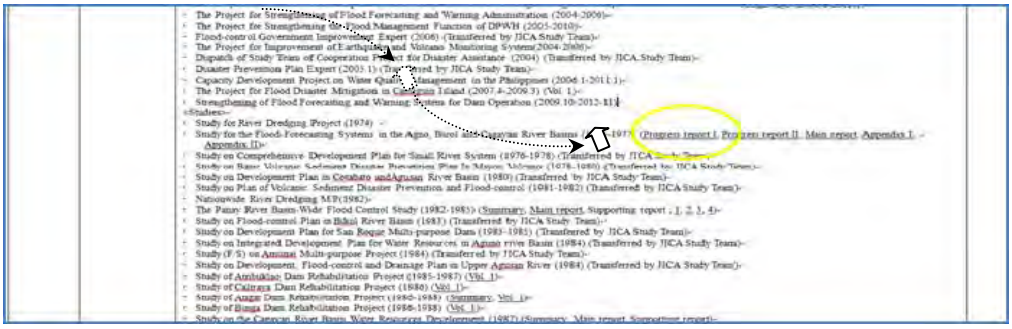
1. Open the file you wish to refer to.



2. Go down to the item 8 "Records of Major Assistance by JICA."



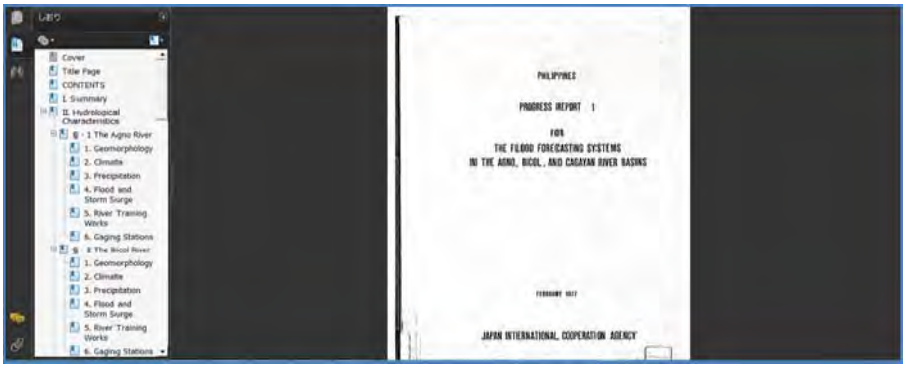
3. You will find the underlined names of the reports that are linked to the files stored in the digital library of JICA.



4. Move the cursor onto the name of the report that you wish to refer to. The linkage will pop up. Hold the Ctrl key down and left-crick. Be sure that your PC is connected with inter-net.

5. JICA Report PDF will come out. Crick the pdf you wish to down load.

6. The pdf of the report will be down-loaded.



INVENTORY ON INFORMATION OF DISASTER MANAGEMENT

Summaries

Brunei

Cambodia

Indonesia

Lao PDR

Malaysia

Myanmar

Philippines

Singapore

Thailand

Vietnam

					Inventory	HFA PforA	HFA IofP	AADMER
Current Situation and Challenges	1. Features of Disasters	• No disasters are recorded in EM-DAT 1980-2011, relatively free from natural disasters • Although Brunei is not located on a major earthquake area, low level earthquakes and tremors were felt in the country in the past two decades. Brunei has experienced small earthquakes with the range of 4-5 magnitude in 1992 and 2005. • Tsunami disaster is considered to occur due to strong earthquake occurred in South China Sea..						
	2. Administrative Division	4 Districts (daerah) – 38 Sub-district (mukim)						
	3. Development of Legislative Framework and Disaster Management Policy & Plans		Current Situation	Challenges		1.(i)	1.(i)	2.1
		Development of Legislative Framework	<Fundamental Law> • Disaster Management Order (2006)	• It is desired in Strategic National Action Plan to have a legal framework consisting of a coherent set of laws and regulations for disaster risk reduction to implement.				
		Disaster Management Policy	• The Outlines of Strategy and Policy for Development (OSPD) 2007-2017 • (the security strategy, one of 8 key strategies, manifests policy directions for "developing further appropriate systems and organizations, for responding quickly and effectively to threats from natural disasters, infectious diseases, acts of terrorism and other emergency")					
		Disaster Management Plans	<Central Level> • Strategic National Action Plan for Disaster Risk Reduction 2012-2025					
	4. Establishment and Enhancement of Disaster Management System	Institutional Framework	Current Situation	Challenges		1.(ii)	1.(ii)	2.1 4
		Central Level	<u>National Disaster Council (NDC)</u> • Policy and Strategic Direction • Chairman: Senior Minister at the Prime Minister's Office • Deputy Chairman (Permanent) : Minister Of Home Affairs • Deputy Co-Chairman (or chairmen): Appointed according to the nature of disasters • Secretariat: Permanent Secretary of Home Affairs • National Disaster Management Centre (NDMC) is the implementing agency. NDMC is headed by a Director as stipulated in the Disaster Management Order.	• NDMC is still in the course of reform for further integration of disaster related agencies.				
			<u>Organizations in charge of Non-structural Measures for Disaster Risk Mitigation and Preparation</u> • Tropical storm: Brunei Darussalam Meteorological Service, Department of Civil Aviation, Ministry of Communication • Flood: Public Works Department, Sewage and Drainage Department, Ministry of Development • Landslide: Public Works Department, Geotechnical and Geological Section, Ministry of Development • Forest Fire: Forestry Department (Ministry of Environment, Parks and Recreation), Fire and Rescue Department (Ministry of Home Affairs) • Forest Fire: Environment, Parks and Recreation Department, Ministry of Development); Fire and Rescue Department, Ministry of Home Affairs; Forest Department, Ministry of Primary and Industry Resources • Earthquake and Tsunami: Public Works Department, Geotechnical and Geological Section, Ministry of Development. The Brunei Darussalam Meteorological Service, Department of Civil Aviation, Ministry of Communication; also monitors Tsunami. <u>Organizations in charge of Structural Measures for Disaster Risk Mitigation</u> • Landslide: <u>Public Works Department, Ministry of Development</u>	• Competent agencies need to identify for each (potential) disaster.				
		Local Level	<u>District Disaster Management Centre</u> (Implementing agency including District Emergency Operation Centre) • Chairperson: District Officer					
		Inter-organizational Arrangement						
		Financial Preparation	• National budget for Disaster Management is annually allocated to NDMC, Ministry of Health and Ministry of Finance. Ministry of Finance allocated $5 million Brunei Dollar for disaster management activities.					
	5. Policy on Community-based Disaster Management	• NDMC embarks on public awareness programme to increase community resilience to disaster through the Community-based Disaster Risk Management (CBDRM). • Districts' response plans are provided as community-based disaster risk management program				1.(iii)	1.(iii)	2.6 4
	6. Prevention and Mitigation	Current Situation		Challenges		-	-	-
	6.1 Flood	Identification of Disaster Risks	• The country is composed of four Districts. Flood hazard maps have been developed for every four Districts by the Public Works Department (PWD), Ministry of Development.			2.(i)	2.(i)	1.1
		Monitoring	• Hydrological monitoring and meteorological monitoring are conducted by PDW and Brunei Darussalam Meteorological Service (BDMS), the Department of Civil Aviation, Ministry of Communication, respectively. • BDMS manages 14 automatic weather stations distributed in the whole county. Those rainfall data are shown on the website at real time.			2.(i)	2.(ii)	1.3
		Non-structural Measures	• To raise public awareness, concerned organizations have carried out public relations through exhibition, campaign, disaster education and so on.			4.(i)	4	2.2
		Structural Measures	• PWD has implemented various river improvement works in order to secure discharge capacity of rivers. • In Tutong district that is one of most flood-affected areas in the country, Sungai Tutong Floodplain Management Plan was formulated in June 2006. In accordance with the plan, some structural measures combining dam, diversion, widening of river channel, and dredging have been taken to mitigate flood damages.			4.(i)	4	2.2
	6.2 Earthquake / Tsunami	Identification of Disaster Risks	• The tsunami simulation conducted by Malaysia and Japan anticipated that the tsunami generated by the earthquake in South China Sea will arrive at the coastal area in Brunei.	• Tsunami simulation analysis is needed to assess vulnerability along coastal area and oil production facilities in Brunei. • Based on simulation analysis, tsunami disaster management plan should be formulated for disaster mitigation.		2.(i)	2.(i)	1.1
		Monitoring	• Earthquake/tsunami specific monitoring facilities are not available.	• Construction of tsunami monitoring and warning system; and community based tsunami evacuation drill will be necessary to reduce tsunami damage. • In construction of tsunami early warning system, international information interchange among the neighborhood		2.(i)	2.(ii)	1.3

				countries is very important to take emergency response against tsunami.			
		Non-structural Measures	・ Earthquake/tsunami specific monitoring facilities are not available.	・ Tsunami education	4.(i)	4	2.2
		Structural Measures	・ N/A		4.(i)	4	2.2
	6.3 Sediment disaster (Landslide, Debris flow)	Identification of Disaster Risks	・ Not relevant, no hazard maps available		2.(i)	2.(i)	1.1
		Monitoring	N/A		2.(i)	2.(ii)	1.3
		Non-structural Measures	N/A		4.(i)	4	2.2
		Structural Measures	N/A		4.(i)	4	2.2
	6.4 Volcano	Identification of Disaster Risks	・ No active volcano in Brunei.		2.(i)	2.(i)	1.1
		Monitoring	N/A		2.(i)	2.(ii)	1.3
		Non-structural Measures	N/A		4.(i)	4	2.2
		Structural Measures	N/A		4.(i)	4	2.2
	6.5 High Tide /Storm Surge (Cyclone/ Typhoon)	Identification of Disaster Risks	・ The country is out of tropical storm prone region. No hazard maps available		2.(i)	2.(i)	1.1
		Monitoring	・ Normal metrological observation is conducted.		2.(i)	2.(ii)	1.3
		Non-structural Measures	・ Not particularly conducted		4.(i)	4	2.2
		Structural Measures	・ A larger part of coastal line is protected with rock-fill banking against coastal erosion.		4.(i)	4	2.2
	6.6 Other Disasters	Identification of Disaster Risks	・ Not identified		2.(i)	2.(i)	1.1
		Monitoring	N/A		2.(i)	2.(ii)	1.3
		Non-structural Measures	N/A		4.(i)	4	2.2
		Structural Measures	N/A		4.(i)	4	2.2
	6.7 Common items for Disaster	Non-structural Measures	・ Any DMIS and/or disaster loss database has not been constructed in Brunei. But disaster losses are systematically reported, monitored and analyzed. The reports are used in planning.		4	4	2.2 2.5
					4	4	2.8
		Structural Measures			4	4	2.3.2 2.3.3
		Climate Change Adaptation	・ Responsible body: National Council on Climate Change ・ NFP: Department of Environment, Parks and Recreation ・ National Appropriate Mitigation Action is being developed; there is no policy document on climate change adaptation (as of July 2010).		4.(i)	4.(i)	2.7
		Public Awareness Research and Development /Human Resource Development / for Disaster Management	・ Ministry of Education is in charge of education for disaster prevention and mitigation. ・ DRR has yet to be incorporated in school curricula. However, outreach program has been taken up seriously through such other means as the ASEAN Regional Drawing Competition among students that is held to promote awareness on disaster resilience among students, teachers and parents. ・ Ministry of Education is going to implement a new education program (called as SPN-21) that includes a curriculum for disaster prevention and mitigation to the public systematically. ・ Drills for public are held once a year based on the program of NDMC and relevant agencies. But, NDMC considers that more frequent training is necessary. ・ NDMC is planning to promote the following four programs to enhance public awareness as follows; (1) Community-Based Disaster Risk Management (CBDRM), (2) Road-show on Disaster Management and Disaster Risk Management, (3) National Drawing Competition/ Essay Competition, and (4) Safe Based Disaster Management Centre.		3	3	2.3.1
7. Preparedness and Response		Current Situation		Challenges			
	7.1 Disaster Response plan / Emergency Financial Measure	Central Level	<Emergency Operation Plan(EOP), Contingency Plan(CP) .etc> ・ National Standard Operating Procedures <Emergency Financial Measure> ・ Contingency Funds are allocated to several Ministries.	・ SOPs are subjects for updating and approval as of April 2012.	5	5	3
		Local Level	<Emergency Operation Plan(EOP), Contingency Plan(CP) .etc> ・ District Response Plan (on the basis of National SOPs)				
	7.2 Early Warning	General Warning and Forecast・Communication	・ Weather forecast and early warning is under the responsibility of Department of Civil Aviation's (DCA's) who is to issue severe weather warning and rough sea warning in three stages. ・ Means of dissemination of early warning are through mainly television, radio and short messaging system (SMS). Speakers of the mosques are utilized to disseminate information to the public.	・ Risk prone communities don't necessarily receive timely warnings of impending hazard events.	2.(ii)	2.(ii)	1.2
		Flood	・ A telemetric flood forecasting and warning system (FFWS) is being developed by the PDW in collaboration with BDMS.	・ A district needs to establish a flood monitoring system and early warning system; and tsunami early warning system. (according to the interview survey for Tutong District)			
		Earthquake / Tsunami	・ NDMC plans to newly install a tsunami warning system. Brunei does not have own tsunami monitoring system and is dependent on the information observed by international institutions and/or other countries. As such, Brunei has limited human resources with technical skills for natural disaster management, such technical expertise as for floods, tsunami and others.	・ Brunei has limited human resources with technical skills for natural disaster management.			
		Sediment disaster (Landslide, Debris flow)					
		Volcano	N/A				
		High Tide / Storm Surge (Cyclone/ Typhoon)	・ When impending hazard such as storm, police cars with laud-speaker are running around to disseminate warning information in coastal area.	・ There is an issue that any means of dissemination directly to fisherman in coastal area are not available.			
		Other disasters					
	7.3 Evacuation plan	・ District Response Plan			5	5	3

	7.4 Establishment of Emergency Response System	Central Level	・ NDMC has a unit by the name of Disaster Command Center in place for planning and logistical support in a case of national level disaster.		5	5	3
		Provincial/ Municipal Level Commune / Village Level	・ District Emergency Operation Centers (DEOC) have been established at the local level as the implementing organizations for disaster management under DDMC. ・ In the onset of a disaster, Incident Command Post (ICP) is established				
		Training etc.	・ Training program on emergency preparedness (Capacity building for the first responders)				
	7.5 Rescue plan	・ National Standard Operating Procedures			5	5	3
	7.6 Relief plan	・ National Standard Operating Procedures			5	5	3
Assistance to challenges	8. Records of Major Assistance by JICA	Nil					
	9. Records of Assistance by other Development Partners	Not identified					
	10.International Networking	Not identified					
ASEAN Cooperation	11. National Policy on ASEAN(ACDM, ARPDM, AADMER) cooperation in Disaster Management, Emergency Response in case of disasters in other ASEAN countries or ASEAN region	・ Signed AADMER in 2007(ASEAN Agreement on Disaster Management and Emergency Response) (AADMER stipulates mutual cooperation in case of disaster.) ・ Participation in ARF meetings on disaster management, ACDM meetings, ARDEX (ASEAN Regional Disaster Exercise)and ASEAN regional technical cooperation Project. ・ SASOP (Regional Standing Arrangement and Standard Operating Procedures) started in 2007. ・ Agreement on trans-boundary haze was signed by ministers of ASEAN countries in 2002 and came into effect in 2003. It stipulates forest fire monitoring, prevention, coordination mechanism, communication system, mutual emergency support and establishment of ASEAN coordination center. Action plan for capacity building of fire fighting in the region and early warning system utilizing satellite images were developed.				
	12. Resources useful for other ASEAN countries	(Funding)					
	13. Needs for External Assistance from the point of view of Regional Cooperation	・ Collaborative research on earthquake and tsunami induced at Manila trench in the South China Sea.					

	Inventory				HFA PforA	HFA IofP	AADMER
Current Situation and Challenges	1. Features of Disasters	・ Frequent Natural Disasters: 1980-2011 EM-DAT Disasters, 23 nos. Out of these Flood (65%), Drought (23%), Storm(13%) ・ Recent Major Natural Disasters: Flood(2000), Flood and drought (2001), Flood and drought(2002), Drought(2005), Flood (2009), Flood (2011) <Floods> ・ When the water level of Mekong gets high, river water flows upstream into Tonle Sap Lake, which serves as a natural flood control reservoir (The area of the Lake is 3-5 times larger and water level is more than 8m higher in rainy season than dry season). Scales of floods is heavily dependent on the capacity of the Lake.					
	2. Administrative Division	20 Provinces (khet)/ 4 Municipalities (krong) – 172 District (khan)－Commune/Sangkat (khum)－Village (Phum)					
	3. Development of Legislative Framework and Disaster Management Policy & Plans		Current Situation	Challenges	1.(i)	1.(i)	2.1
		Development of Legislative Framework	<Fundamental Law> ・ Sub-decree No. 35 ANK (1995) ・ ・ Royal Decree No. NS/RKT/0804/236 (August 31, 2004) on Amendment of Article 1 and Article 2 of Royal Decree No. NS/RKT/0202/040 (December 16, 2002) on the Establishment of National Committee for Disaster Management ・ Sub-decree No. 30 ANKR.BK (April 09, 2002) on the Organization and Functioning of National Committee for Disaster Management ・ Sub-decree No. 61 (June 29, 2006) on the establishment of the CCDM ・ Circular No. 02 (July 02, 2001) on Preparedness and Disaster Management ・ Circular No. 01 S.R (June 07, 2002) on Disaster Preparedness and Response	・ Cambodia has neither approved national policy nor law on disaster management. ・ Cambodia does not have regulatory framework for urban drainage and flood control.			
		Disaster Management Policy	・ Policy document for disaster management (1997) ・ National Policy on Emergency Management (1997: under review) ・ NCDM Institutional Development Strategy (2001: Yellow Book)	・ The policy has never been approved formally. ・ National Contingency Policy requires a decree to be finalized.			
		Disaster Management Plans	<Central Level> ・ NCDM 2-Year Action Plan 2001-2002 ・ Strategic National Action Plan for Disaster Risk Reduction (2008-2013) ・ National Comprehensive Avian and Human Influenza Plan ・ CBDRM Community Based Disaster Risk Management Plan ・ National Contingency Plan for Flood and Drought (2011) ・ Ketsana Rehabilitation and Reconstruction Plan (On-going)	・ Although it was officially launched in 2009, no implementation was observed due to the absence of law.			
	4. Establishment and Enhancement of Disaster Management System	Institutional Framework	Current Situation	Challenges	1.(ii)	1.(ii)	2.1 4
		National Level (Central Level)	<u>National Committee for Disaster Management: NCDM</u> ・ President: Prime Minister ・ 1st Vice President: appointed ・ 2nd Vice President: appointed ・ Vice Presidents: Minister of Interior and Minister of Defense ・ Members: (1) Council of Ministers, (2) Ministry of Economy and Finance, (3) Ministry of Foreign Affairs and International Cooperation, (4) Ministry of Environment, (5) Ministry of Water Resources and Meteorology, (6) Ministry of Agriculture, Forestry and Fisheries, (7) Ministry of Commerce, (8) Ministry of Health, (9) Ministry of Rural Development, (10) Ministry of Industry, Mines and Energy, (11) Ministry of Social Affairs, Veterans and Youth Rehabilitation, (12) Ministry of Public Works and Transport, (13) Ministry of Education, Youth and Sports, (14) Ministry of Women's Affairs, (15) Ministry of Information, (16) Royal Cambodian Armed Forces HQ, (17) Cambodian Red Cross, (18) State Secretary of Civil Aviation. ・ The Minister in charge of NCDM: Senior Minister (since 2003) ・ Secretariat-General: Headed by Secretary General (equal to the ministerial position) ・ NCDM as the implementation body, which has 5 departments, namely: (1) Administration and Finance; (2) Information and Relations; (3) Emergency Response and Rehabilitations; (4) Preparedness and Training, and; (5) Search and Rescue.	・ The dissemination of Disaster Risk Management across all levels is limited due to insufficient funding, dated communication systems, lack of equipment and high technology application.			
			<u>Organizations in charge of Non-structural Measures for Disaster Risk Mitigation and Preparation</u> ・ Flood, Sediment disaster, Typhoon/Cyclone: (1) Ministry of Water Resources and Meteorology, (2) General Department of Water Use Integration, Ministry of Forestry and Fishery (MFF) <u>Organizations in charge of Structural Measures for Disaster Risk Mitigation</u> ・ Flood, Sediment disaster, Typhoon/Cyclone: (1) Department of Road and Bridge, Ministry of Public Works and Transportation, (2) Ministry of Water Resources and Meteorology, (3) Ministry of Rural Development, (4) General Department of Water Use Integration, (5) MFF	・ Flood control measures are being implemented by each organization concerned in order to protect the facilities under their jurisdiction.			
		Sub-national Level (Local Level)	<u>Provincial/ City Committee for Disaster Management: PCDM</u> ・ Coordinator and President: Provincial Governor ・ Vice President: First Deputy Governor/ Mayor ・ Members: Chiefs of each relevant government department(All the municipal civil servants and central government officials at municipal level), representative from the police, army, gendarmerie and Cambodian Red Cross ・ PCDM Secretariat <u>District/ Town Committee for Disaster Management (DCDM)</u> ・ President: District Governor ・ Vice President: First Deputy District Governor ・ Members: All government Ministries, Departments, Corporations and Agencies, head of local CRC <u>Commune Committee for Disaster Management (CCDM)</u> ・ PCDC can decide whether or not CDM is established below district level, considering various conditions. ・ Chairman: Commune Chief ・ Vice Chairman: First Deputy Commune Chief ・ Secretary of CCDM: Commune Clerk <u>Village Disaster Management Team (VDMT): 7 people</u> ・ Chief: Village Headman ・ Deputy Chief: Village Assistant (Female) ・ Village Health Support Team: Member ・ Village Animal Health Agent: Member ・ Village Cambodian Red Cross Volunteer: Member ・ Other two more members				
		Inter-organizational Arrangement	・ All ministers and institutions concerned shall collaborate closely with NCDM when necessary in an emergency situation.	・ There are no agreements or guidelines for PCDM to collaborate with NGOs and international organizations during disasters. It has caused the lack of smooth coordination and cooperation with these organizations. In order to improve the current			

				situation, first, NCDM needs to improve capacity, system and procedures of damage and needs assessment and reporting. ・ The coordination mechanism is limited to development and improvement.			
		Financial Preparation	<Annual Budget> ・ The state has appropriate budget reservation to ensure the disaster management. Budget for the disaster management is under law on finance and the sources come from the state budget, national and international development partners' budget and charitable persons' budget. <Contingency Fund> ・ The Government regular allocation for disaster management is utilized for emergency relief and response operation.	・ It is lacking of proper mechanism to use financial service. ・ Disaster risk reduction resources are mainly borne by partner agencies. ・			
	5. Policy on Community-based Disaster Management	・ Strategic National Action Plan for Disaster Risk Reduction (2008-2013) has six key components and its second component is titled, "Strengthen sub-national and community-based disaster risk management", which intends to promote community-based disaster risk reduction programs. ・ CBDRM (Community Based Disaster Risk Management Plan) has been developed. ・ NCDM provides a coordinating role in establishing and implementing community based disaster preparedness programs with NGOs.		・ Many projects are implemented to empower community and authorities with limited resources and less granted delegation. ・ Local authorities provide facilitation roles but do not primarily implement projects, which results in less sustainability accompanying capacity development and ownership	1.(iii)	1.(iii)	2.6 4
	6. Prevention and Mitigation	Current Situation		Challenges	-	-	-
	6.1 Flood	Identification of Disaster Risks	・ Local offices collect information on disasters in the past, and submit to NCDM. ・ Mekong River Commission develops flood hazard map. ・ Currently a risk map covering the whole country is being developed with an assistance of World Bank.	・ The risk map is prepared based on large-scale map, which is not available for evacuation purpose.	2.(i)	2.(i)	1.1
		Monitoring	・ Water level is monitored in major rivers by Department of Hydrology and River Works (DHRW), MOWRAM. Flood is forecasted by DHRW based on river water level. ・ There are 10 telemetric hydrological stations along the Mekong, Tonle Sap and Bassac rivers. ・ Mekong River Commission collects hydrological and meteorological data and publishes annual reports on hydrology of lower Mekong since 1960.		2.(i)	2.(ii)	1.3
		Non-structural Measures	・ 16.2% of national land is designated as protection area and timber exports are prohibited to protect forests.	・ Evacuation plans have not been prepared.	4.(i)	4	2.2
		Structural Measures	・ Phnom Penh is vulnerable to floods and has been protected by circle levee and pumping facilities from old times. In case of severe flood, emergency measures are taken such as enhancement of circle levee with sandbags and cut off of National Roads based on the decision of the Ministry of Water Resources and Meteorology in order to lower the water level of the Mekong River. ・ Roads functions as dykes to prevent floods. ・ "Colmatage" from old times, which is irrigation channel, functions as driving channel to storm water reservoir.	・ Circle levees are made of earth and built long time ago. Protection works for the levees have not been done. ・ Erosion of trunk roads is progressing by frequent flood. Rehabilitation and maintenance is a matter of urgency. ・ Flood control measures except for dykes have not been constructed along major rivers. ・ There is shortage of equipments, technical staffs and management officers who can manage integrated urban drainage system. ・ Illegal buildings exist in drainage channel and on dykes.	4.(i)	4	2.2
	6.2 Earthquake / Tsunami	Identification of Disaster Risks	・ No earthquake and tsunami disaster occurred in Cambodia.		2.(i)	2.(i)	1.1
		Monitoring	・ No seismic observation system in Cambodia.		2.(i)	2.(ii)	1.3
		Non-structural Measures	N/A		4.(i)	4	2.2
		Structural Measures	N/A		4.(i)	4	2.2
	6.3 Sediment disaster (Landslide, Debris flow)	Identification of Disaster Risks	・ A few sediment disasters because Cambodia has a few mountainous areas.		2.(i)	2.(i)	1.1
		Monitoring	・ According to Ministry of Industry, Mines and Energy, the landslide survey was conducted in three sites; Kampot, Kampong Saom (Sihanoukuville) and Koh Kong.		2.(i)	2.(ii)	1.3
		Non-structural Measures	N/A		4.(i)	4	2.2
		Structural Measures	N/A		4.(i)	4	2.2
	6.4 Volcano	Identification of Disaster Risks	・ No volcanic mountain in Cambodia.		2.(i)	2.(i)	1.1
		Monitoring	N/A		2.(i)	2.(ii)	1.3
		Non-structural Measures	N/A		4.(i)	4	2.2
		Structural Measures	N/A		4.(i)	4	2.2
	6.5 High Tide /Storm Surge (Cyclone/ Typhoon)	Identification of Disaster Risks	・ No hazard maps regarding high tide/storm surge was identified		2.(i)	2.(i)	1.1
		Monitoring	・ Meteorological monitoring		2.(i)	2.(ii)	1.3
		Non-structural Measures	・ Not Particularly identified other than meteorological monitoring		4.(i)	4	2.2
		Structural Measures	・ Not identified		4.(i)	4	2.2
	6.6 Other Disasters	Identification of Disaster Risks	Not particularly identified		2.(i)	2.(i)	1.1
		Monitoring	N/A		2.(i)	2.(ii)	1.3
		Non-structural Measures	N/A		4.(i)	4	2.2

		Structural Measures	N/A		4.(i)	4	2.2
	6.7 Common items for Disaster	Non-structural Measures	・ NCDM is developing an information system for an emergency management and early warning supported by World Bank. The system will be installed to the National Emergency Coordination Centre (under construction). The system will be used to share disaster information among national and province agencies. NCDM plans to install this system in 8 provincial offices out of 24 offices as a pilot project. ・ The system will include a disaster loss database.		4	4	2.2 2.5
					4	4	2.8
		Structural Measures			4	4	2.3.2 2.3.3
		Climate Change Adaptation	・ Responsible body: National Climate Committee (April 2006) ・ NFP: Ministry of Environment ・ Floods are increasing due to extreme climate. ・ Cambodia ratified United Nations Framework Convention on Climate Change (UNFCCC). ・ National Adaptation Programme of Action to Climate Change (NAPA) was developed by Ministry of Environment in 2006.		4.(i)	4.(i)	2.7
		Public Awareness Research and Development /Human Resource Development / for Disaster Management	<Disaster Preparation Drills / Disaster Management Education> ・ Ministry of Education approved disaster education curriculum at secondary school, which was developed in the Disaster Management Mainstreaming Project in Education Sector (2007~). ・ NCDM has created and distributed disaster-related posters with the support of GTZ and ADPC.		3	3	2.3.1
	7. Preparedness and Response	Current Situation		Challenges			
	7.1 Disaster Response plan / Emergency Financial Measure	National Level (Central Level)	<Emergency Operation Plan(EOP), Contingency Plan(CP) .etc> ・ National Policy on Emergency Management prepared in 1997 is still under review) ・ The Cambodia Red Cross has prepared its own response policy. ・ National Contingency Plan for Flood and Drought (2011), which needs a decree to be approved. ・ NCDM is establishing “National Emergency Coordination Center (NECC)”. (as of March 2012) <Emergency Financial Measure> ・ National budget allocation for disaster management is utilized for relief and emergency response.	・ The policy is less practiced under the condition of lack of political authorization ・ Insufficient allocation of contingency fund to NCDM while the line departments have some reserves.	5	5	3
		Sub-national Level (Local Level)	<Emergency Operation Plan(EOP), Contingency Plan(CP) .etc> ・ “Provincial Contingency Plan” is supposed to prepare on the basis of its National Plan as a guideline. ・ Local approaches for emergency response are observed such as Disaster Preparedness Plan formulated at Svay Rieng Provence ・ Flood emergency management strengthening programmes implemented in some provinces. ・ There are other plans to deal with disasters derived from epidemic diseases.	・ Only limited province, district and commune have disaster preparedness and contingency plans because only few projects have focused on those plans at the local level. ・ Lack of appropriate mechanism for using finance service to implement policy and plans especially at sub-national levels			
	7.2 Early Warning	General Warning and Forecast/ Communication	・ MoWRAM is in charge of weather forecast and information is provided to NCDM and public. NCDM determines whether the early warning is issued and/or delivered to relevant agencies according to transmission procedural flow. ・ Warning information is transmitted to local organizations (PCDM, DDCM, and CCDM) through land-line phone now. A new communication means called “geochat” is under development to improve transmission flow. ・ Forecast information is disseminated to public through television and/or radio.	・ Due to insufficient public awareness and/or education on “weather forecasting”, the information is not necessarily utilized fully by the public. ・ Systematic means of dissemination to risk prone communities has not been implemented.	2.(ii)	2.(ii)	1.2
		Flood	・ Hydrological and meteorological monitoring network was developed by the Mekong River Commission. MRC provides flood forecast till 5 days ahead at each monitoring point. ・ Telemetric forecasting systems have been installed in the major river basins, namely Stung Treng, Kratie, Prek Kdam and Kompong Loung basins. There are 10 telemetric hydrological stations along the Mekong, Tonle Sap and Bassac rivers. ・ Once water level reaches to danger level, DHRW issues a notification to the relevant organizations and posts it on the website. ・ In the case of critical flood, a warning is officially issued by National Committee for Disaster Management (NCDM). It is then transmitted to provincial, district and commune commissions for disaster management (PCDM, DDCM, and CCDM, respectively) through land-line phone. ・ Flash flood information is released through the website of MRC. It is analyzed by MRCFFG (Mekong River Commission Flash Flood Guidance) System, however forecast accuracy have been one of the issues.	・ Flood early warning by PCDM is till one day ahead and its accuracy is at provincial level. ・ Media do not provide early warning information and actions to be taken (Media provides a forecast only). ・ Discharge water released from upstream dam have caused damages to downstream urban areas. ・ 10-20% of monitoring facilities along the Mekong River are not functioning due to the lack of maintenance budget.			
		Earthquake / Tsunami	・ Not relevant				
		Sediment disaster (Landslide, Debris flow)	・ Not particularly relevant				
		Volcano	・ Not relevant				
		High Tide /Storm Surge(Cyclone/ Typhoon)	・ Not identified				
		Other disasters	N/A				
	7.3 Evacuation plan				5	5	3
	7.4 Establishment of Emergency Response System	Central Level	・ NCDM is making efforts to improve capacity, system and procedures of damage and needs assessment and reporting. ・ NCDM establishes the command system for rescue operation. The Prime Minister, his designated Senior Minister (who is posted the head of NCDM) or the Secretary General of NCDM will command to other related Ministries or Government agencies to implement responsive operations, organizing multi-sectoral working group for emergency situation. ・ In times of emergency, NCDM General Secretariat shall collaborate with the provincial/municipal CDM and CRC to draw special operational plans, according to		5	5	3

			existing guidelines. The plans must be sent urgently to NCDM General Secretariat after they are approved at the provincial and municipal levels.				
			Local Level	・ Not identified			
			Training etc.	・ The budget allocation to NCDM included for the cost of training. ・ Five-time refresher courses are organized on disaster risk reduction and disaster preparedness plan for teachers at schools in the provinces of Battambang, Banteay Meanchey, Pursat, Kampong Spue and Svay Rieng.			
		7.5 Rescue plan	・ Rescue operation cost is annually budgeted.		5	5	3
		7.6 Relief plan	・ There are small allocation of rice, fuel and cash to NCDM operations.		5	5	3
Assistance to challenges	8. Records of Major Assistance by JICA		<Studies> ・ The Study on Urban Drainage and Flood Control in Phnom Penh City (1998.2~1999.8) ・ The Study on Improvement of Flood Control and Urban Drainage in Phnom Penh City Phase 1 & 2 (2000-2003, 2005-2006)				
	9. Records of Assistance by other Development Partners		・ UN-DMT: Support to NCDM in developing and installing a National Disaster Damage and Needs Assessment System with the support from the WFP and UNICEF. ・ ADB: Phnom Penh Water Supply and Drainage Project (1995-1996, 1998~2003, 2001-2002), Sihanoukville Drainage Plan (1995-1996), Rehabilitation from Flood in 2000 L/A ・ ADB/ADPC: Community Self Reliance and Flood Risk Reduction in Cambodia /ADPC/DANIDA:Capacity Building of National Meteorological Services (2005.12-2008.12) ・ WB: Phnom Penh Drainage Master Plan development, Assistance for improvement of urban drainage infrastructure(1996) /EU: Phnom Penh storm water reservoir planning ・ China: Improvement of Phnom Penh drainage infrastructure /City of Paris: Study on existing drainage facilities in Phnom Penh, Development of drainage master plan (1994-1998) ・ French Development Agency: Phnom Penh Drainage Planning, Drainage infrastructure improvement (2002~2009) ・ NORAD/ADB: Capacity development & technology improvement of officers of DPWT, Phnom Penh Municipality in urban drainage facilities management (1997~2002) ・ ADPC: Enhancing Community Resilience to Natural Disasters in Southeast Asia, Support for development of SNAP ・ EU-ECHO/UNDP/ADPC: Disaster management mainstreaming in education sector (2007.10~)。 ・ ADPC :Capacity development for planning and implementation of flood preparedness program at Province/District level in Lower Mekong, funded by DIPECHO (2005.3-) ・ UNDP: Cambodia Climate Change Alliance (2010-2012) ・ UNDP: Cambodia Community Based Adaptation Programme (2009-2010) ・ UNDP: Climate change initiation (2009 -2010) ・ UNDP: National development report o climate change (2009 -2010) ・ ECHO-CRC: Integrating preparedness for effective disaster response within the CRC model for community-based disaster risk reduction (2010-2011) ・ NZ-Aid: Regional programme-Disaster Management and Emergency Response (2009-2012) ・ DANIDA: Cambodia Climate Change Alliance (2010-2012) ・ DANIDA: Knowledge, Attitude and Practices Study on Climate Change (KAP) (2010-2012)				
	10. International Networking		・ With the onset of massive flood in 2000, flood control has come to be one of the major issues for MRC. MRC developed basic strategy in 2001 and action plan in 2002 and formulated flood control and mitigation program. Flood vulnerability assessment and mapping project was started.				
ASEAN Cooperation	11. National Policy on ASEAN(ACDM, ARPDM,AADMER) cooperation in Disaster Management, Emergency Response in case of disasters in other ASEAN countries or ASEAN region		・ Signed AADMER in 2007(ASEAN Agreement on Disaster Management and Emergency Response)(AADMER stipulates mutual cooperation in case of disaster.) ・ Participation in ARF meetings on disaster management, monthly ACDM meetings, ARDEX (ASEAN Regional Disaster Exercise)and ASEAN regional technical cooperation Project ・ SASOP (Regional Standing Arrangement and Standard Operating Procedures) started in 2007. ・ Agreement on trans-boundary haze was signed by ministers of ASEAN countries in 2002 and came into effect in 2003. It stipulates forest fire monitoring, prevention, coordination mechanism, communication system, mutual emergency support and establishment of ASEAN coordination center. Action plan for capacity building of fire fighting in the region and early warning system utilizing satellite images were developed.				
	12. Resources useful for other ASEAN countries		Not particularly identified				
	13. Needs for External Assistance from the point of view of Regional Cooperation						

	Inventory				HFA		AADMER
					PforA	IofP	
Current Situation and Challenges	1. Features of Disasters	・ Frequent Disaster: 1980-2011 EM-DAT, total of 296 nos.; Out of these Flood (43%), Earthquake (26%), Landslide/Sediment Disasters (14%), Volcano Eruption (13%) ・ Indonesia is situated in seismic belt. Time from occurrence of earthquake to arrival of Tsunami is short. ・ Indonesia has 130 volcanoes (1/7 of volcanoes in the world), including 80 active ones. ・ Landslide and forest fire show tendency of increase.					
	2. Administrative Division	33 Provinces (Provinsi) /405 Regency (Kabupaten)/97 City (Kota)/6543 District (Kecamatan)/75244 Village (Desa and Kelurahan)					
	3. Development of Legislative Framework and Disaster Management Policy & Plans		Current Situation	Challenges	1.(i)	1.(i)	2.1
		Development of Legislative Framework	<Fundamental Law> ・ Disaster Management Law No. 24 (2007.4) <Ancillary Regulations> ・ Regulation No. 22 on Disaster Aid Financing and Management (2008) ・ Regulation No.23 on Participation of International Institutions and Foreign Non-Governmental Organizations in Disaster Management (2008) Regulation No.8 on National Agency Disaster Management (2008) <Laws in Relevant Sectors> ・ River Act (1991) ・ Law on Water Resources (2004) ・ Forestry Act (1999)	・ Disaster Management Act has conflict with Local Government Act in establishing local disaster management organizations in terms of budget and organization structure.			
		Disaster Management Policy	・ The policy has been materialized into the Action Plans and the Law No. 24..	・ Lack of competence in vertical and horizontal regulations and policies.			
		Disaster Management Plans	<Central Level> ・ National Action Plan for Disaster Reduction 2006-2009 (2006) ・ National Action Plan for Disaster Risk Reduction 2010-2012 (2010) ・ National Disaster Management Plan 2010-2014 (2010) as the reference in order disaster management activities/programmes to be mainstreamed into the strategic plans for every government organization <Local Level> ・ Regional governments' action plans are formulated among all 33 Provinces (All of them are still provisional version as of March 2012).	・ The recent two plans are not disseminated optimally among different Ministries and government agencies as well as the public.			
	4. Establishment and Enhancement of Disaster Management System	Institutional Framework Central Level	Current Situation <u>BNPB (National Agency for Disaster Management) (2008.1~)</u> ・ Permanent Disaster Management Organization under direct control by the President, with beyond 250 permanent staffs (as of 2012.2) led by Chief of BNPB, in charge of execution. The function of BNPB is coordination of disaster preparation and mitigation, emergency response and reconstruction. ・ Members of Steering Committee：10 Related government officials and 9 professional community members	Challenges ・ BNPB is positioned at lower level than ministries in the central government structure. Coordination among and control on other ministries by BNPB might not fully function. It is desirable to establish Disaster Management Council, chaired by the President, which consists of ministers concerned (BNPB will serve as secretariat). ・ Human resources development and capacity development of these offices are important.	1.(ii)	1.(ii)	2.1 4
			<u>Organizations in charge of Non-structural Measures for Disaster Risk Mitigation and Preparation</u> ・ Tsunami：BPPT (Agency for the Assessment and Application Technology), LIPI (Indonesia Institute of Science), ITB (Bundung Institute of Technology), MENRISTEK (Ministry of Research and Technology), BMKG (Meteorology, Climatology and Geophysics Agency), BIG (National Survey and Mapping Agency) ・ Cyclone: BMKG ・ Earthquake：BG (Geology Agency), BMKG ・ Flood/Mud Slide：DGWR-PU (Directorate General of Water Resources- Ministry of Public Works) ・ Forest Fire：Ministry of Forestry ・ Volcano Eruption：BG, PVMBG (Center for Volcanology and Geological Hazard Mitigation) ・ Drought：Ministry of Agriculture, BMKG ・ Landslide：BG <u>Organizations in charge of Structural Measures for Disaster Risk Mitigation</u> ・ Earthquake：BG, PU ・ Drought：Ministry of Agriculture, PU ・ Forest Fire：Ministry of Forestry ・ Tsunami/Volcano Eruption/Flood/Mud Slide/Landslide：PU				
		Local Level	BPBD (Local Agency for Disaster Management) ・ Led by an official second to the Governor (Province)/ Regent (Regency)/ Mayor (City). ・ Members of Steering Committee：Related regional government officials and professional & expert community members ・ All 33 Provinces has established BPBD, 395 out of both 405 Regencies and 97 Cities have done (As of April 2012).	・ Human resources with capacity of disaster management are concentrated in provincial level and urban areas. Not all of required local levels have established BPBD.			
		Interorganizational Arrangement	・ BNPD plays a coordinator function among national government agencies				
		Financial Preparation	<Annual Budget and Contingency Fund> ・ Budget items are On-call Budget, Rehabilitation and Reconstruction Budget and Contingency Budget, which are allocated to the central government ・ Disaster Management Reserve Fund is budgeted to BNPB. ・ The new law ensures BNPB authority of budget control to a certain degree (including "Ready Fund"). The budget allocation to BNPB was increased 400% to 800 Million Rupiah during year 2010-2011. ・ Within the scope of decentralization, regional government budgets such as Special Allocation Fund and De-concentration Fund are available to strengthen institution, emergency response, and recovery/rehabilitation expense. The direct budget allocation from the central to the local governments was amounted to 108 Million Rupiah during year2010-2011.	・ Allocation of budget of disaster management sector budgeted to relevant ministries should be decided in coordination with BAPPENAS and BNPB. ・ Actual allocation is unknown while National Action Plan for Disaster Risk Reduction 2010-2012 (2010) has funding indications.			
	5. Policy on Community-	・ Rights and duties of communities are stipulated in Disaster Management Law No.24. Underlying intention is paradigm shift towards community-based disaster management.		・ Community is not well involved in formulation	1.(iii)	1.(iii)	2.6 4

	based Disaster Management	• Resilient village program is implemented for selected villages of all provinces by BNPB. • Community based disaster risk reduction forum is established. • DKI Jakarta has created closer relationship with local communities in Jakarta, networking them having meetings from time to time and listing available resources that these communities can provide in disaster strikes.		process of disaster management and risk reduction programmes. • The existing mechanism is not adequate in participatory process, which is also true in information dissemination to and valid data collection from the community.			
	6. Prevention and Mitigation	Current Situation		Challenges	-	-	-
	6.1 Flood	Identification of Disaster Risks	• General hazard maps are prepared at Kabupaten/Kota Level. • Flood hazard maps for each province have been prepared and updated every year by Ministry of Public Works.	• More detailed hazard map is desirable.	2.(i)	2.(i)	1.1
		Monitoring	• Hydrological monitoring is conducted by the regional offices (BBWS or BWS) of Ministry of Public Works. • BMKG also has 175 automatic weather stations in the county.	• Sharing of data between Ministry of Public Works and BMKG is on request basis.	2.(i)	2.(ii)	1.3
		Non-structural Measures	• Disaster database has been developed by BNPB. Past flood records since 1822 are accumulated. • Each office of BBWS prepares Guideline on Flood Alert for every rainy reason. The guideline indicates institutional arrangement, monitoring network, and flow chart of reporting, coordinating and disseminating warning information. All major rivers have 3 steps of warning water level. • Ministry of Public Works has developed a manual for preparation of early warning and evacuation system for flood.	• Evacuation plans have been prepared for the limited flood prone areas.	4.(i)	4	2.2
		Structural Measures	• Based on Ministry of Public Works Decree No. 12/PRT/M/2006, BBWS and BWS offices were established in 2006 to manage water resources in the particular strategic basins. At present, there are 12 BBWS and 21 BWS offices to manage 65 basins. They are also responsible for flood management, and various structural measures for flood control have been constructed and managed by BBWS and BWS under PU. • 3 million ha of re-afforestation is targeted within 5 years. • Disaster risk assessment is required in environmental impact assessment for projects. • Short-medium Term Flood Control Program (2002-2016)is being implemented based on flood control and drainage master plan. • BNPB is developing a guideline for comprehensive disaster risk analysis for construction of major infrastructures.	• Construction, maintenance and rehabilitation of flood control and Sabo facilities and river improvement works are delayed.	4.(i)	4	2.2
	6.2 Earthquake / Tsunami	Identification of Disaster Risks	• BIG publishes the multi hazard maps for flood and tsunami. • GRDC have developed the active fault maps of Merapi and Karkato, the seismotectonic map of Manado and the tsunami hazard map of Sulawesi Barat, Grontalo and Aceh. • The database disaster in Indonesia called DIBI (Data dan Informasi Bencana Indonesia) has been published on the web pages of BNPB (http://dibi.bnpb.go.id). • In Aceh province, the hazard map and risk map were developed and DIBA (Data dan informasi bencana aceh) was published on the web pages(http://diva.acehprov.go.id).		2.(i)	2.(i)	1.1
		Monitoring	• BMKG has developed the shake map with modified mercalli intensity. • BMKG has conducted seismic observation by broadband seismograph, accelerograph and GPS and transmitted the data to InaTEWS through VSAT system. • BPPT has managed tsunami buy and NAMRIA has conducted tide gauges observation. • BMKG has conducted hypocenter and magnitude decision using “SeisComp3” in InaTEWS.	• The existing buy has problem in maintenance aspect. BPPT have plan to install the submarine cable newly.	2.(i)	2.(ii)	1.3
		Non-structural Measures	• The 24 units of warning system were installed in 6 provinces. • RISTEK has developed some guidelines for tsunami evacuation plan as national standards. • LIPI has developed educational materials for tsunami disaster prevention. • The Aceh Tsunami museum was constructed for tsunami disaster education.		4.(i)	4	2.2
		Structural Measures	• Aceh Tsunami museum is utilized for evacuation building which can contain 6000 people. • In Aceh province, 4 evacuation buildings were constructed.	• The tsunami countermeasure such as breakwater and seawall has not been constructed.	4.(i)	4	2.2
	6.3 Sediment disaster (Landslide, Debris flow)	Identification of Disaster Risks	• CVGHM develops monthly landslide hazard map of landslide-prone areas based on monthly rainfall and send it to relevant local governments. • CVGHM has developed the hazard maps for landslide of 33 provinces.	• Existence and usefulness of early warning system should be more recognized among local people in landslide-prone areas.	2.(i)	2.(i)	1.1
		Monitoring	• Specific landslide is observed by GPS, rainfall observation and extensometer by CVGHM.		2.(i)	2.(ii)	1.3
		Non-structural Measures	• “Manual for Emergency Evacuation for Banjir Bandang” was published.		4.(i)	4	2.2
		Structural Measures	• “Guideline for Banjir Bandang Disaster Mitigation Management” and “Manual for Researching Banjir Bandang Hazardous Area” were published.		4.(i)	4	2.2
	6.4 Volcano	Identification of Disaster Risks	• CVGHM has developed the volcanic hazard maps of over 80 sites.		2.(i)	2.(i)	1.1
		Monitoring	• CVGHM has installed seismographs in all A-type volcanoes and GPS in 5 volcanoes.		2.(i)	2.(ii)	1.3
		Non-structural Measures	• In Rehabilitation and Reconstruction program at Merapi, relocation of communities from hazardous areas has been done.	• In addition to the traditional method of damage reduction for volcano, scientific education for disaster mitigation is needed.	4.(i)	4	2.2
		Structural Measures	• The Sabo communities have been constructed around volcanoes in Central Java and South Sulawesi, and community-base early warning systems are developed.		4.(i)	4	2.2
	6.5 High Tide /Storm Surge (Cyclone/ Typhoon)	Identification of Disaster Risks			2.(i)	2.(i)	1.1
		Monitoring			2.(i)	2.(ii)	1.3
		Non-structural Measures			4.(i)	4	2.2
		Structural Measures			4.(i)	4	2.2
	6.6 Other Disasters	Identification of Disaster Risks	• Collection of Data on disasters in the past started and national disaster data book 2002-2005 was published. • BNPB is developing disaster database, as disaster information is dispersed among relevant organizations. • Ministry of Interior requires all Kabupaten/Kota to submit mapped data on disasters. • Hazard maps of flood, landslide, volcano eruption and earthquake are developed by organizations concerned.	• There is scope of improvement for making the full use of Land slide hazard maps and early warning system. • Knowledge on disaster risk assessment should be enhanced.	2.(i)	2.(i)	1.1

		Monitoring			2.(i)	2.(ii)	1.3
		Non-structural Measures			4.(i)	4	2.2
		Structural Measures			4.(i)	4	2.2
	6.7 Common items for Disaster	Non-structural Measures	・ GEOSPASIAL is a Web-GIS database system that displays (1) disaster/damage information caused by disasters occurred within 30 days, (2) various types of hazard maps, together with (3) administrative boundaries on maps and etc. ・ DIBI is the database that stores information on historical disaster events in Indonesia. DIBI has accumulated disaster loss data since 1815.		4	4	2.2 2.5
					4	4	2.8
		Structural Measures			4	4	2.3.2 2.3.3
		Climate Change Adaptation	・ Responsible body: National Committee on Climate Change and Environment(1992), National Council for Climate Change (July 20089 ・ NFP: Ministry of Environment; Climate Change Division ・ National Action Plan Addressing Climate Change (2007) was provided government institutions. ・ The Indonesia Climate Change Sectoral Roadmap (2010) was issued to expedite the implementation and to mainstream climate change issues into national development planning. ・ Specific climate change adaptation policies are absent except Indonesia's (draft) Climate Change Adaptation Program (ICCAP).		4.(i)	4.(i)	2.7
		Public Awareness Research and Development /Human Resource Development / for Disaster Management	・ Civil rights are stipulated in new disaster management act (rights to take disaster management education and trainings, and rights to access to disaster information). ・ Has legislated for ・ Disaster-prone municipalities have legislated ordinances for incorporating disaster reduction education into school curriculum. ・ The Ministry of National Education of Indonesia has issued a circular letter that encourages the mainstreaming of disaster risk reduction into schools through school curriculums that contain preparedness education for elementary, junior high and senior high schools for six major hazards: earthquake, tsunami, volcano, flood, landslide and typhoon/cyclone.	・ Insufficient public awareness and/or competent resources. ・ No legal or official networks available among disaster experts, managers and planners; information to be circulated with mailing lists, forum database, forum spatial data even when disasters.	3	3	2.3.1
7. Preparedness and Response		Current Situation		Challenges			
	7.1 Disaster Response plan / Emergency Financial Measure	Central Level	<Emergency Operation Plan(EOP), Contingency Plan(CP) .etc> ・ Several contingency and preparedness plans have been formulated at the central government level. ・ SOPs are prepared by government agencies (e.g., Ministry of Public Works) <Emergency Financial Measure> ・ Out of disaster management budget items, there is Contingency Budget, which are allocated to the Central government.		5	5	3
		Local Level	<Emergency Operation Plan(EOP), Contingency Plan(CP) .etc> ・ Some provinces, regencies and cities have formulated contingency and preparedness plans through the stakeholders' meeting organized by BNPB.				
	7.2 Early Warning	General Warning and Forecast/ Communication	・ Weather early warning is under the responsibility of BMKG. ・ BMKG has several weather warning systems as: (1) Indonesia Meteorological EWS, (2) Climatological EWS (CEWS) and (3) C-wave (EWS for the ferry).		2.(ii)	2.(ii)	1.2
		Flood	・ In case of flood, warning announcement is conveyed by radio from organization of corresponding level of PU to the head of local governments/communities. ・ In some river basins, telemetric systems for flood forecasting and early warning have been installed and operated by BBWS. ・ BMKG also has 175 automatic weather stations. BMKG provides information on flood potential area in Jakarta everyday based on analysis by using rainfall data, and also provides flood warning in the form of rainfall.	・ Establishment of flood forecasting and warning system is still limited to a certain part of flood prone areas.			
		Earthquake / Tsunami	・ Tsunami early warning called InaTEWS is under the responsibility of BMKG. ・ Calculation of Magnitude and identification of seismic source by BMKG is possible within 5 minutes after the occurrence of earthquake. ・ BMKG provides early warning to BNPB, disaster management agencies, local governments, mass media, etc. in the following standard three criteria as (1) Red (Major Warning), (2) Orange (Warning) and (3) Yellow (Advisory). ・ Early warning to public is disseminated through siren, television, radio, SMS, FMRDS ALERTUS receiver, speaker, Police siren, social media (Facebook, Twitter), etc. ・ Designation/establishment of evacuation centers in case of Tsunami at Kabupaten/Kota level is being planned. ・ IOTWS was established by Indonesia, Australia and India in 2011 for the tsunami early warning system in the countries along the Indian Ocean. Indonesia is RTSP that provide information to IOTWS.	・ Hazard maps are not fully utilized in early warning system and disaster management activities at community levels. ・ Evacuation order is conveyed orally at local level.			
		Sediment disaster (Landslide, Debris flow)	・ Early warning of debris flow is under the responsibility of DGWR in PU. ・ Center for Volcanology and Geological Hazard Mitigation (CVGHM) sends landslide hazard map monthly to the local governments in landslide-prone areas, based on the monthly prediction of rainfall. ・ The landslide warning that estimated by rainfall level and hazard map is informed by CVGHM.				
		Volcano	・ CVGHM has developed and maintains the early warning system of volcanic eruption. ・ The Sabo communities have been constructed around volcanoes in Central Java and South Sulawesi, and community-base early warning systems are developed.				
		High Tide /Storm Surge (Cyclone/ Typhoon)	・ Tropical Cyclone Warning Center is equipped in BMKG.				
		Other disasters	・ LAPAN has developed forest fire EWS that will soon be connected to BNPB. ・ BNPB and BMKG is planning to develop tornado EWS.				
	7.3 Evacuation plan	・ The Law No.24 states in its Article 48 that disaster management for emergency response shall include "c. rescue and evacuation of disaster-affected community. Local contingency plans are supposed to include evacuation plans. ・ DKI Jakarta has identified them against the flood disasters.			5	5	3
	7.4 Establishment of Emergency Response System	Central Level	・ BNPB is a national commander for emergency response. BNPB has a deputy head in charge of emergency response. ・ As an institutional system for the response to flood, operation units are organized in each level of PU offices, corresponding to the disaster management organizations under BNPB in national, provincial, Kabupaten/Kota, Kechamatan and Town/Village levels. ・ BNPB Head Regulation No. 10 defines the command structure for emergency response.	・ Emergency response system is on the way of establishment. ・ It is recommended to secure alternative communication measures in addition to landline and mobile phones. ・ More commodities and equipments should be stocked for smooth disaster response. ・ Communication systems between Kabupaten/Kota and Province during large-scale disasters	5	5	3

				should be enhanced.			
			Local Level	・ BPBD at the local level is responsible for coordination in utilizing emergency fund from Province, NGO assistance, and provided resources from communities. In a case of DKI Jakarta, because it is Special Capital Territory, BNPB rescue resources will also be provided. ・ POKOMAS, which is an operation unit of PU at Town/Village, performs as the center of flood response activities and evacuation and prepares evacuation centers and necessary equipments. <Level below Kabupaten/Kota> ・ SATGAS (Task Force): engages in emergency response activities in disaster-stricken areas under the control of SATLAK. It is an ad hoc organization in case of disasters, without permanent staff. ・ Disaster Response and Evacuation Community Unit (SATLINMAS PB): voluntary-base community unit in charge of evacuation and emergency response ・ POSKO BENCANA (Kecamatan level) : Disaster response command center on site, in charge of information management, command, acceptance and distribution of foods and supplies ・ POKMAS KORBAN BENCANA (Desa / Kelurahan level): organized in each Desa/kelurahan, in charge of disaster response especially evacuation, preparation of shelters and equipments	・ Communication measures between Kabupaten/Kota and Province in case of large scale disasters is under development.			
			Training etc.	・ Simulation Drills and trainings and drills for capacity building have been conducted.			
		7.5 Rescue plan	・ The Law No.24 states in its Article 48 that disaster management for emergency response shall include “c. rescue and evacuation of disaster-affected community. Local contingency plans are supposed to include rescue plans. ・ BNPB is responsible for all the search and rescue activities. ・ A case of DKI-Jakarta (BDPB) has prepared rescue kits within the office. ・ BPBD has “Quick Response Team” to conduct needs assessment when a disaster strikes.		5	5	3
		7.6 Relief plan	・ There are emergency items stored in every local level. Village level, for example, has a day stock of such emergency items. If the emergency situation continues more than three days, Provincial social unit will provide support items. ・ Local contingency plans are supposed to include relief plans.		5	5	3
Assistance to challenges	8. Records of Major Assistance by JICA		<Technical Assistance/Dispatch of Experts> ・ Volcanic Sabo Technical Center Project (1982-1989) ・ Sabo Technical Center Project (1992-1997) ・ Integrated Sediment Disaster Management Project for Volcanic Area (2001.4-2006.3) ・ Integrated Disaster Mitigation Management for “Banjir Bandang” (2008-2011) ・ Multi disciplinary Hazard Reduction Program from ・ Earthquakes and Volcanoes in Indonesia (2009.3-2012.2) <Studies> ・ Development Study on Disaster Management in Indonesia (2005.8-2007.8) ・ Tsunami Early Warning System Development Project Formulation Study (2007.1-3) ・ The Study on Information Network Building for Disaster Management (2008.4-2009.12) ・ The Study on Natural Disaster Management Plan (2007.3-2009.2) ・ Disaster Management/Reconstruction Program (2007.4-2008.3) ・ Assistance Program for Disaster Management (2008.4-2009.3) ・ The Study on Capacity Development for Jeneberang River Basin Management in the R (2003.4-2007.3) ・ Comprehensive Study on Water Resources Development and Management for Bali Province ・ Study on Regional Water Supply Development Plan for Greater Yogyakarata (2006.9-2008.3) ・ Directorate General of Water Resources, Ministry of Public Works (2004.1-2007.8) ・ The Study on the Development Scheme for the Principal River Ports in Indonesia (2001.1-2002.5)				
	9. Records of Assistance by other Development Partners		・ UNOCHA, WFP, UNDP, WHO, UNESCO: Emergency Drills ・ UNDP: Safer Communities through Disaster Risk Reduction (2007-2012), Focused on Capacity Development of persons in charge of pre-disaster activities (2007-2012), Training future expert on climate change and poverty in Aceh (2009-2010) ・ UNOCHA/UNDP：Planning to assist capacity development of BAKORNAS PB ・ USA/USAID-OFDA (the office of US Foreign Disaster Assistance): Training of Incidence Command System (2007) ・ WB: Jakarta Urgent Flood Mitigation Project (2009.2-), Indonesia Climate Change Development Policy Project (2010), Third National Program for Community Empowerment in Rural Areas - Disaster Management Support(2011), Adapting to Climate Change in Eastern Indonesia (2010-2013) ・ USAid: Increasing Coastal Resiliency and Climate Change Mitigation through Sustainable Mangrove Management in Sumatra (2011-2013), Stakeholder Coordination, Advocacy, Linkages and Engagement for Resilience (SCALE) (2010-2013) ・ ADB：Flood Management in Selected River Basins(2005-2010) ・ ADRC：Community-based flood risk reduction project (2000), Capacity Development Project for Disaster Management in Communities (2006), Training for Teachers on Disaster Management Education (2007) ・ UNHCR: Supply of Main Equipment for AHA Center ・ IOC: Missions to SOP Strengthening at BMG ・ NIED: Supply and Maintenance Management of Seismic Observation Equipment and Training ・ Norway Geo-technical Institute /ADPC: Regional Capacity Enhancement for Landslide Impact Mitigation (RECLAIM) (2004.9~) ・ AusAid: Australia-Indonesia facility for disaster reduction (2008-2013), Vulnerability and Climate Change Adaptation Assessment and Supportive Policies at National and Sub-national Levels, Emergency Preparedness (E-Prep) (2011) ・ NZAid: Piloting a local government disaster risk management capacity building programme in Palu and Padang in September 2011 (2011) ・ Australia: Planning to provide support to BAKORNAS PB ・ France: Planning to provide equipments and systems of emergency operation centers ・ Germany: Introduction of Earthquake Magnitude Analysis System (for BMG) ・ Netherlands: Flood Management in Selected River Basins: Indonesia (2005-2010) ・ Hungary: Equipment supply for Emergency				
	10. International Networking		・ ITIC (International Tsunami Information Center)：Early Tsunami warning through PTWC, Development of disaster education materials, Technical trainings on Tsunami ・ Intergovernmental Coordination Group for the Indian Ocean tsunami Warning and mitigation System was established in 2005 under the coordination of IOC UNESCO.				
ASEAN Cooperation	11. National Policy on ASEAN(ACDM, ARPDM,AADMER) cooperation in Disaster Management, Emergency Response in case of disasters in other ASEAN countries or ASEAN region		・ Signed AADMER in 2007(ASEAN Agreement on Disaster Management and Emergency Response)(AADMER stipulates mutual cooperation in case of disaster.) ・ Participation in ARF meetings on disaster management, monthly ACDM meetings, ARDEX (ASEAN Regional Disaster Exercise)and ASEAN regional technical cooperation Project ・ SASOP (Regional Standing Arrangement and Standard Operating Procedures) started in 2007.				
	12. Resources useful for other ASEAN countries		・ Trainings on Sabo technology and community-based disaster management are conducted in Sabo Technical Center, accepting foreign participants to international training courses.				
	13. Needs for External Assistance from the point of view of Regional Cooperation						

	Inventory				HFA PforA	HFA IofP	AADMER
Current Situation and Challenges	1. Features of Disasters	・ Frequent Natural Disasters: 1980-2011 EM-DAT Disasters 24 nos.; Out of those Flood(62%), Storm (21%), drought(17%), ・ Tropical Cyclones pass through Lao PDR 3-5 times every year during later stage of rainy season, which is from July to September. Until around the season, water level has become high and storm rain make damages of flood more serious. ・ 90% of national land of Lao PDR is Mekong River Basin. Flood damages concentrate in plain area along Mekong River down Vientiane. ・ Sediment disaster has occurred in mountainous area triggered by heavy rain and cyclone/typhoon in the rainy season, and damage to human living and infrastructure, especially roads.					
	2. Administrative Division	16 Provinces (khoueng)/1 Prefecture(kampheng nakhon)including 1 Municipality (nakhon louang)/142 District (muang) / Villages (baan)					
	3. Development of Legislative Framework and Disaster Management Policy & Plans		Current Situation	Challenges	1.(i)	1.(i)	2.1
		Development of Legislative Framework	<Fundamental Law> ・ The Prime Minister's Decree No. 158(1999): Establishment of DMCs ・ NDMC Decree No. 097 (2000) ・ Disaster Management Act is expected to prepare and to enact within 2013. <Laws in Relevant Sectors> ・ Forest Act (1996) ・ Environment Protection Act ・ Land Act ・ Water Act	・ Establishment of fundamental law on disaster management is a matter of urgency. ・ Prime Minister's Decree, which is expected to be issued by October 2012, to order the preparation of the law is required.			
		Disaster Management Policy	・ The National Policy on Disaster Management emphasizes the role of the government, the importance of Disaster Preparedness, Community-Based Disaster Management (CBDM) approach, and the coordination between community and government at different levels.	・ Although the Strategic Plan on Disaster Risk Management was issued as a MLSW decree, it has not been fully owned by other line ministries. ・ Development of disaster risk management plan at provincial and district level needs to be addressed as a priority			
		Disaster Management Plans	<Central Level> ・ Strategic Plan on Disaster Risk Management in Lao 2020, 2010 and action plan (2003-2005)). ・ National Disaster Management Plan 2012-2015 (drafted as of February 2012) <Local Level> ・ 5/17 Provinces have prepared Provincial Disaster Management Plans (as of February 2012). 5 Provinces are (1) Khammouane, (2) Savannakhet, (3) Vientiane, (4) Sayaboury, and (5) Saravan. Some districts within those Provinces have prepared district plans as well.	・ Lack of capacity at local government level to plan and prepare disaster management plan			
	4. Establishment and Enhancement of Disaster Management System	Institutional Framework	Current Situation	Challenges	1.(ii)	1.(ii)	2.1 4
		Central Level	<u>National Disaster Management Committee (NDMC)</u> ・ Chair: Deputy Prime Minister ・ Vice Chairs: Ministers of MLSW, Agriculture and Forestry, and Public Works & Transport ・ Members: Vice Ministers of Public Health, and Public Security, Deputy Director General of Department of Chief of Staff, Ministry of Defense. Chiefs of the cabinet in relevant Ministries/Departments ・ Secretariat: National Disaster Management Office, Ministry of Labour and Social Welfare (MLSW) <u>National Disaster Management Office (NDMO)</u> ・ NDMO is established since 1997 under the Ministry of Labour and Social Welfare (MLSW). It has 9 staffs.	・ The number of staffs of NDMO is not enough, while draft National Disaster Management Plan 2012-2015 sets NDMO's restructuring.. ・ Restructure of NDMC was issued by a decree in 2011. ・ PDMC ・ NDMO has limited power to command and intervene to other ministries and agencies. ・ "Department of Natural Disaster Management and Climate Change" has been newly established within the Ministry of Natural Resources and Environment, which is supposed to play a similar function as NDMO do in terms of water related disaster. It is necessary to clear demarcation and mandates among them.			
			<u>Organizations in charge of Non-structural Measures for Disaster Risk Mitigation and Preparation</u> ・ Flood, Sediment disaster, Typhoon/Cyclone: (1) MLSW, (2) Science, Technology and Environment Agency (STEA), (3) Department of Meteorology and Hydrology (DMH) under the Ministry of Natural Resources and Environment, (4) Ministry of Agriculture and Forestry (MAF) <u>Organizations in charge of Structural Measures for Disaster Risk Mitigation</u> ・ Flood, Sediment disaster, Typhoon/Cyclone: (1) Ministry of Public Works and Transport, (2) Ministry of Agriculture and Forestry (MAF), (3) Ministry of Natural Resources and Environment	・ Ministry of Energy and Mining is supposed to undertake and manage risk reduction programs to ensure the resilience of infrastructure in the draft national disaster management plan. Same applies to Ministry of Industry and Trade.			
		Local Level	<u>Provincial/District Disaster Management Committee (PDMC/DDMC)</u> ・ All Provinces and Districts have established PDMC/DDMC. ・ Chair: Governor ・ Secretariat: Provincial and District offices of MLSW <u>Village Disaster Prevention Unit (VDPU)</u> ・ All villages have set up VDPU. ・ Chair: Traditional village leader	・ Establishment and training of disaster response teams at community level is a priority area to be addressed. ・ Capacity development of officers in charge of disaster management in provincial/district level is necessary along with decentralization.			
		Inter-organizational arrangement	・ NDMO is functioning satisfactory in information coordination and training/mentoring of sub-national focal points.				

		Financial Preparation /	<Contingency Fund> ・ MLSW, where National Disaster Management Office (NDMO) belongs to, was allocated a fund totalling around 1 billion kips in 2011 for immediate use for disaster response ・ Government-wide annual allocation of emergency fund from national budget is amounted around 160 billion kips for 2009-2010 and 100 billion kips for 2010-2011.	・ Disaster preparation budget of NDMO is quite limited. This puts constraints on implementing National Strategy Plan. ・ Disaster management budgets of local governments are not enough in the context of decentralization. ・ Lack of budget allocation for capacity development which is opt to use partially for flood prone areas, resulting in further lack of capacity in the communities affected by other hazards.			
	5. Policy on Community-based Disaster Management	・ NDMO, in cooperation with NGOs, implements Disaster Mitigation and Community-based Disaster preparation Project at community level. ・ NDMO organizes Public Awareness events and activities in every second week of October commemorating ASEAN International Disaster Management Day.		・ Participation of the communities in disaster management needs to be motivated.	1.(iii)	1.(iii)	2.6 4
	6. Prevention and Mitigation	Current Situation		Challenges	-	-	-
	6.1 Flood	Identification of Disaster Risks	・ Preparation of hazard map is being attempted by Department of Water Resources (DWR) under MONRE based on information of Department of Meteorology and Hydrology (DMH) with technical support from MRC.	・ Identification of flood disaster hazard has not completed.	2.(i)	2.(i)	1.1
		Monitoring	・ There are 13 major river basins in the country. DMH manages 113 monitoring stations for water level and rainfall in the whole country. Out of 113, 44 stations are telemetric. Data observed by telemetric system is sent to DMH in Vientiane every day. ・ Rainfall data and water level data at key stations along the Mekong and its major tributaries are sent to Mekong River Commission Secretariat (MRCS) for flood forecasting not only for Lao PDR but also for other MRC member countries.	・ The number of telemetric monitoring stations available for flood forecast is still limited.	2.(i)	2.(ii)	1.3
		Non-structural Measures	・ 20 national protection areas (covering 12% of national land area) are designated in order to protect forest. National action plan on rain forest was approved. ・ As a part of preparedness, Flood Preparedness Program was implemented by LNMC (Lao National Mekong Committee), ADPC (Asian Disaster Preparedness Center) and NDMO with a financial support from GIZ and ECHO. Main activities include i) awareness-raising and enhancing of people's capacities, ii) preparation and implementation of programs, and iii) integration of flood preparedness and emergency management into local development plans.	・ An integrated management system for reservoir operation has not been put into place. ・ Systematic EOS has not been prepared. ・ Particular evacuation drills for flood are not carried out.	4.(i)	4	2.2
		Structural Measures	・ River erosion countermeasures are listed in the 6th five year plan of General Department of Road, MPW. ・ Flood protection dikes, sluice gates, diversion channels and drainages have been constructed by Ministry of Public Works and Transportation (MPWT), particularly in major cities located along the Mekong River and major tributaries.	・ River erosion is serious in some areas. ・ There is no budget allocation for monitoring and maintenance of river erosion prevention facilities.	4.(i)	4	2.2
	6.2 Earthquake / Tsunami	Identification of Disaster Risks	・ The earthquakes limited to occur in northern part of LaoPDR were less than magnitude 6.0, significant damage has not occurred in LaoPDR. ・ Tsunami doesn't occur in LaoPDR due to landlocked country.	・ Earthquake hazard map has not been developed by any organization. ・ DMH can't produce hypocenter distribution map due to lack of ability.	2.(i)	2.(i)	1.1
		Monitoring	・ DMH is in charge of seismic observation and dissemination. ・ DMH installed broadband seismograph and strong motion accelerograph in Luang Prabang and Laksao in 2008 by assistance of China Earthquake Administration (CEA). ・ The observation data is transferred to CEA and DMH in Vientiane through the VSAT satellite communication. ・ DMH can conduct the hypocenter and magnitude decisions using software provided by CEA. But due to few observation stations, DMH collects seismic information from surrounding countries and analyzes the data by hand work.	・ There is a need for capacity development of seismic engineer as well as increase of seismographs. ・ The hypocenter decision needs about 1 hour from earthquake occurrence.	2.(i)	2.(ii)	1.3
		Non-structural Measures	Nil		4.(i)	4	2.2
		Structural Measures	Nil		4.(i)	4	2.2
	6.3 Sediment disaster (Landslide, Debris flow)	Identification of Disaster Risks	・ Sediment disaster information isn't accumulated, and damage anticipation including producing a hazard map has not been conducted neither. ・ There are many landslides occurred along the arterial roads, the geological survey and hazard mapping to identify the disaster risk have not been conducted by MPWT.	・ The organization specializing in sediment disaster need to be established. ・ The master plan for road disaster management needs to be developed.	2.(i)	2.(i)	1.1
		Monitoring	・ There is no activity regarding monitoring and early warning system for sediment disaster except for meteorological and hydrological observation by DMH.	・ The observation systems need to be o after clarifying the disaster susceptibility sites.	2.(i)	2.(ii)	1.3
		Non-structural Measures	・ The handbook about design and construction of countermeasures were formulated in SEACAP project supported by U.K.		4.(i)	4	2.2
		Structural Measures	・ Just only urgent removal of fallen sediment after disaster occurs has been implemented. ・ In International Development Institute in Japan and SEACAP project, the simple and reasonable countermeasures such as gabion walls and revetment works were constructed.	・ The proactive countermeasures along the arterial road need to be introduced. ・ Strengthen of road maintenance system, management of disaster record and development of knowledge and experience of road administrative organization are important issues in road sector.	4.(i)	4	2.2
	6.4 Volcano	Identification of Disaster Risks	・ There is no volcanic mountain in Lao PDR.		2.(i)	2.(i)	1.1
		Monitoring	N/A		2.(i)	2.(ii)	1.3
		Non-structural Measures	N/A		4.(i)	4	2.2
		Structural Measures	N/A		4.(i)	4	2.2
	6.5 High Tide /Storm Surge	Identification of Disaster Risks			2.(i)	2.(i)	1.1
		Monitoring			2.(i)	2.(ii)	1.3

	(Cyclone/ Typhoon)	Non-structural Measures			4.(i)	4	2.2
		Structural Measures			4.(i)	4	2.2
	6.6 Other Disasters	Identification of Disaster Risks	・ NDMO has implemented the National Risk Profile Project under the project cooperation with UNDP. Hazard assessment for earthquake, flood, landslide epidemic, UXO, drought, storm and multi-hazard has implemented at the national revel. ・ Village hazard maps which show possible hazards, disaster-prone area, element at risk, evacuation route and so on, are developed with the cooperation of NGOs.	・ Hazard assessment has implemented but the resolution is national level. It is necessary to implement disaster prone area level. ・ NDMO needs more staffs and capacities to put systems in place for a comprehensive monitoring and dissemination of hazard and vulnerability information.	2.(i)	2.(i)	1.1
		Monitoring			2.(i)	2.(ii)	1.3
		Non-structural Measures			4.(i)	4	2.2
		Structural Measures			4.(i)	4	2.2
	6.7 Common items for Disaster	Non-structural Measures	・ NDMO has implementing two projects under the thematic area of risk assessment and disaster information management. (EDIS Project, National Risk Profile Project) ・ The Establishment of Disaster Information Management System (EDIS) Project is built on a web based system (DesInventar) previously tested in Sayaboury province under a pilot project implemented in 2008 – 2009. EDIS was proven effective in Sayaboury province and commenced implementation at national level in 2010. ・ NDMO has recorded disaster information, particularly flood impact data since 1966, while flood information has been standardized since 2000. Most information is of provincial and district level. NDMO is during integrating disaster loss database into EDIS.		4	4	2.2 2.5
					4	4	2.8
		Structural Measures			4	4	2.3.2 2.3.3
		Climate Change Adaptation	・ Responsible body: National Steering Committee on Climate Change (2008) ・ NFP: Department of Environment; Water Resources and Environment Administration ・ Average temperature has risen more than 1℃ in all of the northern, central and southern meteorology monitoring stations according to the monitoring records since 1976 to 2006. ・ STEA is drafting National Climate Change Adaptation Action Plan, which is supposed to be in line with National Climate Change Strategy (-2020) (as of 2002). ・ Climate Change Executive Committee was established.		4.(i)	4.(i)	2.7
		Public Awareness Research and Development /Human Resource Development / for Disaster Management	・ Education for disaster prevention and mitigation has been carried out to the communities mainly in NDMO, while receiving the support of the NGOs. ・ NDMO implements disaster awareness program under MOU with media. ・ Programs of education for disaster prevention and mitigation are under responsibility of Ministry of Education. There is a curriculum for elementary school 3, 4 and 5 grades. ・ Evacuation drills are conducted on the Day for Disaster Reduction, the second week of October. ・ DMH conducts an open house which is one of the education programs. More than 500 elementary and high school students visited DMH, 2011. ・ NDMO has opened a website and is beginning to share information on a trial basis for knowledge share. The website is very necessary to accumulate the Good Practice in the future.	・ Distribution of early warning information to more than 30 % villages in disaster-prone areas and development of disaster education program mainly focusing on primary schools are targeted in National Strategy Action Plan on DM 2001-2005.	3	3	2.3.1
	7. Preparedness and Response	Current Situation		Challenges			
		7.1 Disaster Response plan / Emergency Financial Measure	Central Level	<Emergency Operation Plan(EOP), Contingency Plan(CP) .etc> ・ There are preparedness and contingency plans for certain hazards (mainly flood). ・ Contingency plan is reviewed to be revised, which includes preparation of SOPs. (as of March 2012) ・ Emergency response is supposed to be led by local level disaster management organizations for mobilizing assistance resources from the government, the army and local communities. <Emergency Financial Measure> ・ Some resources for emergency are allocated to national level. ・ The Ministries such as Health, Public Works & Transportation, Agriculture & Forestry, and Defence have some financial reserves for emergencies respectively.		5	5	3
			Local Level	<Emergency Financial Measure> ・ Some resources for emergency are allocated to provincial level.			
		7.2 Early Warning	General Warning and Forecast/Communication	・ Meteorological and hydrological monitoring and early warning (severe weather, typhoon, heavy rainfall, very hot weather, flood, flash flood) are under responsibility of DMH. ・ DMH is engaged in 24-hour monitoring and forecasting and distributes information to governmental organizations, mass media, electric power company and Lao Mekong River Commission. ・ Early warning information is distributed from DMH to NDMO, 13 agencies, local meteorological observatories, mass media (radio staffs and/or newspapers) by FAX, to TV staffs by e-mail, and to public by websites and mass media and staffs of villages. Village staffs distribute information to communities by hand-speakers, outdoor loudspeakers and so on. ・ Criterion of issuing early warning of flash floods is not also available. DMH issues information of flash floods based on the MRC's flash flood guidance.	・ Information distribution measures from provinces to districts and villages are not enough (by radio or telephone). Early warning information cannot be distributed to villages in remote areas without road access.	2.(ii)	2.(ii)	1.2
			Flood	・ NDMO collects weather forecast and information from DMH, Mekong River Commission and media and provides to coordinating agencies of district along Mekong River. ・ Mekong River Commission developed hydrological and meteorological monitoring networks. It provides flood forecast till 5 days ahead. ・ Flood warning is issued by DMH based on pre-determinate criteria of river water level and rainfall, and is disseminated to the line ministries and provinces as well as mass media by fax or email. Information is also provided to the public through mass media, website, or verbal communication by using a loud speaker. ・ Waning information for flash floods including landslides, which are increasing in recent years, are issued when 12-hourly rainfall exceed 100 mm.	・ A particular monitoring system or warning criteria for flash flood have not been established yet. ・ A system to issue an evacuation order has not been established. At present, National Disaster Management Office (NDMO) decides at each time.			
			Earthquake / Tsunami	・ The seismic information is informed from DMH to provincial disaster management committee through DMH Branch Office. ・ DMH disseminates the seismic information to the minister of MONRE, NDMC and mass media by FAX and announces in their website. ・ Mass media broadcasts the earthquake information immediately in TV and newspaper depending on the scale of earthquake, and radio can broadcast it more quickly.				
			Sediment disaster (Landslide, Debris flow)	・ In case that road closure occurs by landslide, DPWT in provincial office disseminates traffic information to mass media and relevant agencies.			
			Volcano	N/A			

	High Tide /Storm Surge(Cyclone/ Typhoon)	・ DMH is responsible of issuing typhoon and TD (tropical depression) warning.				
	Other disasters					
7.3 Evacuation plan				5	5	3
7.4 Establishment of Emergency Response System	Central Level	・ The Ministry of Foreign Affairs will ask for International/local NGOs to mobilise assistance. ・ NDMO with its Disaster Assessment Committee collects pre and post disaster information with its partners' assistance. ・ "Emergency Task Force" is set up within NDMC to disseminate information from National to Communities level.During disasters, Ministry of Defense mobilizes and provides armed forces, portable housing, equipments and transportation measures. ・ Lao Red Cross keeps relief goods in Southern, Central and northern stock centers. ・ MLSW keeps relief equipments in the central stock center and in all the provinces.	・ Enhancement of emergency response system is a priority issue. ・ As Emergency Task Force has been established, there are challenges of coordination and further exchange of information. ・ Draft National Disaster Management Plan proposes to establish "Disaster Response Coordination Centre" to be operational in the onset of disasters. ・ NDMO is in need of "Emergency Operation Centre" as its internal function. ・ Equipments that MLSW stocks are not sufficient and it is necessary to monitor if they are delivered to the affected areas.	5	5	3
	Local Level	・ PDMC and DDMC are directly responsible for disaster response. In case that the disaster exceeds the capacity of PDMC and DDMC, they make request of assistance to NDMC.				
	Training etc.		・ NDMO's budget for capacity development is not adequate.			
7.5 Rescue plan			・ SOP needs to be prepared.	5	5	3
7.6 Relief plan	・ The Ministry of Labour and Social Welfare has stocks for emergency assistance such as shelter materials, food stocks at various administrative levels		・ Emergency materials are not sufficient.	5	5	3
Assistance to challenges	8. Records of Major Assistance by JICA	<Projects/Experts> ・ River Erosion Prevention Project(2005-2007) ・ Meteorology and Hydrology improvement Project (2006-2010) <Studies> ・ Study for Vientiane Drainage Network Development (1988-1989) ・ Study for Mekong River Basin Hydrological Monitoring (2001-) ・ Study for Mekong River Erosion Prevention in Vientiane and its surrounding Areas (2002-2004) ・ Study for Development of Meteorological Monitoring Network (2002-2004) ・ The Study on the Improvement of Water Environment in Vientiane Capital (2009.1-2011.7) ・ VIENTIANE WATER SUPPLY DEVELOPMENT PROJECT (2003.2-2004.2)				
	9. Records of Assistance by other Development Partners	・ ADRC: Human Resources Development Program (2003), Capacity Building for Local Government Officials in Disaster Management (2008-) ・ ADPC: Trainings of officers of NDMO and other DM organizations ・ OFDA-USAID/ADPC: Asia Urban Disaster Mitigation Program (AUDMP) (1995-2004) ・ DANIDA: Provision of assistance to development of disaster education curriculum in elementary schools by NDMO, MLSW, National Institute of Education Science and Ministry of Education with cooperation by ADPC ・ WFP: provision of Assistance to disaster risk vulnerability assessment by NDMO, MLSW and other organizations ・ CWW:DM Capacity development of Provincial/District officers in 8 Districts, Establishment of telephone and radio network between national , provincial and district offices ・ UNDP: Provision of assistance to NDMO in implementing project for integrating disaster education into curriculum of secondary school from 2007 with cooperation by ADPC, funded by EU-ECHO ・ ADPC :Capacity development for planning and implementation of flood preparedness program at Province/District level in Lower Mekong, funded by DIPECHO (2005.3-) ・ WB: Mainstreaming Disaster and Climate Risk Management into Investment Decisions (2011) ・ ADB: Capacity Enhancement for Coping with Climate Change (2010-2012) ・ UNDP: Second National Communication on Climate Change (SNCCC) (2008-2011) ・ UNDP: National Risk Profile for Lao PDR (2010) ・ NZAid: Regional programme-Disaster Management and Emergency Response (2009-2012)				
	10. International Networking	・ With the onset of massive flood in 2000, flood control has come to be one of the major issues for MRC. MRC developed basic strategy in 2001 and action plan in 2002 and formulated flood control and mitigation program. Flood vulnerability assessment and mapping project was started.				
ASEAN Cooperation	11. National Policy on ASEAN(ACDM, ARPDM, AADMER) cooperation in Disaster Management, Emergency Response in case of disasters in other ASEAN countries or ASEAN region	・ Signed AADMER in 2007(ASEAN Agreement on Disaster Management and Emergency Response) (AADMER stipulates mutual cooperation in case of disaster.) ・ Participation in ARF meetings on disaster management, monthly ACDM meetings, ARDEX(ASEAN Regional Disaster Exercise)and ASEAN regional technical cooperation Project ・ SASOP (Regional Standing Arrangement and Standard Operating Procedures) started in 2007. ・ Agreement on trans-boundary haze was signed by ministers of ASEAN countries in 2002 and came into effect in 2003. Action plan for capacity building of fire fighting in the region and early warning system utilizing satellite images were developed.				
	12. Resources useful for other ASEAN countries					
	13. Needs for External Assistance from the point of view of Regional Cooperation					

	Inventory				HFA		AADMER
					PforA	IofP	
Current Situation and Challenges	1. Features of Disasters	• Frequent Natural Disasters: EM-DAT Disasters 45 nos.; Out of these Flood and Flash Flood (71%), Storm(14%), Landslide(9%) <Floods> • Most rivers are steep stream in upper river basin and low gradient stream in downstream basin. This causes sedimentation and consequent floods. <Landslide> • Damages by landslides are increasing because of housing and commercial area developments on steep slopes. <Others> • The potentiality of tsunami disaster will be considered in Saba Sarawak.					
	2. Administrative Division	13 States/3 Federal territories –114 Districts					
	3. Development of Legislative Framework and Disaster Management Policy & Plans		Current Situation	Challenges	1.(i)	1.(i)	2.1
		Development of Legislative Framework	<Fundamental Law> <Laws in Relevant Sectors> • Water Act (1989) • Federal Forest Act(1984) • Land Conservation Act(1960) • Highland Slope Development Guidance • Road, Drainage and Building Act	• Water Act stipulates only securing river assets.			
		Disaster Management Policy	• The National Security Council Directive No. 20 : The Policy and Mechanism on National Disaster and Relief Management (1997) • Climate Change Adaptation Policy	• NSC Directive No. 20 is under revision as of March 2012.			
		Disaster Management Plans	<Central Level> • National Slope Master Plan (2009) • Federal Haze Action Plan • Integrated River basin Management Plan	• No specific disaster management plan exists, but it is expected to prepare once NSC Directive No.20, is revised. • Local Level disaster management plan is not considered necessary.			
	4. Establishment and Enhancement of Disaster Management System	Institutional Framework	Current Situation	Challenges	1.(ii)	1.(ii)	2.1 4
		Central Level	<u>Central Disaster Management and Relief Committee (CDMRC)</u> • Chair: Minister appointed by the Prime Minister • Deputy chair: Minister of Information • Secretariat: National Security Council • Members: Relevant Ministers and Director-Generals of Departments <u>Special Malaysia Disaster Assistance And Rescue Team (SMART)</u> • Members: Around 90 officers, Personnel/Secondments from the Fire & Rescue Department, Royal Malaysia Police, Armed Forces and other agencies • It was established in 1995. • It responds to search & rescue operation which is beyond the capacity of the existing search & rescue teams.	• Strengthening of the structure of federal disaster management organizations is identified as an important issue to be addressed. • Division of responsibility between flood control and urban drainage is not clearly defined. • Local governments, mandated to be responsible for urban drainage, suffer from shortage of budget and human resources. Some local organizations even do not have drainage division. • River management is implemented by various stakeholders as necessary. Plans and information are limited and dispersed and this leads to difficulty in implementing integrated river basin management.			
			<u>Organizations in charge of Non-structural Measures for Disaster Risk Mitigation and Preparation</u> • Flood, Sediment disaster, Typhoon/Cyclone: (1) Malaysian Meteorological Service (MMS) Department of Science, Technology and Environment, (2) Drainage And Irrigation Department Of Malaysia (DID) ,Ministry of Agriculture, (3) State DID, (4) Survey Department Ministry of Land and Development Cooperation, (5) State governments (District Land Office) <u>Organizations in charge of Structural Measures for Disaster Risk Mitigation</u> • Flood, Sediment disaster, Typhoon/Cyclone: (1) River Division / Drainage Division / Shore Division of DID, (2) State DID, (3)Local governments, (4) Tin mining companies				
		Local Level	<u>State/District DMRC</u> • Chair: State Secretary/District Officer • Secretariat: NSD • Members: State Chief Police Officer, Brigade Commander of Armed Forces, Director of Fire and Rescue Department, Directors of relevant government agencies / departments at State/District Level <u>On-Scene Control Post (OSCP)</u> • It will be opened immediately after disaster has occurred. The Commander will be either of the OCPD, CPO, or the Director, Internal Security and Public Order Royal Malaysia Police, depending on the level of disaster.	• Division of responsibility of urban drainage improvement among organizations concerned is not clear. • Coordinating organization or mechanism across ministries for integrated river management does not exist. • Coordinating organizations or mechanism across states for management of inter-state rivers. • The policy is announced that jurisdiction over water resources will be under the Federal government provided that state councils approve the transfer.			
		Inter-organizational Arrangement	• Arrangement structure exists in the form of the chart of roles and responsibility of agencies at the scene of a disaster.				
		Financial Preparation	<National Budget> • Respective Ministry and agency has the allocation of budget/fund for the activities/projects of disaster prevention and mitigation. <Contingency Fund> • National Disaster Relief Fund was established by the Federal Government for disaster relief operations. The Federal Government contributes fixed amount annually. • Rehabilitation/Emergency expenses by Government agencies are reimbursed by the Ministry of Finance.	• A lack of disaster management law attributes to less integrated control of the budget for disaster management.			

	5. Policy on Community-based Disaster Management	・ Malaysia has disseminated disaster information to communities and implemented Community-based Disaster Management programs, which helps improving people's awareness of disaster management.			1.(iii)	1.(iii)	2.6 4
	6. Prevention and Mitigation	Current Situation		Challenges	-	-	-
	6.1 Flood	Identification of Disaster Risks	・ Malaysian Centre for Remote Sensing (MACRES) and NSD established the National Disaster Data and Information Management (NADDI) ・ DID head office collects information on floods from states and develops flood hazard maps. ・ DID categorizes flood map into three types, namely inundation map, flood hazard map and flood risk map. Inundation maps have been completely developed through site observation and satellite images. Flood hazard maps for 12 areas have been prepared by using hydro-dynamic models with input of hydrological and hydraulic data. Development of flood risk maps will be started soon by adding vulnerability data to flood hazard maps.	・ Malaysia does not have long experience of river management. Data useful for river management are limited and dispersed. Information that covers whole the river basin does not exist. Information sharing and networking system among organizations concerned is not in place. ・ Information on floods collected by the Prime Minister's Office is not disclosed to public.	2.(i)	2.(i)	1.1
		Monitoring	・ Flood forecast and weather forecast are made by DID and MMD (Malaysian Meteorological Department), respectively.		2.(i)	2.(ii)	1.3
		Non-structural Measures	・ Developers are required to bear the cost of river improvement downstream or to construct storm water reservoir, according to the land area of development. ・ Forestry Agency designates Forest Protection Areas. ・ Land use control is set in landslide-prone areas and building codes are developed. Supervising and control of development are enhanced by the amendment of relevant acts.	・ The needs are identified for the implementation of landslide management measures and disaster mitigation measures like embankment of rivers and improvement of knowledge and technical skills are necessary. ・ Development of urban drainage facilities cannot catch up with the increase of peak flow amount in metropolitan area. ・ Around 200,000 people squatter river land areas. ・ In most of the forest protection areas, deforestation is in progress without coordination with river management. ・ Integrated river basin monitoring system is not in place.	4.(i)	4	2.2
		Structural Measures	・ With the onset of severe flood in 1971, the importance of flood control has come to be recognized. In 1980s and 90s, flood control measures were promoted. Development of urban drainage master plan has come to spread. ・ During the past few decades, various flood mitigation projects have completed mainly in order to increase discharge capacity of rivers. The major projects are: SMART (Stormwater Management and Road Tunnel), Batu Jinjang Ponds & Related Diversions Project, Sungai Muda Flood Mitigation Project, Sungai Perai Flood Mitigation Project, and Bertam - Kepala Batas Flood Mitigation Project.	・ Although NSC is responsible for coordination of water volume released from each dam during flood, an integrated rule has not been prepared yet. In addition, there are some reservoir operation rules that are no longer available in old dams.	4.(i)	4	2.2
	6.2 Earthquake / Tsunami	Identification of Disaster Risks	・ Tsunami risk assessment is not fully conducted yet for possible tsunami expected area. ・ The seismic intensity map with mercalli intensity scale and various seismic data have been developed and sold by MMS	・ Assumption of possible earthquake and tsunami scenario will be necessary. Based on scenario, tsunami simulation analysis including damage estimation is necessary. Also, socio-economic condition and infrastructure distribution in the possible tsunami invasion area should be assessed for taking necessary mitigation measures or evacuation planning.	2.(i)	2.(i)	1.1
		Monitoring	・ MMS is monitoring earthquake and tsunami in the country. ・ For tsunami monitoring, modern equipment and warning system has installed in Tsunami Monitoring Center at Kuala Lumpur. ・ Seismograph network is already established in the country but monitoring density is not so high for earthquake observation. ・ Tsunami monitoring system is operated by MMS,	・ For emergency response, tsunami forecasting and monitoring system is still necessary for effective evacuation.	2.(i)	2.(ii)	1.3
		Non-structural Measures	・ In tsunami expected area in Sarawak, warning siren towers were constructed and managed by Central Tsunami Monitoring Center.		4.(i)	4	2.2
		Structural Measures			4.(i)	4	2.2
	6.3 Sediment disaster (Landslide, Debris flow)	Identification of Disaster Risks	・ Department of Agriculture, Ministry of Agriculture develops geo-hazard maps. ・ Landslide hazard maps are being developed.	・ It is recognized by BMG that slope collapse by land development area in Klan Valley will be an important subject for future sediment disaster management.	2.(i)	2.(i)	1.1
		Monitoring			2.(i)	2.(ii)	1.3
		Non-structural Measures			4.(i)	4	2.2
		Structural Measures			4.(i)	4	2.2
	6.4 Volcano	Identification of Disaster Risks	There is no active volcano in Malaysia.		2.(i)	2.(i)	1.1
		Monitoring	N/A		2.(i)	2.(ii)	1.3
		Non-structural Measures	N/A		4.(i)	4	2.2
		Structural Measures	N/A		4.(i)	4	2.2
	6.5 High Tide /Storm Surge (Cyclone/	Identification of Disaster Risks			2.(i)	2.(i)	1.1
		Monitoring			2.(i)	2.(ii)	1.3
		Non-structural Measures			4.(i)	4	2.2

Typhoon)	Structural Measures			4.(i)	4	2.2
6.6 Other Disasters	Identification of Disaster Risks			2.(i)	2.(i)	1.1
	Monitoring			2.(i)	2.(ii)	1.3
	Non-structural Measures			4.(i)	4	2.2
	Structural Measures			4.(i)	4	2.2
6.7 Common items for Disaster	Non-structural Measures	・ NSC and MACRES have implemented a disaster management information system which is the National Disaster Data and Information Management System (NADDI). ・ NADDI emphasizes on the utilization of remote sensing technologies, Geographical Information System (GIS) and Global Positioning System (GPS) technologies to provide up-to-date and reliable data to support the three components of disaster management, that are (1) early warning, (2) detection and monitoring, and (3) mitigation and relief for pre, during and post disaster management activities coordinated by NSC and implemented by relevant authorities. ・ A separate system known as the Government Integrated Radio Network (GIRN) provides radio communication between responders during emergency or disaster. Disaster reporting is now more efficient with the centralized Malaysia Emergency Response System (MERS) emergency hotline.		4	4	2.2 2.5
				4	4	2.8
	Structural Measures			4	4	2.3.2 2.3.3
	Climate Change Adaptation	・ Responsible body: National Steering Committee on Climate Change ・ NFP: Ministry of Natural Resources and Environment ・ National Policy on Climate Change was formulated in 2009.		4.(i)	4.(i)	2.7
	Public Awareness Research and Development /Human Resource Development / for Disaster Management	・ Federal Government continuously implements disaster education to the people in flood-prone areas. ・ Several programs have been implemented to improve the resilience of schools and hospitals against disasters. But the education sector does not have Primary and Secondary school curriculum for disaster risk reduction. ・ In conjunction with the Disaster Awareness Day 2011, Malaysia launched the national level campaign on ‘One Million Safe Schools and Hospitals’ and organized the ASEAN Knowledge Sharing Workshop on Mainstreaming DRR in Education.	・ Budget constraint and difficulty in reaching out to the public in masses and the campaigns only being done on small scale basis. ・ Closer cooperation with Nationals TVs Network, information and Education Ministries is very much needed for the outreach program to reach a greater mass of public and school children in order to build greater awareness and response capability toward a reliance community.	3	3	2.3.1
7. Preparedness and Response	Current Situation		Challenges			
7.1 Disaster Response plan / Emergency Financial Measure	Central Level	<Emergency Operation Plan(EOP), Contingency Plan(CP) .etc> ・ National Radiological Emergency Plan ・ National Influenza Pandemic Preparedness Plan ・ SOPs are prepared for (1) flood; (2) forest fire/open burning and haze; (3) industrial disasters; (4) bencana industry petroleum, gas dan petrochemicals; (5) earthquake; (6) tsunami, and; (7) drought. <Emergency Financial Measure> ・ Emergency fund expensed by the Government Agencies are reimbursed. ・ National Disaster Relief Fund		5	5	3
	Local Level					
7.2 Early Warning	General Warning and Forecast/Communication	・ Weather forecast/warning is under responsibility of MMD. ・ Early warnings are disseminated through sirens, short messaging system (SMS), hotline (between MNTEWC and National Television), fixed line (whenever necessary), telefax, website, mass media broadcasting system (mini studio at MNTEWC) and public announcements. ・ The ICT is utilized to promote awareness and disseminate early warnings to the public via a Fixed-Line Disaster Alert System (FLAS).		2.(ii)	2.(ii)	1.2
	Flood	・ Rainfall and water level monitoring is supplemented by weather radar monitoring. ・ Flood early warning center of DID head office analyze data and announce flood early warning to organizations concerned according to 3 risk level. ・ The Klang Valley basin where Kuala Lumpur locates is recognized as important area due to its high population in the basin. The first flood forecasting and warning system (FFWS) was thus established in this basin. At present forecast accuracy is 80-85%, and the model is being improved with a goal of 90% accuracy. ・ FFWS in the Muda River basin was also completed in 2010. The system is able to forecast flood condition 2 days in advance. Radar rainfall data observed by MMD is also incorporated into the system. Currently similar systems are being established in the Pahang, Kelantan and Johor areas, and will be duplicated in Padas, Dungun and Sarawak areas in the future. ・ The above FFWS is centrally-managed at National Flood Monitoring Centre that locates in the headquarters of DID. Warning information automatically issued by the system is transmitted to the authorized officers of DID through SMS, while also information including river water level and rainfall data is disclosed to the public and the concerned organizations on the web. ・ Local communities set up “flood warning boards (sign boards)” in rivers for water level monitoring and to be able to make their own warning decision by observing the boards. There are four warning levels (Normal/Alert/Warning/Danger). Local resident judges their own danger be observing the board and reports the situations to the DID district office.	・ Real-time hydrological data for accurate warning announcement are not available. ・ Information on dam control by Power Works Bureau and downstream river monitoring by DID are not exchanged each other. It may be an obstacle for integrated river management, which is necessary before and during flood. ・ DID is planning to develop sediment disaster and mud flow warning system utilizing satellite technology.			
	Earthquake / Tsunami	・ Tsunami warning is under responsibility of MMD. MMD has developed Malaysian National Tsunami Early Warning Center (MNTEWC) and set up National Tsunami Early Warning System (MNTEWS) to provide early warning of occurrence of Tsunami in 2004. ・ Geology and Tsunami Division of MMD developed Tsunami Database. MMD conducted a seismic profile, collected tsunami historical events around the Indian Ocean, South China Sea and the western Pacific Ocean, simulated tsunami based on numerous source points (about 1,800 source points), and made database of tsunami.				
	Sediment disaster (Landslide, Debris flow)	・ Landslide early warning is under responsibility of PWD. ・ PWD has developed integrated slope information system (ISIS). 20,000 slopes in Peninsular Malaysia (almost 90% completed) have been inventoriesed and classified its hazard and risk ranking. ・ In a longer term, the National Slope Master Plan will be expanded to provide early warning system in landslide prone areas.	・ The need of development of landslide warning system is identified.			
	Volcano	N/A				
	High Tide /Storm Surge(Cyclone/ Typhoon)	・ Storm surge forecast/warning is under responsibility of MMD.				

		Other disasters	・ Air Pollutant Index Management System (APIMS) for haze has been developed by Development of Environment (DOE) in Ministry of Natural Resources and Environment. DOE has published air pollutant index (API) in the website.				
	7.3 Evacuation plan	・ Social Welfare Department manages total of 3,417 relief evacuation centers.			5	5	3
	7.4 Establishment of Emergency Response System	Central Level	・ In case of a disaster, “On Scene Command Post (OSCP)” is established as a command structure and control. Royal Malaysia Police appoints the officer to head OSCP. OSCP mobilizes its communication items to create communication network and coordinates with “Disaster Operations Control Centre (DOCC)” at each management level. DOCCs are set up according to level of disaster. Below are disaster levels and DOCC locations: a) Level 1 Disaster (a disaster struck within district managed by DDMRC) - District Office; b) Level 2 Disaster (a disaster struck in wider areas than a district managed by SDMRC) – State NSC Operations Room; c) Level 3 Disaster (a disaster struck in wider areas than a state managed by CDMRC) – NSC Operations Room. ・ NSC has “Special Malaysia Disaster Assistance and Rescue Team (SMART)” since 1995. They are composed of teams to conduct rescue operations when a disaster level is more than what local disaster management level can handle and when a request comes nation-widely especially in the Monsoon season.		5	5	3
		Local Level					
		Training etc.	・ Disaster drills for the communities are conducted regularly.	・ Expansion of trainings through international assistance and cooperation, implementation of training programs to core officers and support to staffs for improving capacity to respond to disasters are important issues			
	7.5 Rescue plan	・ SMART deals with the operations which are beyond local management capacity.			5	5	3
	7.6 Relief plan	・ Social Welfare Department manages total of 3,417 relief evacuation centers and a total of 348 forward-supply bases, provides and distributes relief assistance items, registers disaster victims, provides counseling services to the affected victims, evaluates the damage involved, draws up rehabilitation programs/plan.			5	5	3
Assistance to challenges	8. Records of Major Assistance by JICA	<Experts> ・ Tsunami Early Warning Engineering (2006) <Studies> ・ Study for Krang River Basin Flood Control (1986-1988) ・ Study for Kelantan River Basin Flood Control (1987-1989) ・ Study for Flood Mitigation and Drainage in Penang (1988-1990) ・ Study for Integrated Muda River Basin Management (1993-1995) ・ Study for River Basin Information System (1996-1998) ・ Study for Integrated Urban Drainage Improvement (1998-2000) ・ Study on Improvement of Planning Capability in Sewerage Sector (2007.3-2008.10)					
	9. Records of Assistance by other Development Partners	・ USA: Preparation of Kuala Lumpur Flood Mitigation Plan (1973) UNDP/WMO: Introduction of flood early warning systems into 4 major rivers in Peninsula Malaysia (1971~1974) ・ Not identified (2012)					
	10. International Networking	・ MMS, in cooperation with ASEAN Meteorological Center, conducts monitoring and long-term forecasting in ASEAN region putting emphasis on drought caused by El Nino. ・ Malaysia signed The Agreement on Cooperation for Disaster Prevention and Civil Safety with French Government in 1998. ・ Joint search & rescue exercise of SMART and SCDF of Singapore was conducted in Malaysia in 1997. Both countries agreed to sign MOU on disaster management and aid. ・ Intergovernmental Coordination Group for the Indian Ocean tsunami Warning and mitigation System was established in 2005 under the coordination of IOC UNESCO.					
ASEAN Cooperation	11. National Policy on ASEAN(ACDM, ARPDM, AADMER) cooperation in Disaster Management, Emergency Response in case of disasters in other ASEAN countries or ASEAN region	・ Signed AADMER in 2007(ASEAN Agreement on Disaster Management and Emergency Response) (AADMER stipulates mutual cooperation in case of disaster.) ・ Participation in ARF meetings on disaster management, monthly ACDM meetings, ARDEX(ASEAN Regional Disaster Exercise)and ASEAN regional technical cooperation Project ・ SASOP (Regional Standing Arrangement and Standard Operating Procedures) started in 2007. ・ Agreement on trans-boundary haze was signed by ministers of ASEAN countries in 2002 and came into effect in 2003. It stipulates forest fire monitoring, prevention, coordination mechanism, communication system, mutual emergency support and establishment of ASEAN coordination center. Action plan for capacity building of fire fighting in the region and early warning system utilizing satellite images were developed. ・ Malaysia signed MOU on mutual understanding about disaster cooperation and support with Indonesia in 1997. It targets not only haze but other disaster management and aid.					
	12. Resources useful for other ASEAN countries	・ Technology on satellite imagery observation and analysis ・ Training on emergency response ・ (Financial assistance)					
	13. Needs for External Assistance from the point of view of Regional Cooperation						

Inventory					HFA PforA	HFA IofP	AADMER
Current Situation and Challenges	1. Features of Disasters	• Frequent Natural Disasters: EM-DAT Disasters (1980-2011): 26 nos.; Out of these Flood (50%), Tropical Cyclone included storm surge (23%), Landslide (12%), Earthquake/ Tsunami (15%) • Long west coast area along the Bay of Bengal is prone to tropical cyclone. • In the mid of monsoon season, from August to October, Myanmar has frequent floods. 4 major rivers flow from the north to the south. Southern part of the nation, especially delta area, is frequently flooded in monsoon season. Floods tend to occur when high tide and heavy rain come at the same time. • Flood (riverine and flash flood) occurred at 7 region and state in 2011 (Ayeyarwady region, Bago region, Kayin state, Rakhine state, Magway region, Sagaing region, Mandalay region). Hardest-hit area was Magway region and approximately 36,000 people are affected with about 150 casualties and about 2,500 houses totally destroyed. • There were 6 times of storm surge disaster since 1968. The largest peak surge was 5.86m in Nargis (2nd -3rd May 2008). • Myanmar is situated in seismic belt from the Mediterranean Sea to Himalaya, where 15% of world's earthquakes occur, and has earthquakes. There are 3 major epicenters in the nation and had many earthquakes in the past. 23 tremors are monitored in 3 and half years from May 2001 to December 2004.					
	2. Administrative Division	7 Regions (taing detha gyi)/7 States (pyi ne) –63 Districts (kha yaing)－324 Townships (myo ne)－312 Towns (myo)/2548 Wards (yat kwe)/13742 Village-tracts (kyay ywa ok su) <as of 2001>					
	3. Development of Legislative Framework and Disaster Management Policy & Plans		Current Situation	Challenges	1.(i)	1.(i)	2.1
		Development of Legislative Framework	<Fundamental Law> • Rehabilitation Board Act (1950) • Disaster Management Bill (drafted and expected to be approved by June 2012) < Laws in Relevant Sectors> • Board of Development Affairs Act (1993) • Epidemic Diseases Prevention Act (1995) • Implementation of Insurance Act (1996) • Fire Services Act (1997)				
		Disaster Management Policy	• The apex body then called National Disaster Preparedness Central Committee was established in 1995 for disaster management.				
		Disaster Management Plans	<National Level> • Standing Order (2009) • Myanmar Action Plan on Disaster Risk Reduction (MAPDRR) 2009-2015 <Local Level> • Regional/ State Flood Protection Plans	• New Act for disaster management will require some revision of Standing Order and MAPDRR. • Comprehensive Disaster Management Plans and/or Action Plans at the local level have not been prepared yet.			
	4. Establishment and Enhancement of Disaster Management System	Institutional Framework	Current Situation	Challenges	1.(ii)	1.(ii)	2.1 4
		Central Level	<u>Myanmar Disaster Preparedness Agency (MDPA)</u> • Chair: Minister of Social Welfare, Relief and Resettlement (MSWRR) • Co-vice-Chairs: Minister of Defense and Minister of Home Affairs • Secretariat: Director-General, Relief and Resettlement Division (RRD), MSWRR <u>Working Committee</u> • To supervise the implementation of disaster management activities and Sub-Committees <u>Sub-Committees:</u> (1) Information and Education (2) Emergency Communication (3) Search and Rescue (4) Information of losses and Emergency Assistance (5) Assessment of losses (6) Clearing Ways and Transportation (7) Mitigation and Establishing of Emergency Shelter (8) Health (9) Rehabilitation and Reconstruction (10) Security <u>Disaster Preparedness Management Committee of Ministries</u>	• Chairmanship of "Working Committee" needs to be designated with appropriate authority in Disaster Management Bill.			
			<u>Organizations in charge of Non-structural Measures for Disaster Risk Mitigation and Preparation</u> • Earthquake: MSWRR, Ministry of Health, Ministry of Education, DMH (Department of Meteorology and Hydrology, Ministry of Transport), and Myanmar Engineering Society • Tropical Cyclone: DMH • Tsunami: DMH, RRD, Department of Educational Planning and Training • Flood: Irrigation Department (Ministry of Agriculture and Irrigation), DMH, RRD • Landslide: Irrigation Department, DMH, RRD • Drought: Irrigation Department, DMH, RRD, Dry Zone Greening Department (Ministry of Forestry) • Forest Fire: Fire Service Department, Department of Forestry <u>Organizations in charge of Structural Measures for Disaster Risk Mitigation</u> • Earthquake: Ministry of Construction, Irrigation Department, Municipalities • Flood: Irrigation Department • Forest Fire: Fire Service Department, Local authority				
		Local Level	<u>State/Region Disaster Preparedness Committee</u> • Chair: Chief Minister <u>District Disaster Preparedness Committee</u> • Chair: District Administrator	• The institutional arrangements including the chairmanships and memberships at various local government levels are supposed to be clearly vested.			
		Inter-organizational Arrangement	• Standing Order (2009) gives the guideline for inter-Ministerial Coordination Committee in terms of coordination of the government activities and operations.	• Standing Order (2009) is a subject for revision, which may affect the formation of the coordination Committee.			
		Financial Preparation	• Ministry of Finance : Special fund for rehabilitation works • Ministry of Social Welfare, Relief and Resettlement (MSWRR): Budget allocation for relief activities and capacity building	• Financial resources are not sufficient. Fund allocation for disaster management needs clear policy guideline.			
	5. Policy on Community-based Disaster Management	• Myanmar Action Plan on Disaster Risk Reduction includes community participation programs. • International organizations, Red Cross and NGOs have provided grass-roots level assistance to the Communities affected by Cyclone Nargis in 2008.		• External support, on which Community-based Disaster Management depends, has been partial to the cyclone disaster prone areas. • The followings are required: (1) Promotion of CBDRR volunteerism; (2) Establishment of CBDRR Resource Center; (3) Development of community based natural resource management programs, and; (4)	1.(iii)	1.(iii)	2.6 4

				Documentation of CBDRR Good Practices.			
	6. Prevention and Mitigation	Current Situation		Challenges	-	-	-
	6.1 Flood	Identification of Disaster Risks	・ Irrigation Department (ID) of Ministry of Agriculture and Irrigation is the responsible agency to conduct hazard mapping. ID did study of hazard mapping in Bago Township but there are no hazard or risk maps for the whole country level. ・ 48 townships are being pointed as flood prone township.		2.(i)	2.(i)	1.1
		Monitoring	<Monitoring on a normal basis> ・ Key agency for flood monitoring, weather forecasting is Department of Meteorology and Hydrology (DMH) of Ministry of Transportation. ・ Observation stations under controlled of DMH are: metrological station 63, metrology and hydrology station 39, agrometeorological station 17, aeronautical meteorological office 8, tide gauge station 2. ・ 37 stations of meteorology routinely disseminate every 3 hourly to Global Meteorological Observing System. ・ Sampling data at other national climate forecast purposed stations also 3 hours. ・ Sampling interval of hydrological observation is 3 times a day. ・ Ministry of Agriculture installed 120 hydrological stations for the remote and rural area in the eight river basins. <Monitoring at disasters> ・ Sampling interval at meteorological and hydrological stations will be changed to 30min-1 hour in principally at disaster state. But the sampling time can also be changed under necessary of disaster site, local authority and head office of DMH.		2.(i)	2.(ii)	1.3
		Non-structural Measures	・ ID and Forest Department are cooperating to undertake the conservation and reforestation activities in the important watershed areas. ・ As community level initiatives, Myanmar Red Cross Society is the leading force in implementing Community Based Flood Management capacity building programs in selected flood vulnerable areas in the country. ・ RRD conducts Disaster Management Training at Regional and State level alternatively to educate people on disaster preparedness and management.		4.(i)	4	2.2
		Structural Measures	・ Key agency for flood risk mitigation in the country is ID. ・ ID operates the multipurpose dams and maintains embankment system at 14 sites for flood damage protection of agricultural lands and irrigation facilities in the rainy season.		4.(i)	4	2.2
	6.2 Earthquake / Tsunami	Identification of Disaster Risks	・ The nationwide small-scale seismic zone map and the tectonic map in Myanmar were developed by MEC in 2004 and by MGS in 2012 respectively. ・ MEC developed seismic zonation map in Mandalay-Amarapura, Bago-Oaktha, Taunggyi until 2006. ・ The earthquake hazard map in Mandalay has been developed in collaboration with the Norwegian government. ・ Tokyo University and Kyoto University in Japan have researched about seismic activity history in collaboration with MES and conducted a trench survey along Sagaing fault. ・ Any organization has not developed the tsunami hazard map.	・ DMH is in charge of the earthquake hazard map, but they haven't started yet. ・ There is a need to develop more detailed map and to improve the accuracy of existing maps.	2.(i)	2.(i)	1.1
		Monitoring	・ Total twelve broadband seismographs have been installed by Myanmar government, CEA, Yunnan Seismic Bureau (YSB), RIMES and JICA. ・ The seismographs installed by China haven't worked at present due to breakdown of battery and the seismic observation data conducted by RIMES can't be received in Myanmar. ・ Only 2 digital broadband seismographs installed by DMH budget and 3 analog seismographs installed by JICA from 1962 to 1985 have been available for seismic observation. ・ CEA and RIMES have planned to increase seismographs, and some of both proposed stations are duplicated. ・ DMH has only 13 stuffs for seismic observation and analysts. ・ The hypocenter decision takes 45 minutes to 1 hour. In addition, the accuracy is very low because of the small number of observation stations. ・ The strong motion accelerographs were installed at 11 observatories by JICA. However, DMH doesn't analyze these data transmitted from each observatory sufficiently. ・ Regarding tsunami observation, there is 2 tide gauges installed in Myanmar by Hawaii Sea Level Center. But the observation data can't be received directly in the country.	・ The number of seismograph is lacking severely and need to be increased. ・ There is a need to conduct tsunami simulation for detecting tsunami immediately. It is also necessary to capacity development of engineer to operate the earthquake and tsunami monitoring system. ・ They need to be integrated and analyzed data from the seismograph installed by different organization comprehensively, and the accuracy of hypocenter and magnitude decision needs to be improved.	2.(i)	2.(ii)	1.3
		Non-structural Measures	・ Preparedness such as evacuation drill for tsunami disaster prevention has been addressed by national and local government cooperatively.	・ The quake-resistance standards and seismic-resistant design have to be established and improved.	4.(i)	4	2.2
		Structural Measures	・ In the delta area where the tsunami in 2004 and cyclone Nargis hit and damage largely, the tsunami evacuation shelters were built by donated fund from citizen and private company. ・ The tsunami evacuation drills have conducted hold by DMH and local government in October 2011 and many citizens participated proactively. ・ Myanmar government has promoted to plant mangrove as countermeasure to reduce tsunami damage along the front of delta area.	・ The evacuation sign and evacuation route based on tsunami hazard map need to be developed.	4.(i)	4	2.2
	6.3 Sediment disaster (Landslide, Debris flow)	Identification of Disaster Risks	・ MGS produced a small-scaled sediment disaster hazard map of whole Myanmar, based on the geological and topographical distribution. Community-based risk assessment has not conducted by any organization. ・ Some researchers have conducted their study individually.	・ There is a need to anticipate sediment disaster damage on the important arterial road.	2.(i)	2.(i)	1.1
		Monitoring	・ DMH issues heavy rain warning, but DMH and any other organization don't conduct monitoring for sediment disaster.	・ There is a need to develop a hazard map to identify the landslide susceptibility area and to establish observation system and early warning system.	2.(i)	2.(ii)	1.3
		Non-structural Measures	・ MES and MGS held a landslide work shop in some area. ・ Rescue and relief for affected people are the major activities as well as flood after disaster occurrence.		4.(i)	4	2.2
		Structural Measures		・ The countermeasures along the arterial road like Asian Highway important for supply chain should be implemented	4.(i)	4	2.2
	6.4 Volcano	Identification of Disaster Risks	・ There is no active volcano in Myanmar.		2.(i)	2.(i)	1.1
		Monitoring	N/A		2.(i)	2.(ii)	1.3
		Non-structural Measures	N/A		4.(i)	4	2.2
		Structural Measures	N/A		4.(i)	4	2.2
	6.5 High Tide	Identification of Disaster Risks	・ UNDP conducted risk analysis and prepared reports on Hazard Risk and Vulnerability Assessment Report, Multi Hazard Risk Assessment in		2.(i)	2.(i)	1.1

	/Storm Surge (Cyclone/ Typhoon)		Nargis-affected Areas (2011), ・ ADPC conducted together with MES Multi hazad risk assessment (2011)				
		Monitoring	・ Normal metrological observation		2.(i)	2.(ii)	1.3
		Non-structural Measures	・ Community based early warning in place		4.(i)	4	2.2
		Structural Measures	・ 8 earthen embankments which consist of refuge shelters and drinking water ponds were constructed in cyclone prone areas.		4.(i)	4	2.2
	6.6 Other Disasters	Identification of Disaster Risks			2.(i)	2.(i)	1.1
		Monitoring			2.(i)	2.(ii)	1.3
		Non-structural Measures			4.(i)	4	2.2
		Structural Measures			4.(i)	4	2.2
	6.7 Common items for Disaster	Non-structural Measures	・ There is not a comprehensive DMIS and disaster loss database in Myanmar. But, hazard profiles are conducted (title of report is “Hazard Profile of Myanmar”). The report includes historical data of natural disaster and results of the analysis of each natural hazard in Myanmar.		4	4	2.2 2.5
					4	4	2.8
		Structural Measures			4	4	2.3.2 2.3.3
		Climate Change Adaptation	・ Responsible body: N/A ・ NFP: National Commission on Environment		4.(i)	4.(i)	2.7
		Public Awareness Research and Development /Human Resource Development / for Disaster Management	・ The Relief and Resettlement Department has been conducting State and Division Level short-term TOT Disaster Management Courses for the public education and awareness on natural disaster reduction with the co-operation of other department concerned such as Meteorology and Hydrology Department, Health Department, Irrigation Department, Myanmar Red Cross Society, Myanmar Police Force and Fire Services Department. Within the International Decade for Natural Disaster Reduction, 23 courses were conducted in the cities of 11 States and Divisions from 1990-1991. 1998-99 fiscal years. ・ Local people take refuge in high mounds and shelters to avoid storm surge and strong wind. ・ At the primary level, one of the five main areas of Life Skills Subject is ‘Environmental Education’ and there is a chapter on DRR called ‘Caution in Emergencies’ that explains human-made and natural disasters. ・ The Ministry of Education (MoE) has revised General Science Subject of the lower secondary school curriculum (Grade 6 to 9) and included the main area of study ‘Earth and Space’ with lessons on storms. The lower secondary Life Skills includes Flood, Emergencies, Earthquake, Tsunami, Landslides and Fire. ・ The revised upper secondary school subjects include a lesson titled ‘Earthquake’ in Grade 10 English and ‘Earth Surface Process’ in Grade 11 Geography.		3	3	2.3.1
	7. Preparedness and Response	Current Situation		Challenges			
		7.1 Disaster Response plan / Emergency Financial Measure	Central Level	<Emergency Operation Plan(EOP), Contingency Plan(CP) .etc> ・ Standing Order (2009) <Emergency Financial Measure> ・ Emergency Fund (prepared at the Presidential office)	・ Standing Order is to be revised. Institutional arrangements for emergency operation are supposed to be re-structured.	5	5	3
			Local Level	<Emergency Financial Measure> ・ Emergency response budget is received according to the scale of a disaster.	・ Contingency Planning and Coordination, Camp Management, Damage and Need Assessment, Recovery Planning are necessary.			
		7.2 Early Warning	General Warning and Forecast/Communication	・ Forecast of heavy rainfall is issued by DMH. ・ The forecast information is issues from DMH to relevant agencies according to transmission flow by FAX, Phone and SSB (Single Side Band). DMH also delivers early warning to mass media. ・ DMH disseminates to public through TV, radio, website, and so on. Public also receive early warning from local staffs riding motorbikes and bicycles with loudspeakers.	・ Early warnings don't act on effectively because systematic means of dissemination to risk prone communities has not been implemented.	2.(ii)	2.(ii)	1.2
			Flood	・ Flood forecast is issued by Meteorology and Hydrology Department (DMH). ・ Myanmar has 162 meteorological / hydrological monitoring stations and 18 meteorological monitoring stations for agriculture. ・ DMH announces early warning through media such as TV, radio, website, newspapers and so on. Public also receive early warning from local staffs riding motorbikes and bicycles with loudspeakers. ・ Meteorology and Hydrology Department announces early warning through media such as TV, radio and newspapers.				
			Earthquake / Tsunami	・ Earthquakes are monitored at 11 monitoring stations. ・ In Yangon Office with 14 staffs in earthquake section and Mandalay Office with 3 staffs in earthquake section, 24-hour monitoring system is in place. ・ The occurrence of earthquakes is informed from these 2 offices to the director of DMH. Head Office of DMH collects information through internet and satellite TV and transfers it to ministries and agencies. In case of region-wide earthquake, Myanmar gets information on Tsunami from Japan Meteorological Agency, PTWS, ADPC in Thailand and China by facsimile.	・ Accuracy and speed of earthquake monitoring, analysis and information communication have room for improvement. ・ Communication measures between earthquake monitoring station and the head office of DMH should be enhanced in terms of power supply and dedicated line connection.			
			Sediment disaster (Landslide, Debris flow)	・ The early warning system for sediment disaster has not been development except for heavy rain warning issued by DMH.				
			Volcano	N/A				
			High Tide /Storm Surge (Cyclone/ Typhoon)	・ Forecast of cyclone and storm surge are issued by DMH.				
			Other disasters	<Forest Fire> ・ Based on ASEAN Agreement on Prevention of Trans-boundary Haze, early warning system utilizing satellite image was developed.				
		7.3 Evacuation plan				5	5	3
		7.4 Establishment of Emergency Response System	Central Level	・ Standing Order (2009): In case of disaster, Development Association, Schools, Army, Reserved Volunteers, Myanmar National Committee for Women’s Affairs and Police Force engage in response activities.		5	5	3
			Local Level		・ Local level arrangements may need to be included in Standing Order			
			Training etc.	・ Search and rescue drills are provided for Township level by Fire Services Department.				

	7.5 Rescue plan	・ National Search and Rescue Committee (established in 2011) is responsible agency.		5	5	3
	7.6 Relief plan	・ Foods and supply stocks are kept by Relief and Resettlement Department in 17 Stock piling centers in state and divisions and in central warehouse in Yangon. ・ Non-food items for 55000 households are stocked nationally. ・ Safe shelters are constructed in disaster prone areas.		5	5	3
Assistance to challenges	8. Records of Major Assistance by JICA	<Technical Assistance/Dispatch of Experts/Emergency Support> ・ Flood Relief Emergency Support (1997, 2002, 2004) ・ Capacity Development of Earthquake Monitoring (2006) <Trainings> ・ Earthquake Engineering (2000-2002) ・ Port (2000-2003, 2005) ・ Meteorology (2000) ・ Sewerage Engineering (2002) ・ Emergency Disaster Rehabilitation System (2003) ・ River and Dam Engineering (2005) ・ Earthquake, Quake-resistance and Disaster Mitigation Engineering (2006) ・ River and Dam Engineering Ⅲ(2006) ・ Port Development and Planning (2006) ・ Mental Health Service after Disaster (2006) <Studies> ・ The Study on Water Supply System in Mandalay City and in the Central Dry Zone in the Union of Myanmar (2001.3-2003.7)				
	9. Records of Assistance by other Development Partners	・ WHO: Funding for the development of flood preparation action plan in Bago Taing by Department of Health ・ UNDP: Comprehensive Multi-hazard Programme and National Action Plan on Disaster Risk Reduction(2010) ・ ECHO: ECHO for natural disaster(1994-2011) ・ ECHO: ECHO for flash flood (1994-2011) ・ AusAid: Cyclone giri (2010-2011) ・ AusAid: Northern Rakhine State floods (2010-2011) ・ AusAid: Asia Regional Disaster Risk Management (2007-2011) ・ NZaid: Regional programme-Disaster Management and Emergency Response (2009-2012)				
	10. International Networking	・ In case of region-wide earthquake, Myanmar gets information on Tsunami from Japan Meteorological Agency, ADPC in Thailand and China by facsimile. ・ Myanmar is a panel member country of WMO (World Meteorological Organization). DMH serves as the focal point.				
ASEAN Cooperation	11. National Policy on ASEAN(ACDM, ARPDM, AADMER) cooperation in Disaster Management, Emergency Response in case of disasters in other ASEAN countries or ASEAN region	・ Signed AADMER in 2007(ASEAN Agreement on Disaster Management and Emergency Response) (AADMER stipulates mutual cooperation in case of disaster.) ・ Participation in ARF meetings on disaster management, monthly ACDM meetings, ARDEX (ASEAN Regional Disaster Exercise)and ASEAN regional technical cooperation Project ・ SASOP (Regional Standing Arrangement and Standard Operating Procedures) started in 2007. ・ Agreement on trans-boundary haze was signed by ministers of ASEAN countries in charge of environment in 2002 and came into effect in 2003. It stipulates forest fire monitoring, prevention, research, coordination mechanism, communication system, information exchange, mutual emergency support and establishment of ASEAN coordination center. Action plan for capacity building of fire fighting in the region and early warning system utilizing satellite images were developed.				
	12. Resources useful for other ASEAN countries					
	13. Needs for External Assistance from the point of view of Regional Cooperation					

	Inventory				HFA PforA	HFA IofP	AADMER
Current Situation and Challenges	1. Features of Disasters	• Frequent Natural Disasters: 1980-2011 EM-DAT, total nos. 384,; out of these, Storm (55%), Flood (28%), sediment disasters (8%), others (9%). • Annually some 30 tropical cyclones are formed near the Marian Trench. Some 20 out of 30 approach to Philippines. 4-5 out of 20 hit Philippines and bring storms, floods and sediment disasters.					
	2. Administrative Division	• 17 Region (mere administrative division)- 80 Provineces-138 City- 1496 Municipalities - 42,027 Barangay (as of March 31, 2012)					
	3. Development of Legislative Framework and Disaster Management Policy & Plans		Current Situation	Challenges	1.(i)	1.(i)	2.1
		Development of Legislative Framework	<Fundamental Law> • Republic Act 101211 on Disaster Risk Reduction (2010) <Laws in Relevant Sectors> • Republic Act 9729 (Climate Change Act, 2009) • The Subdivision Law • National Building Code • The Environmental Policy Law • The Watershed Law • Local Government Code				
		Disaster Management Policy	• Strategic National Action Plan 2009-2019	• Integration of Strategic National Action Plan 2009-2019 into government policy • Integration of disaster risk reduction and Climate Change Adaptation			
		Disaster Management Plans	<Central Level> • National Disaster Risk Reduction and Management Plan 2011-2028 • National Climate Change Action Plan 2010-2018 <Local Level> • Local Disaster Risk Reduction and Management Plans • Local Climate Change Action Plan • Integrated River Basin Management Plan (A planning guideline is under formulation)	• Preparation of implementation plan of National DRRM plan • Preparation of a guideline of planning for local disaster risk reduction plan • Integrated river basin management is emphasized in MTPDP. Enhancement and expansion of network and coordination with multiple organizations will be required.			
	4. Establishment and Enhancement of Disaster Management System	Institutional Framework	Current Situation	Challenges	1.(ii)	1.(ii)	2.1 4
		Central Level	<u>National Disaster Risk Reduction and Management Council (NDRRMC)</u> • Chair: Secretary of Department of National Defense (DND) • Vice co-chairs: (1) Secretary of the Department of Science and Technology (Prevention and Mitigation); (2) Secretary of the Department of Interior and Local Government (Preparedness); (3) Secretary of the Department of Social Welfare and Development (Response); (4) Director-General of the National Economic and Development Agency (Rehabilitation and Recovery) • Executive Director: Administrator of Office of Civil Defense				
			<u>Organizations in charge of Non-structural Measures for Disaster Risk Mitigation and Preparation:</u> • Earthquake: Philippine Institute of Volcanology and Seismology (PHIVOLCS), OCD, Department of Public Works and Highways (DPWH), Housing and Land Use Regulatory Board (HLURB), National Economic and Development Authority (NEDA), Department of Education (DepEd), and Department of Health (DOH) . • Tsunami: PHIVOLCS, OCD, Phil Coast Guard, Armed Force, Police and Local Government Units (LGUs) • Volcano Eruption: PHIVOLCS, OCD, Armed Force, Police and LGUs • Flood: Philippine Atmospheric, Geophysical and Astronomical Services (PAGASA),/Department of Science and Technology (DOST), OCD, DPWH, law enforcement agencies, LGUs and Mines and Geosciences Bureau (MGB) • Debris flow: PHIVOLCS, PAGASA,/DOST, Department of Environment and Natural Resource (DENR), OCD, river basin control offices, DPWH and law enforcement agencies and LGUs • Landslide: PHIVOLCS, PAGASA, MGB, OCD, LGUs and law enforcement agencies • Drought: PAGASA, Department of Agriculture (DA), dam operators & water resource management offices, Department of Trade and Industry, DOH • Forest Fire: Bureau of Fire Protection, LGUs, OCD, law enforcement agencies, DOH, Forest Management Bureau <u>Organizations in charge of Structural Measures for Disaster Risk Mitigation:</u> • Earthquake: PHIVOLCS, DPWH, Department of Transportation and Communication (DOTC), LGUs, Department of Energy (DOE), HLURB • Tsunami: PHIVOLCS, DPWH, LGUs, DENR, DOTC • Volcano: PHIVOLCS, DPWH, Department of Social Work and Development (DSWD), LGUs, DA and DENR • Flood: DOST-PAGASA, DPWH, DA, LGUs, DENR • Debris flow: PHIVOLCS, PAGASA, MGB, DPWH, DA, LGUs, DENR • Landslide: PHIVOLCS, PAGASA, MGB, DPWH, DA, LGU, DENR • Forest fire: Forest Management Bureau (DENR)				
		Local Level	<u>Regional Disaster Risk Reduction and Management Councils</u> (RDRRMC:17) • Function: Coordination, integration, supervision and evaluation of the activities of the Local Disaster Risk Reduction and Management Councils • Operating Facility: Regional Disaster Risk Reduction and Management Operation Center (to be established when necessary) • Chair: Regional Directors of OCD • Vice chairperson: Regional Directors of (1) Department of Social Welfare and Development, (2) Department of Interior and Local Government, (3) DOST, and (4) NEDA <u>Local Disaster Risk Reduction and Management Councils (LDRRMC: 80 Province, 138 Cities, and 1496 Municipality)</u> • Chair: Local Chief Executive <u>Barangay Development Council</u> (42027 Barangays)				
		Inter-organizational Arrangement	• NDRRMC serves as the multi-sectoral platform with overall supervision of its network of Local Disaster Risk Reduction and Management Councils and offices. • NDRRMC also engages all government agencies based on their technical expertise and existing mandates to address the requirements for disaster risk reduction and management. • CSO or NGO and private sector participation is also ensured to provide a more comprehensive analysis and appreciation of situations and in coming up with an appropriate intervention to manage disaster risks. • NDRRMC coordinates through the Office of Civil Defense (OCD) whose personnel operates the NDRRM Operations Center on a 24/7 basis to coordinate the requirements for disaster risk management.				

		Financial Preparation	<Annual Budget> ・ The Act 101211 renamed former Calamity Fund into “Disaster Risk reduction and Management Fund” available even for disaster mitigation and prevention activities. ・ At local level, 5% of expected revenue from regular resources is set aside for “Local Disaster Risk Reduction and Management Fund (LDRRMF)”. <Contingency Fund> ・ 30% of “Disaster Risk reduction and Management Fund” is allocated for “Quick Response Fund (Stand-by Fund)” ・ 30% of “Local Disaster Risk Reduction and Management Fund (LDRRMF)” is allocated as “Quick Response Fund (Stand-by Fund)”.	・ Utilization of disaster risk reduction fund by Local government needs a guideline.			
	5. Policy on Community-based Disaster Management	・ Strategic Plan to Integrate Community-Based Disaster Risk Management (CBDRM) (2007-2011) was developed. ・ CBDRM is adopted in National Disaster Risk Reduction and Management Plan 2011-2028 ・ Metro Manila has implemented community support through LGUs such as “Flood control Bayanihan zone alliance”, which promotes community activities of construction, rescue and communication in different stages of flood disaster.			1.(iii)	1.(iii)	2.6 4
	6. Prevention and Mitigation	Current Situation		Challenges	-	-	-
	6.1 Flood	Identification of Disaster Risks	・ Various hazard maps for 22 provinces for earthquake, tsunami, landslide, flood and volcano have been developed based on the existing maps prepared by NAMRIA (National Mapping and Resource Information Authority) through READY Project, which was funded by UNDP and AusAID. The project was initiated by NDRRMC (National Disaster Risk Reduction and Management Council) in cooperation with other bodies, and completed in December 2011.	・ Flood hazard maps available for evacuation activities have not been prepared.	2.(i)	2.(i)	1.1
		Monitoring	・ Hydrological monitoring is conducted by PAGASA. ・ PAGASA's telemetric flood forecasting and warning systems (FFWS) have been installed in the 4 river basins. There are 45 rainfall stations and 31 river water level stations in total. ・ In addition, one more FFWS has been established and operated by MMDA.	・ Out of FFWS in 4 river basins, the systems in Bicol and Cagayan have not been well-functioned.	2.(i)	2.(ii)	1.3
		Non-structural Measures	・ Community-based flood management system has been introduced in some flood prone areas. Evacuation activities have proved effective for reduction of flood damages. ・ Land use regulation is stipulated in some flood prone areas for the purpose of preventing encroachment in sandbars along river banks.	・ Lang use regulation is not adequately recognized by local government.	4.(i)	4	2.2
		Structural Measures	・ The policy is stated in the Medium Term Philippines Development Plan that mainstreaming of disaster risk mitigation should be promoted in development plan, land use and infrastructure sector through re-afforestation in land slide-prone area, tree planting on river banks, and keeping adequate capacity of drainage channels by bank strengthening works and dredging.	・ Issues of budgetary constraints and priority of development exist. ・ Standard to incorporate disaster risk mitigation measures into development plans & investment plans is not in place.	4.(i)	4	2.2
	6.2 Earthquake / Tsunami	Identification of Disaster Risks	・ PHIVOLCS under DOST is in charge of hazard mapping, risk and vulnerability assessment and education for earthquake and tsunami disaster. ・ The hazard maps of 22 Provinces were developed in READY project. ・ The microzoning hazard maps with a scale of 1:5,000 in Metro Manila were developed in the JICA development study (2004). ・ Based on the simulations conducted by PHIVOLCS, the tsunami hazard maps with a scale of 1:100,000 to 1:50,000 in 3 islands of Luzon, Mindanao and Visayas were developed. ・ PHIVOLCS has produced the software “REDAS” (Rapid Earthquake Damage Assessment) that anticipates seismic damages after a strong earthquake occurs.	・ Accuracy of the tsunami simulation is low due to the low accurate nautical map of base map.	2.(i)	2.(i)	1.1
		Monitoring	・ PHIVOLCS under DOST is in charge of development of monitoring system, forecast of earthquake and crustal movement and analysis of seismic system. ・ PHIVOLCS has 66 seismic observatories and plan to increase up to 85 observatories by 2016. ・ EQ-Plotter and REDAS produced by PHIVOLCS and PCIEERD decides hypocenter and magnitude, and anticipates the hazards automatically when earthquake occurs. ・ SATREPS project “Enhancement of Earthquake and Volcano Monitoring and Effective Utilization of Disaster Mitigation Information Project” has been conducted by JICA and JST form 2010 to 2015. The project plans to install 100 broadband seismographs and 10 strong motion accelerographs. ・ One tsunami detecting instrument (WET censor) has been monitoring since 2007. Five WET censors are planned to install.		2.(i)	2.(ii)	1.3
		Non-structural Measures	・ DPWH established a quake-resistance standards for public works based on AASHTO (American Association of State Highway and Transportation Officials) in 1992, and amended in 2004.	・ Engineer for antiseismic technology is needed to improve and increase.	4.(i)	4	2.2
		Structural Measures	・ Metro Manila restricts to construct public buildings in the liquefiable area. ・ DPWH has conducted the small-scale antiseismic reinforcement of bridges, such as prevention work from falling bridge beam and repair of pillar.	・ The antiseismic reinforcement has not been conducted in many buildings and structures due to lack of budget.	4.(i)	4	2.2
	6.3 Sediment disaster (Landslide, Debris flow)	Identification of Disaster Risks	・ MGB under DENR is in charge of hazard mapping for sediment disaster. ・ Hazard maps for sediment disaster have been drawn with a scale of 1:50,000 and 1:10,000 in READY project. The hazard maps are open to the public in website of MGB.	・ Hazard map with a scale of 1:50,000 is not applicable for disaster prevention planning because hazard type and exact location are unclear.	2.(i)	2.(i)	1.1
		Monitoring	・ Monitoring for sediment disaster such as landslide movement has not been conducted.		2.(i)	2.(ii)	1.3
		Non-structural Measures	・ MGB has conducted the disaster education including the workshop and seeting sign indicating the hazardous area in READY project. ・ The main disaster responses are removal of soil, evacuation and relocation after disaster occurrence.		4.(i)	4	2.2
		Structural Measures	・ The countermeasures for sediment disaster except for along the road have not been conducted.		4.(i)	4	2.2
	6.4 Volcano	Identification of Disaster Risks	・ PHIVOLCS is in charge of hazard mapping and disaster prevention plan for the volcanic disaster. ・ PHIVOLCS has produced the hazard maps with a scale of 1:25,000 in 14 volcanoes, and classified ash fall, lava flow, pyroclastic flow and lahar (volcanic mud flow) in order to utilize evacuation plan, emergency response and land use etc.	・ The accuracy of the hazard maps is low because they are produced based on the expanded topographical map with a scale of 1:50,000 surveyed by NAMRIA.	2.(i)	2.(i)	1.1
		Monitoring	・ PHIVOLCS is in charge of development of monitoring system, detection and forecast of eruption and analysis of volcanic mechanism. ・ In 6 active volcanoes (Taal, Pinatubo, Mayon, Bulusan, Hibok-hibok, Kanlaon) out of 22 volcanoes, the observatories and monitoring systems are installed. In Parker and Matutum active volcanoes, one set of seismograph was installed.	・ There is a need to develop the monitoring system in the volcanoes without the monitoring system.	2.(i)	2.(ii)	1.3
		Non-structural Measures	・ PHIVOLCS established the two-phased volcanic hazardous area to restrict residence and entry in Mayon volcano.		4.(i)	4	2.2
		Structural Measures	・ DPWH has constructed structural works such as sediment control dam, mega dike and super dike etc in Pinatubo and Mayon volcanoes.		4.(i)	4	2.2

			・ PHIVOLCS and DPWH has conducted the evacuation drill in some community in their projects.				
	6.5 High Tide /Storm Surge (Cyclone/ Typhoon)	Identification of Disaster Risks	・		2.(i)	2.(i)	1.1
		Monitoring	・		2.(i)	2.(ii)	1.3
		Non-structural Measures	・		4.(i)	4	2.2
		Structural Measures	・ DPWH has constructed the sea walls against high tide and storm surge along Roxas Boulevard in Metro Manila.		4.(i)	4	2.2
	6.6 Other Disasters	Identification of Disaster Risks			2.(i)	2.(i)	1.1
		Monitoring			2.(i)	2.(ii)	1.3
		Non-structural Measures			4.(i)	4	2.2
		Structural Measures			4.(i)	4	2.2
	6.7 Common items for Disaster	Non-structural Measures	・ Hazard maps are being prepared in 27vulnerable provinces ・ The policy is stated in Medium Term Philippines Development Plan (MTPDP: 2004-2010) that the development of early warning system for communities is to be promoted in landslide-prone areas. It is under construction in 27 provinces with high priority. ・ NDRRMC has established the Operations Center. The Operation Center has installed a DMIS that is connected with relevant agencies and local governments. In emergency situations, the center collects and integrates information on damages from and responses to the disaster to take advantage of the DMIS. ・ There is the Rapid Earthquake Damage Assessment System (REDAS) as other disaster management system which has developed by PHIVOLCS in 2002-2004.	・ Knowledge of local governments on disaster risk evaluation & monitoring and importance of hazard mapping & early warning system should be enhanced. ・ Local governments' understanding on information dissemination (what kind of data to be collected and what information to be informed to people) should be enhanced.	4	4	2.2 2.5
					4	4	2.8
		Structural Measures			4	4	2.3.2 2.3.3
		Climate Change Adaptation	・ Responsible body: Inter-Agency Committee on Climate Change (1991), Presidential Task Force on Climate Change (2007), Advisory Council on Climate Change Mitigation, adaptation and Communication ・ NFP: Presidential Task Force on Climate Change ・ The Medium Term Philippine Development Plan (MTPDP) for 2004-2010 refers to climate change adaptation within the context of disaster risk reduction. ・ Updated MTPDP 2004-2010 (2009) showed a progress in the mainstreaming of climate change adaptation. ・ The Philippine Climate Change Act of 2009 recognizes the inter-linkage between climate change and disaster risk reduction and mandates the integration of disaster risk reduction into climate change programs and initiatives. ・ Climate change adaptation is addressed in the 12-year National Framework Strategy and Program on Climate Change (2012-2022). ・ The Philippine Information Agency is responsible for disseminating information on climate change, local vulnerabilities and risk, relevant laws and protocols and adaptation measures. ・ DOST developed National Science Intervention Plan, which will be a guideline for policymakers to build strategies based on climate change vulnerability assessment. PAGASA will lead efforts of geo-hazard mapping, data collection and capacity development of researches on climate change. ・ Climate change task force directly under the President was formed. ・ DOST developed National Science Intervention Plan, which will be a guideline for policymakers to build strategies based on climate change vulnerability assessment. PAGASA will lead efforts of geo-hazard mapping, data collection and capacity development of researches on climate change. ・ Climate change task force directly under the President was formed.		4.(i)	4.(i)	2.7
		Public Awareness Research and Development /Human Resource Development / for Disaster Management	・ Department of Education is in charge of school education. There are Primary school and Secondary school curricula on disaster prevention and mitigation. ・ Philippine Information Agency (PIA) is primarily responsible for public awareness and capacity building in communities. ・ About awareness of tsunami, people learn by pamphlet of tsunami and website. Signboards are installed in evacuation sites. Evacuation drills are carried out in schools and communities nationwide. ・ PHIVOLCS has exhibited learning materials for natural disaster. PHIVOLCS invites school students and teaches them natural disaster. ・ Department of Education has begun the Integration of Disaster Risk Reduction and Climate Change Adaptation, Environment education, road safety and peace education in the Basic Education Curriculum of public schools.		3	3	2.3.1
	7. Preparedness and Response	Current Situation		Challenges			
		7.1 Disaster Response plan / Emergency Financial Measure	Central Level	<Emergency Operation Plan(EOP), Contingency Plan(CP) .etc> ・ It is planned to prepare "National Disaster Response Plan" which is scenario-based disaster preparedness plan including the system of search, rescue and recovery of the rescue areas. <Emergency Financial Measure> ・ Financial reserves for emergencies are secured under "Disaster Risk Reduction and Management Fund" both national and local government levels as "Quick Response Fund" or "Stand-by fund" for relief and recovery programs.		5	5	3
			Local Level	<Emergency Operation Plan(EOP), Contingency Plan(CP) .etc> ・ Emergency Response Plans were prepared in 50 communities. <Emergency Financial Measure> ・ Financial reserves for emergencies are secured under "Disaster Risk Reduction and Management Fund" both national and local government levels as "Quick Response Fund" or "Stand-by fund" for relief and recovery programs.	・ A Disaster Preparedness Audit to survey Local government units resulted that 33% of Provinces, 34% of cities and 60% of municipalities are not prepared in terms of functionality of LDRRMC, availability of evacuation centers, appropriate equipage, and quality of the disaster risk management plan			
		7.2 Early Warning	General Warning and Forecast/Communication			2.(ii)	2.(ii)	1.2
			Flood	・ PAGASA predicts floods based on the collected data and conveys announcement of flood warning to OCD, DPWH and NWRB, according to the warning level. ・ The FFWS operated by PAGASA (Philippine Atmospheric, Geophysical and Astronomical Services Administration) have been established for the strategic 4 river basins of Pampanga, Agno, Bicol and Cagayan. ・ In addition, there is one more FFWS for the Marikina river basin under the control	・ The systems in Bicol and Cagayan have not been well-functioned due to malfunction of gauging devices, inadequate update of H-Q curves,			

			of MMDA (Metro Manila Development Authority). ・ Once flood forecast is completed by PAGASA, the result is reported to OCD and concerned organizations. Warning information issued by OCD is disseminated to the public through local government networks, while real time information is also available through PAGASA's website, mass media and SNS.	and inappropriate setting of warning water level. ・ There is some scope of improvement for the full use of flood warning system by PAGASA.			
		Earthquake / Tsunami	・ Issuance of early warning of tsunami and volcanic eruption is under responsibility of PHIVOLCS. ・ PHIVOLCS has a Network of earthquake monitoring stations. Tsunami warning is issued by PHIVOLCS based on those observation data. ・ Tsunami warning system is set up for Manila Bay area. ・ PHIVOLCS disseminates tsunami warning to mass media (TV, radio) through OCD and LGU.				
		Sediment disaster (Landslide, Debris flow)	・ There is no early warning system for sediment disaster.				
		Volcano	・ Manned observation stations are set up and regular monitoring is conducted in 6 volcanoes. ・ PHIVOLCS has a Network of volcano observatories. Volcano alert is issued by PHIVOLCS based on those observation data. However, the volcano which has been real-time monitoring systems totals to only 6 volcanoes out of 23 active volcanoes. Other 17 volcanoes are observed only seismic activities. ・ Volcano alert levels are established in consideration of eruption type and local circumstances in each volcano and are classified in 5 levels.	・ PHIVOLCS desires to prepare instruments for carrying out emergency observation for those 17 volcanoes if their activity went up.			
		High Tide /Storm Surge(Cyclone/ Typhoon)	・ Issuance of early warning of typhoon is under responsibility of PAGASA.				
		Other disasters					
	7.3 Evacuation plan				5	5	3
	7.4 Establishment of Emergency Response System	Central Level	・ NDRRMC has operation center with constant staffing, which functions as emergency operation center (EOC) during disasters. Member organizations of NDRRMC send focal persons to EOC during disasters for quick coordination and information management.		5	5	3
		Local Level	・ The Act 101211 (SEC 15) provides a guide for local coordination during emergencies: LGUs are primary responsible organizations which are supported by LDRRMCs. Private Sector and Civil Society Organizations works in accordance with the coordination mechanism and policies set by LDRRMCs.	・ Permanent and reliable emergency medical services are necessitated at local level across the nation.			
		Training etc.	・ OCD holds emergency response drills and training on alarming system and technical emergency response in the whole country. ・ Drills are regularly conducted in schools and hospitals by Departments of Education and Health.				
	7.5 Rescue plan	・ It is observed that rescue items are reserved within containers under the bridges or spaces as such. (a case of Metro Manila)			5	5	3
	7.6 Relief plan	・ It is observed that stockpiles are reserved within containers under the bridges or spaces as such. (a case of Metro Manila)			5	5	3
Assistance to challenges	8. Records of Major Assistance by JICA	<Technical Assistance/Dispatch of Experts> ・ The Project for Enhancement of Capabilities in Flood Control and Sabo Engineering of the Department of Public Works and Highways (2000-2003, 2003-2005) ・ The Project for Strengthening of Flood Forecasting and Warning Administration (2004-2006) ・ The Project for Strengthening the Flood Management Function of DPWH (2005-2010) ・ The Project for Improvement of Earthquake and Volcano Monitoring System(2004-2006) <Studies> ・ Study for River Dredging Project (1974) ・ Nationwide River Dredging M/P(1982) ・ Project Formulation Study “Disaster Management” (1998) ・ Program Formulation Study in Disaster Management (2004) ・ The Nationwide Flood Risk Assessment and the Flood Mitigation Plan for the Selected Areas(2006-) ・ Project Formulation study on Program for the Disaster prevention(2007-2008) ・ Study on Integrated Water Resources Management for Poverty Alleviation and Economic Development in Pampanga River Basin(2009.2-2011.2) ・ The Study for Improvement of Water Supply and Sanitation in Metro Cebu(2009.1-2010.8) ・ The Study on Comprehensive Flood Mitigation for Cavite Lowland Area(2007.3-2009.2) ・ Earthquake Impact Reduction Study for Metropolitan Manila, Republic of the Philippines(2002.8-2004.3)				
	9. Records of Assistance by other Development Partners	・ WB: Recommendation of disaster management framework in the turning point of paradigm shift from disaster response to pre-disaster preparation and mitigation. ・ ADB/UNDP: Nationwide assessment of the situation of DRM/Preparation of DRM framework ・ EU/UNISDR/UNDP: Preparation of SNAP/Setting up of Mechanism for Stakeholders Participation in Disaster Mitigation ・ UNDP/AusAID/:READY Project(Preparation of Hazard Map and CBDRM)(2006-2011) /USAID: Urban Disaster Risk Reduction Project (1995-2004) ・ ECHO/ADPC:DRM Mainstreaming in Education Sector /Finland: Support for Setting up Tsunami Warning System in Manila Bay Area ・ ECHO/UNDP:DRM Mainstreaming in Development and Land Use/Physical Planning at Region Level ・ ADPC: Prioritization of Projects in Infrastructure Sector in the context of DRM Mainstreaming (Risk Assessment) ・ ADRC: Training on emergency logistics management (2003), Joint Training with PHIVOLCS on Disaster Management for stakeholders in Education Sector ・ WB: Disaster Risk Management Development Loan with a CAT DDO(2011-2014) ・ WB: Climate Change Adaptation Program (2010-2015) ・ WB: Disaster Risk Reduction City-To-City Sharing Initiative for Developing Countries (2009-2012) ・ UNDP: Integrating Disaster Risk Reduction and Climate Change Adaptation in Local Development Planning and Decision -making Processes(-2012) ・ UNDP: Building Community Resilience and Strengthening Local Government Capacities for Recovery and Disaster Risk Management (2012) ・ UNDP: Early Recovery and Rehabilitation for Central Mindanao (-2012) ・ ECHO: Improving Forest Governance and Sustainable Upland Development through Climate Change Mitigation Financing Strategies in Southern Palawan (2010-2012) ・ ECHO: Integrated Community Disaster Preparedness Program (ICDPP) in four provinces of Philippines(2010-2011) ・ ECHO: Strengthening Assets and Capacities of Communities and Local Governments for Resilience to to Disasters, Year 2 (ACCORD 2) (2008-2010) ・ ECHO: Disaster Risk Reduction in the Eastern Visayas Region (2008-2010) ・ ECHO: Community Based Disaster Risk Reduction in Bicol Region – Philippines (2008-2010) ・ AusAid: Building the Resilience and Awareness of Metro Manila Communities to Natural Disasters and Climate Change Impacts (BRACE Program) (2010-2017) ・ AusAid: Disaster and Climate Risks Management (2006-2014) ・ AusAid-UNDP: Hazard Mapping and Assessment for Community-Based Disaster Risk Management (READY II) (2006-2010) ・ Netherlands: Preparedness for Climate Change Programme (PfCC) - Phase 1(2006-2009)				
	10. International Networking	・ PTWC (Pacific Tsunami Warning Center) has network with NDCC and provides information on Tsunami.					
ASEAN Cooperation	11. National Policy on ASEAN(ACDM, ARPDM, AADMER) cooperation in Disaster Management, Emergency Response in case of disasters in other ASEAN countries or ASEAN region	・ Philippines has not signed AADMER (ASEAN Agreement on Disaster Management and Emergency Response), which stipulates mutual cooperation during disasters, yet. ・ Participation in ARF meetings on disaster management, monthly ACDM meetings, ARDEX (ASEAN Regional Disaster Exercise)and ASEAN regional technical cooperation Project ・ SASOP (Regional Standing Arrangement and Standard Operating Procedures) started in 2007. ・ Agreement on trans-boundary haze was signed by ministers of ASEAN countries in charge of environment in 2002 and came into effect in 2003. It stipulates forest fire monitoring, prevention, research, coordination mechanism, communication system, information exchange, mutual emergency support and establishment of ASEAN coordination center. Action plan for capacity building of fire fighting in the region and early warning system utilizing satellite images were developed.				
	12. Resources useful for other	・ FCSEC (Flood Control and Sabo Engineering Center) has hydrological experiment facilities and 15 technical experts who can provide lectures in international training courses.					

	ASEAN countries	
	13. Needs for External Assistance from the point of view of Regional Cooperation	

Inventory					HFA PforA	HFA IofP	AADMER
Current Situation and Challenges	1. Features of Disasters	• Singapore does not have tropical cyclone, earthquake nor volcano eruption. (Possibility of man-made disasters in urban area where various human activities concentrate.)					
	2. Administrative Division	5 Community Development Council Districts- 48 Constituencies					
	3. Development of Legislative Framework and Disaster Management Policy & Plans		Current Situation	Challenges	1.(i)	1.(i)	2.1
		Development of Legislative Framework	<Fundamental Law> • Fire Safety Act (1986) • Environmental Pollution Control Act (2002) • Civil Defense Act (1986) (It provides the legal framework for the declaration of a state of emergency and the mobilization and deployment of operationally ready national service rescuers) • Civil Defense Shelter Act (1997) (It provides the legal framework for provision of buildings with civil defense shelters during a state of emergency)				
		Disaster Management Policy					
		Disaster Management Plans	• Operations Civil Emergency (Ops CE) Plan • National Tsunami Management Plan (establishment of early warning system is discussed)				
	4. Establishment and Enhancement of Disaster Management System	Institutional Framework	Current Situation	Challenges	1.(ii)	1.(ii)	2.1 4
		Central Level	Home-front Crisis Management System • Home-front Ministry Group • Home-front Crisis Executive Group • Statutory Board Ministry of Home Affairs: (MHA) • Permanent Secretary: the chair of Home-front Crisis Executive Group • Main policy making organization for safety and defense of the nation Singapore Civil Defense Force (SCDF) • National organization for emergency response in charge of fire fighting and rescue • It commands and coordinates response of organizations concerned with advice by joint planning staffs. • It has 5,600 staffs (1,700 regular staffs, 200 civil staffs, 3,700 national service persons). In an emergency, more than 8300 stand-by national service persons can be mobilized. • There are 16 fire fighting offices over the nation divided into 4 divisions. In these offices, fire fighters and search and rescue staffs are deployed. Command center in SCDF head office decide and order to the nearest team to g for operation. • SCDF has established the Disaster Assistance and Rescue Team (DART), a specially trained unit that can undertake high-risk fire fighting and rescue operations.				
			Organizations in charge of Non-structural Measures for Disaster Risk Mitigation and Preparation • Department of Meteorology of the National Environment Agency(NEV)(provision of weather information, management of haze monitoring center) Organizations in charge of Structural Measures for Disaster Risk Mitigation • National Critical Infrastructure Authority				
		Local Level	Civil Defense Execution Committee (CDEC) • CDECs are grassroots entities that help to promote civil defense messages at the community level and assist in organizing various civil defense programs. Community Emergency Response Teams (CERTs) • CERTs are emergency response units consisting of residents living within a particular neighborhood's vicinity. • During emergencies, the CERTs will work hand in hand with the police and SCDF to mitigate the impact of the emergencies on the community.				
		Inter-organizational Arrangement	"Home-front Ministry Group" is organized under Home-front Crisis Management System • In an emergency, SCDF is vested with the authority to direct all response forces under a unified command structure. • With the coordination by SCDF, pre-planning activities and mitigating operations during an incident are undertaken by 18 other ministries and statutory boards under a unified framework of Operation Civil Emergency. • Exercises are regularly conducted to test the effectiveness of the multi-agency response and typically involve several hundred participants.				
		Financial Preparation	<Contingency Fund> • The Budget size for SCDF on national level is about SGD$300 million.				
	5. Policy on Community-based Disaster Management	• SCDF also aims to work hand in hand with the community to be more involved in their own safety and security. • Community Emergency Preparedness Programme (CEPP): Basic First Aid, One-Man Cardio-Pulmonary Resuscitation (CPR) & Automated External Defibrillator (AED), Fire Safety & Casualty Evacuation, Emergency Procedures and Terrorism. • Civil emergency handbook is provided to the public.			1.(iii)	1.(iii)	2.6 4
	6. Prevention and Mitigation	Current Situation		Challenges	-	-	-
	6.1 Flood	Identification of Disaster Risks	• Flood risk maps covering the whole country are being developed currently. On the other hand, 58 flood prone areas have been identified by Public Utilities Board (PUB), and the map is available on the website. The total area is estimated at 49 ha.		2.(i)	2.(i)	1.1
		Monitoring	• Responsible organization for flood monitoring is MSS (Meteorological Service Singapore) for meteorological observations and PUB for hydrological observations. There are 64 rainfall stations and 150 sensors for monitoring of the drainage system.		2.(i)	2.(ii)	1.3
		Non-structural Measures	• Past flash flood records have been accumulated and disclosed on PUB's website. The recorded items are; location, extent (depth, width, length and impact to traffic), findings and follow-ups.		4.(i)	4	2.2
		Structural Measures	• PUB adopts three key strategies for flood management, namely i) providing adequate drainage ahead of new developments, ii) implementing flood protection measures, and iii) continual drainage improvement in flood prone areas. In accordance with the strategies, necessary measures such as drainage systems and flood barriers have been developed and maintained.		4.(i)	4	2.2
	6.2 Earthquake / Tsunami	Identification of Disaster Risks	• Historically, big earthquake disaster and tsunami disaster are not recorded. • Tsunami risk assessment was completed. Some beaches vulnerable to the risk of Tsunami were identified.		2.(i)	2.(i)	1.1
		Monitoring	• The seismic monitoring network in Singapore currently comprises four sensors located at Bukit Timah, Jurong West, Pulau Tekong and Toa Payoh.		2.(i)	2.(ii)	1.3
		Non-structural Measures			4.(i)	4	2.2
		Structural Measures			4.(i)	4	2.2
	6.3 Sediment disaster (Landslide, Debris flow)	Identification of Disaster Risks			2.(i)	2.(i)	1.1
		Monitoring			2.(i)	2.(ii)	1.3
		Non-structural Measures			4.(i)	4	2.2
		Structural Measures			4.(i)	4	2.2
	6.4 Volcano	Identification of Disaster Risks	• There is no active volcano in Singapore.		2.(i)	2.(i)	1.1
		Monitoring	N/A		2.(i)	2.(ii)	1.3
		Non-structural Measures	N/A		4.(i)	4	2.2

		Structural Measures	N/A		4.(i)	4	2.2
	6.5 High Tide /Storm Surge (Cyclone/ Typhoon)	Identification of Disaster Risks			2.(i)	2.(i)	1.1
		Monitoring			2.(i)	2.(ii)	1.3
		Non-structural Measures			4.(i)	4	2.2
		Structural Measures			4.(i)	4	2.2
	6.6 Other Disasters	Identification of Disaster Risks			2.(i)	2.(i)	1.1
		Monitoring			2.(i)	2.(ii)	1.3
		Non-structural Measures			4.(i)	4	2.2
		Structural Measures			4.(i)	4	2.2
	6.7 Common items for Disaster	Non-structural Measures	・ SCDF does not need DMIS and a disaster loss database for natural disaster because a large disaster has not occurred so far. ・ SCDF has established the Emergency Operation Center (EOC). In emergency situation, SCDF manages the situation of disaster response. ・ The Building and Construction Authority of Singapore has strict building codes and conducts regular checks to ensure their compliance.		4	4	2.2 2.5
					4	4	2.8
		Structural Measures	・ National Critical Infrastructure Authority is responsible to assist major buildings and infrastructure risk assessment.		4	4	2.3.2 2.3.3
		Climate Change Adaptation	・ Responsible body: National Climate Change Committee (2007), National Climate Change Secretariat (2010) ・ NFP: Ministry of Environment and Water Resources ・ National adaptation policy is embodied in the National Climate Change Strategy (2008) ・ There is a study on-going on the impact of climate change on Singapore.		4.(i)	4.(i)	2.7
		Public Awareness Research and Development /Human Resource Development / for Disaster Management	<Disaster Awareness Raising/Disaster Education/Drills> ・ Since 1982, the SCDF has been reaching out to people with the objectives of enhancing the awareness of the whole population in Civil Defense. Under the Civil Defense Public Education Program, the SCDF aims to have at least one member of every household trained in civil defense skills. ・ The Meteorology Service has in place all standard of procedures for various types of disasters. ・ SCDF oversees the civil defense shelter construction program. ・ Public education takes place via the distribution of the Civil Defense Emergency Handbook. ・ Methods of educating the public include the conduct of annual Community Exercises and the Home Fire Safety Visit Program. The former familiarizes the grassroots volunteers and residents on how to deal with large scale emergencies within their neighborhood, while the latter provides personal fire safety advice from CD volunteer personnel to registered residents. ・ To sensitize and get the community more prepared for terrorist acts, the SCDF conducts modular-based instructional training for the public under the Community Emergency Preparedness Program (CEPP). ・ SCDF constantly recruits volunteers from the community. They are trained to assist the SCDF in operational and public educational activities. ・ SCDF and other MHA agencies have established the Community Safety and Security Program (CSSP), a framework that encourages the community to look after its own safety and security through self-help and mutual support. ・ SCDF works closely with the Ministry of Education to incorporate emergency preparedness as a subject within the Civics and Moral Education Syllabus for students in the primary and secondary levels. Since 2005, SCDF has reached out to the youths in secondary schools through the formulation of the National Civil Defense Cadet Corps. In 2007, SCDF started to reach out to primary school students through a Fire Station Engagement Program.		3	3	2.3.1
	7. Preparedness and Response	Current Situation		Challenges			
		7.1 Disaster Response plan / Emergency Financial Measure	Central Level	<Emergency Operation Plan(EOP), Contingency Plan(CP) .etc> ・ The Ops CE is a national-level contingency plan. The Ops CE is activated when pre-defined emergency event occur. ・ SCDF has a comprehensive set of emergency preparedness plan, which includes Community Emergency Preparedness Programme.		5	5	3
			Local Level				
		7.2 Early Warning	General Warning and Forecast/Communication	・ The National Environment Agency (NEA) provides weather surveillance and multi-hazard warning services on a 24/7 basis to the public, industry and relevant agencies in Singapore. ・ NEA established the Meteorological Service Singapore (MSS). MSS provides weather forecasts, heavy rain warnings, smoke haze advisories, and information of earthquake/tremor/tsunami. ・ SCDF has a Public Warning System (PWS) to provide early warning to the general population of any imminent threats that could endanger lives and property. PWS is in place with an island wide network of more than 240 outdoor sirens mounted strategically on high rise buildings. ・ Radio and TV stations broadcast advisory message from SCDF. ・ MSS has implemented “myENV iPhone App” in July 2011 to provide environmental information (including weather information) to iPhone users. ・ The Heavy Rain SMS Alert System is implemented in July 2011 in collaboration with the PUB (national water agency) to provide SMS alerts of heavy rain and high water levels in canals to the public.		2.(ii)	2.(ii)	1.2
			Flood	・ MSS provides warnings of heavy rain as well as real-time rainfall data from its network of 64 rain gauges around the island for the purpose of flood monitoring. In contrast, PUB has 150 water level sensors for monitoring of the drainage system. Warnings are disseminated via SMS, fax and internet.				
			Earthquake / Tsunami	・ MSS provides information of earthquake/tremor/tsunami. ・ Tsunami early warning system was developed in 2008. It is able to receive data in real-time from more than 20 seismic stations in the region.				
			Sediment disaster (Landslide, Debris flow)				
			Volcano	・ MSS monitors and issues advisories/alerts about volcanic ash fallout to aviation sector and the public. ・ Alerting and assessments are based on advisories from Volcanic Ash Advisory Centers (VAAC) and dispersion models run in-house.				
			High Tide / Storm Surge (Cyclone/ Typhoon)				
			Other disasters	・ MSS carries out routine monitoring of the forest fires/ haze situation in the region using data from the polar-orbiting satellites. MSS advises the Haze Task Force on risk of trans-boundary haze affecting Singapore.				
		7.3 Evacuation plan	・ Ops CE plan ・ “Community Emergency Preparedness Program” provides evacuation methods.		5	5	3
		7.4 Establishment of Emergency	Central Level	・ SCDF provides effective 24-hour fire fighting, rescue and emergency ambulance services. ・ In an emergency, SCDF is vested with the authority to direct all response forces	5	5	3

	Response System		under a unified command structure. ・ With the coordination by SCDF, pre-planning activities and mitigating operations during an incident are undertaken by 18 other ministries and statutory boards under a unified framework of Operation Civil Emergency.				
		Local Level					
		Training etc.	・ Exercises are regularly conducted to test the effectiveness of the multi-agency response and typically involve several hundred participants.				
	7.5 Rescue plan	・ Ops CE plan ・ Country Emergency Rescue Team (CERT) is formed by community volunteer.			5	5	3
	7.6 Relief plan	・ Ops CE plan			5	5	3
Assistance to challenges	8. Records of Major Assistance by JICA	<Experts> ・ Disaster Management/Emergency Medical Services (2006) <Studies> ・ Study mission on disaster assistance cooperation projects (2004-2005)					
	9. Records of Assistance by other Development Partners						
	10. International Networking	・ Intergovernmental Coordination Group for the Indian Ocean tsunami Warning and mitigation System was established in 2005 under the coordination of IOC UNESCO.					
ASEAN Cooperation	11. National Policy on ASEAN(ACDM, ARPDM, AADMER) cooperation in Disaster Management, Emergency Response in case of disasters in other ASEAN countries or ASEAN region	・ Signed AADMER in 2007(ASEAN Agreement on Disaster Management and Emergency Response)(AADMER stipulates mutual cooperation in case of disaster.) ・ Participation in ARF meetings on disaster management, ACDM meetings, ARDEX (ASEAN Regional Disaster Exercise)and ASEAN regional technical cooperation Project ・ SASOP (Regional Standing Arrangement and Standard Operating Procedures) started in 2007. ・ SCDF has assisted Philippines in the Baguio Earthquake rescue operation in 1990 and Malaysia in rescue operation in the collapse of the Highland Towers in 1993, and Taiwan in 921 Earthquake rescue operation in 1999. ・ Agreement on trans-boundary haze was signed by ministers of ASEAN countries in 2002 and came into effect in 2003. It stipulates forest fire monitoring, prevention, coordination mechanism, communication system, mutual emergency support and establishment of ASEAN coordination center. Action plan for capacity building of fire fighting in the region and early warning system utilizing satellite images were developed.					
	12. Resources useful for other ASEAN countries	・ International Search and Rescue Advisory Group (INSARAG) register SCDF as an international Search and Rescue Advisory Group. Since April 1999, the Singapore Civil Defense Force registered two of its disaster management experts to be part of the United Nations Disaster Assessment and Coordination (UNDAC) Team. ・ SCDF offers training courses, such as the Urban Search and Rescue Course, Fire Fighting and Hazmat Course and Emergency Behavior Management Course, to its international partners. To date, some 263 participants from 37 countries have attended courses at the Civil Defense Academy. Overseas participants in CDA courses include personnel from the fire and rescue departments in Taiwan, Brunei Fire Services and the Special Malaysia Disaster Assistance and Rescue Teams (SMARTS).					
	13. Needs for External Assistance from the point of view of Regional Cooperation						

	Inventory				HFA PforA	HFA IofP	AADMER
Current Situation and Challenges	1. Features of Disasters	• Frequent Natural Disasters: 1980-2011 EM-DAT Disasters 104 nos.; Out of these flood (58%), Storm (29%) • 36% of national land is Mekong River Basin. Most of the other area is Chao Phraya River Basin. In mid-downstream basin of Chao Phraya River, flooding proceeds slowly and continues for 3-5 months. • Floods have become the most devastated disaster of the country and according to past 30 year statistics data (1970-2009), average occurrence no. of disaster is 1.48 which is the highest value among the natural disasters in the country with 67.1 of yearly average of casualties. Floods are the dominant risk in Thailand with economic AAL (Average Annual Loss) of $164.4 million, followed by tsunami ($50.6 million), storms ($36.8 million) and droughts ($20.5 million).					
	2. Administrative Division	76 Provinces (changwat) – 878 District (Amphoe)－7,254 Tambon – 69,307 Community (Muban)					
	3. Development of Legislative Framework and Disaster Management Policy & Plans		Current Situation	Challenges	1.(i)	1.(i)	2.1
		Development of Legislative Framework	<Fundamental Law> • Disaster Prevention and Mitigation Act (2007)				
		Disaster Management Policy	• Based on National Civil Defense Plan 200, DDPM implements integrated disaster risk management. • Policy is reviewed in the light of Flood disaster in 2011				
		Disaster Management Plans	<Central Level> • Strategic National Action Plan for Disaster Risk Reduction 2010-2019 (SNAP) • National Disaster Prevention and Mitigation Plan 2010-2014 (NDPMP) • Flood, storm and landslide prevention master plan for natural disaster prevention and relief of affected people (2008-2012) was approved by the Cabinet. <Local Level> • Preparation of Provincial Disaster Prevention and Mitigation Plan (Disaster Prevention and Mitigation Act stipulates it compulsory. But lower than District is not compulsory.)	• DDPM is planning to prepare integrated disaster prevention and mitigation action plan with the purpose of participation of all the stakeholders.			
	4. Establishment and Enhancement of Disaster Management System	Institutional Framework	Current Situation	Challenges	1.(ii)	1.(ii)	2.1 4
		Central Level	<u>National Disaster Prevention and Mitigation Committee (NDPMC)</u> • Chair:Prime Minister or designated Deputy Prime Minister • First vice-chair: Minister of Interior • Second vice-chair: Permanent Secretary of the Ministry of Interior Central Director:Director General of Department of Disaster Preparedness and Management (DDPM) <u>Department of Disaster Prevention and Mitigation (DDPM)</u> • It was established under the Ministry of Interior (MOI) in 2002, integrating organizations concerned with disaster prevention and mitigation. It has 4,220 staffs and 18 Regional Operation Centers & 75 Provincial Offices (as of 2008).				
			<u>Organizations in charge of Non-structural Measures for Disaster Risk Mitigation and Preparation:</u> • General: (1) Ministry of Education, (2) National Disaster Warning Center • Flood, Tropical Cyclone: (1) Thai Meteorological Department, (2) Royal Irrigation Department (RID), (3) Department of Water Resources, (4) Department of Forestry/Department of Land Development, the Ministry of Agriculture and Cooperation (MAC), (5)Thai Power Agency • Sedimented disaster: (1) Department of Mines and Resources, (2) Department of Water Resources, (3) Department of Forestry/Department of Land Development, MAC, • High tide: Thai marine transport authority,(5) <u>Organizations in charge of Structural Measures for Disaster Risk Mitigation:</u> • Flood, Sedimented disaster, Tropical Cyclone: (1) Department of Public Works (Urban planning of local governments), (2) RID, (3) Department of Drainage and Sewerage, Bangkok Metropolitan Administration	• DPM is planning capacity building of staffs in local government in charge of disaster management through trainings and exercises.			
		Local Level	• Local administrative organizations are responsible for planning and operation of disaster management activities at each jurisdiction. • Provincial Director: Provincial Governor • District Director: District Chief • Local Director: Executive of local administration				
		Inter-organizational Arrangement	• NDPMP stipulates the management structure in a chart. • Local centers of DDPM provide technical support and supplementary services to local governments' organizations. • Heads of local centers of DDPM are required to collaborate with Provincial Governors. • In case of massive disasters, local centers of DDPM mobilize staffs and equipments. • To enhance the linkage with Provincial governments, DDPM establishes provincial office and deploys staffs. Deployed staffs will go under the control by the Provincial Governor.				
		Financial Preparation	• Budget allocation and use of fund is decentralized to local administration.				
	5. Policy on Community-based Disaster Management	• There are several projects on "Community-based Disaster Reduction Management (CBDRM)" implemented. • DDPM is implementing CBDRM projects continuously with governmental organizations, NGOs, private sectors, civil defense organizations and international organizations. • There are more than 1 million community-based civil defense volunteer over the nation. DDPM is planning to increase the civil defense volunteers.		• It is necessary to have a comprehensive monitoring and evaluation system to ensure the effect of the projects	1.(iii)	1.(iii)	2.6 4
	6. Prevention and Mitigation	Current Situation		Challenges	-	-	-
	6.1 Flood	Identification of Disaster Risks	• Department of Water Resources started to prepare flood risk map for medium and long term flood relief plan which based on the existing graphical images of various department in 2008 • In Chao Phraya River basin, 35,000km^2, 22% of the basin, is being pointed at flood risk area.		2.(i)	2.(i)	1.1
		Monitoring	<Monitoring on a normal basis> • Meteorological observations are being carried out by Thai Meteorological Department (TMD), Royal Irrigation Department (RID) and Department of Water Resources (DWR). • TMD is a key agency to supply weather forecasts for the entire country and the agency operates meteorological observation, upper weather observation, satellite imagery, metrological radar observation. • RID operates 536 metrology and hydrology stations at along major rivers but most equipments are old. • DWR has 120 telemetry stations for metrology and hydrology observation. Besides, CCTV for river monitoring system and observation stations for Early Warning System (EWS) are also being operated under control of DWR. • BMA is also operating metrological and hydrological observation under control of FCC (Flood Control Center). The equipments are C Band Radar 1 unit, rain gauge stations 127 unit, water level sensors in the main canal 113 unit. <Monitoring at disasters> • Subcommittee to monitor water situation and flood situation will be established among TMD and other relevant agencies.		2.(i)	2.(ii)	1.3
		Non-structural Measures	• Retention Basin, Land Use Control, Public Information and Education, Reservoir Operation, Flood Forecasting and Warning, Flood Fighting		4.(i)	4	2.2
		Structural Measures	• National roads which run through the national land from the north to the south functions as dike. • In Bangkok, various projects by BMA including raising the level of circle dikes and construction of pumping stations have decreased flood damages (as of 1996). • PWD implements circle dike construction projects in major cities.	• There is no organization that manages whole the river system. Construction of dikes and dredging are done locally.	4.(i)	4	2.2

			• RID implements river improvement projects, development of drainage system in lower delta area and construction of multi-purpose dams. • Department of ocean and coastal resources is planning prevention measures for shore erosion which is getting serious in coastal cities. It developed long-term strategy for shore erosion prevention. • Dam, Pump, Polder Embankments, Dyke, Channel improvement, Drainage (inner pump/sub-channel/ drain pipe), Flood wall • As for flood mitigation work in BMA, dike along Chao Phraya River, Bangkok Noi Canal and Maha Sawat Canal was constructed with 75.8km length and 1.2km is under construction. • Drainage canals are also operated by BMA with main canal 211 (length 920km), minor canal 1,444 (length 1,686km), 369 pumping stations and gates (total pumping rate 1,531 m^3/s). Drainage capacity of those pumping system is 60 mm/hr of rainfall intensity. • Drainage tunnels are also being constructed in BMA, in case of where the drainage system is insufficient. The tunnels will drain the exceed storm water through the tunnels lying 15-22m underground surface and pump out to the river by high capacity pumps. Now, there are 7 drainage tunnels with 19km long and 155 m^3/s of pumping capacity. • BMA has provided 21 detention ponds with total capacity 12.7 Mm^3 to keep storage volume for early rainfall detention in order to decrease peak runoff during rainfall.	• Comprehensive national flood control plan or master plan for each river system is not prepared. • Flooding areas that serve as storm water reservoir are designated as urban development area in land use plan.			
	6.2 Earthquake / Tsunami	Identification of Disaster Risks	• A large scale earthquake has not occurred in historical record. • DMR has produced the active fault distribution map and the earthquake risk map which was assessed in 4 levels. • DMR has conducted the survey about not only active fault distribution but also activity history by trench survey. • The tsunami hazard maps with a scale of 1:5,000 in 6 prefectures of the south Thailand have been developed based on tsunami risk assessment.	• There is a need to develop a microzoning hazard map at main cities in the northern and western of Thailand.	2.(i)	2.(i)	1.1
		Monitoring	• According to the observation result of recent years, comparative small-scale earthquakes measured less than 6.5 on the Richter scale have occurred only in the northern and western area in Thailand. • The strengthening of earthquake and tsunami observation network in Thailand has been implemented after catastrophe of tsunami in 2004 and the observation network has been expanded. TMD installed total 41 broadband seismographs by own budget. • TMD has planned to increase each 20 stations of broadband seismograph and strong motion accelerograph. • Hypocenter and magnitude decision has been conducted by TMD using software “SeisComp3” manufactured in Germany, and TMD calculates them with about 10 minutes. In case of earthquake in abroad, it takes about 15 minutes. • The tsunami observation buoys were installed in DART project conducted by U.S from 2006. The tsunami observation system has some issues about maintenance. • Earthquake centered in Myanmar and LaoPDR surrounding Thailand also have some damages in Thailand. However, the seismic observation network in Myanmar and LaoPDR is less well-developed than Thailand. It is desirable to operate with RIMES and AEIC (ASEAN Earthquake Information Center) and monitor earthquake in Thailand and surrounding countries comprehensively. Similarly, tsunami observation system shall be operated in cooperation with IOTWS and Ina-TEWS of BMKG in Indonesia. • There is a need to increase the buoy for early detection of tsunami occurrence and identification of the tsunami scale or to install new tsunami observation system including submarine cable in order to observe without breakdown and reduce maintenance cost.	• Because tsunami warning recourse is chiefly depending on information from abroad, tsunami observation network has to be strengthened. • The number of observation station in the south Thailand where seismic observation density is low need to increase.	2.(i)	2.(ii)	1.3
		Non-structural Measures	• The tsunami evacuation drill has been conducted in school and hotel once a year. • The law regarding quake-resistance standards covered on 10 prefectures was enacted in 1997 and was amended that restraining area increase from 10 to 22 prefectures based on distribution of active fault and soft foundation in 2007. • The warning towers to alert, evacuation route sign and tsunami shelter have been built in tsunami disaster area.		4.(i)	4	2.2
		Structural Measures	• The countermeasures for tsunami are constructed even in disaster area in 2004 such as Phuket.		4.(i)	4	2.2
	6.3 Sediment disaster (Landslide, Debris flow)	Identification of Disaster Risks	• DMR has developed the sediment disaster hazard map on base map with a scale of 1:10,000 which was expanded original topographic map with a scale of 1:50,000. • The hazard maps of 70 sites were completed and ones of 190 sites are planned to produce in 2012.	• There is a need to limit the activities such as excavating rock and soil, deforestation and building new houses in the susceptibility area.	2.(i)	2.(i)	1.1
		Monitoring	• TMD has observed a river level and rainfall and issued warning based on meteorological and hydrological data. • DMR conducted an urgent survey of debris flow in mountain streams when the local government requests • Some community has conducted rainfall observation using a simple rain gauge and visual monitoring of river level. The monitoring and observation has been conducted by volunteers of the community.	• There is a need to install the automatic rain gauge and the sensor detecting the debris flow and strengthen the monitoring system.	2.(i)	2.(ii)	1.3
		Non-structural Measures	• The evacuation and rescue drill against sediment disaster have been conducted by vigilante group organized with volunteers of the community. • DPPM is a leading agency for preparing emergency response for sediment disaster and directing other agencies in case of disaster. In community of mountainous area, DPPM has conducted the evacuation and rescue drill in collaboration with DMR, local government, school and hospital etc.		4.(i)	4	2.2
		Structural Measures	• The structural works against sediment disaster have been constructed by local government and road authority, which is retaining wall made of gabion walls on road slope and check dam (sabo dam) on river with a danger of the debris flow.	• The structural work for sediment disaster has not constructed systematically and remains a small scale and simple level.	4.(i)	4	2.2
	6.4 Volcano	Identification of Disaster Risks	• There is no active volcano in Thailand.		2.(i)	2.(i)	1.1
		Monitoring	N/A		2.(i)	2.(ii)	1.3
		Non-structural Measures	N/A		4.(i)	4	2.2
		Structural Measures	N/A		4.(i)	4	2.2
	6.5 High Tide /Storm Surge (Cyclone/ Typhoon)	Identification of Disaster Risks			2.(i)	2.(i)	1.1
		Monitoring			2.(i)	2.(ii)	1.3
		Non-structural Measures			4.(i)	4	2.2
		Structural Measures			4.(i)	4	2.2
	6.6 Other Disasters	Identification of Disaster Risks			2.(i)	2.(i)	1.1
		Monitoring			2.(i)	2.(ii)	1.3
		Non-structural Measures			4.(i)	4	2.2
		Structural Measures			4.(i)	4	2.2
	6.7 Common items for Disaster	Non-structural Measures	• DDPM has database on various disasters. Disaster information is collected by some organizations under DDPM separately. • Hazard maps are prepared separately by DDPM, Department of Meteorology, RDI, and Mekong River Commission.	• In only limited Provinces, hazard maps are prepared. • Provincial hazard maps do not have enough	4	4	2.2 2.5

			• DDPM developed simple risk map with community people in some affected Provinces by Tsunami. • Division of Hydrology and Division of O&M of RDI publishes hydrology report on floods, inundation, and damages.	accuracy for the utilization in communities.			
					4	4	2.8
		Structural Measures			4	4	2.3.2 2.3.3
		Climate Change Adaptation	• Responsible body: National Committee on Climate Change (1993), National Board on Climate Change Policy and Climate Change Coordination Unit (2007) • NFP: Ministry of Natural Resources and Environment; Office of Natural Resources and Environmental Policy and Planning (ONEP) • Strategic Plan on Climate Change (2008 -2012) includes capacity building for adaptation and reduction of vulnerabilities to climate change impacts. • National Mater Plan on Climate Change (2010-2019) was completed in 2009		4.(i)	4.(i)	2.7
		Public Awareness Research and Development /Human Resource Development / for Disaster Management	<Disaster Education/Drills> • Promotion of disaster preparation education is stated in national education plan 2007-2011 developed by the Ministry of Education. • Working group composed of Office of Basic Education Committee and others developed textbooks of disaster preparation education and distributed to all the public schools. • NDWC and TMD has created and distributed educational materials such as booklets, posters, and so on. • Large-scale evacuation trainings were implemented 3 or more times since 2006.	• DDPM is planning to prepare provincial evacuation plans at all the Provinces based on Provincial Civil Defense Plans. • School curricula, education material and trainings are not promoted widely. • It is necessary to create and announce hazard maps in high resolution, to identify high risk area, to consider and announce how to avoid the risk. It is important to prepare and share information related to disaster prevention and mitigation among all level stakeholders.	3	3	2.3.1
	7. Preparedness and Response	Current Situation		Challenges			
		7.1 Disaster Response plan / Emergency Financial Measure	Central Level	<Emergency Operation Plan(EOP), Contingency Plan(CP) .etc> • NDPMP (the strategies on “Preparedness arrangement” and “Disaster emergency management”, and “Standing Orders on Disaster” and “Disaster Countermeasure Procedure” for 14 defined disasters are contained.) <Emergency Financial Measure> • Victim compensation budget and recovery budget for flood affected provinces	• At central level, the importance of capacity development of emergency response, especially search & rescue has been emphasized. • Responding to the flood disaster in 2011, DDPM will prepare more practical emergency response plan. • Also, disaster by disaster master plan is supposed to be prepared for effective response.	5	5	3
			Local Level	<Emergency Financial Measure> • Disaster management budget is decentralized for local administrative level to decide.			
		7.2 Early Warning	General Warning and Forecast/Communication	• TMD issues weather forecast and early warning based on meteorological observation data, weather maps, satellite images, weather radars, and so on. TMD delivers forecast and warning to central government and relevant agencies, local governments, local meteorological observatories, mass media (e.g. television, radio, and newspaper). • TMD disseminates early warning to public through mass media (e.g. television, radio, newspaper) and local government agencies. TMD is planning to add a way to disseminate early warning directly from TMD and local meteorological observatories to risk areas. • DDPM has intra-net, emergency telephone lines connecting head office, regional centers, provincial offices and relevant organizations. • Local Administration Department of MOI has own telephone lines and radio networks with provincial governments. • RID has radio network connecting head office with regional offices, project offices and major monitoring stations.		2.(ii)	2.(ii)	1.2
			Flood	• Flood warning is under responsibility of TMD. • TDM, RID and Department of Water Resources have monitoring stations in urban areas, major rivers, or mountain areas and provide forecasting and flood warning. • Mekong River Commission developed hydrology & meteorology monitoring network and provide flood forecast till 5 days ahead.	• Rainfall monitoring station owned by RID are mainly located around irrigation facilities and not sufficient for flood early warning. • TMD, DWR and RID responsible for monitoring meteorological, hydrological information and collect sets of data (e.g. rainfall, water levels, seismic data, etc.) using observation networks and manage the data on database systems. However, some of the databases are isolated.			
			Earthquake / Tsunami	• With the onset of Tsunami, cross-ministerial National Disaster Warning Center (NDWC) was established. It announces Tsunami warning to people and organizations concerned. • NDWC issues tsunami early warning based on input data from TMD, RID, Royal Thai Navy (RTN), international organizations (e.g. PTWC, JMA, USGS), NDWC Contact Center (e.g. Amateur Radio, General Public). NDWC delivers tsunami warning to central government and local government, rescue units, effected communities and people. • Means of dissemination are SMS (more than 20 Million Mobile phones), FAX (16ports), E-mail, mass media (television, radio), Warning Towers(328 Towers, installed also inland), local dissemination network (500 small towers and 1,500 special radios for leaders of village), and so on. Warning tower is 25m height and can broadcast siren and pre-recorded voice (multiple languages). The tower can cover up to 4km around with one. • TMD transfers the earthquake and tsunami information to relevant authorities within about 15 minutes after earthquake occurs. • The warning towers have been built in not only tsunami disaster area but also whole of country including mountainous area, which issue warning in 5 languages				

			of English, German, Chinese, Japanese and Thai in Phuket area.				
		Sediment disaster (Landslide, Debris flow)	・ Landslide warning is under responsibility of DMR. ・ DMR Promoted to build the network of upstream and downstream to issue warning to each other in case of emergency.	・ The warning level need to be improved based on scientific and technical study.			
		Volcano	N/A				
		High Tide / Storm Surge (Cyclone/ Typhoon)	・ Cyclone warning is under responsibility of TMD.				
		Other disasters					
	7.3 Evacuation plan	・ After the occurrence of Tsunami, DDPM engaged in relief activities including search & rescue and setting up of evacuation camps.			5	5	3
	7.4 Establishment of Emergency Response System	Central Level	・ DDPM is planning to establish emergency operation team for massive disaster composed of 10 members (1 team leader, 3 planners, 6 operation staffs) for each type of disaster. The team will coordinate directors at Provincial level and staffs of temporary command center.		5	5	3
		Local Level					
		Training etc.	・ The simulated exercises are conducted at National, Cluster Provincial, Provincial and District levels every year by assuming a specific type of disaster				
	7.5 Rescue plan	・ DDPM is planning to establish rescue team composed of 10 members in all the 7,255 Tambon local governments.			5	5	3
	7.6 Relief plan	・ After the occurrence of Tsunami, DDPM engaged in relief activities including search & rescue and setting up of evacuation camps.			5	5	3
Assistance to challenges	8. Records of Major Assistance by JICA	<Projects/Experts> ・ Advisor for the enhancement of functions of Disaster Prevention and Mitigation Academy (2006) ・ Capacity development Project for Disaster Management (2006-2008) <Studies> ・ Study for Bangkok Metropolitan Area Subsidence and Groundwater Management (1991-1994) ・ Comprehensive Study for Chao Phraya River Basin Flood Mitigation and Agricultural Field Conservation (1997-1999)					
	9. Records of Assistance by other Development Partners	・ ADRC: Disaster education in elementary schools (2006) ・ Denmark: Assistance for introduction of flood early warning system in five river basins. ・ ADPC:TV program production for disaster awareness raising (2005) ・ USA: Dispatch of experts to flood emergency prevention and mitigation committee and BMA ・ ADB: Implementation of flood control and management plan in Bangkok with request from RNESDB ・ UNDP/ADPC: Capacity Development of DDPM in southern 6 Provinces(emergency response, risk management, damage evaluation and needs analysis) (2005.7-2006.12) ・ USA/ADPC: Program for Tsunami Warning System in Indian Ocean (2005.8-2007.9), Asia Urban Disaster Mitigation Program (1995-2004) ・ ADPC/Italy: Tsunami risk analysis for the preparation of guideline for urban and regional development and construction in Southern Thailand (2005.5-2006.9) ・ EU-ECHO/ADPC:Capacity development at Provincial and District level in Lower Mekong for flood preparation program planning and implementation, funded by DIPECHO ・ ECHO: Capacity building of Thai food industries on "Carbon footprint labelling" to promote the development of low-carbon trade between EU and Thailand for climate change mitigation(2010) ・ ECHO: Response to natural disaster(2011)					
	10. International Networking	・ DDPM and ADPC signed MOU on cooperation for human resources management, disaster prevention and mitigation and exchange of disaster management experts in 2003. ・ With the onset of massive flood in 2000, flood control has come to be one of the major issues for MRC. MRC developed basic strategy in 2001 and action plan in 2002 and formulated flood control and mitigation program. Flood vulnerability assessment and mapping project was started ・ Intergovernmental Coordination Group for the Indian Ocean tsunami Warning and mitigation System was established in 2005 under the coordination of IOC UNESCO.					
ASEAN Cooperation	11. National Policy on ASEAN(ACDM, ARPDM, AADMER) cooperation in Disaster Management, Emergency Response in case of disasters in other ASEAN countries or ASEAN region	・ Signed AADMER in 2007(ASEAN Agreement on Disaster Management and Emergency Response)(AADMER stipulates mutual cooperation in case of disaster.) ・ Participation in ARF meetings on disaster management, monthly ACDM meetings, ARDEX (ASEAN Regional Disaster Exercise)and ASEAN regional technical cooperation Project ・ SASOP (Regional Standing Arrangement and Standard Operating Procedures) started in 2007. ・ Agreement on trans-boundary haze was signed by ministers of ASEAN countries in 2002 and came into effect in 2003. It stipulates forest fire monitoring, prevention, coordination mechanism, communication system, mutual emergency support and establishment of ASEAN coordination center. Action plan for capacity building of fire fighting in the region and early warning system utilizing satellite images were developed.					
	12. Resources useful for other ASEAN countries						
	13. Needs for External Assistance from the point of view of Regional Cooperation						

Inventory					HFA PforA	HFA IofP	AADMER
Current Situation and Challenges	1. Features of Disasters	・ Frequent Natural Disasters: Areas along Rivers and Coastal Areas / Storm, Floods, River Bank Erosion, Tornado ・ Inland Areas and Mountain Areas / Forest Fire, Landslide, Sediment Disaster ・ 1980-2011 EM-DAT disasters: 154times; Out of these flood (41%), Storm (51%) ・ Most densely-populated areas are prone to floods. 70% of population is living with risks of tropical cyclone, flood and surge. ・ Flood damages are serious in rainy season especially in Central Region. Flood in Mekong Delta covers 25% of Mekong Delta Area and continues for more than 3 months. ・ Floods tend to occur when high river water level during rainy season and tropical cyclone come together. Viet Nam has 6.2 tropical cyclones per annum in average. ・ DfID points out the possibility that Viet Nam will be the most affected country by sea level rise due to global warming.					
	2. Administrative Division	58 Provinces(tỉnh)+5 Centrally Governed Cities (thành phố trực thuộc trung ương)－Districts (huyện)/Provincial Cities (thành phố trực thuộc tỉnh)/Towns (thị xã) + Rural District (huyện)/Urban District (quận)－Towns (thị trấn)/Communes (xã) + Wards (phường)					
	3. Development of Legislative Framework and Disaster Management Policy & Plans		Current Situation	Challenges	1.(i)	1.(i)	2.1
		Development of Legislative Framework	<Fundamental Law> ・ Decree No.168 - aHDBT (1990) (It stipulates the roles and responsibilities of Central Committee for Storm and Flood Control and relevant organizations of all levels). ・ Disaster Management Law (drafted and expected to be enacted in 2013) <Laws in Relevant Sectors> ・ Statutes on Dike Management, and Flood and Typhoon Mitigation ・ Ordinance on Flood and Storm Control ・ Environment Protection Law (1993) ・ Ordinance on Water Resources Structures Protection ・ Water Law(1998)				
		Disaster Management Policy	・ National Strategy for Natural Disaster Prevention, Response and Mitigation to 2020 (2007～2020)： It emphasizes the policy shift from disaster prevention and mitigation based only on structural measures to the one including non-structural measures, from top-down to local government and community-based disaster management.	・ Multi hazard coverage is necessary in disaster management policy.			
		Disaster Management Plans	<Central Level> ・ Implementation Plan of the National Strategy for Natural Disaster Prevention, Response and Mitigation to 2020 (2009) <Local Level> ・ (Provinces prepare respective implementation plan on the basis of Implementation Plan of the National Strategy for Natural Disaster Prevention, Response and Mitigation to 2020 (2009))	・ Basic data (hydrology, meteorology and geology), information and knowledge on integrated river basin development and management planning should be better equipped with. ・ Contents and priority of many plans for flood control, irrigation and river basin development developed by development partners are not clear.			
	4. Establishment and Enhancement of Disaster Management System	Institutional Framework Central Level	Current Situation National Committee for Search and Rescue (NCSR) ・ Chair: Deputy Prime Minister (Minister of Defence) ・ Secretariat: Department of Search and Rescue, Ministry of Defence Central Committee for Storm and Flood Control (CCSFC) ・ Chair: Minister of Agriculture and Rural Development ・ Secretariat: Department of Dyke Management, Flood and Storm Control (DDMFSC), Ministry of Agriculture and Rural Development (MARD)	Challenges ・ Each Province has only few officers in charge of disaster management. ・ Capacity of disaster management organizations should be improved in order to deal with non-structural disaster mitigation and preparation measures and community-base disaster management. ・ Enhancement of disaster management systems at all administrative level is identified as a priority area to be addressed in Action Plan of NSDPRM2020.	1.(ii)	1.(ii)	2.1 4
			Organizations in charge of Non-structural Measures for Disaster Risk Mitigation and Preparation ・ Flood, Sediment disaster, Cyclone: (1) National Water Resources Board (2000-), (2) Department of Forest Management of Provincial Council, (3) Department of Dike Management and Flood Control,, MARD, (4) Meteorology and Hydrology Services(MHS) of the Ministry of Natural Resources and Environment, (5) river basin management organizations Organizations in charge of Structural Measures for Disaster Risk Mitigation ・ Flood, Sediment disaster, Cyclone: (1) Department of Infrastructure, Ministry of Planning & Investment, (2) Sewerage & Drainage Corporation, (3) Urban Drainage Corporation, (4) DDMFC of the MARD (64 local offices in provinces and municipalities)	・ More efforts should be made to build linkage between disaster management and development issues, as well as disaster management organizations and other sectors.			
		Local Level	<Provisional Level> Provincial Committee for Flood and Storm Control & Search and Rescue (PCFSC&SR) ・ Chair: the Chairman of People's Committee at province ・ Vice-chairman: the Deputy Director of Department of Agriculture and Rural Development (DARD) in respective Province ・ Secretariat: People's Committee <District Level> DCFSC&SR ・ Chair: the Chairman of People's Committee at district ・ Vice-chairman: the Deputy Director of Department of Agriculture and Rural Development (DARD) in respective District ・ Secretariat: People's Committee <Commune Level> CCFSC&SR ・ Chair: the Chairman of People's Committee at commune				
		Inter-organizational Arrangements	・ Ministerial Committee (for both flood and storm control & search and rescue)				
		Financial Preparation	・ DDMFSC was allocated 200 Billion VND in 2011. ・ The Ministry of Natural Resources and Environment (MONRE) is allocated some budget for meteorological and hydrological stations to establish.	・ DDMFSC budget is used for dykes in 19 out of 58 provinces. Provinces in Southern Viet Nam are not subject for DDMFSC budget in terms of dyke management.			
	5. Policy on Community-	・ Networking of disaster volunteers is listed in Action Plan of NSDPRM2020. ・ Community participation for disaster reduction management has been emphasised by the Prime Minister's			1.(iii)	1.(iii)	2.6 4

	based Disaster Management	Decision (Decision 1002/QD-TTg) in 2009. ・ The Prime Minister's Decision in 2009 stipulates that Provinces' implementation Plan is to prepare and roll out Community-based Disaster Reduction Management (CBDRM) to 6000 out of 11111Communes (as of 2010) by 2020.					
	6. Prevention and Mitigation	Current Situation		Challenges	-	-	-
	6.1 Flood	Identification of Disaster Risks	・ Flood hazard maps for the Mekong River basin has been developed by MRC based on the actual inundation areas for floods in 1995, 1996 and 2000. ・ Also flood hazard maps for 4 provinces including Thua Thien Hue province was prepared through Natural Disaster Risk Management Project in 2010.	・ Development of hazard maps in disaster-prone areas is identified as priority area in Action Plan for National Strategy for Natural Disaster Prevention, Response and Mitigation to 2020 (NSDPRM2020).	2.(i)	2.(i)	1.1
		Monitoring	・ Hydro-meteorological monitoring and flood forecasting are conducted by National Hydro- Meteorological Service (NHMS). There are 70 hydrological monitoring stations all over the country.	・ The number of monitoring stations for both rainfall and river water level. ・ Improvement of monitoring accuracy and data transmission system is also one of the issues.	2.(i)	2.(ii)	1.3
		Non-structural Measures	・ Program for squatter relocation from canals has been implemented since 1994. ・ 5 million ha afforestation program is implemented to recover the lost forests and to mitigate flood risks. ・ At the time of the typhoon Ketsana in September 2009, there was a significant difference in damage situations depending on the response activities by each commune. In some communes such Binh Duong commune of Quang Ngai province, flood damages were quite limited since disaster response plan had been formulated in advance and had been well known to residents in workshops and meetings on a regular basis. ・ In Huong Tho commune of Thua Thien Hue province, a pilot project for community-based disaster management was carried out. A committee at commune level has been established, and they started the activity in 2010 after organization, information dissemination method, and hazard maps were developed.		4.(i)	4	2.2
		Structural Measures	・ i) Installation of structural measures for disaster management, ii) construction and effective utilization of storm water reservoir, iii) improvement of facilities for river bank erosion prevention, drainage channel and dikes are listed in Action Plan of National Strategy for Natural Disaster Prevention, Response and Mitigation to 2020. ・ Flood damages are decreasing due to the progress of dike construction and improvement of river capacity in Mekong River Basin. ・ River dikes for 100-year flood have been constructed along the Red River in Hanoi. They are maintained DDMFSC (Department of Dyke Management, Flood and Storm Control) by using systematic database. ・ Urban drainage issues caused by development are being emphasized. To solve these issues, the phase 2 of drainage project in Hanoi is just getting underway.	・ Dikes are exposed to risks of damage and break due to aging. Shortage of staffs and equipments for dike maintenance and repairing is one of the underlying causes. ・ Improvement of forest coverage ratio, housing area planning in vulnerable areas to sediment disasters and landslides, land use planning in river basins are listed in Action Plan of NSDPRM2020. ・ Although river dikes for 100-year flood have been constructed along the Red River in Hanoi, the problem is that a number of families have settled in the riverside land since ole times.	4.(i)	4	2.2
	6.2 Earthquake / Tsunami	Identification of Disaster Risks	・ Earthquake risk assessment in Vietnam is not conducted yet. ・ If earthquake occurs, magnitude at more than 6near Hanoi, severe building damage is anticipated to taken place. ・ According to tsunami disaster research by experts, tsunami wave generated at Manila Trench will reach at the central coast of Vietnam such as Da Nang. Wave height is estimated at 3~5m at Da Nang.	・ Earthquake research in Hanoi area is recommended at first and building damage assessment shall be followed on research result.	2.(i)	2.(i)	1.1
		Monitoring	・ Broadband seismographs will be installed at another 15 stations in Vietnam. New seismographs will be networked together with existing system. ・ At Da Nang, tsunami monitoring and warning system is operated only at this moment.	・ Tsunami forecasting and monitoring system is not fully installed yet. ・ More tsunami forecasting and warning system is necessary along the coastal area of central part of Vietnam.	2.(i)	2.(ii)	1.3
		Non-structural Measures	・ Availability of seismic building code for residential building is not clear. Vulnerable buildings against earthquake shock are constructed and distributed thoroughly in Hanoi as for example. ・ In Vietnam, detailed disaster management plan is not prepared yet for earthquake and tsunami.	・ The strict building code and construction permission system should be improved. ・ The community disaster management drill such as evacuation should be conducted at regular schedule in tsunami expected area.	4.(i)	4	2.2
		Structural Measures			4.(i)	4	2.2
	6.3 Sediment disaster (Landslide, Debris flow)	Identification of Disaster Risks			2.(i)	2.(i)	1.1
		Monitoring			2.(i)	2.(ii)	1.3
		Non-structural Measures			4.(i)	4	2.2
		Structural Measures			4.(i)	4	2.2
	6.4 Volcano	Identification of Disaster Risks	・ There is no active volcano in Viet Nam.		2.(i)	2.(i)	1.1
		Monitoring	N/A		2.(i)	2.(ii)	1.3
		Non-structural Measures	N/A		4.(i)	4	2.2
		Structural Measures	N/A		4.(i)	4	2.2
	6.5 High Tide /Storm Surge (Cyclone/ Typhoon)	Identification of Disaster Risks			2.(i)	2.(i)	1.1
		Monitoring			2.(i)	2.(ii)	1.3
		Non-structural Measures			4.(i)	4	2.2
		Structural Measures			4.(i)	4	2.2
	6.6 Other Disasters	Identification of Disaster Risks			2.(i)	2.(i)	1.1
		Monitoring			2.(i)	2.(ii)	1.3
		Non-structural Measures			4.(i)	4	2.2
		Structural Measures			4.(i)	4	2.2

	6.7 Common items for Disaster	Non-structural Measures	・ At the national level, a disaster monitoring system installed in Disaster Management Center (DMC) is in place to monitor, archive and disseminate data on key hazards and damages caused by disasters. In addition, when flood disaster occurs, DDMFSC is supposed to receive disaster reports including damage information and needs (e.g. food, drinking water, seeds) from PCFSC&SC. ・ The CCFSC monitors the monitoring system and generates damage inventory reports after each disaster and consolidates into one annual national report. ・ The CCFSC website displays information on main disasters since 1989 – damage inventory reports. CCFSC maintains records for much longer but only on hard-copies.	・ In order to make effective use of flood hazard maps, it is desirable to integrate those maps on GIS and to be able to browse freely among disaster management agencies.	4	4	2.2 2.5
					4	4	2.8
		Structural Measures			4	4	2.3.2 2.3.3
		Climate Change Adaptation	・ Responsible body: Ministry of Natural Resources and Environment; Thematic Ad Hoc Working Group on Climate Change Adaptation (Nov. 2007) ・ NFP: Ministry of Natural Resources and Environment; Department of Meteorology, Hydrology and Climate Change ・ National Strategy for Environmental Protection until 2010 and vision toward 2020' includes climate change adaptation measures. ・ The 'National Target Program (NTP) to Respond to Climate Change 2008' establishes directions for the development of sectoral and geographic adaptation action plans ・ The Ministry of Agriculture and Rural Development is also developing an Action Plan for Adaptation and Mitigation. ・ Increase of natural disaster events by climate change and difficulties in coping with them are reported in the 8th five-year social and economic development plan (2000~2005). ・ National Goals Program on climate change and sea-level rise was approved in 2008. Besides national budget, Denmark and IUCN will fund. ・ Viet Nam is listed as one of the five countries that are most susceptive to negative impacts of climate change. It is estimated that average temperature has risen 0.7 degree in the last half century and will rise 3 degree by 2100. Sea level is also estimated to rise 50-60cm by 2100. With 1m of sea-level rise, 5% of national land, 11% of population, 7% of agriculture are estimated to be affected and GDP is estimated to decrease 10%.		4.(i)	4.(i)	2.7
		Public Awareness Research and Development /Human Resource Development / for Disaster Management	<Disaster Education/Drills> ・ DMU of CCFSC drafted community-based disaster preparation drills plan for school children. ・ There is not Primary school and Secondary school curriculum. However, there have been numerous educational projects led by Vietnam Red Cross (VNRC), donor countries and International Non-government Organizations (INGOs). ・ One specific example is the successful program to provide swimming lessons for children in the flood prone areas (Mekong Delta and other central provinces).	・ Community participation in disaster management is not active because top-down approach has been common.	3	3	2.3.1
	7. Preparedness and Response	Current Situation		Challenges			
	7.1 Disaster Response plan / Emergency Financial Measure	Central Level	<Emergency Operation Plan(EOP), Contingency Plan(CP) .etc> ・ CCFSC and relevant ministries prepare the preparedness and response plans. <Emergency Financial Measure> ・ The budget for emergency response is set aside from 2-5% of national and provincial budget by the State Budget Law.	・ Enhancement of disaster management systems at all administrative level is identified as a priority area to be addressed.	5	5	3
		Local Level	<Emergency Operation Plan(EOP), Contingency Plan(CP) .etc> ・ Annually, 100 % of local entities from province to commune levels conduct the planning of the disaster preparedness and response.	・ Planning is conducted chiefly by MARD and its branches with less effective coordination and participation. ・ Due to the report failure revealed by 8 provinces as for disaster situations, it was instructed to craft the standard manual for disaster assessment. ・ It is expected to prepare SOP as well in the process of preparing the manual.			
	7.2 Early Warning	General Warning and Forecast/Communication	・ Weather forecast and early warning is under responsibility of National Hydro-Meteorological Service (NHMS).NHMS is consist of 9 Regional Hydro-Metrological Centers and 54 Provincial Hydro-Metrological Forecasting Centers and has observation station networks nationwide. ・ CCFSC distributes early warnings in 3 warning level to PCSFCs and media, taking into account disaster preparation operations. PCFSCs distribute disaster management information to DCSFCs/VCSFCs. ・ NHMS is promoting automation of local monitoring stations, enhancement of communication network and installation of weather radars by 2010. ・ NHMS disseminates to communities through mass media (e.g. television, radio), NHMS's website and local governments.	・ Introduction of disaster education, implementation of evacuation drills in disaster-prone areas with local people, distribution of disaster information through media, development of early warning system and shelters for people and fishing boats are listed in Action Plan of NSDPRM2020.	2.(ii)	2.(ii)	1.2
		Flood	・ Mekong River Commission developed hydrology and meteorology monitoring network and provides .flood forecasting. It receives monitoring data monthly (in rainy season, daily for major monitoring points). Monitoring facilities in Viet Nam are well maintained. ・ Flood forecast of 5-day advance is made every 6 hours by NHMS. The result of forecast is shown on the website with flood warning information that is categorized into three steps.	・ Central highland area and Mekong Delta area are not covered by weather radar.			
		Earthquake / Tsunami	・ Tsunami early warning is under responsibility of Institute of Geophysics. ・ Institute of Geophysics has established the Operation Centre for Earthquake Information and Tsunami Warning and has installed 10 siren towers in Da Nang. The Operation Centre monitors whether there is possible to occur tsunami impact to Vietnam. ・ If there is possible to occur tsunami impact to Vietnam, early warning is issued and the Operation Centre disseminates the warning to Da Nang directly using siren networks. The Operation Center also delivers the warning to relevant agencies/organizations by e-mail, SMS and FAX.	・ Tsunami is likely to come to the coastal area of Vietnam nationwide, but means of dissemination is installed in Da Nang only. Therefore, it is necessary to install tsunami observation network off the coast of Vietnam and to establish early warning system nationwide.			
		Sediment disaster (Landslide, Debris flow)	・ Some pilot projects were implemented to monitor and warn the landslide and flash flood in some mountainous province with an early warning system installed but the capacity was not very effective and well-functioned.				
		Volcano					
		High Tide / Storm Surge (Cyclone/ Typhoon)	・ NHMS sets 4 levels for typhoon warning. CCFSC starts taking action from warning level 3.	・ Enhancement of short-term forecasting, typhoon and flood warning by following changing weather conditions in real time is an issue to be addressed.			

		Other disasters					
	7.3 Evacuation plan	・ Under the Fatherland Front, mass organizations are networked strongly for response activities.			5	5	3
	7.4 Establishment of Emergency Response System	Central Level	・ In case of massive disaster, PCFSC integrates needs for assistance and forward them to CCFSC. ・ MARD, CCFSC, Provinces and PCFSC evaluate disaster damages and report it to NCSR. NCSR approves relief plan and requests contingency budget to Ministry of Finance and Ministry of Planning and Investment (MPI). ・ Damage inventory system is well established.		5	5	3
		Local Level	・ In case of massive disaster, PCFSC integrates needs for assistance and forward them to CCFSC. ・ MARD, CCFSC, Provinces and PCFSC evaluate disaster damages and report it to NCSR. NCSR approves relief plan and requests contingency budget to Ministry of Finance and Ministry of Planning and Investment (MPI)				
		Training etc.		・ Simulations and rehearsals are less conducted due to resource shortage.			
	7.5 Rescue plan	・ Under the Fatherland Front, mass organizations are networked strongly for response activities.			5	5	3
	7.6 Relief plan	・ CCFSC coordinates relief operations. In case of minor disasters, PCFSC will be the main actor in distributing funds and goods. ・ The requirement of the Ordinance is that every government agency and individual should stockpile sufficient material reserves such as rock, sand bag, stone, bamboo for rescuing infrastructure failure; life vest, lifebuoy, boat for rescuing people; and foods, fuel, medicines for surviving.			5	5	3
Assistance to challenges	8. Records of Major Assistance by JICA	<Projects/Experts> ・ Central Viet Nam Disaster Management Project (2009.3-) ・ Capacity Development Project for National Water Environment Management (2009-) <Studies> ・ Study for Hanoi Drainage and Sewerage Development (1993-1994) ・ Study for Ho Chi Min Drainage and Water Environment Improvement (1999) ・ Study on National Water Resource Management Planning (2000) Study on Weather Radar Network Development (1999-2000) ・ Study on River Bank Erosion Prevention (2006-) ・ The Study on Groundwater Resources Development in Southern Coast in Vietnam (2007.5-2009.3)					
	9. Records of Assistance by other Development Partners	<Donor Coordination Framework> ・ With the onset of flood in Central Region in 1999, Multi-donor joint assessment was implemented. In 2002, UNDP and Dutch Government facilitated the establishment of National Disaster Mitigation Partnership. MARD serves as a secretariat. <Assistance by Development Partners> ・ WB：Natural Disaster Risk Management Program (2006-2012), Water Resource Management in Mekong Delta, Assistance to establish river basin management organizations, Trainings for safe dam operation ・ ADB：Water resource management in Red River, Dong Nai River Basin Management, Assistance to establish river basin management organizations, Technical Assistance to National Water Resource Board, Natural Disaster Risk Management Project ・ DANIDA：Water resource management in Red River, Ca River Water Resource Development and Management (2001-2005), Assistance to establish river basin management organizations, Technical Assistance to National Water Resource Board, Integrated Water Resource Management ・ AusAID：Mekong Delta Water Resource Management, Assistance to establish river basin management organizations, Development of National Water Resource Information System, Technical Assistance to National Water Resource Board, Natural Disaster Risk Management Project (2003-2006) ・ UNDP：Disaster Management System Assistance Project (1993-2001), Capacity Development for Disaster Risk Mitigation (2002-2005) ・ UNDP/WFP：Rehabilitation and Construction of Coastal Bank in Northern and Central Region ・ ADPC/DANIDA：Capacity Building of National Meteorological Services (2005.12-2008.12) /ADPC/OFDA：Extreme Climate Events Program (1998-2003) ・ ADPC：Enhancing Community Resilience to Natural Disasters in Southeast Asia。Support for Preparation of SNAP ・ EU-ECHO/ADPC：Capacity Development for Flood Preparation Program Planning and Implementation in Provincse and Districtsin Lower Mekong ・ ADPC/OFDA：Extreme Climate Events Program (1998-2003) ・ ADPC：Enhancing Community Resilience to Natural Disasters in Southeast Asia ・ WB: Natural Disaster Risk Management Project(2005-2013) ・ WB: Vietnam Climate Change Development Policy(2012) ・ WB: Mekon Delta Water Management for Rural Dev (2011-2017) ・ WB: GRDRR-Vietnam DRM Capacity Building(2010-2012) ・ WB: Climate Change Partnership-Capacity Building Component (2011) ・ ADB: Climate Change Impact and Adaptation Study in the Mekong Delta(2010-2011) ・ UNDP: Strengthening Institutional Capacity for Disaster Risk Management in Viet Nam, including Climate Change related Disasters(2009-2011) ・ UNDP: Strengthening National Capacities to Respond to Climate Change in Viet Nam, Reducing Vulnerability and Controlling Green House Gases (GHG) Emissions(2009-2012) ・ UNDP: Strengthening Sustainable Development and Climate Planning(2009-2011) ・ ECHO: Response to natural disaster(1994-2011) ・ ECHO: Disaster preparedness (1998-2011) ・ AusAid: Climate Change and Coastal Ecosystems Program (CCCEP)(2011-2016) ・ NZAid: Regional programme-Disaster Management and Emergency Response(2009-2012)					
	10. International Networking	・ With the onset of massive flood in 2000, flood control has come to be one of the major issues for MRC. MRC developed basic strategy in 2001 and action plan in 2002 and formulated flood control and mitigation program. Flood vulnerability assessment and mapping project was started.					
ASEAN Cooperation	11. National Policy on ASEAN(ACDM, ARPDM, AADMER) cooperation in Disaster Management, Emergency Response in case of disasters in other ASEAN countries or ASEAN region	・ Signed AADMER in 2007(ASEAN Agreement on Disaster Management and Emergency Response)(AADMER stipulates mutual cooperation in case of disaster.) ・ Participation in ARF meetings on disaster management, monthly ACDM meetings, ARDEX (ASEAN Regional Disaster Exercise)and ASEAN regional technical cooperation Project ・ SASOP (Regional Standing Arrangement and Standard Operating Procedures) started in 2007. ・ Agreement on trans-boundary haze was signed by ministers of ASEAN countries in 2002 and came into effect in 2003. It stipulates forest fire monitoring, prevention, coordination mechanism, communication system, mutual emergency support and establishment of ASEAN coordination center. Action plan for capacity building of fire fighting in the region and early warning system utilizing satellite images were developed.					
	12. Resources useful for other ASEAN countries						
	13. Needs for External Assistance from the point of view of Regional Cooperation						

INVENTORY ON INFORMATION OF DISASTER MANAGEMENT

Full Descriptions

Brunei

Cambodia

Indonesia

Lao PDR

Malaysia

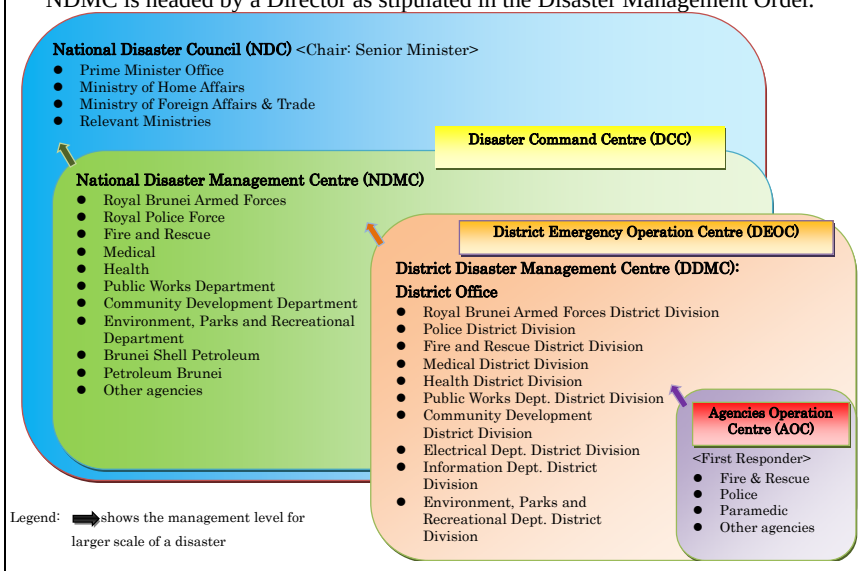
Myanmar

Philippines

Singapore

Thailand

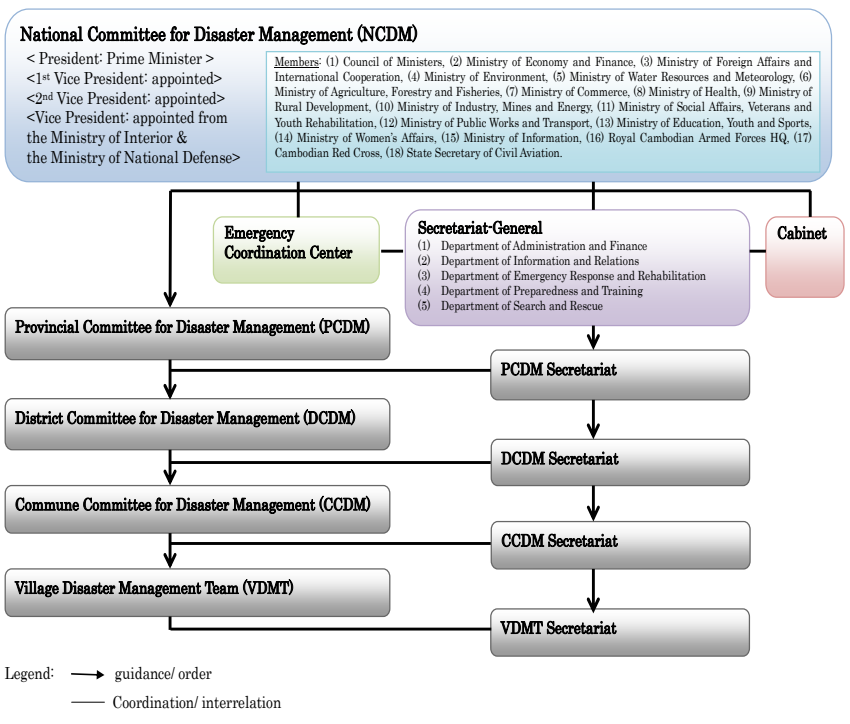
Vietnam

Inventory					HFA PforA	HFA IofP	AADMER
Current Situation and Challenges	1. Features of Disasters	・ No disasters are recorded in EM-DAT 1980-2011, relatively free from natural disasters. ・ Frequent disaster in Brunei is flood and flash flood, which occurred 6 times since 1960[*1], and killed 10 people. ・ Although Brunei is not located on a major earthquake area, low level earthquakes and tremors were felt in the country in the past two decades. Brunei has experienced small earthquakes with the range of 4-5 magnitude in 1992 and 2005. ・ Tsunami disaster is considered to occur due to strong earthquake occurred in South China Sea.					
	2. Administrative Division	4 Districts (daerah) – 38 Sub-district (mukim)					
	3. Development of Legislative Framework and Disaster Management Policy & Plans		Current Situation	Challenges	1.(i)	1.(i)	2.1
		Development of Legislative Framework	<Fundamental Law> ・ Disaster Management Order (2006)	・ It is desired in Strategic National Action Plan to have a legal framework consisting of a coherent set of laws and regulations for disaster risk reduction to implement.			
		Disaster Management Policy	・ The Outlines of Strategy and Policy for Development (OSPD) 2007-2017 ・ (the security strategy, one of 8 key strategies, manifests policy directions for "developing further appropriate systems and organizations, for responding quickly and effectively to threats from natural disasters, infectious diseases, acts of terrorism and other emergency")				
		Disaster Management Plans	<Central Level> ・ Strategic National Action Plan for Disaster Risk Reduction 2012-2025[*2]				
	4. Establishment and Enhancement of Disaster Management System	Institutional Framework	Current Situation	Challenges	1.(ii)	1.(ii)	2.1 4
		Central Level	<u>National Disaster Council (NDC)</u> ・ Policy and Strategic Direction ・ Chairman: Senior Minister at the Prime Minister's Office ・ Deputy Chairman (Permanent) : Minister Of Home Affairs ・ Deputy Co-Chairman (or chairmen): Appointed according to the nature of disasters ・ Secretariat: Permanent Secretary of Home Affairs ・ National Disaster Management Centre (NDMC) is the implementing agency. NDMC is headed by a Director as stipulated in the Disaster Management Order.	・ NDMC is still in the course of reform for further integration of disaster related agencies.			
			 Source: NDMC <Edited by JICA Study Team> **Figure Brunei's Disaster Management Structure**				
			<u>Organizations in charge of Non-structural Measures for Disaster Risk Mitigation and Preparation</u> ・ Tropical storm: Brunei Darussalam Meteorological Service, Department of Civil Aviation, Ministry of Communication ・ Flood: Public Works Department, Sewage and Drainage Department, Ministry of Development ・ Landslide: Public Works Department, Geotechnical and Geological Section, Ministry of Development ・ Forest Fire: Forestry Department (Ministry of Environment, Parks and Recreation), Fire and Rescue Department (Ministry of Home Affairs) ・ Forest Fire: Environment, Parks and Recreation Department, Ministry of Development); Fire and Rescue Department, Ministry of Home Affairs; Forest Department, Ministry of Primary and Industry Resources ・ Earthquake and Tsunami: Public Works Department, Geotechnical and Geological Section, Ministry of Development. The Brunei Darussalam Meteorological Service, Department of Civil Aviation, Ministry of Communication; also monitors Tsunami. <u>Organizations in charge of Structural Measures for Disaster Risk Mitigation</u> ・ Landslide: Public Works Department, Ministry of Development	・ Competent agencies need to identify for each (potential) disaster.			
		Local Level	<u>District Disaster Management Centre</u> (Implementing agency including District Emergency Operation Centre) ・ Chairperson: District Officer				
		Inter-organizational Arrangement					
		Financial Preparation	・ National budget for Disaster Management is annually allocated to NDMC, Ministry of Health and Ministry of Finance. Ministry of Finance allocated $5 million Brunei Dollar for disaster management activities.	・ There is a need to distribute a budget to local level[*3].			
	5. Policy on Community-based Disaster Management	・ NDMC embarks on public awareness programme to increase community resilience to disaster through the Community-based Disaster Risk Management (CBDRM). ・ Districts' response plans are provided as community-based disaster risk management program			1.(iii)	1.(iii)	2.6 4
	6. Prevention and Mitigation	Current Situation		Challenges	-	-	-
	6.1 Flood	Identification of Disaster Risks	・ The country is composed of four Districts. Flood hazard maps have been developed for every four Districts by the Public Works Department (PWD), Ministry of Development[*4].		2.(i)	2.(i)	1.1
		Monitoring	・ Hydrological monitoring and meteorological monitoring are conducted by PDW and Brunei Darussalam Meteorological Service (BDMS), the Department of Civil Aviation, Ministry of Communication, respectively[*4]. ・ BDMS manages 14 automatic weather stations distributed in the whole county. Those rainfall data are shown on the website at real time[*5].		2.(i)	2.(ii)	1.3
		Non-structural Measures	・ To raise public awareness, concerned organizations have carried out public relations through exhibition, campaign, disaster education and so on.		4.(i)	4	2.2
		Structural Measures	・ PWD has implemented various river improvement works in order to secure discharge capacity of rivers[*4]. ・ In Tutong district that is one of most flood-affected areas in the country, Sungai Tutong Floodplain Management Plan was formulated in June 2006. In accordance		4.(i)	4	2.2

		with the plan, some structural measures combining dam, diversion, widening of river channel, and dredging have been taken to mitigate flood damages[*6*7].				
6.2 Earthquake / Tsunami	Identification of Disaster Risks	・ The tsunami simulation conducted by Malaysia and Japan anticipated that the tsunami generated by the earthquake in South China Sea will arrive at the coastal area in Brunei.	・ Tsunami simulation analysis is needed to assess vulnerability along coastal area and oil production facilities in Brunei. ・ Based on simulation analysis, tsunami disaster management plan should be formulated for disaster mitigation.	2.(i)	2.(i)	1.1
	Monitoring	・ Earthquake/tsunami specific monitoring facilities are not available.	・ Construction of tsunami monitoring and warning system; and community based tsunami evacuation drill will be necessary to reduce tsunami damage. ・ In construction of tsunami early warning system, international information interchange among the neighborhood countries is very important to take emergency response against tsunami.	2.(i)	2.(ii)	1.3
	Non-structural Measures	・ Earthquake/tsunami specific monitoring facilities are not available.	・ Tsunami education	4.(i)	4	2.2
	Structural Measures	・ N/A		4.(i)	4	2.2
6.3 Sediment disaster (Landslide, Debris flow)	Identification of Disaster Risks	・ Not relevant, no hazard maps available		2.(i)	2.(i)	1.1
	Monitoring	N/A		2.(i)	2.(ii)	1.3
	Non-structural Measures	N/A		4.(i)	4	2.2
	Structural Measures	N/A		4.(i)	4	2.2
6.4 Volcano	Identification of Disaster Risks	・ No active volcano in Brunei.		2.(i)	2.(i)	1.1
	Monitoring	N/A		2.(i)	2.(ii)	1.3
	Non-structural Measures	N/A		4.(i)	4	2.2
	Structural Measures	N/A		4.(i)	4	2.2
6.5 High Tide /Storm Surge (Cyclone/ Typhoon)	Identification of Disaster Risks	・ The country is out of tropical storm prone region. No hazard maps available		2.(i)	2.(i)	1.1
	Monitoring	・ Normal metrological observation is conducted.		2.(i)	2.(ii)	1.3
	Non-structural Measures	・ Not particularly conducted		4.(i)	4	2.2
	Structural Measures	・ A larger part of coastal line is protected with rock-fill banking against coastal erosion.		4.(i)	4	2.2
6.6 Other Disasters	Identification of Disaster Risks	・ Not identified		2.(i)	2.(i)	1.1
	Monitoring	N/A		2.(i)	2.(ii)	1.3
	Non-structural Measures	N/A		4.(i)	4	2.2
	Structural Measures	N/A		4.(i)	4	2.2
6.7 Common items for Disaster	Non-structural Measures	・ Any DMIS and/or disaster loss database has not been constructed in Brunei. But disaster losses are systematically reported, monitored and analyzed. The reports are used in planning[*3].		4	4	2.2 2.5
				4	4	2.8
	Structural Measures			4	4	2.3.2 2.3.3
	Climate Change Adaptation	・ Responsible body: National Council on Climate Change ・ NFP: Department of Environment, Parks and Recreation ・ National Appropriate Mitigation Action is being developed; there is no policy document on climate change adaptation (as of July 2010).		4.(i)	4.(i)	2.7
	Public Awareness Research and Development /Human Resource Development / for Disaster Management	・ Ministry of Education is in charge of education for disaster prevention and mitigation[*4]. ・ DRR has yet to be incorporated in school curricula. However, outreach program has been taken up seriously through such other means as the ASEAN Regional Drawing Competition among students that is held to promote awareness on disaster resilience among students, teachers and parents[*3]. ・ Ministry of Education is going to implement a new education program (called as SPN-21) that includes a curriculum for disaster prevention and mitigation to the public systematically[*4]. ・ Drills for public are held once a year based on the program of NDMC and relevant agencies. But, NDMC considers that more frequent training is necessary[*4]. ・ NDMC is planning to promote the following four programs to enhance public awareness as follows; (1) Community-Based Disaster Risk Management (CBDRM), (2) Road-show on Disaster Management and Disaster Risk Management, (3) National Drawing Competition/ Essay Competition, and (4) Safe Based Disaster Management Centre[*4].		3	3	2.3.1
7. Preparedness and Response	Current Situation		Challenges			
7.1 Disaster Response plan / Emergency Financial Measure	Central Level	<Emergency Operation Plan(EOP), Contingency Plan(CP) .etc> ・ National Standard Operating Procedures <Emergency Financial Measure> ・ Contingency Funds are allocated to several Ministries.	・ SOPs are subjects for updating and approval as of April 2012.	5	5	3
	Local Level	<Emergency Operation Plan(EOP), Contingency Plan(CP) .etc> ・ District Response Plan (on the basis of National SOPs)				
7.2 Early Warning	General Warning and Forecast・Communication	・ Weather forecast and early warning is under the responsibility of Department of Civil Aviation's (DCA's) who is to issue severe weather warning and rough sea warning in three stages[*8]. ・ Means of dissemination of early warning are through mainly television, radio and short messaging system (SMS). Speakers of the mosques are utilized to disseminate information to the public[*4].	・ Risk prone communities don't necessarily receive timely warnings of impending hazard events[*3].	2.(ii)	2.(ii)	1.2
	Flood	・ A telemetric flood forecasting and warning system (FFWS) is being developed by the PDW in collaboration with BDMS.	・ A district needs to establish a flood monitoring system and			

				early warning system; and tsunami early warning system[*9]. (according to the interview survey for Tutong District)			
		Earthquake / Tsunami	・ NDMC plans to newly install a tsunami warning system. Brunei does not have own tsunami monitoring system and is dependent on the information observed by international institutions and/or other countries. As such, Brunei has limited human resources with technical skills for natural disaster management, such technical expertise as for floods, tsunami and others[*4].	・ Brunei has limited human resources with technical skills for natural disaster management[*4].			
		Sediment disaster (Landslide, Debris flow)					
		Volcano	N/A				
		High Tide / Storm Surge (Cyclone/ Typhoon)	・ When impending hazard such as storm, police cars with laud-speaker are running around to disseminate warning information in coastal area[*4].	・ There is an issue that any means of dissemination directly to fisherman in coastal area are not available[*4].			
		Other disasters					
	7.3 Evacuation plan	・ District Response Plan			5	5	3
	7.4 Establishment of Emergency Response System	Central Level	・ NDMC has a unit by the name of Disaster Command Center in place for planning and logistical support in a case of national level disaster.		5	5	3
		Provincial/ Municipal Level Commune / Village Level	・ District Emergency Operation Centers (DEOC) have been established at the local level as the implementing organizations for disaster management under DDMC. ・ In the onset of a disaster, Incident Command Post (ICP) is established				
		Training etc.	・ Training program on emergency preparedness (Capacity building for the first responders)				
	7.5 Rescue plan	・ National Standard Operating Procedures			5	5	3
	7.6 Relief plan	・ National Standard Operating Procedures			5	5	3
Assistance to challenges	8. Records of Major Assistance by JICA	Nil					
	9. Records of Assistance by other Development Partners	Not identified					
	10.International Networking	Not identified					
ASEAN Cooperation	11. National Policy on ASEAN(ACDM, ARPDM, AADMER) cooperation in Disaster Management, Emergency Response in case of disasters in other ASEAN countries or ASEAN region	・ Signed AADMER in 2007(ASEAN Agreement on Disaster Management and Emergency Response) (AADMER stipulates mutual cooperation in case of disaster.) ・ Participation in ARF meetings on disaster management, ACDM meetings, ARDEX (ASEAN Regional Disaster Exercise) and ASEAN regional technical cooperation Project. ・ SASOP (Regional Standing Arrangement and Standard Operating Procedures) started in 2007. ・ Agreement on trans-boundary haze was signed by ministers of ASEAN countries in 2002 and came into effect in 2003. It stipulates forest fire monitoring, prevention, coordination mechanism, communication system, mutual emergency support and establishment of ASEAN coordination center. Action plan for capacity building of fire fighting in the region and early warning system utilizing satellite images were developed.				
	12. Resources useful for other ASEAN countries	(Funding)					
	13. Needs for External Assistance from the point of view of Regional Cooperation	・ Collaborative research on earthquake and tsunami induced at Manila trench in the South China Sea.					

[1] National Disaster Management Centre, Presentation document (PPT), “WELCOME TO THE NATIONAL DISASTER MANAGEMENT CENTRE 02 APRIL 2012”
[2] Brunei Darussalam (2012) Strategic National Action Plan for Disaster Reduction for Disaster Risk Reduction 2012-2025
[3] Brunei Darussalam (2011) National progress report on the implementation of the Hyogo Framework for Action (2009-2011)
[4] JICA, “Data Collection Survey on ASEAN Regional Collaboration in Disaster Management” (2012): Interview to NCDM (2012. 04.02)
[5] Website of Brunei Darussalam Meteorological Service (http://bruneiweather.com.bn/) (accessed on 27 June 2012)
[6] Website of Ministry of Public Works and Transportation (http://www.pwd.gov.bn/index.php/component/content/article/82-news-a-articles/1183-tutong-project-to-ease-floods-impact) (accessed on 27 June 2012)
[7] Tutong District Office, Presentation document (PPT), “FLOOD SITUATION in TUTONG DISTRICT”
[8] JICA, “Data Collection Survey on ASEAN Regional Collaboration in Disaster Management” (2012): Interview to Department of Civil Aviation (2012.04.03)
[9] JICA, “Data Collection Survey on ASEAN Regional Collaboration in Disaster Management” (2012): Interview to Tutong District Office (2012.04.02)

Inventory					HFA PforA	HFA IofP	AADMER
Current Situation and Challenges	1. Features of Disasters	・ Possible Natural Disasters *[1] *[2] : Flood, Drought, Storm, High Tide, Flash Flood ・ Frequent Natural Disasters: 1980-2011 EM-DAT Disasters, 23 nos. Out of these Flood (65%), Drought (23%), Storm(13%) ・ Recent Major Natural Disasters: Flood(2000), Flood and drought (2001), Flood and drought(2002), Drought(2005), Flood (2009), Flood (2011) ・ 85.5% of the national land is in the catchment area of Mekong River (total river basin area of Mekong River is 795.000 km^2).*[3] <Floods> ・ When the water level of Mekong gets high, river water flows upstream into Tonle Sap Lake, which serves as a natural flood control reservoir (The area of the Lake is 3-5 times larger and water level is more than 8m higher in rainy season than dry season). Scales of floods is heavily dependent on the capacity of the Lake.*[3]*[4] ・ Large scale floods of Mekong River occurred in 1961, 1966, 1978, 1984, 1991, 1996, 2000, 2001, 2009 and 2011. *[5] *[6] ・ In Phnom Penh City and its outskirt areas, flood occurs almost every year. *[3] ・ In 1992, 1997, 1999, 2000 and 2001, it has been hit by typhoons. *[7] ・ Major disasters in these years: flood (2000), flood/ drought (2001), flood / drought (2002), drought (2005).					
	2. Administrative Division	20 Provinces (khet)/ 4 Municipalities (krong) – 172 District (khan)－Commune/Sangkat (khum)－Village (Phum)					
	3. Development of Legislative Framework and Disaster Management Policy & Plans		Current Situation	Challenges	1.(i)	1.(i)	2.1
		Development of Legislative Framework	<Fundamental Law> ・ Sub-decree No. 35 ANK (1995) *[1]*[8] ・ Royal Decree No. NS/RKT/0804/236 (August 31, 2004) on Amendment of Article 1 and Article 2 of Royal Decree No. NS/RKT/0202/040 (December 16, 2002) on the Establishment of National Committee for Disaster Management ・ Sub-decree No. 30 ANKR.BK (April 09, 2002) on the Organization and Functioning of National Committee for Disaster Management ・ Sub-decree No. 61 (June 29, 2006) on the establishment of the CCDM ・ Circular No. 02 (July 02, 2001) on Preparedness and Disaster Management ・ Circular No. 01 S.R (June 07, 2002) on Disaster Preparedness and Response	・ Cambodia has neither approved national policy nor law on disaster management *[1] ・ Cambodia does not have regulatory framework for urban drainage and flood control. *[3]			
		Disaster Management Policy	・ Policy document for disaster management (1997) ・ National Policy on Emergency Management (1997: under review) ・ NCDM Institutional Development Strategy (2001: Yellow Book)	・ The policy has never been approved formally. ・ National Contingency Policy requires a decree to be finalized. *[1]			
		Disaster Management Plans	<Central Level> ・ NCDM 2-Year Action Plan 2001-2002 ・ Strategic National Action Plan for Disaster Risk Reduction (2008-2013) ・ National Comprehensive Avian and Human Influenza Plan ・ CBDRM Community Based Disaster Risk Management Plan ・ National Contingency Plan for Flood and Drought (2011) ・ Ketsana Rehabilitation and Reconstruction Plan (On-going)	・ Although it was officially launched in 2009, no implementation was observed due to the absence of law.			
	4. Establishment and Enhancement of Disaster Management System	Institutional Framework	Current Situation	Challenges	1.(ii)	1.(ii)	2.1 4
		National Level (Central Level)	・ Committee for Disaster Management (CDM) has been established in the central and regional levels. The general tasks of the committee are as follows. *[1] ・ Training members of CDM in provinces / cities, familiarization of important information to the citizens. ・ Assessing the damage, implementation of needs assessment. ・ Formulating restoration / re-construction programs. ・ Coordinating the activities with other relevant agencies, international bodies and NGOs. ・ Evaluating the disaster risks and analyzing the vulnerability. ・ Formulating the emergency rescue plan. ・ Providing early warning and other information to inhabitants living in the areas with potential risks. ・ Making coordination with various agencies, bodies and CRC in order to build up a communication network between NCDM and CDM of provinces / cities. ・ Guiding evacuation, providing protective shelter and safety, establishing a program for improvement of anti-disaster consciousness of citizens and coordinating with various agencies, bodies and CRC on the activity related to formulation of other programs. ・ Issuing interim reports as well as final reports containing proposals for national policies, changes in practical implementation and the like every time when emergency situation as well as disastrous situation is declared.  (1) Secretariat-General (2) Emergency Coordination Center Source: A presentation material provided by NCDM [September 2012] and "NCDM-DMIS Aide Memoire", a document provided by NCDM [September 2012]. **Figure Cambodia's Disaster Management Structure** <u>Organizations in charge of Non-structural Measures for Disaster Risk Mitigation and Preparation</u> ・ Flood, Sediment disaster, Typhoon/Cyclone: (1) Ministry of Water Resources and Meteorology, (2) General Department of Water Use Integration, Ministry of Forestry and Fishery (MFF)	・ Governmental organizations do not fully understand the rolls and responsibility for disaster management[5]. ・ The dissemination of Disaster Risk Management across all levels is limited due to insufficient funding, dated communication systems, lack of equipment and high technology application.			

			Organizations in charge of Structural Measures for Disaster Risk Mitigation ・ Flood, Sediment disaster, Typhoon/Cyclone: (1) Department of Road and Bridge, Ministry of Public Works and Transportation, (2) Ministry of Water Resources and Meteorology, (3) Ministry of Rural Development, (4) General Department of Water Use Integration, (5) MFF National Committee for Disaster Management: NCDM ・ President: Prime Minister ・ 1st Vice President: appointed ・ 2nd Vice President: appointed ・ Vice Presidents: Minister of Interior and Minister of Defense ・ Members: (1) Council of Ministers, (2) Ministry of Economy and Finance, (3) Ministry of Foreign Affairs and International Cooperation, (4) Ministry of Environment, (5) Ministry of Water Resources and Meteorology, (6) Ministry of Agriculture, Forestry and Fisheries, (7) Ministry of Commerce, (8) Ministry of Health, (9) Ministry of Rural Development, (10) Ministry of Industry, Mines and Energy, (11) Ministry of Social Affairs, Veterans and Youth Rehabilitation, (12) Ministry of Public Works and Transport, (13) Ministry of Education, Youth and Sports, (14) Ministry of Women's Affairs, (15) Ministry of Information, (16) Royal Cambodian Armed Forces HQ, (17) Cambodian Red Cross, (18) State Secretary of Civil Aviation. ・ The Minister in charge of NCDM: Senior Minister (since 2003) ・ Secretariat-General: Headed by Secretary General (equal to the ministerial position) ・ NCDM as the implementation body, which has 5 departments, namely: (1) Administration and Finance; (2) Information and Relations; (3) Emergency Response and Rehabilitations; (4) Preparedness and Training, and; (5) Search and Rescue. Task: - Making coordination among government agencies, UN agency, international agencies, NGO, international society, domestic associations to appeal support in case of emergency as well as restoration. - Proposing to the government, formulation of principles as well as policies, warning for evacuation. - Disseminating disaster prevention activities in the community level, enhancing cooperation between the respective levels (between government agencies / relevant agencies of national level and levels of province/city/district/sub-district) and human resource cultivation. - Stockpiling commodities, materials and equipment, securing reserve fund for disasters, promoting reservation of human resources in all stages from before disaster to after disaster and restoration. ・ Creating a general secretariat which plays the role of an execution organ. Minister (senior minister) is appointed to take in charge. The Secretary General (minister level) is also appointed. The roles of the secretariat are as follows. *7 - Making research and studies on disasters. - Collecting information on disaster prevention technology, damages caused by the disasters as well as information on the needs, etc. Providing guidance to the local governments on the formulation of rehabilitation and re-construction programs. - Planning training program both inside and outside the country for staffs of the local governments and rescue communities. - Making coordination with relevant agencies on evacuation of citizens and on disaster education. ・ Below the general secretariat, department of general affairs/accounting, department of information and external affairs, department of emergency response and re-construction, department of disaster prevention training and department of search and rescue. *7 ・ Central government agencies /government organizations related to disaster prevention shall form disaster prevention working group inside each organization. *7				
			Inter-organizational Arrangement ・ All ministers and institutions concerned shall collaborate closely with NCDM whenever required in an emergency situation. *5	・ Communication system is unclear. *1 ・ As countermeasures for flood, under the current conditions, they are limited to works implemented by each government agency to protect facilities under its control. *4 ・ There are no agreements or guidelines for PCDM to collaborate with NGOs and international organizations during disasters. It has caused the lack of smooth coordination and cooperation with these organizations. *5 ・ In order to improve the current situation, first, NCDM needs to improve capacity, system and procedures of damage and needs assessment and reporting.*5 ・ The coordination mechanism is limited to development and improvement.			
		Provincial Level / Regency / City Level	・ Committee for Disaster Management (CDM) shall be established in each level of province, city and regency. *1 Provincial/ City Committee for Disaster Management: PCDM ・ Coordinator and President: Provincial Governor ・ Vice President: First Deputy Governor/ Mayor ・ Members: Chiefs of each relevant government department(All the municipal civil servants and central government officials at municipal level), representative from the police, army, gendarmerie and Cambodian Red Cross ・ PCDM Secretariat Roles: *7 ・ Implementing national disaster prevention policies. ・ Supporting disaster prevention activities of lower level and development of guidelines. ・ Proposing to NCDM on activities of relevant disaster prevention related bodies. ・ Reporting to NCDM on the state of damages, applying budget / materials & equipment / means of transportation / necessary measures. ・ Implementing training to staffs of disaster prevention related bodies for the implementation of disaster mitigation education in the community level.				
		Levels below Regency	District/Town Committee for Disaster Management (DCDM) *1				

		and Cities	・ President: District Governor ・ Vice President: First Deputy District Governor ・ Members: All government Ministries, Departments, Corporations and Agencies, head of local CRC <u>Roles</u> ・ Implementing national disaster prevention policies ・ Selecting participants in the training course ・ Providing disaster information to the citizens ・ Reporting to Provincial / Citi CDM on damages and requirements of assistance. ・ Taking command of evacuation during disaster and immediate after disasters as well as of rescue activities ・ Reporting to province / city CDM on evacuation / rescue activities. <u>Commune Committee for Disaster Management (CCDM)</u> ・ PCDC can decide whether or not CDM is established below district level, considering various conditions. ・ Chairman: Commune Chief ・ Vice Chairman: First Deputy Commune Chief ・ Secretary of CCDM: Commune Clerk <u>Village Disaster Management Team (VDMT): 7 people</u> ・ Chief: Village Headman ・ Deputy Chief: Village Assistant (Female) ・ Village Health Support Team: Member ・ Village Animal Health Agent: Member ・ Village Cambodian Red Cross Volunteer: Member ・ Other two more members				
		Financial Preparation	<Annual Budget> ・ The state has appropriate budget reservation to ensure the disaster management. Budget for the disaster management is under law on finance and the sources come from the state budget, national and international development partners' budget and charitable persons' budget. <Contingency Fund> ・ The Government regular allocation for disaster management is utilized for emergency relief and response operation.	・ It is lacking of proper mechanism to use financial service. *9 ・ In Phnom Penh City, budget for new installation /maintenance of urban drainage system is not available at all. *3 ・ Disaster risk reduction resources are mainly borne by partner agencies.			
	5. Policy on Community-based Disaster Management	・ Strategic National Action Plan for Disaster Risk Reduction (2008-2013) has six key components and its second component is title, *10 "Strengthen sub-national and community-based disaster risk management", which intends to promote community-based disaster risk reduction programs. ・ CBDRM (Community Based Disaster Risk Management Plan) has been developed. ・ NCDM provides a coordinating role in establishing and implementing community based disaster preparedness programs with NGOs.		・ Many projects are implemented to empower community and authorities with limited resources and less granted delegation. ・ Local authorities provide facilitation roles but do not primarily implement projects, which results in less sustainability accompanying capacity development and ownership	1.(iii)	1.(iii)	2.6 4
	6. Prevention and Mitigation	Current Situation		Challenges	-	-	-
	6.1 Flood	Identification of Disaster Risks	・ Local offices collect information on disasters in the past, and submit to NCDM. ・ In the drainage pump station located in the suburb of Phnom Penh City, high water level of rivers during the past large scale floods as well as submerged depth in the damaged area by the flood and state of distribution of water covered areas are recorded. *3 ・ Mekong River Commission develops flood hazard map. *11 ・ Currently a risk map covering the whole country is being developed with an assistance of World Bank.	・ The risk map is prepared based on large-scale map, which is not available for evacuation purpose. *12	2.(i)	2.(i)	1.1
		Monitoring	・ There are 2 weather stations in Phnom Penh City and its neighboring areas. *3 ・ Water level is monitored in major rivers by Department of Hydrology and River Works (DHRW), MOWRAM. Flood is forecasted by DHRW based on river water level. ・ There are 10 telemetric hydrological stations along the Mekong, Tonle Sap and Bassac rivers. ・ In the drainage pump station located in the suburb of Phnom Penh City, hydrologic information such as water level of the flood control pond, etc. as well as the flow rate of drain water, etc. is observed. *3 *13 ・ Mekong River Commission collects hydrological and meteorological data and publishes annual reports on hydrology of lower Mekong since 1960. *14 *15		2.(i)	2.(ii)	1.3
		Non-structural Measures	・ 16.2% of national land is designated as protection area and timber exports are prohibited to protect forests.	・ Evacuation plans have not been prepared. *16	4.(i)	4	2.2
		Structural Measures	・ Phnom Penh is vulnerable to floods and has been protected by circle levee and pumping facilities from old times. In case of severe flood, emergency measures are taken such as enhancement of circle levee with sandbags and cut off of National Roads based on the decision of the Ministry of Water Resources and Meteorology in order to lower the water level of the Mekong River. At flood in 2001, in order to protect Phnom Penh from the damage of flood, the National Road No.1 was cut at least at 3 locations. *4*7 ・ Roads functions as dykes to prevent floods. ・ "Colmatage" from old times, which is irrigation channel, functions as driving channel to storm water reservoir. ・ The Ministry of Public Works and Transportation, Road and Bridge Bureau *3 takes charge of construction and maintenance of the roads. ・ The Ministry of Water Resources and Meteorology takes charge of construction and maintenance of irrigation facilities and dykes. ・ The Ministry of Rural Community Development takes charge of regional infrastructure. ・ Irrigation and Drainage Bureau of the Ministry of Agriculture and Fisheries takes charge of the management of the facilities of major rivers. ・ Drainage and Sewage Division of Department of Public Works and Transportation of Phnom Penh City takes charge of operation and maintenance of flood control / drainage facilities. *17	・ Circle levees are made of earth and built long time ago. Protection works for the levees have not been done. ・ Erosion of trunk roads is progressing by frequent flood. Rehabilitation and maintenance is a matter of urgency. ・ There is shortage of equipments, technical staffs and management officers who can manage integrated urban drainage system. *3 ・ Illegal buildings exist in drainage channel and on dykes. *3 ・ Due to new tree trimming and population pressure, flood damage protection forests are reduced. *3 ・ Drainage pumps in Phnom Penh City have become too old for	4.(i)	4	2.2

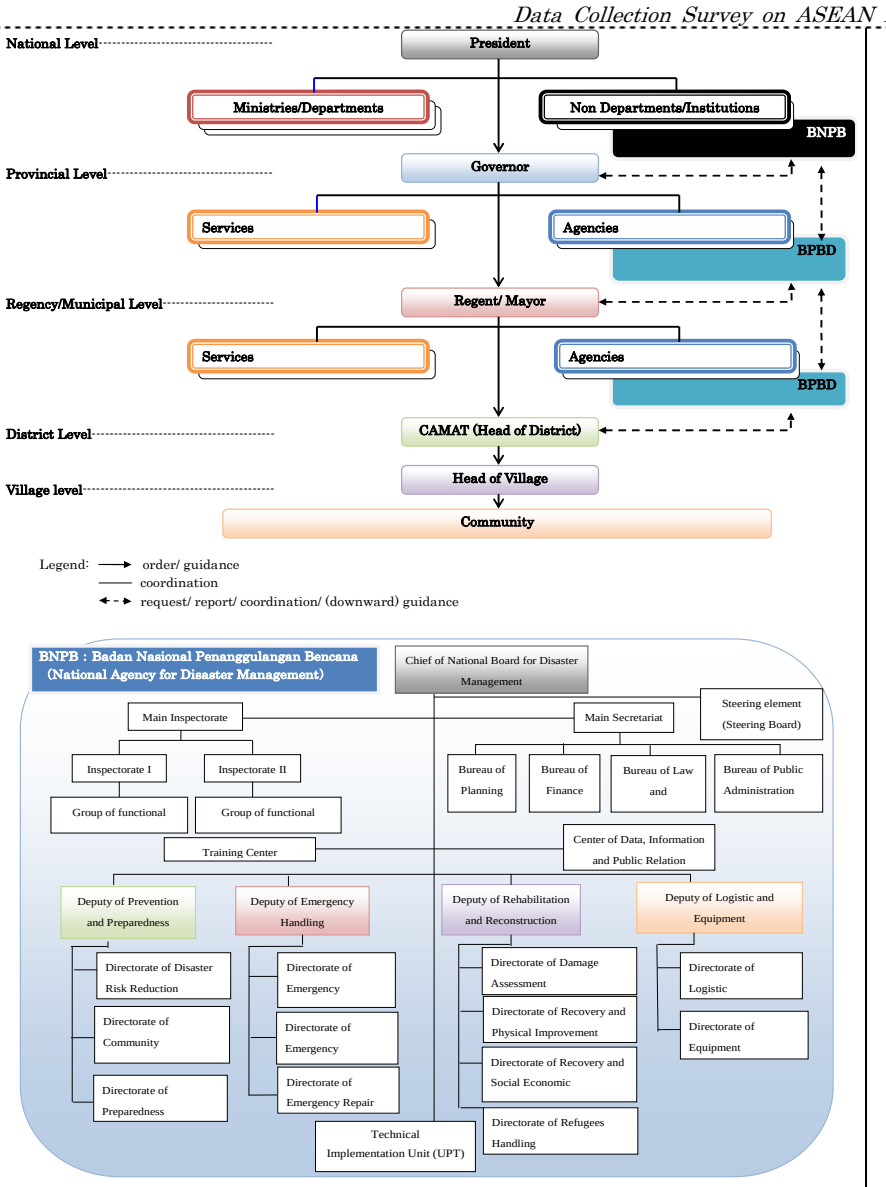
			work, their drainage performance decreased remarkably; only 7 pump stations out of 9 are operated. *3 ・ In the main stream of Mekong River, Sap River, and Bassac River, there are no flood control facilities except for dykes.*18 ・ Except for roads and bridges, design standards for various structures have not been established; Japanese standards as well as standards or European countries and that of the USA have been applied correspondingly. *3			
6.2 Earthquake / Tsunami	Identification of Disaster Risks	・ There is no earthquake and tsunami disaster occurred in Cambodia.		2.(i)	2.(i)	1.1
	Monitoring	・ There is no seismic observation system in Cambodia.		2.(i)	2.(ii)	1.3
	Non-structural Measures			4.(i)	4	2.2
	Structural Measures			4.(i)	4	2.2
6.3 Sediment disaster (Landslide, Debris flow)	Identification of Disaster Risks	・ There are a few sediment disasters because Cambodia has a few mountainous area. ・		2.(i)	2.(i)	1.1
	Monitoring	・ According to Ministry of Industry, Mines and Energy, the landslide survey was conducted in three sites; Kampot, Kampong Saom (Sihanoukuville) and Koh Kong.		2.(i)	2.(ii)	1.3
	Non-structural Measures	-		4.(i)	4	2.2
	Structural Measures	-		4.(i)	4	2.2
6.4 Volcano	Identification of Disaster Risks	・ There is no volcanic mountain in Cambodia.		2.(i)	2.(i)	1.1
	Monitoring			2.(i)	2.(ii)	1.3
	Non-structural Measures			4.(i)	4	2.2
	Structural Measures			4.(i)	4	2.2
6.5 High Tide /Storm Surge (Cyclone/ Typhoon)	Identification of Disaster Risks			2.(i)	2.(i)	1.1
	Monitoring			2.(i)	2.(ii)	1.3
	Non-structural Measures			4.(i)	4	2.2
	Structural Measures			4.(i)	4	2.2
6.6 Other Disasters	Identification of Disaster Risks			2.(i)	2.(i)	1.1
	Monitoring			2.(i)	2.(ii)	1.3
	Non-structural Measures			4.(i)	4	2.2
	Structural Measures			4.(i)	4	2.2
6.7 Common items for Disaster	Non-structural Measures	・ NCDM is developing an information system for an emergency management and early warning supported by World Bank. The system will be installed to the National Emergency Coordination Centre (under construction). The system will be used to share disaster information among national and province agencies. NCDM plans to install this system in 8 provincial offices out of 24 offices as a pilot project. ・ The system will include a disaster loss database.		4	4	2.2 2.5
				4	4	2.8
	Structural Measures			4	4	2.3.2 2.3.3
	Climate Change Adaptation	・ Floods are increasing due to extreme climate. ・ Cambodia ratified United Nations Framework Convention on Climate Change (UNFCCC). *21 ・ National Adaptation Program of Action to Climate Change (NAPA) was developed by Ministry of Environment in 2006. *19 ・ Responsible body: National Climate Committee (April 2006) ・ NFP: Ministry of Environment		4.(i)	4.(i)	2.7
	Public Awareness	<Disaster Preparation Drills / Disaster Management Education> ・ Ministry of Education approved disaster education curriculum at secondary school, which was developed in the Disaster Management Mainstreaming Project in Education Sector (2007~). *20		3	3	2.3.1
	Research and Development /Human Resource Development / for Disaster Management	・ NCDM has created and distributed disaster-related posters with the support of GTZ and ADPC.				
7. Preparedness and Response		Current Situation	Challenges			
7.1 Disaster Response plan / Emergency Financial Measure	National Level (Central Level)	<Emergency Operation Plan(EOP), Contingency Plan(CP) .etc> ・ National Policy on Emergency Management prepared in 1997 is still under review) ・ The Cambodia Red Cross has prepared its own response policy. ・ National Contingency Plan for Flood and Drought (2011), which needs a decree to be approved. ・ NCDM is establishing “National Emergency Coordination Center (NECC)”. (as of March 2012) <Emergency Financial Measure> ・ National budget allocation for disaster management is utilized for relief and emergency response.	・ The Policy (1997) has not been approved and not been implemented. ・ NCDM is not provided sufficient budget, whole budget for emergency is provided to relevant governmental organization.	5	5	3
	Sub-national Level (Local Level)	<Emergency Operation Plan(EOP), Contingency Plan(CP) .etc> ・ “Provincial Contingency Plan” is supposed to prepare on the basis of its National Plan as a guideline. ・ Local approaches for emergency response are observed such as Disaster Preparedness Plan formulated at Svay Rieng Provence ・ Flood emergency management strengthening programmes implemented in some provinces. ・ There are other plans to deal with disasters derived from epidemic diseases.				
7.2 Early Warning	General Warning and Forecast/Communication	・ In order to make known thoroughly the ordinances or the official notices, senior staffs of NCDM have visited flood-prone provinces every year for orientation. *21 ・ MoWRAM is in charge of weather forecast and information is provided to NCDM and public. NCDM determines whether the early warning is issued and/or delivered to relevant agencies according to transmission procedural flow. *12	・ Due to insufficient public awareness and/or education on “weather forecasting”, the information is not	2.(ii)	2.(ii)	1.2

			・ Warning information is transmitted to local organizations (PCDM, DDCM, CCDM) through land-line phone now. A new communication means called ・ “geochat” is under development to improve transmission flow. ・ Forecast information is disseminated to public through television and/or radio. *12	necessarily utilized fully by the public. ・ Systematic means of dissemination to risk prone communities has not been implemented.			
		Flood	・ Hydrological and meteorological monitoring network was developed by the Mekong River Commission. MRC provides flood forecast till 5 days ahead at each monitoring point. *22 ・ Telemetric forecasting systems have been installed in the major river basins, namely Stung Treng, Kratie, Prek Kdam and Kompong Loung basins. There are 10 telemetric hydrological stations along the Mekong, Tonle Sap and Bassac rivers. *23 *13 ・ Once water level reaches to danger level, DHRW issues a notification to the relevant organizations and posts it on the website. *24 ・ In the case of critical flood, a warning is officially issued by National Committee for Disaster Management (NCDM). It is then transmitted to provincial, district and commune commissions for disaster management (PCDM, DDCM, and CCDM, respectively) through land-line phone. *12 ・ Flash flood information is released through the website of MRC. It is analyzed by MRCFFG (Mekong River Commission Flash Flood Guidance) System, however forecast accuracy have been one of the issues.	・ PCDM forecasts flood one day before, disseminate it to the whole nation or province level. Localized information is not available. Media is utilized for dissemination. Warning is not provided.*5 ・ When Mekong flooded, discharged water from Yaly Dam damaged cities along.*7 ・ 10-20% of monitoring facility of Mekong River are not operational, budget is not sufficient*23. ・ Enhancement of facility is needed*23.			
		Earthquake / Tsunami		-			
		Sediment disaster (Landslide, Debris flow)		-			
		Volcano		-			
		High Tide /Storm Surge (Cyclone/ Typhoon)					
		Other disasters					
	7.3 Evacuation plan				5	5	3
	7.4 Establishment of Emergency Response System	Central Level	・ NCDM is making efforts to improve capacity, system and procedures of damage and needs assessment and reporting. *25 ・ NCDM establishes the command system for rescue operation. The Prime Minister, his designated Senior Minister (who is posted the head of NCDM) or the Secretary General of NCDM will command to other related Ministries or Government agencies to implement responsive operations, organizing multi-sector working group for emergency situation. ・ In times of emergency, NCDM General Secretariat shall collaborate with the provincial/municipal CDM and CRC to draw special operational plans, according to existing guidelines. The plans must be sent urgently to NCDM General Secretariat after they are approved at the provincial and municipal levels.		5	5	3
		Local Level					
		Training etc.	・ The budget allocation to NCDM included for the cost of training. ・ Five-time refresher courses are organized on disaster risk reduction and disaster preparedness plan for teachers at schools in the provinces of Battambang, Banteay Meanchey, Pursat, Kampong Spue and Svay Rieng.				
	7.5 Rescue plan	・ Rescue operation cost is annually budgeted.			5	5	3
	7.6 Relief plan	・ When disaster occurs, NCDM with CRS as its main partner shall execute rescue activities jointly. The General Secretariat of NCDM shall formulate an emergency operational plan in cooperation with CDM and CRC; after it obtains approval of provincial / city level, said plan shall be conveyed to the General Secretariat of NCDM. *1 ・ There are small allocation of rice, fuel and cash to NCDM operations.			5	5	3
Assistance to challenges	8. Records of Major Assistance by JICA	<Studies> ・ The Study on Urban Drainage and Flood Control in Phnom Penh City (1998.2~1999.8) (Vol. 1, Vol. 2, Vol. 3, Vol. 4) ・ The Study on Improvement of Flood Control and Urban Drainage in Phnom Penh City Phase I ,II &III (2000-2003,2005-2006,2011-2016) (Phase I, Phase II, Phase III) <Trainings> ・ Port and Harbor (1997-2005) ・ Meteorology (1997-1998,2000-2004) ・ River and Dam Engineering (1999-2000) ・ Emergency disaster rehabilitation system (2003) ・ Sewage Works Engineering (2004) ・ Integrated Water Resources Management (2004) ・ Flood Hazard Mapping (2006) ・ Synoptic meteorology (2006)				
	9. Records of Assistance by other Development Partners	・ UN-DMT: Support to NCDM in developing and installing a National Disaster Damage and Needs Assessment System with the support from the WFP and UNICEF. *1 ・ ADB: Phnom Penh Water Supply and Drainage Project (1995-1996, 1998~2003, 2001-2002), Sihanoukville Drainage Plan (1995-1996), Rehabilitation from Flood in 2000 L/A *3 *18 ・ ADB/ADPC: Community Self Reliance and Flood Risk Reduction in Cambodia /ADPC/DANIDA:Capacity Building of National Meteorological Services (2005.12-2008.12) ・ WB: Phnom Penh Drainage Master Plan development, Assistance for improvement of urban drainage infrastructure (1996) /EU: Phnom Penh storm water reservoir planning. *17 ・ China: Improvement of Phnom Penh drainage infrastructure /City of Paris: Study on existing drainage facilities in Phnom Penh, Development of drainage master plan (1994-1998) ・ French Development Agency: Phnom Penh Drainage Planning, Drainage infrastructure improvement (2002~2009) *18 ・ NORAD/ADB: Capacity development & technology improvement of officers of DPWT, Phnom Penh Municipality in urban drainage facilities management (1997~2002) *17 *18 ・ ADPC: Enhancing Community Resilience to Natural Disasters in Southeast Asia, Support for development of SNAP ・ EU-ECHO/UNDP/ADPC: Disaster management mainstreaming in education sector (2007.10~) ・ ADPC :Capacity development for planning and implementation of flood preparedness program at Province/District level in Lower Mekong, funded by DIPECHO (2005.3-) ・ ADPC/OFDA-USAID: Asian Urban Disaster Mitigation Program(AUDMP) (1995-2004) ・ UNDP: Cambodia Climate Change Alliance (2010-2012) ・ UNDP: Cambodia Community Based Adaptation Program (2009-2010) ・ UNDP: Climate change initiation (2009 -2010) ・ UNDP: National development report o climate change (2009 -2010) ・ ECHO-CRC: Integrating preparedness for effective disaster response within the CRC model for community-based disaster risk reduction (2010-2011) ・ NZ-Aid: Regional program-Disaster Management and Emergency Response (2009-2012) ・ DANIDA: Cambodia Climate Change Alliance (2010-2012) ・ DANIDA: Knowledge, Attitude and Practices Study on Climate Change (KAP) (2010-2012)				
	10. International Networking	・ Mekong River runs through five countries in the ASEAN region; i.e. Thailand, Lao PDR, Myanmar, Cambodia and Vietnam. The Secretariat of Mekong River Commission (MRC) undertakes coordination among the countries. Initially, MRC mainly focused on development before the flood of 2000. Thereafter, MRC handles the issues of flood. The MRC prepared MRC Strategy of Flood Management and Mitigation*4. ・ With the onset of massive flood in 2000, flood control has come to be one of the major issues for MRC. MRC developed basic strategy in 2001 and action plan in 2002 and formulated flood control and mitigation program. Flood vulnerability assessment and mapping project was started. *26 This program consisted of: (1) establishment of regional flood management center (supported by Japan, Holland, USAID-OFDA and Danish), (2) Structural countermeasures (Supported by ADB and Holland), (3) Multi-national food management (Supported by Holland), (4) Capacity building for Emergency Response to Flood (Supported by German, EU-Echo, cooperated by ADPC), and (5) Land-use management (Supported by German). Flood vulnerability assessment and Mapping Project (FVAMP) was commenced in June and July of 2007 (Phase-I) *26				
ASEAN	11. National	・ Signed AADMER in 2007(ASEAN Agreement on Disaster Management and Emergency Response)(AADMER stipulates mutual cooperation in case of disaster.)					

Cooperation	Policy on ASEAN(ACDM, ARPDM,AADMER) cooperation in Disaster Management, Emergency Response in case of disasters in other ASEAN countries or ASEAN region	• Participation in: - ARF meetings on disaster management, - monthly ACDM meetings, - ARDEX (ASEAN Regional Disaster Exercise)and - ASEAN regional technical cooperation Project • SASOP (Regional Standing Arrangement and Standard Operating Procedures) started in 2007. • Agreement on trans-boundary haze was signed by ministers of ASEAN countries in 2002 and came into effect in 2003. It stipulates forest fire monitoring, prevention, coordination mechanism, communication system, mutual emergency support and establishment of ASEAN coordination center. Action plan for capacity building of fire fighting in the region and early warning system utilizing satellite images were developed. *27
	12. Resources useful for other ASEAN countries	
	13. Needs for External Assistance from the point of view of Regional Cooperation	

[1] EM-DAT
[2] EM DAT Website (http://www.emdat.be/ (July 2010)
[3] JICA "Preliminary Survey Report for Survey on Urban Drainage Development Plan in Phnom Penh City, Cambodia" (1997).
[4] JICA "Project Formation Survey Report on 'Flood Disaster Prevention' in Kingdom of Cambodia" (2001)
[5] ADRC, Country Report (2003)
[6] ADRC Website: (http://www.adrc.asia/nationinformation_j.php?NationCode=116&Lang=jp&NationNum=06) (accessed on 28 June 2012)
[7] ADRC, Country Report (2002)
[8] ADRC, Country Report (1998)
[9] National progress report on the implementation of the Hyogo Framework for Action (2007-2009)
[10] Strategic National Action Plan for Disaster Risk Reduction 2008-2013 (2009)
[11] Yoshiaki Otsubo, "Actual State of Severe Flood in the Downstream of Mekong River in 2000 and Issues to flood" (2004), the Japanese Society of Irrigation, Drainage and Reclamation Engineering, Academic Journal Volume 72, No.2
[12] JICA "Data Collection Survey on ASEAN Regional Collaboration in Disaster Management . (2012): Interview to NCDM (2012.03.05)
[13] Website of Mekong River Committee: http://ffw.mrcmekong.org) (accessed on 28 June 2012)
[14] JICA "Data Collection Survey on ASEAN Regional Collaboration in Disaster Management . (2012): Interview to DHRW (2012.03.06)
[15] Website of Department of Hydrological River Works, Ministry of Water Resources and Meteorology: (http://www.dhrw-cam.org/) (accessed on 28 June 2012)
[16] JICA "Data Collection Survey on ASEAN Regional Collaboration in Disaster Management
[17] (2012): Interview to the Government of Siem Reap Province (2012.03.07)
[18] JICA, "Survey Report for Basic Design of Flood Disaster Prevention / Drainage Improvement Plan (Phase II) in Phnom Penh City, the Kingdom of Cambodia"
[19] Ministry of Environment, Royal Government of Cambodia, "National Adaptation Program of Action to Climate Change (NAPA)", 2006
[20] Website of ADPC: (http://www.adpc.net/v2007/Programs/DMS/PROGRAMS/Capacity%20Building%20at%20the%20National,%20Provincial%20and%20District%20Levels/Default-Capacity%20Building.asp) (accessed on 10 April 2009)
[21] Institute of Global Environmental Strategies (IGES); "2008 Momentous News in Asia" (2009)
[22] Shin Utsumi, "Current Status and Direction of Activity of Mekong River Committee" (2004); the Japanese Society of Irrigation, Drainage and Reclamation Engineering, Academic Journal Volume 72, No.2
[23] Takao Masumoto, Huan Thain Hi; "Development Status and Future Outlook of Hydrological Weather Observation Network in Mekong River Basin"; (2004) the Japanese Society of Irrigation, Drainage and Reclamation Engineering, Academic Journal Volume 72, No.2.
[24] Website of Department of Hydrological River Works, Ministry of Water Resources and Meteorology: (http://www.dhrw-cam.org/flood warning.php) (accessed on 28 June 2012)
[25] Institute of Global Environmental Strategies (IGES); "2003 Momentous News in Asia" (2004)
[26] Website of Mekong River Committee : (http://www.mrcmekong.org/programmes/flood.htm) (accessed 6 April 2009)
[27] Institute of Global Environmental Strategies (IGES); "2002 Momentous News in Asia" (2003)

	Inventory				HFA PforA	HFA IofP	AADMER
Current Situation and Challenges	1. Features of Disasters	• EMDAT Disaster 1980-2011: Number of disaster 296; among which floods (43%), Earthquakes (Share of Number of Cases 26%), Landslide/Sediment Disasters (14%), Volcano Eruption (13%) *1 *2 ; (by statistics in 1982-1994, annual mean number of instances of flood was 410; earth and sediment related disaster 207, earthquake and tsunami 8.4, volcano eruption 2.5) *3 • More than 5,500 rivers are dotted throughout the nation; almost every year, flood/sediment disasters occur in the rainy season.*4 • Indonesia is situated in frequent occurrence zone of plate type earthquakes. Time from occurrence of earthquake to arrival of Tsunami is short. • Active fault type earthquake (local earthquake) is active, too. • Indonesia has 129 volcanoes (1/7 of volcanoes in the world), including 80 active ones. • Since there are many flashy streams, sediment disasters such as floods and debris floods occur frequently. • In almost every year, forest fires occur in the dry season, which causes air pollution in neighboring nations.*4 • In Java, habitation in dangerous zone increases because of population pressure, which results in high risk.*4 • Landslide and forest fire show tendency of increase.*5 • Large scale disasters in these years are: Tsunami in 2004, volcano eruption and earthquake in 2005, flood x 2 times, earthquake, river flash flood, Tsunami in 2006, flood x 3 times, earthquake, volcano eruption in 2007, flood in 2008, river flash flood in 2009, earthquake, tsunami and volcano eruption in 2010, earthquake and sediment disasters in 2012 etc. • Earthquakes in Magnitude of more than 5.5 or felt earthquakes occurred 70~ 100 times in a year; in the period of 1991 ~ 2009, 30 large scale earthquakes and 14 large scale tsunami have been observed. *6					
	2. Administrative Division	33 Provinces (Provinsi) /405 Regency (Kabupaten)/97 City (Kota)/6543 District (Kecamatan)/75244 Village (Desa and Kelurahan)					
	3. Development of Legislative Framework and Disaster Management Policy & Plans		Current Situation	Challenges	1.(i)	1.(i)	2.1
		Development of Legislative Framework	<Fundamental Law> • Disaster Management Law No. 24 (2007.4) <Ancillary Regulations> • Regulation No. 22 on Disaster Aid Financing and Management (2008) • Regulation No.23 on Participation of International Institutions and Foreign Non-Governmental Organizations in Disaster Management (2008) Regulation No.8 on National Agency Disaster Management (2008) <Laws in Relevant Sectors> • River Act (1991); it provides, nationalization of river, utilization of river is regulated by the government, the government formulates guidelines to cope with floods.*7 • Law on Water Resources (2004); it provides that comprehensive master plan including water resources, flood control, environment of the respective rivers is to be formulated. *7 • Forestry Act (1999); it provides efforts to be made to prevent destruction of forests by fire as protection of forests and forest land. • In order to enhance enforcement of the said law, the government decree is under drafting (as of 2000). *8	• Disaster Management Act has conflict with Local Government Act in establishing local disaster management organizations in terms of budget and organization structure. *9			
		Disaster Management Policy	• New law provides that the major emphasis shall be shifted from responses to disasters to reducing disaster/preparation, protection of the people from disasters shall be for protection of human rights, management of disasters shall be the responsibility of not only the government but also citizens and the society as a whole. • The policy has been materialized into the Action Plans and the Law No. 24..	• Lack of competence in vertical and horizontal regulations and policies. *10			
		Disaster Management Plans	<Central Level> • Formulating2001.3 Disaster Management Guides. • Emergency response plan intended for State, Province, Regency and City levels are under formulation. *1 • National Action Plan for Disaster Reduction 2006-2009 (2006) • National Action Plan for Disaster Risk Reduction 2010-2012 (2010) • National Disaster Management Plan 2010-2014 (2010) as the reference in order disaster management activities/programmes to be mainstreamed into the strategic plans for every government organization • Based on the “Investigation for Natural Disasters Management Plan” (2007.3 ~ 2009.3) by JICA, National Disaster Management Plan, and Regional Disaster Management Plan (in 2 provinces, regency/city level: 2 places, pilot areas in the municipality level intended for earthquake / tsunami / flood / landslide) have been formulated. • When they are approved by adding response to other disasters (volcanic eruption, forest fire, etc.), they will become official plans. • According to the provisions in the new law, the President shall be responsible for the formulation and review of the National Disaster Management Basic Plan. *5 <Local Level> • Regional governments’ action plans are formulated among all 33 Provinces in 2011.	• The recent two plans are not disseminated optimally among different Ministries and government agencies as well as the public.			
	4. Establishment and Enhancement of Disaster Management System	Institutional Framework	Current Situation	Challenges	1.(ii)	1.(ii)	2.1 4
		Central Level	BNPB (National Agency for Disaster Management) (2008.1~)*5 • This is a permanent organization, which replaces BAKORNAS PB; a central system for disaster countermeasures under the direct control of the President. It is obligated to report to the President every month. • The level of Director General of the organization (appointed on 2008.5) is equivalent to that of the State Minister that is positioned below the Coordinating Minister of People’s Welfare (the level is a little higher than other ministries). There are 4 Deputy Director Generals. *11. • Different from BAKORNAS PB, which has only coordinating function, this organization takes on execution; it handles from preventive measures for disasters to emergency measures and recovery & reconstruction. • Members of BNPB Committee (not established yet) are staff members of relevant agencies. (It consists of 10 relevant officials of the relevant ministries and 9 experts / community leaders.) • Operation Unit: (Director of Secretariat, Chief Inspector, 4 Deputy Inspectors) • Permanent staffs: a little over 250 (as of 2012.2) • Disaster contingent budget is under the control of BNPB. (The old organization BAKORNAS PB had no budget authority.) • As to frequent small scale disasters, since there are duplications among allocation of business operation, BNPB is coordinating the role sharing of relevant organizations in the activities or business operations. *5 • After disasters have occurred and when emergency countermeasures are taken, BNPB is authorized to give orders to other government agencies; BNPB takes action on the budge for emergency measures. In the normal period and reconstruction period, BNPG gives an appropriate advice to the other government agencies.	• BNPB is ranked at a lower lever than other ministries/agencies. *5			



Sources: (Above) Dr. Syamsul Maarif, Msi (date unknown) *Disaster management in Indonesia*, (Presentation slide), p.11. (Below) http://www.bnpb.go.id/website/asp/content.asp?id=4 [Accessed: June 3, 2012] (BNPB's organogram was provisionally translated in English by JICA Study Team)

Figure Indonesia's Disaster Management Structure (Top) and BNP's Organogram (Bottom)

			<u>Organizations in charge of Non-structural Measures for Disaster Risk Mitigation and Preparation</u> • Tsunami：BPPT (Agency for the Assessment and Application Technology), LIPI (Indonesia Institute of Science), ITB (Bundung Institute of Technology), MENRISTEK (Ministry of Research and Technology), BMKG (Meteorology, Climatology and Geophysics Agency), BIG (National Survey and Mapping Agency) • Cyclone: BMKG • Earthquake：BG (Geology Agency), BMKG • Flood/Mud Slide：DGWR-PU (Directorate General of Water Resources- Ministry of Public Works) • Forest Fire：Ministry of Forestry • Volcano Eruption：BG, PVMBG (Center for Volcanology and Geological Hazard Mitigation) • Drought：Ministry of Agriculture, BMKG • Landslide：BG <u>Organizations in charge of Structural Measures for Disaster Risk Mitigation</u> • Earthquake：BG, PU • Drought：Ministry of Agriculture, PU • Forest Fire：Ministry of Forestry • Tsunami/Volcano Eruption/Flood/Mud Slide/Landslide：PU					
			<u>Cooperation / coordination between organizations</u> • Under the coordination of BNPB, each government agency implements disaster mitigation, monitoring, etc. Therefore, in the stages from the early warning, occurrence of disasters to post-disaster, BNPB plays a central role. In the local area, too, BNPB undertakes the same role.					
		Provincial Level / Regency & Municipality Level	BPBD (Local Agency for Disaster Management) • The Head of the Local Agency: An official second to the Governor of Province / Regent (Regency)/ Special Capital District. • Members of Steering Committee：Related regional government officials, professional & expert and community members (in all 33 provinces, BPBD has been established)	• Human resources with capacity of disaster management are concentrated in provincial level and urban areas. • In terms of budget arrangement and organizational structure, there is a conflict between Disaster Management Law and the Local Autonomy Law on the establishment of the regional disaster management organization. *11				
		Level below Regency & Municipality	<u>BPBD (Local Agency for Disaster Management)</u> • Establishment of BPBD in these levels has achieved about 60%.	• With decentralization, cooperation between the central government related agencies and the local government becomes important.*3 • At a large scale disaster, a system to convey and coordinate the information between the disaster management organizations of provincial level and that of Regency &				

				Municipality level does not work sufficiently.[*5] • When disaster occurs, coordination between sectors of local level is insufficient[*10]			
		Financial Preparation/Budgeting (at normal / emergency period)	• 2008 Government Decree No.22 provides Disaster Support Fund and its management. [*10] <Annual Budget > • On-call Budget, Rehabilitation and Reconstruction Budget (which are allocated to the central government) • Disaster Management Reserve Fund (BNPB) • The Disaster Management Law ensures BNPB authority of "Ready Fund". The budget allocation to BNPB was increased 400% to 800 Million Rupiah during year 2010-2011. • With the decentralization, regional government budgets are available to emergency response, and recovery/rehabilitation expense. The direct budget allocation from the central to the local governments was amounted to 108 Million Rupiah in 2011. <Emergency measure budget> • National Budget in 2005: 3.2 trillion Rupiah, 2006: 2.9 trillion Rupiah, 2007: 2.0 trillion Rupiah, 2008: 3.0 trillion Rupiah (US$252,000,000 / exchange rate as of 2009.2). (The above amounts have been allocated to BNPB, excluding allocation to Aceh and Jogjakarta)[*5] • Accounting for the budget to cope with unexpected circumstances is recommended to the local government. [*1]	• Budget for the implementation of disaster mitigation program is lacking both in central and regional governments. [*10] • Allocation of budget of disaster management sector budgeted to relevant ministries should be decided in coordination with BAPPENAS and BNPB. • Actual allocation is unknown while National Action Plan for Disaster Risk Reduction 2010-2012 (2010) has funding indications.			
	5. Positioning Community-based Disaster Management	• Rights and duties of communities are stipulated in Disaster Management Law No.24 Year 2007. Underlying intention is paradigm shift from government-led disaster management towards community-based disaster management. [*2] • DKI Jakarta has created closer relationship with local communities in Jakarta, networking them having meetings from time to time and listing available resources that these communities can provide in disaster strikes.			1.(iii)	1.(iii)	2.6 4
	6. Prevention and Mitigation	Current Situation		Challenges	-	-	-
	6.1 Flood	Identification of Disaster Risks	• General hazard maps are prepared at Kabupaten/Kota Level. *[12] • Flood hazard maps for each province have been prepared and updated every year by Ministry of Public Works. [*7] • Directorate General of Water Resources of the Ministry of Public Works (DGWR, PU) takes charge of the creation/maintenance of the early warning system of flood, creation of the flood hazard map and related social education.	• More detailed hazard map is desirable.	2.(i)	2.(i)	1.1
		Monitoring	• Hydrological monitoring is conducted by the regional offices (BBWS or BWS) of Ministry of Public Works.*[13] • BMKG also has 175 automatic weather stations in the county.*[14] *[15]	• It needs to increase the number of rain-gauge stations to observe water level. [*5] • Sharing of data between Ministry of Public Works and BMKG is on request basis. [*15]	2.(i)	2.(ii)	1.3
		Non-structural Measures	• Disaster database has been developed by BNPB. Past flood records since 1822 are accumulated. *[16] *[17] • Each office of BBWS prepares Guideline on Flood Alert for every rainy reason. The guideline indicates institutional arrangement, monitoring network, and flow chart of reporting, coordinating and disseminating warning information. All major rivers have 3 steps of warning water level. *[18] • BBWS/BWS office formulates POLA (basin water resources strategic planning) and RENCANA (basin water resources management plan). Based on the concept of Integrated Water Resources Management (IWRM), the above plans are formulated for each river basin by combining structural and non-structural measures. *[19] • Ministry of Public Works has developed a manual for preparation of early warning and evacuation system for flood. *[20]	• Evacuation plans have been prepared for the limited flood prone areas.	4.(i)	4	2.2
		Structural Measures	• Based on Ministry of Public Works Decree No. 12/PRT/M/2006, BBWS and BWS offices were established in 2006 to manage water resources in the particular strategic basins. At present, there are 12 BBWS and 21 BWS offices to manage 65 basins. They are also responsible for flood management, and various structural measures for flood control have been constructed and managed by BBWS and BWS under PU.[*13]. • Short-medium Term Flood Control Program (2002-2016) is being implemented based on flood control and drainage master plan. *[21] • The Ministry of Forestry takes charge of "Maintenance of River Basin" *[22] such as restoration of devastated land by tree planting, soil conservation, etc. • PU and Provincial Government (with enforcement of Local Autonomy Law, on and after 2001, more than 120 BBWS and BBS as well as the construction offices of PU have been transferred to the Provincial Government [*3]) take charge of planning / construction of flood management facilities. • 3 million ha of re-afforestation is targeted within 5 years. • Disaster risk assessment is required in environmental impact assessment for projects. • BNPB is developing a guideline for comprehensive disaster risk analysis for construction of major infrastructures. • BBWS/BWS offices formulate POLA (basin water resources strategic planning) and RENCANA (basin water resources management plan). Based on the concept of Integrated Water Resources Management (IWRM), the above plans are formulated for each river basin by combining structural and non-structural measures.*[19]	• Construction, maintenance and rehabilitation of flood control and Sabo facilities and river improvement works are delayed. *[3]*[7]*[9]*[23] • Inhibition of living in river basin area cannot be enforced thoroughly and many people are living in such area. *[12]*[24]. • In DKI Jakarta, river /drainage appliance ledger and their maintenance records are not prepared. [*7]	4.(i)	4	2.2
	6.2 Earthquake / Tsunami	Identification of Disaster Risks	• Bureau of Geology (BG) takes charge of earthquake hazard forecasting (fault investigation, risk allowance evaluation, etc.) • National Survey and Mapping Agency (BIG) takes charge of collecting information on the landform of the sea floor to carry out simulation of Tsunami. • Agency for Assessment and Application of Technology (BPPT), Indonesian Institute of Science (LIPI), Institute Technology Bandung (TTB), the State Ministry of Research and Technology (RISTEK) takes charge of calculation of tsunami simulation for the development of database for tsunami forecast as well as promotion of evacuation route planning and implementation of evacuation drill by the regional governments (LIPI, RISTEK)*[25] . • BNPB creates multi-hazard map covering all provinces.*[26] • BIG publishes the multi hazard maps for flood and tsunami (as of 2012.2) *[27]. • GRDC have developed the active fault maps of Merapi and Karkato, the seismotectonic map of Manado and the tsunami hazard map of Sulawesi Barat, Grontalo and Aceh (as of 2012.2) [*25.] • The database disaster in Indonesia called DIBI (Data dan Informasi Bencana Indonesia) has been published on the web pages of BNPB (http://dibi.bnpb.go.id) (as of 2012.2) [*25] • The Ministry of Marine and Fishery (KKP) takes charge of mitigation of disaster at coast areas by planning projects for installation of green belt, construction of raised-floor type houses. [*28] • In Aceh province, the hazard map and risk map were developed and DIBA (Data dan informasi bencana aceh) was published on the web pages (http://diva.acehprov.go.id) (as of 2012.5) [*27].	• Hazard maps and risk maps are provided by individual government agency. It needs to develop a system that takes into consideration utilization of citizens by preparing a portal site for actual utilization by citizens (as of 2012.5) [*27] • Most of the studies on earthquake in Indonesia is made on Western part of Indonesia (Sumatera, a part of Java); it needs to do the study on Eastern part of Indonesia (as of 2012.5).[*25] • KKP is carrying out Tsunami Disaster Mitigation Program at coastal areas (50 pilot projects of total of that in 500 villages have been completed); verification of them is needed. *[28]	2.(i)	2.(i)	1.1

		Monitoring	• BMKG has conducted seismic observation by broadband seismograph, accelerograph and GPS and transmitted the data to InaTEWS through VSAT system*[29]. • BPPT has managed tsunami buy and NAMRIA has conducted tide gauges observation. • BMKG has conducted hypocenter and magnitude decision using "SeisComp3" in InaTEWS.[*27] • BMKG prepare a Shake Map by means of revised Mercali scale to provide it to BNPB. It is published on the web page of InaTEWS (http://inatews.bmkg.go.id) (as of 2012.5) [*27]	• The existing buoy has problem in maintenance aspect. BPPT have plan to install the submarine cable newly. In June 2012, the first one is scheduled to install (as of 2012.5) • As to the seismic observation equipment, initially planned quantity has not been installed (as of 2012.5) [*27] • The earthquake recorder is unevenly installed in the Western part; it needs to install them in the Eastern part, too (as of 2012.5) [*27] • BMKG plans to install its own tidal level observation equipment at 2 places (as of 2012.5) [*27]	2.(i)	2.(ii)	1.3
		Non-structural Measures	• The Ministry of Public Works (PU) *10 takes charge of establishing Standard for the Earthquake Resistant Design. • The 24 units of warning system were installed in 6 provinces.*[29] • RISTEK has developed some guidelines for tsunami evacuation plan as national standards. [*27] • LIPI has developed educational materials for tsunami disaster prevention. [*27] • The Aceh Tsunami museum was constructed for tsunami disaster education. [*27] • In Ace, tsunami warning is broadcasted from the mosque (as of 2012.5) [*27]		4.(i)	4	2.2
		Structural Measures	• Bureau of Geology (BG) takes charge of zoning related to the earthquake resistance standard. • The Ministry of Public Works takes charge of construction of structures based on the earthquake resistance standard. • The Ministry of Public Works and Provincial Government (with enforcement of Local Autonomy Law, on and after 2001, more than 120 BBWS and BBS as well as construction offices of PU have been transferred to the Provincial Government *[3]) take charge of planning / construction of overseas disaster prevention facilities. <Regulation / Land utilization> • In the construction of public schools, earthquake resistance is being considered. [*10] • The Earthquake Resistance Standard has been established in 1981; since then, training has been provided and intended for architect engineers, construction contractors, etc. on the standard for earthquake resistant building and earthquake resistant building technologies. [*12] • KKP implements pilot projects for tree plantation, construction of raised-floor type houses at coast area (as of 2012.5). [*27] • Aceh Tsunami museum is utilized for evacuation building which can contain 6000 people. (as of 2012.5) [*27] • In Aceh province, 4 evacuation buildings were constructed. (as of 2012.5) [*27]	• Existence of the standard for earthquake resistance design is not known among people; therefore, the regulation is not enforced adequately. [*10] • Earthquake resistance of general structures, which do not need to obtain a construction permit, is delayed Monitoring system is not established at the construction site to be the target of a construction permit. [*11*12]. • The tsunami countermeasure such as breakwater and seawall has not been constructed in Aceh Province (2012/5)[*27.]	4.(i)	4	2.2
	6.3 Sediment disaster (Landslide, Debris flow)	Identification of Disaster Risks	• 1/100.000. It indicates the trace of the past sediment disaster, classification of dangerous area into 4 stages, etc. (as of 1995) [*12] • Gadja Mada University developed landslide hazard map in 2 provinces. [*3] • Directorate General of Water Resources of the Ministry of Public Works (DGWR, PU) takes charge of social education regarding development of mud flood alarm system/maintenance system. • Bureau of Geology takes charge of assessment of landslide risk degree, development of forecast/alarm system and its maintenance, development of landslide hazard map and related social education. • BNPB has developed the hazard map on the sediment disaster in Indonesia. [*26] • CVGHM develops monthly landslide hazard map of landslide-prone areas based on monthly rainfall and send it to relevant local governments. • CVGHM has developed the hazard maps for landslide of 33 provinces. [*27] • Sediment disaster called "Banjir Bandang" occurs; in where flood and mud flood arise accompanied by rapid freshet caused by development and collapse of a natural dam mainly brought about by mud slide (as of 2012.5). [*27]	• The landslide risk degree map is not utilized adequately as the database for the land utilization plan as well as the regional development, which must be planned based on the threat of sediment related disaster. [*30] • The local governments, communities as well as inhabitants in the landslide risk area do not cope with the early warning system and have no awareness on the said system. *[30]	2.(i)	2.(i)	1.1
		Monitoring	• Specific landslide is observed by GPS, rainfall observation and extensometer by CVGHM. (as of 2012.5) [*27]		2.(i)	2.(ii)	1.3
		Non-structural Measures	• "Manual for Emergency Evacuation for Banjir Bandang" was published. [*27]		4.(i)	4	2.2
		Structural Measures	• The Ministry of Public Works and Provincial Government (with enforcement of Local Autonomy Law, on and after 2001, more than 120 BBWS and BBS as well as construction offices of PU have been transferred to the Provincial Government [*3]) take charge of planning / construction of landslide measure works and planning / construction of mud flood measure works. • "Guideline for Banjir Bandang Disaster Mitigation Management" and "Manual for Researching Banjir Bandang Hazardous Area" were published.(as of 2012.5) [*27]		4.(i)	4	2.2
	6.4 Volcano	Identification of Disaster Risks	• It has been prepared for 104 volcanoes. On 40 of the 104 volcanoes, geologic maps of 1/50,000 are created, too. Every large scale eruption, the maps are revised (as of 1995) [*12.] • In the hazard map on the Mt. Merapi, hazardous zones are divided into categories according to the risk degree to provide necessary control/alarm system. *[31] • Bureau of Geology (BG), Center for Volcanology and Geological Hazard Mitigation (CVGHM) takes charge of developing/maintaining forecast / alarm system on volcanic explosion, creation of lava flow hazard maps and related social education. • BNPB has developed the hazard map on the volcanic disaster in Indonesia (as of 2012.5) [*27] • CVGHM has developed the volcanic hazard maps of over 80 sites (as of 2012.5) . [*27] • As studies on volcanoes, CVGHM implements studies on geophysics such as development of geologic maps, earthquake observation, deformation observation, geomagnetic observation, studies on geosciences, where sample of water or gas is analyzed, development of hazard maps, etc. [*27] • Since the Mt. Merapi extends over 2 provinces, Jogjakarta and Central Java, one volcanic hazard map is developed by the said two provinces. [*27]	• Disaster information can be available in the central area; however, it is not conveyed to the local communities. [*10] • A bridge connecting Sumatera and Java is planned; however, since there is a possibility of eruption of the Mt. Klakatau, study must be made from that point of view. [*27]	2.(i)	2.(i)	1.1
		Monitoring	• CVGHM has installed seismographs in all A-type volcanoes and GPS in 5 volcanoes (as of 2012.5) [*27]		2.(i)	2.(ii)	1.3
		Non-structural Measures	• In Rehabilitation and Reconstruction program at Merapi, relocation of communities from hazardous areas has been done (as of 2012.5). [*27]	• In addition to the traditional method of damage reduction for	4.(i)	4	2.2

			volcano, scientific education for disaster mitigation is needed (as of 2012.5) [*27]			
	Structural Measures	• The Ministry of Public Works and Provincial Government (with the enforcement of Local Autonomy Law, on and after 2001, more than 120 BBWS and BBS as well as construction offices of PU have been transferred to the Provincial Government [*3]) take charge of planning / construction of lava flow control works. • The Ministry of Public Works and Provincial Government (with the enforcement of Local Autonomy Law, on and after 2001, more than 120 BBWS and BBS as well as construction offices of PU have been transferred to the Provincial Government [*3]) take charge of planning / construction of landslide and debris flow measure works. <Regulation / Land utilization> • Off-limit zone is set up for 72 volcanoes (as of 1995). [*12] • In the hazard map on the Mt. Merapi, hazardous zones are divided into 3 categories to control habitation. [*31]	• Off-limits in the dangerous zone in volcanic belt or in the river basin is not enforced thoroughly and many people are living in such areas. [*12*24.]	4.(i)	4	2.2
6.5 High Tide /Storm Surge (Cyclone/ Typhoon)	Identification of Disaster Risks			2.(i)	2.(i)	1.1
	Monitoring			2.(i)	2.(ii)	1.3
	Non-structural Measures			4.(i)	4	2.2
	Structural Measures			4.(i)	4	2.2
6.6 Other Disasters	Identification of Disaster Risks	• The Ministry of Agriculture and Weather and Geophysics Bureau take charge of the development of Drought Forecast/Alarm System.		2.(i)	2.(i)	1.1
	Monitoring			2.(i)	2.(ii)	1.3
	Non-structural Measures			4.(i)	4	2.2
	Structural Measures	• Competent agency for the forest fire is the Ministry of Forestry.		4.(i)	4	2.2
6.7 Common items for Disaster	Non-structural Measures	• Under BAKORNAS PB (past of BNPB), collection of the past data has started and National Hazard Data Book 2002-2005 has been published. [*5] • Hazard information is dispersed in the respective government offices; to cope with the circumstance, BNPB has developed the National Hazard Database called DIBI (Data dan informasi Bencana Indonesia).[*10] DIBI is the database that stores information on historical disaster events in Indonesia. DIBI has accumulated disaster loss data since 1815. [*17] The data in DIBI are provided to BAPPENAS, too, where they are utilized in the Integrated Management Information System (SIMT = Sistem Informasi Manajemen Terpadu) of PNPM Mandiri (national poverty reduction program) by BAPPENAS.[*17] • DIBI: http://dibi.bnpb.go.id/DesInventar/dashboard.jsp?lang=ID • SIMT: http://simpadu-pnpm.bappenas.go.id/Desinventar/home&lang=ID • GEOSPASIAL is a Web-GIS database system that displays (1) disaster/damage information caused by disasters occurred within 30 days, (2) various types of hazard maps, together with (3) administrative boundaries on maps and etc.[*17] • GEOSPASIAL: http://goespasial.bnpb.go.id • The Ministry of Health, the Department of Social, National Police and Indonesian Red Cross develop disaster database individually, which are updated regularly.[*10] • In the level of regencies/municipalities, general hazard maps are developed.[*10] • The Ministry of Home Affairs requests to all governments of regencies/municipalities to collect and draw the mapping of the disaster data for submission.[*10]	• Knowledge on risk assessment is lacked.[*4] • Method of risk assessment is not standardized; under the coordination of BNPB, guidelines that are applicable to the local level are under development by a team of experts. [*10] • Efforts to analyze risks that cover all variety of disasters and to formulate policies and development plans based on the said analysis has still been limited.[*10] • The hazard maps developed by regencies/municipalities are less detailed. • It is necessary to develop a topographic map that describes the height with a scale of 1-2m. [*5] • It is necessary to accumulate and analyze the past disaster data. [*5] • Records of hazardous events or damages, historical records of disasters are insufficient and are not shared. [*12]	4	4	2.2 2.5
				4	4	2.8
	Structural Measures	• In the re-construction of damaged hospitals, the Ministry of Health announced the policy to enhance earthquake resistance. [*10] <Regulation / Land utilization> • In order to improve environment that has been worsened by excessive cultivation and destruction of forests, the Government inaugurated “National Movement for Rehabilitation of Land and Restoration of Forests” in 2003; which aims to rehabilitate / restore 3 million hectares in 372 prefectures throughout the country in 5 years.[*1*32] • The Ministry of Forestry together with the Ministry of Habitation, Regions and Infrastructure plans to implement the business of “Tree Plantation and Restoration of River Basin Environment” (2003)[*22]. Forest Preservation Center, which is under control of the Ministry of Forestry (BPDAS: it belongs to the Afforest and Soil Conservation Bureau and is established in 26 places throughout the nation) takes charge of the restoration of devastated land and soil conservation works. *[33] • In environmental assessment on the project basis, disaster assessment is requested to be implemented. [*5] • BNPB is developing guidelines for the implementation of comprehensive disaster risk assessment. [*10] • In the new disaster management act, disaster mitigation by introducing safety standard at space (land utilization) planning and penalty clause for the offenders is stipulated. [*5] • In the space planning act (2008), it is provided that risk assessment shall be implemented in formulating the space planning.[*10]	• As to space (land utilization) planning, there is no provision on the role of BNPB and BPBD. [*5] • Regulations that incorporate viewpoints of disaster prevention in it are entirely focused on general matters; no details are provided. The regulations are not enforced strictly, too. [*10] • Disaster risk assessment is not reflected on the space planning. [*10]	4	4	2.3.2 2.3.3
	Climate Change Adaptation	• National Action Plan for Climate Change Adaptation was announced in 2007. [*10] • Responsible body: National Committee on Climate Change and Environment(1992), National Council for Climate Change (July 20089 • NFP: Ministry of Environment; Climate Change Division • National Action Plan Addressing Climate Change (2007) provides government institutions. • The Indonesia Climate Change Sectoral Roadmap (2010) was issued to expedite the implementation and to mainstream climate change issues into national development planning. • Specific climate change adaptation policies are absent except Indonesia’s (draft) Climate Change Adaptation Program (ICCAP).		4.(i)	4.(i)	2.7
	Public Awareness Research and Development /Human Resource Development	• Civil rights are stipulated in new disaster management act (rights to take disaster management education and trainings, and rights to access to disaster information).[*5] • Bringing about the disaster prevention culture is provided in the new disaster management act. [*5] • In the disaster prevention action plan (2006-2009), creating the disaster prevention culture as well as the disaster prevention education is put in a position as one of the important fields. (Relevant agencies: BNPB, LIPI, PMI,MPBI).[*5]	• Insufficient public awareness and/or competent resources.*[35] • No legal or official networks available among disaster experts, managers and planners;	3	3	2.3.1

			/ for Disaster Management	• Disaster-prone municipalities have legislated ordinances for incorporating disaster reduction education into school curriculum. *10 • The Ministry of National Education of Indonesia has issued a circular letter that encourages the mainstreaming of disaster risk reduction into schools through school curriculums that contain preparedness education for elementary, junior high and senior high schools for six major hazards: earthquake, tsunami, volcano, flood, landslide and typhoon/cyclone.*9 • Local NGO enhances activities aiming at improving readiness of community against disasters. *1 • The Sabo communities have been constructed at the mountain foot of Mt. Merapi in Central Java and Mt. Bawakaraeng in South Sulawesi (in South Sulawesi: 22 groups, about 820 persons, as of 2004) and community-base early warning systems are developed (regular meeting, monitoring of mud flood, rainfall observation, planning alarm system, disaster prevention drill, disaster prevention education, etc).*2 *34 • The Government supports to establish Disaster Management Research Center in Gadja Mada University, Bandung Institute of Technology, Sepuluh Nopember Institute of Technology, etc. *1 • In the Sabo Technology Center, besides various hydraulics model test, in tie-up with Gadja Mada University, training program of engineers in the comprehensive sediment disaster measures (various training) as well as a program for promotion of disaster prevention in community, etc. is implemented*34 Training for engineers has been implemented since Volcanological Sabo Center was established in 1982*31. • A simple training is provided for the neighborhood security members. *12 • Plenty of donors provide earthquake-related training to BMG. *25 • Academic researchers, universities and research institutes established a platform for disaster prevention researchers in 2008. *10	information to be circulated with mailing lists, forum database, forum spatial data even when disasters. • Presidential Decree concerning adoption of disaster prevention education in the school curriculums was issued to the Ministry of National Education and the Ministry of Home Affairs; however, since there are no guidelines or legal system required to enforce it, said decree has not been implemented. *10 • Activities for enlightenment related to anti-disaster awareness /creation of disaster prevention culture are implemented sporadically; activities are not the national scale and there is question about their sustention, too. *10 • Even when SATKORLAZK PB is established permanently and even if hazard maps are developed, there is almost no early warning system or the disaster prevention activities in the community level, which utilize those facilities. *4 • There is an area, where even the people receive an early warning, they don't know what kind of action should be taken, because education to the people was lacking. *10 • Most of enlightening activities and disaster prevention educations are implemented on the project basis; there is an issue on sustention of those activities.*5 • Community-based disaster prevention activities are arranged by various bodies; however, they are not always based on the coordinated and systematic methods. *10 • Evacuation places at the time of disaster are not designated except for the case of tsunami. *5 • There are no evacuation plans as well as evacuation manuals. *5 • DGWR has to give technical guidance / dissemination to BBWS and BWS as well as the construction offices of PU, which were transferred to the Regional Government with decentralization; it becomes important to improve the administrative capacity and maintain/train the human resources. *3 *23 • Development of an appropriate disaster prevention technology is lacking. *4*12 • Training for BMG is made on the one-time basis, and moreover, BMG itself has no organization that can receive training regularly. *25 • Human resources that have enough capability to manage disasters are concentrated in the province level or urban area. *10			
	7. Preparedness and Response		Current Situation		Challenges			
		7.1 Disaster Response plan / Emergency	Central Level	<Emergency Operation Plan(EOP), Contingency Plan(CP) .etc> • BNPB updates EOP very year <Emergency Financial Measure> • On-call budget • Ready Fund		5	5	3

	Financial Measure	Local Level	<Emergency Operation Plan(EOP), Contingency Plan(CP) .etc> • Disaster response plan for regional level has yet to be formulated. BNPB prepared a guideline for formulation of regional disaster management plan and provides training opportunities. • Some provinces, regencies and cities have formulated contingency and preparedness plans through the stakeholders' meeting organized by BNPB. <Emergency Financial Measure> • Local budget can be utilized for emergency response when disaster occurs.				
	7.2 Early Warning	General Warning and Forecast/Communication	• Weather early warning is under the responsibility of BMKG. *15 • BMKG has several weather warning systems as: (1) Indonesia Meteorological EWS, (2) Climatological EWS (CEWS) and (3) C-wave (EWS for the ferry). *15 • Since the mechanism of early warning system is controlled by different agencies depending on the kind of disasters; BNPB is taking charge of overall control. *11 • As the communication systems in the government agencies, mostly the public telephone lines are utilized. The Ministry of Home Affairs, National Police, Meteorological Agency, Volcano Research Institute, and National Search & Rescue Bureau have individual radio network (as of 1995). *12 • The Ministry of Home Affairs conveys information to the local governments through the private line. *25 • In the new disaster management act, it is provided that, at evacuation in the time of disaster, national agencies as well as regional level agencies shall need to dispatch an alarm depending on the degree of risk and to guide the citizens. *5	• There is no mutual link among the radio networks of the respective government agencies. • Early warning system such as an operation center and information system are not well organized. *4*7*11*12*23 • In some cases, there is no system to convey the early warning dispatched by the center to the end community. Especially in the remote areas, there are communities that do not have enough roads or communication means. *10 • In the new disaster management act, government agencies that take charge of dispatching alarm, guiding the citizens, etc. are not stipulated. *5 • Instructions for evacuation / conveyance of orders are implemented verbally; which cannot cope with a large scale disaster. *5 • Maintenance management of warning systems and communications equipments are insufficient and may not operate in case of disaster.	2.(ii)	2.(ii)	1.2
		Flood	• There are 131 local meteorological stations and 7 s (4 out of 7 have been damaged) throughout the nation. They receive images from 'Himawari' and international weather information as well (as of 1995). *12 • When it is requested by the government agencies, Meteorological, Climatological and Geophysics Agency delivers the daily rainfall data received from the meteorological station through telephone line to them by FAX. *7 • 5,886 rivers in the nation are divided into 90 water systems and standard work procedures for flood control are provided by the water systems. This has been created jointly by PU and the local governments; wherein dangerous water levels they are provided in 3 stages for each river. When a flood occurs, according to the alarm level, the alarm is conveyed by radio from organization of corresponding level of PU (water level observation station or operators of pumps) to the head of local government/ community. In DKI Jakarta, this flood forecasting/warning system is utilized by the citizens. *7*12 • In some river basins, telemetric systems for flood forecasting and early warning have been installed and operated by BBWS. • BMKG also has 175 automatic weather stations. BMKG provides information on flood potential area in Jakarta everyday based on analysis by using rainfall data, and also provides flood warning in the form of rainfall. • Calculation method of flood assessment is shown in the Standard Work Procedure of PU. *12 • In the main rivers, at the beginning of the rainy season, a Flood Warning Team, which consists of staffs of the public works office of the local government, project office of PU and the local neighborhood security team, is formed. *12	• Establishment of flood forecasting and warning system is still limited to a certain part of flood prone areas. *5 • Maintenance work of the water level observation system by means of telemeter is not good; about 1/4 of the facilities have not worked. *12 • Gathering of rainfall data is relied on the telephone line; it is necessary to secure alternative means. *7			
		Earthquake / Tsunami	• Tsunami early warning called InaTEWS is under the responsibility of BMKG. *15 • Calculation of Magnitude and identification of seismic source by BMKG is possible within 5 minutes after the occurrence of earthquake. *1 *15 • BMKG provides early warning to BNPB, disaster management agencies, local governments, mass media, etc. in the following standard three criteria as (1) Red (Major Warning), (2) Orange (Warning) and (3) Yellow (Advisory). *15 • Early warning to public is disseminated through siren, television, radio, SMS, FMRDS ALERTUS receiver, speaker, Police siren, social media (Facebook, Twitter), etc. *5 • Designation/establishment of evacuation centers in case of Tsunami at Kabupaten/Kota level is being planned. • In 2006, a large scale earthquake evacuation drill has been carried out. *25 • IOTWS was established by Indonesia, Australia and India in 2011 for the tsunami early warning system in the countries along the Indian Ocean. Indonesia is RTSP that provide information to IOTWS. *15	• Current earthquake warning does not contain estimates on occurrence area of tsunami, time of occurrence, scale of tsunami; which is inadequate for promotion of evacuation of inhabitants. *25			
		Sediment disaster (Landslide, Debris flow)	• The landslide warning that estimated by rainfall level and hazard map is informed by CVGHM. The warning is delivered based on the category of warning by rainfall prepared by BMKG; however, the scientific basis is lacking, because the category of warning by rainfall and the risk of landslide are not studied individually. • EWS on the landslide is under development (as of 2012.5) *27				
		Volcano	• As to 60 volcanoes, Volcanological Survey of Indonesia (VSI) has observation system, in where 150 observing staffs are deployed. In the normal period, the results of observation is sent everyday to the Headquarters of VSI (Bandung); while, when volcanic activity gets active, observation results are reported 3 times a day or every 6 hours by radio. At the same time, the event is informed to the local governments, too. Volcanic information like above is conveyed by means of a radio, ham radio, telephone, etc. In the community, it is also informed by hitting a wooden alarm bell. *31 • For the forecasting/warning of mud flow after the eruption, facilities are provided by Sabo project of PU for Mt. Merapi, Mt. Galunggung and Mt. Semeru. *31 • CVGHM has developed and maintains the early warning system of volcanic eruption. Warning is published in Web Page of BMKG, too. (as of 2012.5) *27				
		High Tide /Storm Surge (Cyclone/ Typhoon)	• Tropical Cyclone Warning Center is equipped in BMKG.				

	Other disasters	(Forest fire) • By the forest fire finding system utilizing satellite information, data are sent to the office of the provincial government; then, based on this, monitoring or warning is implemented. The data are delivered to other ministerial agencies and international organizations as well to be used for prevention of forest fire. *8 • By Smog Prevention Agreement among ASEAN nations, forest fire early warning system has been prepared. *36 • LAPAN has developed forest fire EWS that will soon be connected to BNPB*9. • BNPB and BMKG is planning to develop tornado EWS *37	• Forest fire early forecasting/ warning system has not been developed yet. *8 • Insufficient means of communication makes difficult to send message to the site of fire. *8			
7.3 Evacuation plan	• The Law No.24 states in its Article 48 that disaster management for emergency response shall include "c. rescue and evacuation of disaster-affected community. Local contingency plans are supposed to include evacuation plans. • DKI Jakarta has identified them against the flood disasters.		• Evacuation places are not designated except for a case of flood*5	5	5	3
7.4 Establishment of Emergency Response System	Central Level	<u>Indonesian National Board for Disaster Management (New) (2008.1 ~)</u> *5 • As to frequent small scale disasters, since there are duplications among allocation of business operation, BNPB is coordinating the role sharing of relevant organizations in the activities or business operations. *5 • After disasters have occurred and when emergency countermeasures are taken, BNPB is authorized to give orders to other government agencies; BNPB takes action on the budge for emergency measures. In the normal period and reconstruction period, BNPG gives an appropriate advice to the other government agencies. *11 • When a flood occurs, as an organization to cope with it, the operation unit is established in each level of PU corresponding to the respective levels; national level (BNPB), provincial level (BPBD), regency/municipal level (BPBD Kabupaten/Kota), district/sub district level (SATGAS PB)/village level (Satlinmas PB).	• Lack of capability to cope with disaster in both public and citizens. *4 • There are no self-help and cooperation; only assistance by public bodies is demanded. *11 • It needs to secure alternate means of communication other than telephone (fixed , hand phones) *5 • There is no standardized system to convey and manage information on the disaster; therefore, the information is not utilized for making decision. *10	5	5	3
	Provincial Level / Regency/Municipal Level	<u>Regional Disaster Mitigation Agency: BPBD (new)</u> • BPBD at the local level is responsible for coordination in utilizing emergency fund from Province, NGO assistance, and provided resources from communities. In a case of DKI Jakarta, because it is Special Capital Territory, BNPB rescue resources will also be provided. • POKOMAS, which is an operation unit of PU at Town/Village, performs as the center of flood response activities and evacuation and prepares evacuation centers and necessary equipments. <u>Tie-up / Coordination among organizations:</u> • In 2 provinces and 4 regencies surrounding Mt. Merapi, cooperation system covering early warning, evacuation procedures, supports for sufferers has been built crossing over the administrative boundaries. *10	• With decentralization, cooperation between central governmental agencies and the local governments becomes important. *3 • At a large scale disaster, a system to convey / coordinate information between disaster prevention agencies of provincial level and that of regency/municipal level is not well arranged. *5 • At the occurrence of disasters, coordination between sectors of regional level is insufficient. *10 • In preparation for the occurrence of disasters, it is necessary to build up cooperation with Pusdalops (disaster countermeasures headquarters) of neighboring local governments. *10 • Network to response at disasters is formed and functioned well enough; however, it is not a systematic network but it remains as connections among individuals. *10			
	Level below regency/municipality					
	Training etc.	• Simulation Drills and trainings and drills for capacity building have been conducted. *1				
7.5 Rescue plan	• National Search and Rescue Agency (BASARNAS) plays a role to give guidance /coordinate all domestic searches and rescue activities; it has Rescue Coordination Center in 4 places and sub-centers in 15 places all over the nation; all of those centers are neighboring to airports. Many of the staffs are former military men (as of 1995) *12 • POKOMAS of town/village level plays central role in flood control activity and evacuation activity. POKOMAS prepares necessary equipment and materials such as buoys and rubber boats. *7 • The Ministry of Health implements analysis of needs for medical services at the disaster. Red Cross also plays important roles in first aid, confirmation of one's safety, counseling, etc. *12 • The Ministry of Health has built in 10 places all over the nation of the regional support organizations to provide medical services to the sufferers. *10		• Emergency medical care system has not been established. *5*12 • Emergency medical care coordinating system at the occurrence of disaster has not formed yet (as of 1995) *12	5	5	3
7.6 Relief plan	• There are emergency items stored in every local level*10. • Village level, for example, has a day stock of such emergency items. If the emergency situation continues more than three days, Provincial social unit will provide support items. Local contingency plans are supposed to include relief plans. • BPBD has "Quick Response Team" to implement needs assessment at occurrence of disasters. • The Department of Social Services engages in the rescue activities such as distribution of materials, provision of temporary tents, etc. (as of 1995) *12 • The Red Cross arranges 3 central hubs and 6 regional hubs, which have stockpiles that can be supplied to 10,000 households*10.		• Due to lack of budget, materials and equipment for evacuation are not stored or are lacking. *5 • Sometimes, due to lack of operational budget, means of transportation, infrastructure, etc.; goods are not delivered. *10	5	5	3
Assistance to challenges	8. Records of Major Assistance by JICA	<Development Studies> • The Study on the Flood Control Plan of the Upper Citarum Basin (1987-1988) (Summary, Main report, Supporting report) • The Feasibility Study on the Disaster Prevention Project in the Southeastern Slope of Mt. Galunggung (1987-1988) (Main report, Data, Supporting report 1, Supporting report 2) • The Study on Urban Drainage and Wastewater Disposal Project in the City of Jakarta (1988-1990) (Summary, Main report, Supporting report, Data book, Drawings, Master plan study. Main report, Master plan study. Supporting report; Vol. 1, Master plan study. Supporting report; Vol. 2) • The Study on Belawan-Padang Integrated River Basin Development (1990-1992) (Summary, Main report, Supporting report, Drawings) • The Master Plan on Water Resources Development and Feasibility Study for Urgent Flood Control and Urban Drainage in Semarang City and Suburbs (1991-1993) (Main report, Supporting report, Data book) • The Detailed Design Study on Medan Flood Control Project (D/D) (1995) (Vol. 1, Vol. 2) • The Study on Comprehensive River Water Management Plan in Jabotabek (1995-1996) (Vol. 1, Vol. 2, Vol. 3, Vol. 4, Vol. 5, Vol. 6, Vol. 7, Vol. 8) • The Study on Flood Control for Ambon and Pasahari Area (1996-1997) (Summary, Main report, Supporting report, Data book)					

- The Detailed Design for Urban Drainage Project in the City of Jakarta (D/D) (1996-1997) (Summary, Vol. 1, Vol. 2-I, Vol. 2-II, Vol. 2-III, Vol. 2-IV, Vol. 3, Implementation program)
- The detailed design of flood control, urban drainage and water resources development in Semarang (D/D) (1997-2000) (Summary, Implementation program, Component A : Vol. 1, Vol. 2, Vol. 3, Vol. 4, Vol. 5, Vol. 6, Vol. 7, Package 1{ Prequalification doc., Bidding doc. ; Vol. 1, Vol. 2, Vol. 3}, Package 2{ Prequalification doc., Bidding doc. ; Vol. 1, Vol. 2, Vol. 3}, Package 3{ Prequalification doc., Bidding doc. ; Vol. 1&2, Vol. 3&4, Vol. 5}, Supplementary information, Component B : Vol. 1, Vol. 2, Vol. 3, Vol. 4, Vol. 5, Vol. 6, Vol. 7, Vol. 8, Package 1{ Prequalification doc., Bidding doc. ; Vol. 1, Vol. 2, Vol. 3}, Package2{ Prequalification doc., Bidding doc.; Vol. 1, Vol. 2, Vol. 3}, Component C : Vol. 1, Vol. 2, Vol. 3, Vol. 4, Vol. 5, Vol. 6, Package 1{ Prequalification doc., Bidding doc. ; Vol. 1, Vol. 2, Vol. 3}, Package 2{ Prequalification doc., Bidding doc. ; Vol. 1, Vol. 2, Vol. 3}, Package 3{ Prequalification doc., Bidding doc. ; Vol. 1, Vol. 2, Vol. 3}, Supplementary information
- The Study on Critical Land and Protection Forest Rehabilitation at Tondano Watershed (2000-2001) (Vol. 1, Vol. 2, Vol. 3, Vol. 4, Laporan utama)
- The Study on Flood Control and Water Management in Limboto-Bolango-Bone Basin (2001-2002) (Vol. 1, Vol. 2, Vol. 3, Vol. 4, Vol. 5, Vol. 6, Vol. 7, Vol. 8)
- The Study on the Development Scheme for the Principal River Ports in Indonesia (2001.1-2002.5) (Summary, Vol. 1, Vol. 2, Vol. 3)
- The Study on Comprehensive Water Management of Musi River Basin (2002-2003) (Vol. 1, Vol. 2, Vol. 3, Vol. 4, Booklet of master plan, Laporan akhir,; Vol. 1, Laporan akhir; Vol. 2, Buku rencana utama)
- Basic Design Study Report on the Project for Improvement of Pump Drainage in Poverty District in Jakarta (2003-2004) (Vol. 1)
- The Study on Capacity Development for Jeneberang River Basin Management in the Republic of Indonesia (2003.4-2007.3) (Vol. 1, Vol. 2, Vol. 3-1, Vol. 3-2, Vol. 4-1, Vol. 4-2)
- Directorate General of Water Resources, Ministry of Public Works (2004.1-2007.8)
- Comprehensive Study on Water Resources Development and Management for Bali Province (2004.9-2006.8) (Summery, Main report, Supporting report, Data book, Rangkuman, Laporan utama)
- Urgent Rehabilitation and Reconstruction Support Program for West Coast Road in North Sumatra (2005-2006) (Vol. 1)
- Development Study on Disaster Management in Indonesia (2005.8-2007.8)
- Study on Regional Water Supply Development Plan for Greater Yogyakarata (2006.9-2008.3) (Vol. 1, Vol. 2, Jilid 1, Jilid 2)
- Tsunami Early Warning System Development Project Formulation Study (2007.1-3)
- The Study on Natural Disaster Management Plan (2007-2009) (Vol. 2-2, Vol. 2-3, Vol. 2-4, Vol. 2-5, Vol. 4)
- Disaster Management/Reconstruction Program (2007-2008)
- Information Network for Disaster (2008-2009)
- Integrated Disaster Mitigation Management (2008-2009)
- Project for Safe School Reconstruction in Devastated Areas of Earthquake in Offshore of Padang in West Sumatra Region (2009-2011) (Vol. 1)
- Study on Rehabilitation Situation of Ulee Lheu Community in Ache Province (2011) (Transferred by JICA Study Team) (2011)
- Bali Beach Protection Project (II) (2011.9-2013.1)
- Aerial Survey for Volcanic Disaster Prevention Planning of Mount Merapi (2012.1-2012.10) (Transferred by JICA Study Team) (2012.1-2012.10)
- Preparatory Survey on Development Plan for Regional Disaster Prevention System (2012.7) (Transferred by JICA Study Team)

<Technical Cooperation Projects>

- Volcanic Sabo Technical Center Project (1982-1989)
- Project on Soil and Water Conservation in South Sulawesi (1988-1992) (Transferred by JICA Study Team)
- Sabo Technical Center Project (1992-1997)
- Integrated Sediment Disaster Management Project for Volcanic Area (2001.4-2006.3)
- Central Jawa and DIY Earthquake Reconstruction Program Advisory Team (2006-2007)
- Project on Self-sustainable Community Empowerment Network Formulation in Nanggroe Aceh Darussalam (NAD) Province (2007-2009)
- The Institutional Revitalization Project for Flood Management in JABODETABEK (2007-2010) (Vol. 1)
- Project on Building Administration and Enforcement Capacity Development for Seismic Resilience (2007-2011)
- Project on Capacity Development for RBOs in Practical Water Resources Management and Technology(2008-2011)
- Integrated Disaster Mitigation Management for “Banjir Bandang”(2008-2012)
- Safety Navigation, Preventing Marine Disaster and SAR (2008-2010)
- Project for Capacity Development of Jakarta Comprehensive Flood Management (2010-2013)
- Earthquakes and Volcanoes in Indonesia(2009.3-2012.2)
- Project for Post-earthquake Rehabilitation of Water Resource Management Facilities in Padang (2010-2011) (Final Report)
- Project on Building Administration and Enforcement Capacity Development for Seismic Resilience Phase 2 (2011-2014)
- The Project on Enhancing the Disaster Management Capacity of National Agency for Disaster Management(BNPB) and Regional Agency for Disaster Management (BPBD) (2011-2015)
- Project on Self-sustainable Community Empowerment Network Formulation in Nanggroe Aceh Darussalam (NAD) Province (F/U) (2012-2013)
- Integrated Project on Impact Assessment and Water Resource Management Plan for Climate Change in Brantas River and Musi River (2012-2015) (Transferred by JICA Study Team)

< Dispatch of Experts>

- Jakarta Volcanic Sediment Disaster Expert (1987-1989)
- Seismic Damage of Irian Jaya Expert (1995)
- Sabo technical and Water hazard Measure Expert (2001)
- Advisor for Rehabilitation Plan of Forest Fire Area (2004)
- Disaster Prevention (Sediment Disaster) Expert (2006-2008)
- Tsunami Early Warning Advisor (2009-2010)
- BNPB Advisor (2009-2010)
- Advisor for Comprehensive Disaster Management Policy (2010-2013) (Transferred by JICA Study Team)
- Directorate General of Water Resources, Ministry of Public Works (2010-2013)

<Trainings>

- Volcanology and Comprehensive Sediment-Related Disaster Prevention Measures (2005)
- Natural Disaster Mitigation(2005)
- Disaster Mitigation and Restoration system for Infrastructure(2005)
- Seminar on Emergency/Disaster Medicine II(2005,6,7)
- Seismology, Earthquake Engineering and Disaster Mitigation (2005,6,7)
- Seminar on Disaster Management II(2006)
- Mitigation Strategy for Mega-Urban Earthquake Disaster (2006)
- Training for Mental Health Services after Disasters (2005)
- Disaster Prevention in School (2006)
- Seminar on Emergency/Disaster Medicine (2007)
- Disaster Mitigation, Preparedness and Restoration for Infrastructure (2009)

<Loan Project>

- Surabaya River Improvement Project (1990)
- Ancol Drainage Improvement Project (1991)
- Mount Kelud Urgent Volcanic Disaster Mitigation Project (1991)
- Upper Citarum Basin Urgent Flood Control Project (I) (1993)
- Lower Solo River Improvement Project (I) (1995)
- Padang Area Flood Control Project (II) (1995)
- Mt. Merapi and Mt. Semeru Volcanic Disaster Countermeasures Project (II) (1995)
- Upland Plantation and Land Development Project at Citarik Sub-Watershed (1995)
- Bali Beach Conservation Project (1996) (http://www.id.emb-japan.go.jp/oda/en/projects/loan/odaprojects_loan_1996_bali.htm)
- Medan Flood Control Project (1997) (http://www.id.emb-japan.go.jp/oda/en/projects/loan/odaprojects_loan_1997_12_medan.htm)
- Ciliwung-Cisadane River Flood Control Project (I) (1997)
- Upper Citarum Basin Urgent Flood Control Project (II) (1997) (http://www.id.emb-japan.go.jp/oda/en/projects/loan/odaprojects_loan_1997_14_irigation.htm)
- Water Resources Existing Facilities Rehabilitation and Capacity Improvement Project (2002)
- Lower Solo River Improvement Project (II) (2004) (http://www.id.emb-japan.go.jp/oda/en/projects/loan/odaprojects_loan_2004_2.htm)
- Urgent Disaster Reduction Project For Mt. Merapi/Progo River Basin And Mt. Bawakaraeng (2004) (http://www.id.emb-japan.go.jp/oda/en/projects/loan/odaprojects_loan_2004_4.htm)
- Integrated Water Resources And Flood Management Project For Semarang (2005) (http://www.id.emb-japan.go.jp/oda/en/projects/loan/odaprojects_loan_2005_4.htm)
- Ache Reconstruction Project (2006)
- Disaster Rehabilitation and Management Sector Program Loan (2007)
- Urban Flood Control System Improvement in Selected Cities (2008)
- The Project for Urgent Countermeasures for Sedimentation in Wonogiri Multipurpose Dam Reservoir (2009)

<Grant Aid Project>

- Project for Rehabilitation of the National Park Degraded by Forest Fire (1999) (http://www.mofa.go.jp/mofaj/gaiko/oda/data/zyoukyou/h_13/010605_1.html)
- Project for Rehabilitation of the National Park Degraded by Forest Fire (2000)
- the Project for Improvement of Forest Fire Equipment (2000) (http://www.mofa.go.jp/mofaj/gaiko/oda/data/zyoukyou/h_13/010605_1.html)
- Project for Urgent Countermeasures for Sedimentation in Wonogiri Multipurpose Dam Reservoir (2001) (http://www.mofa.go.jp/mofaj/gaiko/oda/data/zyoukyou/h_14/020705_1.html)

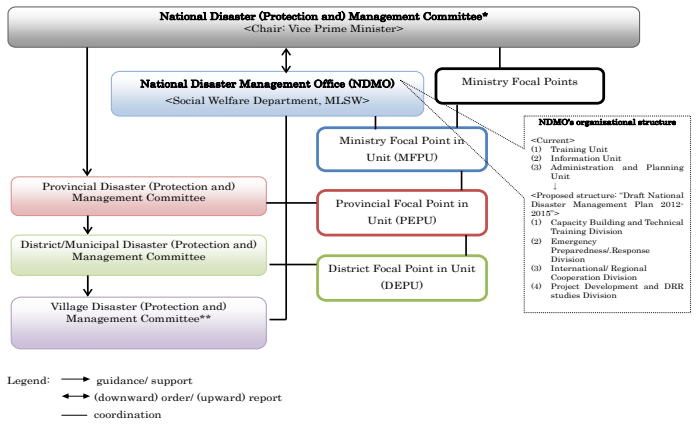
		• Project for Rehabilitation of the National Park Degraded by Forest Fire (2001) • Project for Urgent Countermeasures for Sedimentation in Wonogiri Multipurpose Dam Reservoir (2002) • Project for Rehabilitation of the National Park Degraded by Forest Fire (2002) • Project for Urgent Countermeasures for Sedimentation in Wonogiri Multipurpose Dam Reservoir (2003) • Project for Improvement of Pump Drainage in Poverty District in Jakarta (2003) (http://www.id.emb-japan.go.jp/oda/en/projects/grant/odaprojects_grant_2003_jkt.htm) • Project for Reconstruction for the Area Affected by Earthquake in Yogyakarta and Central Java (2006) • Project for Safe School Reconstruction in Devastated Areas of Earthquake in Offshore of Padang in West Sumatra Region (2010.6-2010.12) • Project for Improvement of Bridges in Nias Island (2010) • Project for Urgent Reconstruction of East Pump Station of Pluit in Jakarta (2011) <JICA Partnership Program> • Study on Plan for Assisting People Afflicted by Flood and Landslide in Nias Island (2001) (Transferred by JICA Study Team) • Study on Emergency Response Plan for Flood in Jakarta City (2001) (Transferred by JICA Study Team) • Project for Humanitarian Assistance for Natural Disaster at Nusa Tenggara Timur Province (2003) • Project for Humanitarian Assistance for Natural Disaster at Jambi Province (2003) (http://www.id.emb-japan.go.jp/oda/en/projects/grassroot/odaprojects_grass_2003_jambi.htm) • Project for Humanitarian Assistance for Natural Disaster at Riau Province (2003) (http://www.id.emb-japan.go.jp/oda/en/projects/grassroot/odaprojects_grass_2003_riau.htm) • Project for Humanitarian Assistance through Mobile Clinic in Nanggroe Aceh Darussalam Affected by the Tsunami and Earthquake Disaster (2004) (http://www.id.emb-japan.go.jp/oda/en/projects/grassroot/odaprojects_grass_2004_nad_01.htm) • Promoting Project for Geotechnical Disaster Prevention Technology in hilly and Mountainous Areas in Indonesia (2009) • Enhancing abilities of community-based disaster management of several villages around Merapi Volcano in Central Java (2011)
	9. Records of Assistance by other Development Partners	• UNOCHA, WFP, UNDP, WHO, UNESCO: Emergency Drills • UNDP: Safer Communities through Disaster Risk Reduction (2007-2012), Focused on Capacity Development of persons in charge of pre-disaster activities (2007-2012), Training future expert on climate change and poverty in Aceh (2009-2010) • UNOCHA/UNDP：Planning to assist capacity development of BAKORNAS PB • USA/USAID-OFDA (the office of US Foreign Disaster Assistance): Training of Incidence Command System (2007) • WB: Jakarta Urgent Flood Mitigation Project (2009.2-), Indonesia Climate Change Development Policy Project (2010), Third National Program for Community Empowerment in Rural Areas - Disaster Management Support(2011), Adapting to Climate Change in Eastern Indonesia (2010-2013) • USAid: Increasing Coastal Resiliency and Climate Change Mitigation through Sustainable Mangrove Management in Sumatra (2011-2013), Stakeholder Coordination, Advocacy, Linkages and Engagement for Resilience (SCALE) (2010-2013) • ADB：Flood Management in Selected River Basins(2005-2010) • ADRC：Community-based flood risk reduction project (2000), Capacity Development Project for Disaster Management in Communities (2006), Training for Teachers on Disaster Management Education (2007) • UNHCR: Supply of Main Equipment for AHA Center • IOC: Missions to SOP Strengthening at BMG • NIED: Supply and Maintenance Management of Seismic Observation Equipment and Training • Norway Geo-technical Institute /ADPC: Regional Capacity Enhancement for Landslide Impact Mitigation (RECLAIM) (2004.9~) • AusAid: Australia-Indonesia facility for disaster reduction (2008-2013), Vulnerability and Climate Change Adaptation Assessment and Supportive Policies at National and Sub-national Levels, Emergency Preparedness (E-Prep) (2011) • NZAid: Piloting a local government disaster risk management capacity building programme in Palu and Padang in September 2011 (2011) • Australia: Planning to provide support to BAKORNAS PB • France: Planning to provide equipments and systems of emergency operation centers • Germany: Introduction of Earthquake Magnitude Analysis System (for BMG) • Netherlands: Flood Management in Selected River Basins: Indonesia (2005-2010) • Hungary: Equipment supply for Emergency
	10. International Networking	• ADRC: CBDRM project (2000) • Capacity development for disaster management in communities (2006) • Training of teachers for disaster management (2007) • APEC: Formulation of the task force for preparation of APEC urgent response (2007)*[5]*[38]. • Intergovernmental Coordination Group for the Indian Ocean tsunami Warning and mitigation System was established in 2005 under the coordination of IOC UNESCO. *[38] • ITIC (International Tsunami Information Center)：Early Tsunami warning through PTWC, Development of disaster education materials, Technical trainings on Tsunami *[39]
ASEAN Cooperation	11. National Policy on ASEAN(ACDM,ARPDM,AADMER) cooperation in Disaster Management, Emergency Response in case of disasters in other ASEAN countries or ASEAN region	• Signed AADMER in 2007(ASEAN Agreement on Disaster Management and Emergency Response) (AADMER stipulates mutual cooperation in case of disaster.) • Participation in ARF meetings on disaster management, monthly ACDM meetings, ARDEX (ASEAN Regional Disaster Exercise)and ASEAN regional technical cooperation Project *[40] • SASOP (Regional Standing Arrangement and Standard Operating Procedures) started in 2007 *[41]
	12. Resources useful for other ASEAN countries	• Trainings on Sabo technology and community-based disaster management are conducted in Sabo Technical Center, accepting foreign participants to international training courses. *[3]
	13. Needs for External Assistance from the point of view of Regional Cooperation	• ASEAN, UNISDR and World Bank signed the cooperation about the disaster prevention project for five years in April 30, 2009. AHA Centre was officially established in November 2011. As of June, three officers were allocated and are scheduled to increase to 13 staffs within 2011. In the whole, technical assistance and financial support are required.

[1] EM-DAT: http://www.emdat.be (accessed in July 2012)
[2] Norio Okada /Kanako Hiraoka (2008), "Formation of Asian Type Comprehensive Disaster Prevention Technology: Toward Mainstreaming Public Participation Type Disaster Reduction Management in Development Assistance"; Journal of Japan Bank of International Cooperation No. 36, Page 220-240
[3] JICA, "Comprehensive Disaster Prevention Project for Volcanic Area in the Republic of Indonesia and Project Documents" (2001)
[4] JICA, Global Environment Department (2005), "The Study on Way of Being of Projects in Disaster Prevention Field"; Report, ODA White Paper and so on
[5] BNPB, JICA, "The Study on Natural Disaster Management in Indonesia" (Draft Final Report), 2008
[6] BMKG, InaTEWS Concept and Implementation
[7] JICA, Yachiyo Engineering Co., Ltd., "Flood Mitigation Organization Enhancement Project in Jakarta Metropolitan Basin Area of Republic of Indonesia – Basic Survey Final Report" (2006)
[8] JICA, "Forest Fire Prevention Plan in Indonesia – Assessment Report at the End of the project" (2000)
[9] Indonesia (2011) National Progress Report o the Implementation of the Hyogo Framework for Action (2009-2011)
[10] Indonesia Interim National Progress Report on the Implementation of the Hyogo Framework for Action (2008)
[11] JICA, "Data Collection Survey on ASEAN Regional Collaboration in Disaster Management. (2012): Interview to BNPB (2012.05.25)
[12] Disaster Prevention Bureau of National Land Agency, Engineering Consulting Firms Association (ECFA), "Survey on Promotion of Disaster Prevention Organization Development in Developing Countries – Republic of Indonesia" (1995)
[13] Website of Ministry of Public Works: (http://sda.pu.go.id) (accessed on 28 June 2012)
[14] Website of Agency for Meteorology, Climatology and Geophysics: (http://www.bmkg.go.id/BMKG_Pusat/Depan.bmkg) (accessed on 28 June 2012)
[15] JICA, "Data Collection Survey on ASEAN Regional Collaboration in Disaster Management " (2012): Interview to BMKG (2012.02.08)
[16] Website of DIBI: (http://dibi.bnpb.go.id/DesInventar/dashboard.jsp?countrycode=id&continue=y&lang=ID) (accessed on 28 June 2012)
[17] Website of DIBI: (http://dibi.bnpb.go.id/DesInventar/dashboard.jsp?countrycode=id&continue=y&lang=ID) (accessed on 28 June 2012)
[18] Guidelines for Flood Alert (Flood Alert Guidelines for Bengawan Solo River Basin for the Rainy Season 2009/2010, BBWS Bengawan Solo)
[19] Balai Besar Wilayah Sungai Bengawan Solo, Ministry of Public Works, "CRBOM Small Publications Series No. 5, The Bengawan Solo Water Council" (2009)
[20] Ministry of Public Works, "Manual for Preparation of Early Warning and Evacuation System for Banjir Bandang" (2012)
[21] JICA, Survey Report for Basic Design of Drainage Improvement in Poverty Area in Jakarta, Republic of Indonesia" (2004)
[22] JICA, "Preliminary Survey Report for Emergency Flood Control Plan in Limboto / Bone / Bolango River Basins in Republic of Indonesia" (2003)
[23] JICA, "Urgent Inventory Study on Damage of Flood 2002 in JABODETABEK Area in Indonesia" (2003)
[24] JICA, "Preliminary Survey Report for Flood Control Plan in Limboto / Bone / Bolango River Basins in Republic of Indonesia" (2001)
[25] JICA, "Project Formation Survey Report in Tsunami Disaster Prevention Field in the Republic of Indonesia" (2007)

[26] BNPB Index Rawan Bencana Indonesia (2011)
[27] JICA, “Data Collection Survey on ASEAN Regional Collaboration in Disaster Management”. (2012): Interview to BIG (2012.05.08)
[28] JICA, “Basic Information Collection / Survey Report on Observation System of Earthquake and Tsunami” (2012); Interim Report
[29] BMKG, Pedoman Pelayanan Peringatan Dini Tsunami (2010)
[30] ADRC, “Good Practices 2008” (2008)
[31] Japan Sabo Association, Japan/Indonesia 30 Years History Compilation Association; “History of Sabo Technical Assistance for 30 Years in between Japan and Indonesia” (2000)
[32] JICA, “Final Survey Report for Countermeasures for Sedimentation in Wonogiri Multipurpose Dam Reservoir in the Republic of Indonesia” (2007)
[33] JICA, “Preliminary Survey Report for Countermeasures Plan for Sedimentation in Wonogiri Multipurpose Dam Reservoir” (2004)
[34] International Sabo Network Website: (http://www.sabo-int.org/projects/indonesia.html) (accessed on 2 August 2012)
[35] JICA, “Data Collection Survey on ASEAN Regional Collaboration in Disaster Management ” (2012): (Answers to Questionnaire HFA3)
[36] Institute of Global Environmental Strategies (IGES); “2003 Momentous News in Asia” (2004)
[37] Prevention Web, Indonesia to develop tornado early warning system, (2012.04.09)
[38] Website of APEC: (http://www.apec.org/apec/apec_groups/som_committee_on_economic/som_special_task_groups/emergency_preparedness.html), (accessed on 26 February 2009)
[39] Website of PTWC: (http://www.prh.noaa.gov/ptwc/responsibilities.php) (accessed on 27 February 2009)
[40] Institute of Global Environmental Strategies (IGES); “2002 Momentous News in Asia” (2003)
[41] Institute of Global Environmental Strategies (IGES); “2008 Momentous News in Asia” (2009)

Inventory					HFA		AADMER
					PforA	IofP	
Current Situation and Challenges	1. Features of Disasters	• Possible Natural Disasters*[1]*[2]*[3]: Flood, Storm, drought, Earthquake, Extreme temperature, Landslide and Sediment Disasters, Volcano Eruption, Surge, Forest Fire • Frequent Natural Disasters: 1980-2011 EM-DAT Disasters 24 nos.; Out of those Flood (62%), Storm (21%), drought(17%), • Large scale floods occurred in 1966, 1971, 1987, 1988, 1990, 1991, 1992, 1994, 1995, 1996, 2000, 2001, 2001, 2008, 2009 and 2012*[3]*[4]. • Tropical Cyclones pass through Lao PDR 3-5 times every year during later stage of rainy season, which is from July to September. Until around the season, water level has become high and storm rain make damages of flood more serious*[5]. • Serious drought occurred in 1977, 1983, 1994 and 1995*[4]*[6]. • 35% of Mekong River basin belongs to Lao PDR. 90% of national land of Lao PDR is Mekong River Basin[7]. Flood damages concentrate in plain area along Mekong River down Vientiane*[8]. • Earthquakes were observed in Northern mountainous area in 1994, 1996 and 2007*[6]. • It was reported that, in 20 years (1980s and 1990s) sediment ratio has increase in Southern part of Lao PDR, which has reached the highest level in the area; however, the causes have not been investigated*[6]. • Sediment disaster has occurred in mountainous area triggered by heavy rain and cyclone/typhoon in the rainy season, and damage to human living and infrastructure, especially roads. • In 1996, 2 hydroelectric dams have been destroyed due to landslide*[6].				
	2. Administrative Division	16 Provinces (khoueng)/1 Prefecture(kampheng nakhon)including 1 Municipality (nakhon louang)/142 District (muang) / Villages (baan)					
	3. Development of Legislative Framework and Disaster Management Policy & Plans		Current Situation	Challenges	1.(i)	1.(i)	2.1
		Development of Legislative Framework	<Fundamental Law for Disaster Prevention> • The Prime Minister's Decree No. 158(1999) concerning the establishment of Disaster Management Committee (DMC) of national, regency, district levels*[1]*[9]. • NDMC Decree No. 097 (2000) concerning roles and responsibilities of various divisions that consist of National Disaster Management Committee (NDMC)*[1]. • Preparation has started to establish Disaster Management Act (which is scheduled to be established in 2012). <Laws in Relevant Sectors> • Forest Act (1996)*[7] * • Environment Protection Act *[7] • Land Act *[7] • Water Act *[7]	• Prime Minister's Decree, which is expected to be issued by October 2012, to order the preparation of the law is required.			
		Disaster Management Policy	• The National Policy on Disaster Management shows the importance of the roles of the government to be fulfilled in preparation for disasters, attaching importance to Community-Based Disaster Management (CBDM), as to disaster risk, reducing disaster risks or brittleness to disaster for various kinds of disaster is indispensable to 'sustainable development', importance of cooperation between community and the government at respective levels, and the importance of enhancement of self-help capacity of the community*[1]*[4]*[9]. • In National 5-years Development and Strategic Plan (2001~2005), "Promotion of Collection and Transmission of Hydrologic and Atmospheric Data" has been emphasized*[6]. • In the Decree dated 12th December 2007 announced by the Prime Minister's Office (in the name of the Chief Cabinet Secretary) it states that the particular emphasis of the government strategy was shifted from the response at disaster to reducing disaster*[9].				
		Disaster Management Plans	<Central Level> • Strategic Plan related to disaster risk management (Long-term: 2001-2020; Medium-term: 2001-2010; Short-term: 2001-2005). They have been foromulated.*[1] They have been announced as Ministerial Decree of the Ministry of Labor, Social and Welfare.*[9] • National Disaster Management Plan 2012-2015 (drafted as of February 2012) <Local Level> • 5/17 Provinces have prepared Provincial Disaster Management Plans (as of February 2012). 5 Provinces are (1) Khammouane, (2) Savannakhet, (3) Vientiane, (4) Sayaboury, and (5) Saravan. Some districts within those Provinces have prepared district plans as wel*l[9].	• Formulating rational disaster management plan is the priority issue*1. • Since the strategic plan related to disaster risk management is provided by the Decree of the Ministry of Labor, Social and Welfare; relevant government offices did not implement it actively. • Formulating the disaster risk management plan at each level of province, regency and district is the priority issue*1.			
	4. Establishment and Enhancement of Disaster Management System	Institutional Framework	• Decentralization is being progressed in the area of disaster management, too*[7].	• An issue is the duplication of roles as well as efforts among the government, private sectors, NGO, international organs. There is no agreed plan for the establishment of a platform that may include all of those sectors*[9]	1.(ii)	1.(ii)	2.1 4
		Central Level	<u>National Disaster Management Committee (NDMC)*[1]</u> • It has been established based on Decree of Prime Minister No.158 (1999) • Chair: Deputy Prime Minister • Vice Chairs: Ministers of MLSW, Agriculture and Forestry, and Public Works & Transport • Secretariat: National Disaster Management Office (NDMO), • Members: Vice Ministers of Public Health, and Public Security, Deputy Director General of Department of Chief of Staff, Ministry of Defense. Chiefs of the cabinet in relevant Ministries/Departments • Members are stipulated in the Ministerial Decree of the Ministry of Labor, Social and Welfare No.097 (2000). • Roles*[4]: - Specifying resources; - Making decision on policies based on the conference among ministries and agencies; - Coordination among relevant ministries and agencies throughout all stages of disaster management. - Formulation of policies including disaster management basic plan, giving instructions to the local government level on the formulation of policies. - Taking command on emergency measures. - Distributing relief goods and fund. - Reporting to the government. • Coordination of disaster management / preventive activities and other efforts made by central government. • The committee consists of representatives of main ministries and agencies, various bodies, and regencies; it is for the promotion of disaster management activities made by competent ministries and agencies as well as regency authorities. <u>National Disaster Management Office (NDMO) *[1]</u> • It is the lower organization of the Ministry of Labor, Social and Welfare. *[4]*[9] • The roles of NDMO are stipulated in the Ministerial Decree of the Ministry of Labor, Social and Welfare No. 097 (2000). *[9] • This is the central organization to check information through the media	• The number of staffs of NDMO is not enough, while draft National Disaster Management Plan 2012-2015 sets NDMO's restructuring*[11] • Restructure of NDMC was issued by a Presidential Decree in 2011. • "Department of Natural Disaster Management and Climate Change" has been newly established within the Ministry of Natural Resources and Environment, which is supposed to play a similar function as NDMO do in terms of water related disaster. It is necessary to clear demarcation and mandates among them*[9]. • A number of disaster management committees and task forces implements their activities individually; those should be put together under control of NDMC. *[9] • NDMO has limited power to command and intervene to other ministries and agencies[9]. • In the case that assistance is requested by PDMC or DDMC, NDMC is not in a			

			such as national TV broadcast, newspapers, national radio broadcast as well as regencies located in the river basin of Mekong River. • It consists of 4 divisions; rescue, disaster management plan, information and publicity and training. *4 • Numbers of staffs are 12. *4 <u>Special Committee for Flood Management (temporary facility)</u> *1 • After a serious flood occurred in 2002, it has been established by the order of the Prime Minister with the Minister of Agriculture and Forestry as the chairman. • The roles and functions of this committee are to plan prevention of flood and formulate countermeasures with tie-up with NDMC. • It develops flood prevention plan in cooperation with persons in charge of city authority as well as those of prefectural authorities. <u>National Flood and Drought Committee</u> *9 <u>National Committee for Coordination of Water Resources</u> *9 <u>Lao PDR Mekong Committee</u>: *10 • It coordinates matters between Mekong Committee and domestic ministries and agencies. • Members: 6 from relevant ministries and agencies (Vice Minister of Prime Minister Office, Vice Minister of Agriculture and Forestry, Vice Minister of Industry and Technical Art, Representative of Ministry of Foreign Affairs, Representative of the Ministry of Public Works (communication, transportation, post and construction), Representative of Foreign Investment Economic Cooperation Committee, and 5 additional members are proposed (Representative of National Planning Committee, Representative of the Ministry of Scientific Technology and Environment, Representative of the Ministry of Home Affairs, Representative of the Ministry of Defense and Representative of the Ministry of Justice).	position to make emergent decision; actual relief activities are left in the hand of NDMO. *9 • In the long-term behavior strategy plan, it is emphasized to tie-up disaster management program with those of other sectors. *1			



Source: Draft National Disaster Management Plan 2012- 2015, p.26. <Partly added by JICA Study Team>

Note: *NDMC is renamed by Draft Decree on National Disaster Protection and Management (Provisional English Translation by JICA Study Team). Differences are bracketed off. ** Committee at village level is established especially where there is in high risk. It is currently called "Village Disaster Protection Unit" in "Draft National Disaster Management Plan 2012- 2015".

Figure Lao PDR's Disaster Management Structure

	<u>Organizations in charge of Non-structural Measures for Disaster Risk Mitigation and Preparation</u> • Flood, Sediment disaster, Typhoon/Cyclone: (1) MLSW, (2) Science, Technology and Environment Agency (STEA), (3) Department of Meteorology and Hydrology (DMH) under the Ministry of Natural Resources and Environment, (4) Ministry of Agriculture and Forestry (MAF) <u>Organizations in charge of Structural Measures for Disaster Risk Mitigation</u> • Flood, Sediment disaster, Typhoon/Cyclone: (1) Ministry of Public Works and Transport, (2) Ministry of Agriculture and Forestry (MAF), (3) Ministry of Natural Resources and Environment <u>Inter-organizational arrangement</u> • NDMO is functioning satisfactorily in information coordination and training/mentoring of sub-national focal points* 9	• Ministry of Energy and Mining is supposed to undertake and manage risk reduction programs to ensure the resilience of infrastructure in the draft national disaster management plan. Same applies to Ministry of Industry and Trade.
Local Level	<u>Provincial/District Disaster Management Committee (PDMC/DDMC)</u> • It has been established based on the Prime Minister's Decree No. 158 (1999). • All Provinces and Districts have established PDMC/DDMC (as of 2012.3) • Chair: Governor • Secretariat: Provincial and District offices of MLSW	
Level below Regency and Municipality	<u>Village Disaster Prevention Unit (VDPU)</u> • All villages have set up VDPU. • Chair: Traditional village leader • Based on the Prime Minister's Decree, Forest Fire Extinguishing Team has been organized at the village level. *6	• Establishment and training of disaster response teams at community level is a priority area to be addressed.*1 • Capacity development of officers in charge of disaster management in provincial/district level is necessary along with decentralization*7. • In the short-term strategic action plan, it is emphasized to establish focal points for disaster management in various kinds of schools as well as military organizations, factories, etc*4. • In the short-term strategic action plan, a target was set to establish the rescue team consisting of military, police, students and volunteers as well as the emergency response team at regency/municipal levels*4. • It needs to enhance technical and budgetary aspects of New River Bank Erosion Measures Division. *12 • Focusing on capacity development of officials of the government and relevant agencies is the priority issue.

				In the short-term behavior strategy plan, it aims to implement 4 training courses at regency/municipal levels and 4 courses at village level*1*4. • Knowledge and capacity of the members of DMCs are lacking. *9 • Number of researchers of disaster management is not enough*6.			
		Financial Preparation	<Contingency Fund> • MLSW, where National Disaster Management Office (NDMO) belongs to, was allocated a fund totalling around 1 billion kips in 2011 for immediate use for disaster response • Government-wide annual allocation of emergency fund from national budget is amounted around 160 billion kips for 2009-2010 and 100 billion kips for 2010-2011. • The Ministry of Public Works and Transportation is in the position to arrange US$6.68 million for the repair of roads and bridges*9.	• It is emphasized in the strategy to allocate the budget for disaster prevention research. *6 • Due to the lack of fund, training for staffs of NDMO cannot be implemented sufficiently. *9 • National budget for disaster prevention is not enough. NDMO has no budget for stockpile of relief commodities / materials and equipment or for maintenance of facilities. The National Strategy Plan has not been implemented well enough due to lack of fund*6*9. • The issue is that the lack of budget of disaster prevention at the local level, which is brought about with decentralization. Especially, the budget for training of staffs of PDMC and DDMC is lacking*7*9. • Establishment of the social welfare fund for the support of disaster victims is set in the strategy*6. • Allocation of budget to disaster prevention research and forecasting / warning system is set in the strategy*6. • Lack of budget allocation for capacity development which is opt to be used partially for flood prone areas, resulting in further lack of capacity in the communities affected by other hazards.			
	5. Policy on Community-based Disaster Management	• It is a priority issue to focus on the participation of community in the disaster management; it is to give people motivation and support so that may take appropriate measures to protect their lives, properties and community from disasters in cooperation with each other. *1 • NDMO, in cooperation with NGOs, implements Disaster Mitigation and Community-based Disaster preparation Project at community level.*9 • NDMO organizes Public Awareness events and activities in every second week of October commemorating ASEAN International Disaster Management Day. • NGO and international organizations collect disaster-related data in villages in the remote areas and those along Mekong River through rural development projects or community-based disaster management projects. *9 • With the cooperation of NGO, community-based hazard map (types of disasters, location where disaster is likely to occur, dangerous elements, evacuation route, etc. are shown) is developed. *9 • Due to lack of the budget, manpower required to convey information as well as the capacity to manage information is lacking in NDMO. *9	• Participation of the communities in disaster management needs to be motivated.	1.(iii)	1.(iii)	2.6 4
	6. Prevention and Mitigation	Current Situation		Challenges	-	-	-
	6.1 Flood	Identification of Disaster Risks	• Mekong Committee is developing flood hazard map. *13 Flood risk assessment /mapping project started in June 2007. *9 • Department of Water Resources of MONRE just started to develop flood hazard map in March 2012. This utilizes the data of the Department of Meteorology and Hydrology of the same Ministry and the project is implemented under the support of Mekong Committee. *14 • Asia Disaster Prevention Center (ADPC) has developed flood hazard map covering 8 river basins, which are accustomed to be hit by floods, out of all river basins in the country. *15 • NDMO has been collecting disaster information, especially flood information, since 1966; however, uniform recording format has been started to be used only since 2000. Most of the data are of regency / district level *9. • NDMO has developed disaster database for the period of 2000-2005*9. • The Ministry of Labor, Social and Welfare (MLSW) and Scientific Technology and Environment Agency (STEA)*1*7*16 take charge of macro-leveled disaster management and study on accommodation to climate change. • STEA is going to be reorganized into two organizations that take charge of “water resources and environment” and “national land management”. *17	• Risk data are available in ministries and agencies, UN organization, and NGO; however, there is no mechanism to share the information. *9 • NDMO is planning to develop a unified format to collect disaster data from relevant ministries and agencies.*9 • NDMO does not implement community-based disaster data investigation. *9 • There is shortage of well-qualified persons who are able to do risk assessment. *9 • In the short-term strategic action plan, developing hazard map and specifying disaster danger areas are set as the target. *4 • Maps with the scale 1/20,000 or 1/10,000 cover only a part of the national land. *10		2.(i)	1.1
		Monitoring	• Department of Meteorology and Hydrology (DMH)*5 of the Ministry of Natural Resources and Environment (MONRE) takes charge of meteorological and hydrological observation / forecast and river management, observation/forecast of flow rate of rivers. • There are 13 major river basins in the country. DMH manages 113 monitoring stations for water level and rainfall in the whole country. Out of 113, 44 stations are telemetric. Data observed by telemetric system is sent to DMH in Vientiane every day.*18 • Rainfall data and water level data at key stations along the Mekong and its major tributaries are sent to Mekong River Commission Secretariat (MRCS) for flood forecasting not only for Lao PDR but also for other MRC member countries.*19 • Department of Meteorology and Hydrology of the Ministry of Agriculture	• The number of telemetric monitoring stations available for flood forecast is still limited.*14	2.(i)	2.(ii)	1.3

			and Forestry installs river water level observation station at each river; data collected at the home office are utilized for river water level management and forecast of flood. *5 • NDMO collects the weather forecast data from the Department of Meteorology and Hydrology as well as Mekong Committee, and collects news from international media; those data and information are provided to the disaster management coordinating agency of the regencies located along Mekong River, where flood is likely to occur. *1 • As a part of the activities of Mekong Committee, hydrological and meteorological observation network has been developed; at each observation point, where flood for the coming 5 days is forecasted*20. 569 observation points of water level/amount of rainfall are installed along Mekong River (as of 2000); among which, 143 points are within Lao PDR. The data are gathered at headquarters of the respective countries once in 3 ~ 6 months by means of mailing or mail through telephone line. In the period of flood assessment, data from important observation points are gathered everyday at the headquarters of the respective countries to send Mekong Committee. At the part of the river that forms border line of Thailand and Lao PDR, international joint observation is implemented based on the agreement concluded in 1999. *21				
		Non-structural Measures	• In the Development Vision 2020, restoration of deteriorated forest for 2 million ha., tree plantation for 500,000 ha., rehabilitation of natural forest for more than 16.5 million ha are set as the target. *7 • 20 national protection areas (covering 12% of national land area) are designated in order to protect forest. National action plan on rain forest was approved. • As a part of preparedness, Flood Preparedness Program was implemented by LNMC (Lao National Mekong Committee), ADPC (Asian Disaster Preparedness Center) and NDMO with a financial support from GIZ and ECHO. Main activities include i) awareness-raising and enhancing of people's capacities, ii) preparation and implementation of programs, and iii) integration of flood preparedness and emergency management into local development plans.*22	• An integrated management system for reservoir operation has not been put into place.*14 • Systematic EOS has not been prepared.* 23 • Particular evacuation drills for flood are not carried out.* 23 • It needs to establish a system to restrict excavation of sand and earth from the river bed of Mekong River. *12	4.(i)	4	2.2
		Structural Measures	• Flood protection dikes, sluice gates, diversion channels and drainages have been constructed by Ministry of Public Works and Transportation (MPWT), particularly in major cities located along the Mekong River and major tributaries*6. • River erosion countermeasures are listed in the 6th five year plan of General Department of Road, MPW*12. • By JICA's technical cooperation projects, low cost river bank erosion countermeasure works are introduced. In some villages located along Mekong River, there are cases that inhabitants implement simple turfing works by themselves.*12 • Agricultural division of the government*1 takes charge of reinforcement work of dykes and water gates. • The Ministry of Communication, Transport, Port and Construction (MCTPC) takes charge of construction and maintenance of revetments of rivers.	• River erosion is serious in some areas.*6 • Budget for new installation of river erosion prevention facilities is allocated; however, there is no budget allocation for monitoring and maintenance of those facilities. *12	4.(i)	4	2.2
	6.2 Earthquake / Tsunami	Identification of Disaster Risks	• The earthquakes limited to occur in northern part of LaoPDR were less than magnitude 6.0, significant damage has not occurred in LaoPDR. • DMH prepares epicenter map according to Strategic Plan (2011-2015) • No tsunami occurs in LaoPDR due to landlocked country.	• Earthquake hazard map has not been developed by any organization. • DMH can't produce hypocenter distribution map due to lack of ability.	2.(i)	2.(i)	1.1
		Monitoring	• DMH is in charge of seismic observation and dissemination. • DMH installed broadband seismograph and strong motion accelerograph in Luang Prabang and Laksao in 2008 by assistance of China Earthquake Administration (CEA). • The observation data is transferred to CEA and DMH in Vientiane through the VSAT satellite communication. • For the power source of observation devices, AC power source is applied. • CEA system has been checked if there is any abnormal condition; it has been renewed for twice or so and is working normally at this moment. • Since the local observation staff cannot carry out maintenance work, when the equipment is in trouble, repair work is requested to CEA. If any serious problem occurs, improvement of it is requested to CEA. • As the staff for observation / analysis of earthquake, there are 3 in Vientiane (for analysis) and 3 in Luang Prabang (for observation) and 2 in Laksao (for observation).	• Increase of seismometer is the most important issue. Not only increase in number but also training of engineers for inspection and maintenance of the equipment as well as analysis of data are required. • With growth of urban area such as Vientiane, it is required to improve current analysis technique of observation data on the strong earthquake as well as to establish earthquake resistance standard.	2.(i)	2.(ii)	1.3
		Non-structural Measures	Nil		4.(i)	4	2.2
		Structural Measures	Nil		4.(i)	4	2.2
	6.3 Sediment disaster (Landslide, Debris flow)	Identification of Disaster Risks	• Sediment disaster information isn't accumulated, and damage anticipation including producing a hazard map has not been conducted neither*24. • There are many landslides occurred along the arterial roads, the geological survey and hazard mapping to identify the disaster risk have not been conducted by MPWT*25.	• The organization specializing in sediment disaster need to be established. • The master plan for road disaster management needs to be developed.	2.(i)	2.(i)	1.1
		Monitoring	• There is no activity regarding monitoring and early warning system for sediment disaster including the area along the main roads.		2.(i)	2.(ii)	1.3
		Non-structural Measures	• The handbook about design and construction of countermeasures were formulated in SEACAP project supported by U.K*26. • There is no activity regarding monitoring and early warning system for sediment disaster including the area along the main roads.	• Enhancement of the ability to manage maintenance of roads and establishment of the method to keep and manage disaster history, etc. shall be an important issue in the road sector.	4.(i)	4	2.2
		Structural Measures	• Just only urgent removal of fallen sediment after disaster occurs has been implemented*25. • In International Development Institute in Japan and SEACAP project, the simple and reasonable countermeasures such as gabion walls and revetment works were constructed.	• The proactive countermeasures along the arterial road need to be introduced.	4.(i)	4	2.2
	6.4 Volcano	Identification of Disaster Risks	• No volcanic mountains are in LaoPDR.		2.(i)	2.(i)	1.1
		Monitoring	N/A		2.(i)	2.(ii)	1.3
		Non-structural Measures	N/A		4.(i)	4	2.2
		Structural Measures	N/A		4.(i)	4	2.2
	6.5 High Tide /Storm Surge (Cyclone/ Typhoon)	Identification of Disaster Risks			2.(i)	2.(i)	1.1
		Monitoring			2.(i)	2.(ii)	1.3
		Non-structural Measures			4.(i)	4	2.2

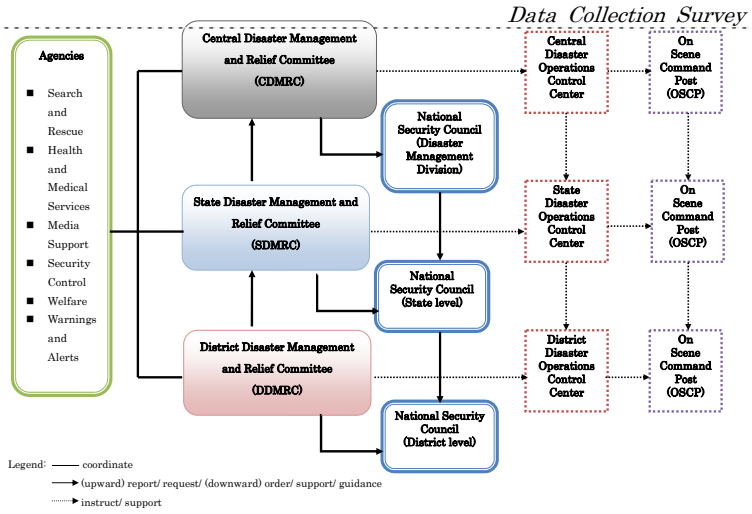
	Structural Measures			4.(i)	4	2.2
6.6 Other Disasters	Identification of Disaster Risks			2.(i)	2.(i)	1.1
	Monitoring			2.(i)	2.(ii)	1.3
	Non-structural Measures			4.(i)	4	2.2
	Structural Measures			4.(i)	4	2.2
6.7 Common items for Disaster	Non-structural Measures	• NDMO has implementing two projects under the thematic area of risk assessment and disaster information management. (EDIS Project, National Risk Profile Project)*[27] • The Establishment of Disaster Information Management System (EDIS) Project is built on a web based system (DesInventar) previously tested in Sayaboury province under a pilot project implemented in 2008 – 2009. EDIS was proven effective in Sayaboury province and commenced implementation at national level in 2010*[24].		4	4	2.2 2.5
				4	4	2.8
	Structural Measures			4	4	2.3.2 2.3.3
	Climate Change Adaptation	• Average temperature has risen more than 1 in all of the northern, central and southern meteorology monitoring stations according to the monitoring records since 1976 to 2006.*[28] • International Treaty related to climate change has been concluded (1995). *[7] • It has attended International Conference of Climate Change (1997). *[7] • Kyoto Protocol on Climate Change has been ratified (2002). *[16] • Having been supported by UNDP, STEA is drafting National Climate Change Adaptation Action Plan, which is supposed to be in line with national Climate Change Strategy (-2020) (as of 2002).*[16] • Climate Change Executive Committee was established. It consists of 7 working groups including forest and land utilization WG, hydrology/water resources WG, urban area infrastructure WG. It aims to formulate National Action Plan for Climate Change in line with National Strategy for Climate Change targeting 2020 and the 7th National and Social Economy Development Plan*[9]. • Responsible body: National Steering Committee on Climate Change (2008) • NFP: Department of Environment; Water Resources and Environment Administration		4.(i)	4.(i)	2.7
	Public Awareness Research and Development /Human Resource Development / for Disaster Management	• Education for disaster prevention and mitigation has been carried out to the communities mainly in NDMO, while receiving the support of the NGOs*[23]. • NDMO implements disaster awareness program under MOU with media*[4]. • The Ministry of Education takes charge of education for disaster prevention. Relative curriculum is prepared for 3~ 5 grade of primary school. *[4] • At the national and local levels, on the Day For Disaster Reduction in October every year, disaster prevention enlightenment campaign is implemented.*[9] • Lao PDR Red Cross implements DBDR program (2007-2011) in 5 villages where drought occurs frequently, wherein community-based collection of disaster information is implemented, too. *[9] • By cooperation of NGO, development of community-based early warning system (installation of watermark, appointment of PIC of monitoring and communication etc.), preparation of community-based hazard map are implemented. *[9] • By the cooperation of ECHO, UNDP and ADPC, NDMO has implemented a pilot project to include education for disaster prevention in the curriculum of the junior high school since 2007. In addition, UNDP and ADPC have investigated the impact of disaster to the education at school in attempting to make the school building earthquake resistant.*[8] *[9]. • With the joint work of NDMO, the Ministry of Education, Department of Education of Savaboury District and ADPC, in the period of 2008.7 ~ 2009.6, disaster prevention education project has been implemented which is intended for 2 primary schools and 2 junior high schools. *[9] • DMH conducts an open house which is one of the education programs. More than 500 elementary and high school students visited DMH, 2011.*[18] • NDMO has opened a website and is beginning to share information on a trial basis for knowledge share. The website is very necessary to accumulate the Good Practice in the future. *[23]	• Middle term strategy declares public awareness campaign through media*[1]. • MDMO is unable to conduct awareness campaign due to lack of human and financial resources*[9]. • The midterm strategy prompts to all the level disaster drills*[1]. • In the Short-term Strategic Plan, it is set as a goal to develop a ‘disaster prevention education in the school’, especially putting an importance on the primary schools.*[16].	3	3	2.3.1
7. Preparedness and Response	Current Situation		Challenges			
7.1 Disaster Response plan / Emergency Financial Measure	Central Level	<Emergency Operation Plan(EOP), Contingency Plan(CP) .etc> • There are preparedness and contingency plans for certain hazards (mainly flood). • Contingency plan is reviewed to be revised, which includes preparation of SOPs. (as of March 2012) • Emergency response is supposed to be led by local level disaster management organizations for mobilizing assistance resources from the government, the army and local communities*[24]. <Emergency Financial Measure> • Some resources for emergency are allocated to national level. • The Ministries such as Health, Public Works & Transportation, Agriculture & Forestry, and Defence have some financial reserves for emergencies respectively.		5	5	3
	Local Level	<Emergency Financial Measure> • Some resources for emergency are allocated to provincial level.				
7.2 Early Warning	General Warning and Forecast/Communication	• Meteorological and hydrological monitoring and early warning (severe weather, typhoon, heavy rainfall, very hot weather, flood, flash flood) are under responsibility of DMH.*[18] • Early warning information is distributed from DMH to NDMO, 13 agencies, local meteorological observatories, mass media (radio staffs and/or newspapers) by FAX, to TV staffs by e-mail, and to public by websites and mass media and staffs of villages. Village staffs distribute information to communities by hand-speakers, outdoor loudspeakers and so on.*[18] • Criterion of issuing early warning of flash floods is not also available. DMH issues information of flash floods based on the MRC’s flash flood guidance. *[18] • DMH implements weather observation/ forecast, river management, observation / forecast of flow rate of the river by around-the-clock system and distribute the information once a day (when a typhoon approaches or at flood, several times a day) to government-related agencies, offices of the local governments, mass media such as TV, radio, newspapers, electric power companies (EDL: Electric De Lao, which is the main body	• Out of 160 monitoring station, only 30 stations are able to transmit real-time information. It is not a big help to weather forecast. *[5] • It is stated in medium-term strategic action plan to develop/install early warning system /information system in all 142 districts in the country.*[1] • Information distribution measures from provinces to districts and villages are not enough (by radio or telephone). Early warning information cannot be distributed to villages in	2(ii)	2.(ii)	1.2

			of Nam Ngum Dam caused the flood at downstream of Nam Ngum River by the release of waster from the Nam Ngum Dam in 1996 as a lesson; this distribution of the information has been implemented since 1997), Lao Mekong Committee and airports, and so on. Weather forecast is carried out only at home office of DMH. Number of weather person are 6*[5]. • There are 50 weather stations and 107 precipitation stations throughout the nation, where staffs of the Department of Meteorology and Hydrology as well as those of the local government are working. Density of installation of observation stations is 1/6 of the case in Japan. *[5] • Observation is implemented once in 1 hour in the case of weather station and once in 3 hours in the case of precipitation station. The results of observation are conveyed to the home office in Vientiane by means of telephone or HF radio[5]. • Those observation stations that have no telephone or HF radio facilities send the observation data in a written form to the home office once in a month. In a certain observation station, river flow rate is observed, too. *[5] • Since the data from weather/precipitation station cannot be obtained in real-time, actual forecast relies mainly on weather data of WMO and meteorological image from the meteorological satellite "Himawari"; it is difficult to do the local forecast (in the case of Japan, prefectural units). *[5] • Distribution of weather information to the local cities is made from the home office by telephone or HF radio to the main (local) weather station; then, the information is conveyed to each local agriculture and forestry office or the office of the local government. Distribution to the respective villages relies on the transmission of sounds such as a loud speaker and so on. *[5]	remote areas without road access.*[9] • It is stated in medium-term strategic action plan to build information network in the village where disaster is likely to occur. *[1] • In short-term strategic action plan, it is stated as target to make it possible to convey early warning information to more than 30% of villages located in disaster prone area. *[4] • In short-term strategic action plan, it is stated as target to establish the information center in NDMO. *[4] • A system to convey information as well as materials and equipment is not sufficient. *[6] • It is stated in the strategic plan to allocate the budget to disaster forecast /warning system. *[6] • In the "Upgrading and Expanding of Forecast Service" program referred to in DMH's Development Plan for 2001~2010", it is stated that DMH shall aim at the development of weather observation, improvement of monitoring ability and forecast /warning service. *[5]			
		Flood	• When water level reached the alert level, flood alert is distributed by national as well as provincial TV or radio broadcasts every 30 minutes to arouse evacuation or movement of properties. *[1] • Mekong River Commission developed hydrological and meteorological monitoring networks. It provides flood forecast till 5 days ahead.*[29] • Flood warning is issued by DMH based on pre-determinate criteria of river water level and rainfall, and is disseminated to the line ministries and provinces as well as mass media by fax or email. Information is also provided to the public through mass media, website, or verbal communication by using a loud speaker.*[18] • Waning information for flash floods including landslides, which are increasing in recent years, are issued when 12-hourly rainfall exceed 100 mm.*[18] • At flood in 2002, military unit that was called up by cooperation of private sectors and security groups of the village has evacuated inhabitants in the flooded area along the river, their animals and properties by boats*[1]. • At flood in 2002, military unit that was called up by cooperation of private sectors and security groups of the village has backed up the reinforcing works of dyke , which were carried out by the youth organizations as well as volunteers at district and village levels, and has formed a team to monitor around-the clock. *[1]	• About 10 ~ 20% of hydrological and meteorological observation facilities in Mekong River are not operated due to shortage in allocation of budget for the maintenance. *[21] • As to hydrological and meteorological observation facilities in Mekong River, further enhancement of observation density is required. *[21] • A particular monitoring system or warning criteria for flash flood have not been established yet.*[18] • A system to issue an evacuation order has not been established. At present, National Disaster Management Office (NDMO) decides at each time.*[23]			
		Earthquake / Tsunami	• The seismic information is informed from DMH to provincial disaster management committee through DMH Branch Office*[18]. • DMH disseminates the seismic information to the minister of MONRE, NDMC and mass media by FAX and announces in their website*[18]. • Mass media broadcasts the earthquake information immediately in TV and newspaper depending on the scale of earthquake, and radio can broadcast it more quickly*[18].				
		Sediment disaster (Landslide, Debris flow)	• There is no early warning system related to sediment disasters.				
		Volcano	N/A				
		High Tide /Storm Surge(Cyclone/ Typhoon)	• DMH is responsible of issuing typhoon and TD (tropical depression) warning.*[18]				
		Other disasters	(Forest fire) • By Smog Prevention Agreement among ASEAN countries, forest fire early warning system has been developed utilizing satellite images.*[30]	• No observation stations for strong earthquake have been installed; Lao PDR gets earthquake information from Thailand and Viet Nam. *[6]			
	7.3 Evacuation plan				5	5	3
	7.4 Establishment of Emergency Response System	Central Level	[Current Conditions] • The Ministry of Foreign Affairs will ask for International/local NGOs to mobilize assistance. • NDMO with its Disaster Assessment Committee collects pre and post disaster information with its partners' assistance. • "Emergency Task Force" is set up within NDMC to disseminate information from National to Communities level. • PDMC and DDMC are responsible to emergency measures; however, in the case of disasters, with which abilities of those agencies are not enough to cope with, assistance is requested to NDMC. *[9] • At flood in 2002, military unit that was called up by cooperation of private sectors and security groups of the village has distributed relief goods package, medical supply, etc. to sufferers stayed in a temporary shelter in 4 districts. *[1] • MLSW stocks 456 tons of rice. *[9] • During disasters, Ministry of Defense mobilizes and provides armed forces, portable housing, equipments and transportation measures.*[9] • Lao Red Cross keeps relief goods in Southern, Central and northern stock centers.*[9] • MLSW keeps relief equipments in the central stock center and in all the provinces.*[9] • The Ministry of Agriculture and Forestry has distributed organic fertilizer for re-planting in post-flood, vegetables, rice and seeds of corn to each village. *[1]	• In the case of receiving requests from PDMC or DDMC, NDMC is not in a position to make emergent decision; actual relief activity is left in the hand of NDMO. *[9] • As Emergency Task Force has been established, there are challenges of coordination and further exchange of information. • Draft National Disaster Management Plan proposes to establish "Disaster Response Coordination Centre" to be operational in the onset of disasters. • NDMO is in need of "Emergency Operation Centre" as its internal function. At national and provincial level, 'Emergency Response Measures' under the editorship of NDMC has not been developed. *[9]	5	5	3

				• In short-term strategic action plan, it is set that disaster drills shall be implemented twice in a year. [*4] • Equipments that MLSW stocks are not sufficient [*9] and it is necessary to monitor if they are delivered to the affected areas. • Forest fire fighting team at village level does not have enough fire apparatus. [*7] • In medium-term strategic action plan, it is set that warehouses of emergency relief goods shall be constructed in all disaster prone regencies and districts as well. [*1]			
		Local Level	• PDMC and DDMC are directly responsible for disaster response. In case that the disaster exceeds the capacity of PDMC and DDMC, they make request of assistance to NDMC.				
		Training etc.		• NDMO's budget for capacity development is not adequate.			
	7.5 Rescue plan			• SOP needs to be prepared.	5	5	3
	7.6 Relief plan	• The Ministry of Labour and Social Welfare has stocks for emergency assistance such as shelter materials, food stocks at various administrative levels		• Emergency materials are not sufficient.	5	5	3
Assistance to challenges	8. Records of Major Assistance by JICA	<Technical Cooperation Projects/Experts/ Emergency Assistance > • Project for Riverbank Protection (2005.1-2014.9) • Meteorology and Hydrology improvement Project (2006.7-2011.1) • Survey on the Existing Road and Drainage Condition in Vientiane Lao P.D.R. <Studies> • Study for Vientiane Drainage Network Development (1988-1989) (Summary , Vol. 1, Vol. 2, Vol. 3, Vol. 4) • Study for Mekong River Basin Hydrological Monitoring (2001-) (Vol. 1, Vol. 2-1, Vol. 2-2, Vol. 3) • The Study on Mekong Riverbank Protection around Vientian Municipality, in the Lao People's Democratic Republic (2001.11-2004.10) • Study for Mekong River Erosion Prevention in Vientiane and its surrounding Areas (2002-2004) • Study for Development of Meteorological Monitoring Network (2002-2004) • Vientiane Water Supply Development Project (2003.2-2004.2) (Vol. 1, Vol. 2, Vol. 3, Vol. 4, Vol. 5) • Program for the Improvement of Capabilities to Cope with Natural Disasters Caused by Climate Change (2009) • The Study on the Improvement of Water Environment in Vientiane Capital(2009.1-2011.7) (Vol. 1, Vol. 2, Vol. 3, Translated Title: Vol. 1, Translated Title: Vol. 2) <Trainings> • Meteorology II (1993-) • River and Dam Engineering (1998-2005) • Meteorology (1999-2001,2003-2005) • Sewage Works Engineering (2000,2003) • Port and Harbors (2003) • Integrated Water Resources Management (2005) • River and Dam Engineering III (2006) • Flood Hazard Mapping (2006)					
	9. Records of Assistance by other Development Partners	• ADRC: Human Resources Development Program (2003), Capacity Building for Local Government Officials in Disaster Management (2008-) • ADPC: Trainings of officers of NDMO and other DM organizations • OFDA-USAID/ADPC: Asia Urban Disaster Mitigation Program (AUDMP) (1995-2004) • DANIDA: Provision of assistance to development of disaster education curriculum in elementary schools by NDMO, MLSW, National Institute of Education Science and Ministry of Education with cooperation by ADPC • WFP: provision of Assistance to disaster risk vulnerability assessment by NDMO, MLSW and other organizations • CWW:DM Capacity development of Provincial/District officers in 8 Districts, Establishment of telephone and radio network between national , provincial and district offices • UNDP: Provision of assistance to NDMO in implementing project for integrating disaster education into curriculum of secondary school from 2007 with cooperation by ADPC, funded by EU-ECHO • ADPC :Capacity development for planning and implementation of flood preparedness program at Province/District level in Lower Mekong, funded by DIPECHO (2005.3-) • AusAid: Laos-Australia NGO cooperation Agency Program, DREC and TDRA* [31] • WB: Mainstreaming Disaster and Climate Risk Management into Investment Decisions (2011) • ADB: Capacity Enhancement for Coping with Climate Change (2010-2012) • UNDP: Second National Communication on Climate Change (SNCCC) (2008-2011) • UNDP: National Risk Profile for Lao PDR (2010) • NZAid: Regional programme-Disaster Management and Emergency Response (2009-2012)					
	10. International Networking	• Mekong River runs through five countries in the ASEAN region; i.e. Thailand, Lao PDR, Myanmar, Cambodia and Vietnam. The Secretariat of Mekong River Commission (MRC) undertakes coordination among the countries. Initially, MRC mainly focused on development before the flood of 2000. Thereafter, MRC handles the issues of flood. The MRC prepared MRC Strategy of Flood Management and Mitigation. • With the onset of massive flood in 2000, flood control has come to be one of the major issues for MRC. MRC developed basic strategy in 2001 and action plan in 2002 and formulated flood control and mitigation program. Flood vulnerability assessment and mapping project was started. This program consisted of: (1) establishment of regional flood management center (supported by Japan, Holland, USAID-OFDA and Danish), (2) Structural countermeasures (Supported by ADB and Holland), (3) Multi-national food management (Supported by Holland), (4) Capacity building for Emergency Response to Flood (Supported by German, EU-Echo, cooperated by ADPC), and (5) Land-use management (Supported by German). Flood vulnerability assessment and Mapping Project (FVAMP) was commenced in June and July of 2007 (Phase-I)。					
ASEAN Cooperation	11. National Policy on ASEAN(ACDM, ARPDM, AADMER) cooperation in Disaster Management, Emergency Response in case of disasters in other ASEAN countries or ASEAN region	• Signed AADMER in 2007(ASEAN Agreement on Disaster Management and Emergency Response) (AADMER stipulates mutual cooperation in case of disaster.) • Participation in ARF meetings on disaster management, monthly ACDM meetings, ARDEX(ASEAN Regional Disaster Exercise)and ASEAN regional technical cooperation Project • SASOP (Regional Standing Arrangement and Standard Operating Procedures) started in 2007. • Agreement on trans-boundary haze was signed by ministers of ASEAN countries in 2002 and came into effect in 2003. Action plan for capacity building of fire fighting in the region and early warning system utilizing satellite images were developed.					
	12. Resources useful for other ASEAN countries						
	13. Needs for External Assistance from the point of view of Regional Cooperation						

[1] ADRC, Country Report (2006)
[2] Website of Emergency Events Database: (http://www.emdat.be/Database/CountryProfile/countryprofile2.php) (accessed on 23 March 2009).
[3] Website to ADRC: (http://www.adrc.asia/nationinformation_j.php?NationCode=418&Lang=jp&NationNum=19) (accessed on 28 June 2012).
[4] ADRC, Country Report (2003).
[5] JICA, "Preliminary Survey Report for Development Plan of Meteorological Observation Network in Laos" (2003).
[6] ADRC, Country Report (1998).
[7] ADRC, Country Report (1999).
[8] Hajime Tanji, Takao Masumoto, Shigeo Ogawa, Naoki Horikawa, "Current Status of Flood Issue in Mekong River" (2004); the Japanese Society of Irrigation, Drainage and Reclamation Engineering, Academic Journal Volume 72, No.2.
[9] Lao PDR, Interim national progress report on the implementation of the Hyogo Framework for Action (2008).
[10] JICA, "Preliminary Survey Report for Survey on Development of Geographical Information of the Mekong River Basin in Lao PDR" (1998).
[11] National Disaster Management Plan 2012-2-15 (draft).
[12] JICA, Survey Report for Assessment at the End of Project for Countermeasures against Erosion of River Bank in Laos PDR" (2007).
[13] Yoshiaki Otsubo, "Actual State of Severe Flood in the Downstream of Mekong River in 2002 and Issues to Flood (2004); the Japanese Society of Irrigation, Drainage and Reclamation Engineering, Academic Journal Volume 72, No.2.
[14] JICA, "Data Collection Survey on ASEAN Regional Collaboration in Disaster Management " (2012): Interview to Department of Water Resources of Ministry of Natural Resources and Environment (2012.03.02)
[15] Developing a National Risk Profile of Lao PDR, 2010, ADPC.
[16] Institute of Global Environmental Strategies (IGES); "2002 Momentous News in Asia" (2003).
[17] Institute of Global Environmental Strategies (IGES); "2004 Momentous News in Asia" (2005).
[18] JICA, "Data Collection Survey on ASEAN Regional Collaboration in Disaster Management " (2012): Interview to DMH (2012.02.29).
[19] National Water Resources Profile (Department of Water Resources, June 2008).
[20] Shin Utsumi, "Current Status and Direction of Activity of Mekong River Committee" (2004); the Japanese Society of Irrigation, Drainage and Reclamation Engineering, Academic Journal Volume 72, No.2
[21] Takao Masumoto, Huan Thain Hi; "Development Status and Future Outlook of Hydrological Weather Observation Network in Mekong River Basin"; (2004) the Japanese Society of Irrigation, Drainage and Reclamation Engineering, Academic Journal Volume 72, No.2.
[22] NDMO Presentation Data: "Disaster Prevention and Management in Lao PDR".
[23] JICA, "Data Collection Survey on ASEAN Regional Collaboration in Disaster Management " (2012): Interview to NDMO (2012.02.27)
[24] JICA, "Data Collection Survey on ASEAN Regional Collaboration in Disaster Management " (2012): Interview to DGM and Water Resources Department of Ministry of Natural Resources and Environment (2012.02.28-29).
[25] JICA, "Data Collection Survey on ASEAN Regional Collaboration in Disaster Management " (2012): Interview to MPWT DoR (2012.03.01).
[26] Gareth Heam et al, "Landslide Impacts on the road network of Lao PDR and the feasibility of implementing a slope management program" (2008).
[27] Lao PDR, National progress report on the implementation of the Hyogo Framework for Action (2009-2011), 2011.
[28] Institute of Global Environmental Strategies (IGES); "2008 Momentous News in Asia" (2009).
[29] Website of Mekong River Committee: (http://ffw.mrcmekong.org/) (accessed on 28 June 2012).
[30] Institute of Global Environmental Strategies (IGES); "2003 Momentous News in Asia" (2004).
[31] ADPC (http://www.adpc.net/v2007/Programs/DMS/PROGRAMS/Capacity%20Building%20at%20the%20National,%20Provincial%20and%20District%20Levels/LANGOCA/Default-LANGOCA.asp) (accessed on 2 Aug 2012)

					Inventory	HFA PforA	HFA IofP	AADMER
Current Situation and Challenges	1. Features of Disasters				• Possible Natural Disasters *1*2*3: Flood and Flash Flood (28 times since 1980), Landslide(5 times since 1980), Forest Fire and Haze (4 times since 1980), Storm (6 times since 1980), Tsunami (2004) • Frequent Natural Disasters: 1980-2011EM-DAT: Flood Disasters 45 nos.; Out of these Flood and Flash Flood (71%), Storm (14%), Landslide(9%) <Flood> • Heavy intensive rainfall arises during monsoon; there are many heavy rainfalls at some limited area. *4*5*6 • Most rivers are steep stream in upper river basin and low gradient stream in downstream basin. This causes sedimentation and consequent floods.*7 • Inundated area by flood spreads to wide area. Flooded area in the period of 1963 ~1980 reached 9% of the national land*7; population in the flooded area comes to2.5 million people. More than 1,500 rivers in the country have been accustomed to overflow (as of 1995). *8 • River basin of Kinabatangan River in Sabah Province is flooded frequently and duration of flood is long, too (as of 1980). *9 • In the upstream basin of Kelantan River located in the North-Eastern part of peninsula, which is known as the most frequently flooded area; there is an inclination that deforestation as well as colonization in rubber plantation brings about increase in flood disaster in the delta at the downstream of the river (as of 1988) *10*4 • In the metropolitan area in the river basin of Klang River; sediment discharge caused by rapid urban development is one of the causes of increase in flood disasters (as of 1987). *5 • In the case of tidal rivers, when high tide is combined with intensive rainfalls, flood occurs frequently. *11 <Landslide> • Loss and injuries by landslides are increasing because of housing and commercial area developments on steep slopes, where landslide is likely to occur (as of 1999) *12 <Others> • The potentiality of tsunami disaster will be considered in Saba Sarawak. • Major disasters in these years are; flood (in 1996, death: 238 persons), forest fire (1998), storm (2004, 2 times, death: 1 person), tsunami (2004, death: 80 persons), flood (2004, death: 13 persons), mud flow (2005, death:3 persons), flood (2005, death: 17 persons), flood (2006, death: 19 persons), flood (2007, death: 33 persons), landslide (2008, death: 11 persons), flood (2008, death: 5 persons), flood (2011, death: 6 persons), etc. *1*12*13			
	2. Administrative Division				13 States/3 Federal territories –114 Districts			
	3. Development of Legislative Framework and Disaster Management Policy & Plans		Current Situation	Challenges		1.(i)	1.(i)	2.1
		Development of Legislative Framework	<Laws in Relevant Sectors> • Water Act (1989) *14*15 • Federal Forest Act(1984) • Land Conservation Act(1960) • Highland Slope Development Guidance *16 • Road, Drainage and Building Act	• Water Act stipulates only securing river assets. *7				
		Disaster Management Policy	• The National Security Council Directive No. 20 : The Policy and Mechanism on National Disaster and Relief Management (1997) *1 • Climate Change Adaptation Policy • HFA was adopted on November 2005 in National Disaster and Fund Management Committee Meeting	• NSC Directive No. 20 is under revision as of March 2012.				
		Disaster Management Plans	<Central Level> • National Slope Master Plan (2009) • Federal Haze Action Plan *12 • Integrated River basin Management Plan *17	• No specific disaster management plan exists, but it is expected to prepare once NSC Directive No.20, is revised. • Local Level disaster management plan is not considered necessary.				
	4. Establishment and Enhancement of Disaster Management System	Institutional Framework	Current Situation	Challenges		1.(ii)	1.(ii)	2.1 4
		Central Level	• In National Security Conference (NSC) Instruction No.20, it shall be provided that, when disaster occurs, depending on the scale of disasters, Disaster Management Rescue Committee shall be established in 3 different levels (Federal Government, Province and District). *1 • It is in the stage of re-structuring /re-formation. *1 Central Disaster Management and Relief Committee (CDMRC) *1 • Chair: Minister appointed by the Prime Minister • Deputy chair: Minister of Information • Secretariat: National Security Department (NSD) (it belongs to the Executive Office of Prime Minister). • Members: Relevant Ministers and Director-Generals of Departments*12 - Minister of National Unity and Community Development - Minister of Finance - Chief Secretary to the Government - Chief of Armed Forces - Inspector General of Police - Director General of Health - Director General of National Security Division - Director General of Fire and Rescue Department - Director General of Atomic and Energy Licensing Board - Director General of Road and Transport Department - Director General of Public Works and Utilities Department - Director General of Department of Environment - Director General of Meteorological Department - Director General of Drainage and Irrigation Department - Representatives from Ministry of Finance and Attorney General Office - Director General of Department of Occupational Safety and Health • NSD coordinates disaster relief activities in every form and monitors the progress and development of the said activities. • NSD formulates national policies /strategies on warning and preparation against disasters made by various organizations that are involved to disaster response. Special Malaysia Disaster Assistance And Rescue Team (SMART) *1 • SMART is founded in 1995 (based on NSC Instruction No. 19) • It is responsible to the Head of Disaster Risk Management Unit of NSD. • Members: Around 90 officers, Personnel/Secondments from the Fire & Rescue Department, Royal Malaysia Police, Armed Forces and other agencies • It responds to search & rescue operation which is beyond the capacity of the existing search & rescue teams. • Members are those who have received training in search and rescue (SAR) training organizations outside the country such as the USA, Sweden, Australia, Singapore, and so on. • Decision of mobilization or deployment is made by the Director General of NSD or the Head of Disaster Risk Management Unit. Federal Organization for Flood Disaster Relief*7 • This is the lower organization of National Security Committee. • It implements countermeasures for flood disaster relief. National Water Resources Council *16	• Strengthening of the structure of federal disaster management organizations is identified as an important issue to be addressed.*1 • Division of responsibility between flood control and urban drainage is not clearly defined. • Local governments, mandated to be responsible for urban drainage, suffer from shortage of budget and human resources. Some local organizations even do not have drainage division. • River management is implemented by various stakeholders as necessary. Plans and information are limited and dispersed and this leads to difficulty in implementing integrated river basin management.			



Source: A. Fakhru'l-Razi (date unknown) *Disaster Management in Malaysia* (PPT Slide), p.36.

Figure Malaysia's Disaster Management Structure

			Inter-organizational arrangement • It is in the stage to coordinate responsibilities mutually among the government agencies. *1			
			Organizations in charge of Non-structural Measures for Disaster Risk Mitigation and Preparation • Flood, Sediment disaster, Typhoon/Cyclone: (1) Malaysian Meteorological Service (MMS) Department of Science, Technology and Environment, (2) Drainage And Irrigation Department Of Malaysia (DID) ,Ministry of Agriculture, (3) State DID, (4) Survey Department Ministry of Land and Development Cooperation, (5) State governments (District Land Office) Organizations in charge of Structural Measures for Disaster Risk Mitigation *1 • Flood, Sediment disaster, Typhoon/Cyclone: (1) River Division / Drainage Division / Shore Division of DID, (2) State DID, (3)Local governments, (4) Tin mining companies			
		Local Level	State/District DMRC *1 • Chair: State Secretary/District Officer • Secretariat: NSD Members: *12 - State Chief Police Officer, - Brigade Commander of Armed Forces (only for provincial level) - State Director of Fire and Rescue Department, - State Director of Health - Directors of relevant government agencies / departments at State/District Level Roles: - Coordination among various organizations related to disaster response and specialization of roles of main emergency response agencies (police, medical fire fighting) and other supporting agencies. - As needed, establishing and operating Disaster Measures Management Office at district, province or federal government levels. - Procurement and mobilization of funds and goods from the government agencies as well as private sectors. - Supporting sufferers /coordinating restoration activities. - Post analysis / reporting after completion of disaster response activities. Province/District Flood Disaster Relief Organization *7 • This is the lower organization of National Security Committee. • Implementation of countermeasures for flood disaster relief On-Scene Control Post (OSCP) *1 • It will be opened immediately after disaster has occurred. The Commander will be the Director of Internal Security and Public Order Royal Malaysia Police The main functions of the site commander are as follows. - Implementing initial assessment at the location, where disaster is expected to occur, or at the location of disaster; as needed, it shall install OSCP immediately. - Confirming necessity of facilities as well as logistical supports. - Coordinating functions of various agencies related to search & rescue activities. - Reporting and giving advice to DMRC at the respective levels.	• Division of responsibility of urban drainage improvement among organizations concerned is not clear. • Coordinating organization or mechanism across ministries for integrated river management does not exist. • Coordinating organizations or mechanism across states for management of inter-state rivers. • The policy is announced that jurisdiction over water resources will be under the Federal government provided that state councils approve the transfer.			
		Inter-organizational Arrangement	• Arrangement structure exists in the form of the chart of roles and responsibility of agencies at the scene of a disaster.			
		Financial Preparation	<National Budget> • Respective Ministry and agency has the allocation of budget/fund for the activities/projects of disaster prevention and mitigation. *1 <Contingency Fund> • National Disaster Relief Fund was established by the Federal Government for disaster relief operations. The Federal Government contributes fixed amount annually. *1 • Rehabilitation/Emergency expenses by Government agencies are reimbursed by the Ministry of Finance.	• A lack of disaster management law attributes to less integrated control of the budget for disaster management.			
	5. Policy on Community-based Disaster Management	• Malaysia has disseminated disaster information to communities and implemented Community-based Disaster Management programs, which helps improving people's awareness of disaster management. *18			1.(iii)	1.(iii)	2.6 4
	6. Prevention and Mitigation	Current Situation		Challenges	-	-	-
	6.1 Flood	Identification of Disaster Risks	• Malaysian Centre for Remote Sensing (MACRES) and NSD established the National Disaster Data and Information Management System (NADDI). *1 • It engages in specialization of disaster risks, assessment, monitoring. *1 • DID head office collects information on floods from DID in the respective states *19 • DID categorizes flood map into three types, namely inundation map, flood hazard map and flood risk map. *7 • Inundation maps have been completely developed through site observation and satellite images. • Flooded area maps for 12 river basins including those of Kelan River and Pahan River as well as expected flood area map by using hydro-dynamic models with input of hydrological and hydraulic data are prepared. *7*19 • Development of flood risk maps will be started soon by adding vulnerability data to flood hazard maps.*19 • Flood area maps based on inundation throughout the country has been prepared by DID. *7 • Prime Minister Office gathers flood disaster information from ministries and agencies. *7 • Department of Agriculture of the Ministry of Agriculture and Forestry	• Necessity of improving macro level as well as micro level hazard maps has been recognized. *1 • Flood control by the government started only from 1972 onward; history of river management is short and data are few and dispersed. *7 • The flood map has not been renewed after it was prepared and is not utilized frequently. *7 • Flood disaster information of DID has been dispersed and lost due to inconsistent format and shortage of manpower. *7 • Information on floods collected by the Prime Minister's Office is not disclosed to public. *7	2.(i)	2.(i)	1.1

			develops Soil Erosion Risk Map with the scale of 1:50,000 by plotting satellite photos. *7 • Coast Department of DID assemble information on the state of erosion of the coast. *7 • It engages in developing landslide hazard map. *12				
		Monitoring	• Hydrology Division of Department of Drainage and Irrigation (DID) of the Ministry of Agriculture and Forestry and Irrigation and Drainage Bureau *1 of State take charge of providing flood forecast /warning (FFW) service /hydrological data. • Department of Survey of the Ministry of Land and Development Cooperation takes charge of maps / survey / tidal level. • Department of Irrigation and Drainage (DID) provides flood forecast/warning (FFW) services. *1 • In the 4 biggest rivers in Malaysia Peninsula, flood forecast / warning system using automatic observation /telemetering equipment has been installed in the middle of 1970s. *6 • Rainfalls measurement is made in combination with the observation by metrological radar. *6 • In the State of Pahang, in which it has Pahang River, there are134 rainfalls stations, 28 water level /flow rate observation stations, 21 flood warning boards, 14 telemetering devices, 7 automatic flood alert sirens to dispatch flood warning in 3 stage alert levels. After the data have been analyzed by computer in the home office of DID, flood forecast is sent to State DIDs. *7 • In the State of Sarawak, rainfalls observation has been started in 1910s; regular hydrological observation started in 1963 (numbers of observation stations were increased). There are 229 rainfalls stations and 67 water level observation stations. Since 1988, telemetering equipment has been used in 2 rivers. *7 • In the State of Sabah, 5 hydrological observation stations have been installed with telemetering devices along Kinabatangan River since 1980*7. • In Perak River, there are 67 rainfalls stations and 14 water level observation stations, where DID, PWB, MMS and Perak Waterworks Public Corporation implement observations. *20 • DID collects /analyses river water level and rainfalls data in real time to dispatch flood forecast and alert. So far, 72 rainfalls meters, 89 automatic measuring and transmission devices of river water level and 137 manual water level observation stations have been installed/ established. Automatically measured data are conveyed by VHF radio, telephone or via satellite. In the 7 Five Years Malaysia Development Plan (1966-2000), the same type of system is being arranged in 10 rivers. During the flood period, real time flood forecast is implemented in 7 rivers. When the river water level reaches the specified level, the local observer transmits the real time water level information to the State office of DID by means of a telephone, VHF radio and so on. The State office of DID, then, transmits the information to the flood countermeasure unit of the government level (as of 1999). *12 • In the flood prone areas of main rivers, 60 warning boards that show river water level at the observation points of the upstream of the river. Inhabitants in the village can recognize by themselves the state of flood in the upstream of the river and the forecast level shown on the warning board. *12	• There are comparatively large numbers of hydrological observation stations; however, reliability of the data is low due to many inaccuracies in measurement. (as of 1982) *21 • With rainfalls measurement system in the 4 biggest rivers in peninsula part, observation points are not enough and they are set in inappropriate positions. *6 • Rainfalls station network in Perak River has not covered the river basin adequately. *20 • Data from the meteorological radar are not quantitative but qualitative. *6 • It needs to increase and train engineers who engage in the analysis of flood forecast / warning as well as maintenance of equipment and instruments. *6 • Flow rate observation has not been implemented so frequently and utilization of the data is low, too. Observation of flood flow rate has almost never been implemented. *7 • It is hard to gather latest hydrological date, by which warning can be dispatched. *7 • Dam control information by Electric Power Public Corporation (PWB) and observation information at the downstream by DID are not exchanged each other; there is a big fear that it could work against the comprehensive river management, which are necessary at the occurrence of flood. *20	2.(i)	2.(ii)	1.3
		Non-structural Measures	• It is stated as important challenges that, in the assessment of a development project, risk analysis and analysis of danger /vulnerability shall be the essential items; and as needed, GIS or remote sensing (RS) technology shall be used so that the assessment may be implemented at micro level. *1 • As to an application for permit of development, which is applied to the city council; approval of the said development plan is judged by the Local Government Drainage Committee (local office of DID is also a member of the committee) based on the “Urban Drainage Design Standard and Procedure for Peninsular Part of Malaysia” (established in 1975). The developer should bear improvement costs of the downstream of the river in proportion to the area to be developed. In the case of development of more than 10 ha, construction of a flood control reservoir is requested. A new guidelines putting focus on new development project is being developed aiming to completion at the end of 1999 (as of 1998). *11 • Forestry Agency designates Forest Protection Areas*8. • Standing Committee for Flood Control*7 takes charge of formulating the national policies of flood control. • High Land/ Islands Development Committee*16 takes charge of Monitoring of Hilly Terrain Development Control. • Department of Survey of the Ministry of Land / Development Cooperation takes charge of maps / surveying / tidal level. • State Government (land office of district government) takes charge of land management at the upstream. • Department of Agriculture of the Ministry of Agriculture and Forestry takes charge of the information on land utilization /soil erosion. • Department of Environment (DOE) of the Ministry of Scientific Technology and Environment takes charge of information on land utilization in the river basin / illegally occupied area.	• In Kuala Lumpur, people who live illegally inside the dyke and neighboring area have been hit by flood disaster. *5 • Around 200,000 people squatter river land areas*7 • Effective legal measures are not taken to the action that has significant impact on the functions of river such as abnormal excavation of sand and gravel, longitudinal occupation, etc. *7 • In many rivers, river area has not been fixed legally. *7 • In the drainage measures stated in the permit for a development, it does not include improvement of the river at its downstream and the balance of drainage capacity in the upstream and the downstream is not considered. Excessive discharge from the flood control pond as well as insufficient maintenance work is observed. *11 • Provision of the Water Act that prohibits building structures within 15m from the river bank is not complied with. *15 • In most of the forest protection areas, deforestation is in progress without coordination with river management.*8 • Integrated river basin monitoring system is not in place.*8 • There is not clear dividing point between flood protection and urban drainage; scope of responsibility is unclear. *5 • The local government that controls urban drainage does not have enough budget and personnel.*22 • River management is implemented by a number of organizations according to the respective needs; drawings and information are not enough, and are scattered and lost. It is difficult to manage the river in the integrated manner by basin units. *7 • Responsibility assignment in the agencies that engage in the urban drainage improvement is	4.(i)	4	2.2

				not clear. [*15]			
		Structural Measures	• With the onset of severe flood in 1971, the importance of flood control has come to be recognized. In 1980s and 90s, flood control measures were promoted. In the latter half of 1990s, flood control business has shared 65% of total expenditures of DID (in the latter half of 1960s, it was only 2.3%). [*7] • Necessity to the urban drainage has been recognized since 1970s; in 1981, it was taken up as an important item. After that, the budget for the urban drainage has become increasingly significant. Since 1987, development of urban drainage master plan has adopted in a number of areas. [*11] • During the past few decades, various flood mitigation projects have completed mainly in order to increase discharge capacity of rivers. The major projects are: SMART (Stormwater Management and Road Tunnel), Batu Jinjang Ponds & Related Diversions Project, Sungai Muda Flood Mitigation Project, Sungai Perai Flood Mitigation Project, and Bertam - Kepala Batas Flood Mitigation Project. • Drainage measures in the regional core cities are progressed in 100 years probability. [*15] • Department of Irrigation and Drainage (DID) implements measures for flood control and structural flood mitigation. In the rainfall management / road tunnel projects (SMART), it has constructed a draw-off tunnel (extension: 9.7 km, diameter: 11.83m) to ease an issue of flash flood in the urban area. [*1] • Among other projects implemented by DID in these years are; construction of Batu Jinjang flood control pond / discharge channel, flood control in Mudah River and Bertam –Kepala Batas flood control project. [*23] • In the 4th Malaysia Plan (1981 ~ 1985), formulation of sewage plan in all State Capital Cities is scheduled to complete. [*22] • Flood mitigation plan is planned in 17 main rivers and 27 cities (as of 1999). [*12] • River Division of DID[*]7 of the Ministry of Agriculture and Forestry and DID*1 of State Irrigation and Drainage Bureau take charge of flood control measures and construction of flood control facilities. • Drainage Division of DID[*]7 of the Ministry of Agriculture and Forestry and the local governments (City/Town) [*1*7*11] take charge of development of urban drainage master plan. • Local governments (City/town) [*1*7*11] take charge of development of urban drainage master plan and development of drain channels. • Coast Division of DID[*]7 of the Ministry of Agriculture and Forestry takes charge of works on estuary /maintenance of coast line. • Tin mining company [*20] takes charge of flood control measures and construction of flood control facilities jointly with DID.	• It needs to implement disaster mitigation measures such as landslide management, raising embankment as well as to enhance knowledge and expertise. [*1] • In the metropolitan area, the development of urban drainage facilities does not catch up with the rapid urbanization, development of land by reclaiming abandoned tin mine, which has potential functions as flood control pond, and swampy lowland, which has water retaining function, effusion and sedimentation of earth and sand with land development work, increase in flow rate at flood peak caused by modification of flow capacity of tributary and drainage channels, which is excessive comparing to that of the main stream and so on. [*5*11*24] • There are places where cross sectional surface at linearized part of the river is not enough, slope of the river bed is too steep. [*5] • There are many rivers of which the flow capacity is extremely small in the urban area (less than 2 years probability). [*15] • Among 150 water systems in the country, those that have flood control plan are only 13 rivers (flood control planning ratio: 10%) (as of 1997). [*7] • In the urban drainage, there is a large gap between the current flow capacity of rivers and development standard (100 years probability); river improvement cannot be progressed due to the costs and time to acquire the land. [*15] • There is no coordination body that may go beyond the border of ministries and agencies, which implement comprehensive management of rivers. [*8] • In the case of rivers that flow across the states, there is no body that coordinates the edge of the states. [*8] • As to jurisdiction on water resources between the federal government and the state government, it was announced that, should the State Council approves, the federal [*16] governments may have charge of the state government's work on water management. [*15] • NSC Shortage of drainage engineers becomes a serious issue in the local government; there is a case that even Department of Drainage does not exist in the organization of the government. [*25]	4.(i)	4	2.2
	6.2 Earthquake / Tsunami	Identification of Disaster Risks	• Tsunami risk assessment is not fully conducted yet for possible tsunami expected area. • The seismic intensity map with mercalli intensity scale and various seismic data have been developed and sold by MMS	• Assumption of possible earthquake and tsunami scenario will be necessary. Based on scenario, tsunami simulation analysis including damage estimation is necessary. Also, socio-economic condition and infrastructure distribution in the possible tsunami invasion area should be assessed for taking necessary mitigation measures or evacuation planning.	2.(i)	2.(i)	1.1
		Monitoring	• Malaysian Meteorological Service (MMS) takes charge of weather observation, providing information, tsunami early warning in the country. • For tsunami monitoring, modern equipment and warning system has installed in Tsunami Monitoring Center at Kuala Lumpur. • Seismograph network is already established in the country but monitoring density is not so high for earthquake observation. • Department of Coast of DID takes charge of coast erosion information.	• For emergency response, tsunami forecasting and monitoring system is still necessary for effective evacuation.	2.(i)	2.(ii)	1.3
		Non-structural Measures	• In tsunami expected area in Sarawak, warning siren towers were constructed and managed by Central Tsunami Monitoring Center. • After the Indian Ocean Tsunami in 2004, Department of Geography and Tsunami of MMS has developed national tsunami early warning system; it is planned to arrange 3 ocean data buoys, various facilities and equipment, tsunami analysis/ monitoring system and warning dissemination devices.		4.(i)	4	2.2
		Structural Measures			4.(i)	4	2.2
	6.3 Sediment disaster (Landslide, Debris flow)	Identification of Disaster Risks	• Department of Agriculture, Ministry of Agriculture develops geo-hazard maps. • Landslide hazard maps are being developed.	• It is recognized by BMG that slope collapse by land development area in Klan Valley will be an important subject for future sediment	2.(i)	2.(i)	1.1

			disaster management.			
	Monitoring			2.(i)	2.(ii)	1.3
	Non-structural Measures	• Land utilization in the landslide hazardous area has been regulated and building standard has been established. By amending Land Protection Law (1960) and Assessment of Environmental Impact (1987), supervision and control of the development activity has been enhanced. *12		4.(i)	4	2.2
	Structural Measures			4.(i)	4	2.2
6.4 Volcano	Identification of Disaster Risks	• There is no active volcano in Malaysia.		2.(i)	2.(i)	1.1
	Monitoring	N/A		2.(i)	2.(ii)	1.3
	Non-structural Measures	N/A		4.(i)	4	2.2
	Structural Measures	N/A		4.(i)	4	2.2
6.5 High Tide /Storm Surge (Cyclone/ Typhoon)	Identification of Disaster Risks			2.(i)	2.(i)	1.1
	Monitoring			2.(i)	2.(ii)	1.3
	Non-structural Measures			4.(i)	4	2.2
	Structural Measures			4.(i)	4	2.2
6.6 Other Disasters	Identification of Disaster Risks			2.(i)	2.(i)	1.1
	Monitoring			2.(i)	2.(ii)	1.3
	Non-structural Measures	• In order to prevent forest fire, legal measures are taken to those who violated the rules that prohibit open burning in the plantation. *12		4.(i)	4	2.2
	Structural Measures			4.(i)	4	2.2
6.7 Common items for Disaster	Non-structural Measures	• NSC and MACRES have implemented a disaster management information system which is the National Disaster Data and Information Management System (NADDI). *1 • NADDI emphasizes on the utilization of remote sensing technologies, Geographical Information System (GIS) and Global Positioning System (GPS) technologies to provide up-to-date and reliable data to support the three components of disaster management, that are (1) early warning, (2) detection and monitoring, and (3) mitigation and relief for pre, during and post disaster management activities coordinated by NSC and implemented by relevant authorities. *26 • A separate system known as the Government Integrated Radio Network (GIRN) provides radio communication between responders during emergency or disaster. Disaster reporting is now more efficient with the centralized Malaysia Emergency Response System (MERS) emergency hotline. *18		4	4	2.2 2.5
				4	4	2.8
	Structural Measures			4	4	2.3.2 2.3.3
	Climate Change Adaptation	• Responsible body: National Steering Committee on Climate Change • NFP: Ministry of Natural Resources and Environment • National Policy on Climate Change was formulated in 2009.		4.(i)	4.(i)	2.7
	Public Awareness Research and Development /Human Resource Development / for Disaster Management	• Federal Government continuously implements disaster education to the people in flood-prone areas such as; implementation of programs for education and enlightenment of awareness through various media as radio, TV, etc.; education and drill regarding emergency measures in the natural disaster prone areas; distribution of pamphlets to children on disaster prevention in the flood prone areas, etc. *12 • Several programs have been implemented to improve the resilience of schools and hospitals against disasters. But the education sector does not have Primary and Secondary school curriculum for disaster risk reduction. *18 • In conjunction with the Disaster Awareness Day 2011, Malaysia launched the national level campaign on 'One Million Safe Schools and Hospitals' and organized the ASEAN Knowledge Sharing Workshop on Mainstreaming DRR in Education. *18 • Malaysian Red Cross and the Ministry of Defense provide education course to the general public especially intended for children. *18	• Budget constraint and difficulty in reaching out to the public in masses and the campaigns only being done on small scale basis. *1 • Closer cooperation with Nationals TVs Network, information and Education Ministries is very much needed for the outreach program to reach a greater mass of public and school children in order to build greater awareness and response capability toward a reliance community. *18 • Continuous awareness raising program intended for the community in the disaster prone areas is set as an important challenge. *18	3	3	2.3.1
7. Preparedness and Response	Current Situation		Challenges			
7.1 Disaster Response plan / Emergency Financial Measure	Central Level	<Emergency Operation Plan(EOP), Contingency Plan(CP) .etc> • National Radiological Emergency Plan • National Influenza Pandemic Preparedness Plan • SOPs are prepared for (1) flood; (2) forest fire/open burning and haze; (3) industrial disasters; (4) bencana industry petroleum, gas dan petrochemicals; (5) earthquake; (6) tsunami, and; (7) drought. <Emergency Financial Measure> • Emergency fund expensed by the Government Agencies are reimbursed. • National Disaster Relief Fund		5	5	3
	Local Level					
7.2 Early Warning	General Warning and Forecast/Communication	• Weather forecast/warning is under responsibility of MMD. *27 • Early warnings are disseminated through sirens, short messaging system (SMS), hotline (between MNTEWC and National Television), fixed line (whenever necessary), telefax, website, mass media broadcasting system (mini studio at MNTEWC) and public announcements. *27 • The ICT is utilized to promote awareness and disseminate early warnings to the public via a Fixed-Line Disaster Alert System (FLAS). *27 • By NSD and MACRES, National Disaster Data Information Managing System (NADDI) has been developed in the purpose of building a central system for the collection, storing, processing, analysis and transmission of the data and information to support relevant agencies in the respective stages such as early warning, detection and monitoring, disaster mitigation and rescue. NADDI is providing the latest data by remote sensing, GIS and GPS. *1 • Malaysian Center for Remote Sensing (MARCRES) and NSD have built the National Disaster Data Information Management System (NADDI). *1	• Necessity to improve warning system of flood, landslide, and forest fire is set as the important challenge. *1	2.(ii)	2.(ii)	1.2
	Flood	• Rainfall and water level monitoring is supplemented by weather radar monitoring. *28 • Flood early warning center of DID head office analyze data electronic computer system; results are automatically transmitted to organizations concerned according to 3 risk level (peninsula part). At the same time, river water level and rainfall data are published on the web site. *6*29 • The Klang Valley basin where Kuala Lumpur locates is recognized as important area due to its high population in the basin. The first flood forecasting and warning system (FFWS) was thus established in this basin. At present (as of March 2012) forecast accuracy is 80-85%, and the model	• Real-time hydrological data for accurate warning announcement are not available. • Information on dam control by Power Works Bureau and downstream river monitoring by DID are not exchanged each other. It may be an obstacle for integrated river management,			

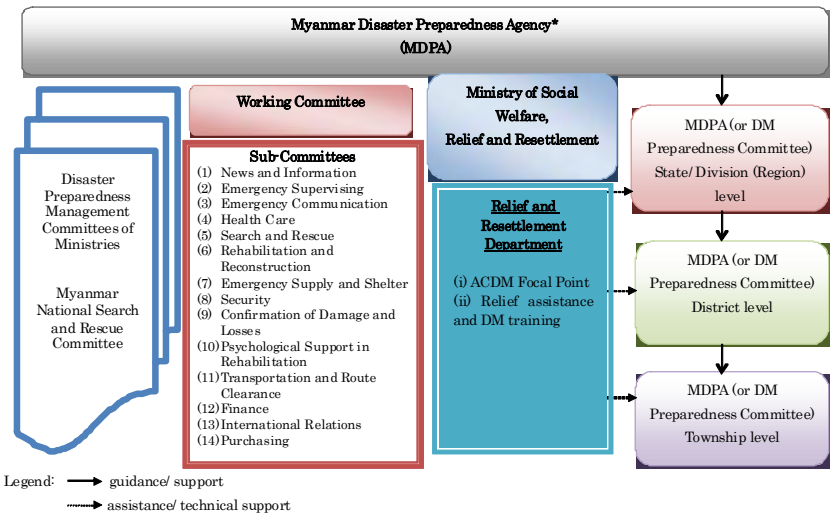
			is being improved with a goal of 90% accuracy. *30 • FFWS in the Muda River basin was also completed in 2010. The system is able to forecast flood condition 2 days in advance. Radar rainfall data observed by MMD is also incorporated into the system. *30 • Currently (as of June 2012) similar systems are being established in the Pahang, Kelantan and Johor areas, and will be duplicated in Padas, Dungun and Sarawak areas in the future.*30 • The above FFWS is centrally-managed at National Flood Monitoring Centre that locates in the headquarters of DID. Warning information automatically issued by the system is transmitted to the authorized officers of DID through SMS, while also information including river water level and rainfall data is disclosed to the public and the concerned organizations on the web. *27 • Local communities set up "flood warning boards (sign boards)" in rivers for water level monitoring and to be able to make their own warning decision by observing the boards. There are four warning levels (Normal/Alert/Warning/Danger). Local resident judges their own danger be observing the board and reports the situations to the DID district office. • Flood Evacuation Center has been developed. *11 • In the basin of Kelantan River, flood forecast/warning system has been adopted in 1971 and has been improved in 1986. Remote operated rain gauge has been installed at 6 places. *4 • In Klang River, DID home office has delivered flood forecast/warning. Flood control unit works around-the-clock and data on the amount of rainfall/ water level are sent in real time from the observation station. Automatic warning sirens are installed in 5 places in the flood prone area of the urban area. *27 • Along the river where flash flood is likely to occur, automatic alert sirens are installed at 60 places. *31	which is necessary before and during flood. • DID is planning to develop sediment disaster and mud flow warning system utilizing satellite technology by specializing in landforms and geological conditions, which are likely to receive damages by mud flow (as of 2005).			
		Earthquake / Tsunami	• Tsunami warning is under responsibility of MMD. MMD has developed Malaysian National Tsunami Early Warning Center (MNTEWC) and set up National Tsunami Early Warning System (MNTEWS) to provide early warning of occurrence of Tsunami in 2004.*27 • Geology and Tsunami Division of MMD developed Tsunami Database. MMD conducted a seismic profile, collected tsunami historical events around the Indian Ocean, South China Sea and the western Pacific Ocean, simulated tsunami based on numerous source points (about 1,800 source points), and made database of tsunami.*27 • With the warning dissemination system intended for the mass communication media, which is under the control of Earthquake / Tsunami Area Monitoring Center of MMS; warning by SMS reaches to each media within 5 seconds. *17 • National Tsunami Early Warning System is planned to be upgraded in the near future (as of 2008.4). *31				
		Sediment disaster (Landslide, Debris flow)	• Landslide early warning is under responsibility of PWD.*32 • PWD has developed integrated slope information system (ISIS). 20,000 slopes in Peninsular Malaysia (almost 90% completed) have been inventoriesed and classified its hazard and risk ranking. *32 • In a longer term, the National Slope Master Plan will be expanded to provide early warning system in landslide prone areas.*32	• The need of development of landslide warning system is identified.			
		Volcano	N/A				
		High Tide /Storm Surge(Cyclone/ Typhoon)	• Storm surge forecast/warning is under responsibility of MMD. *27				
		Other disasters	<Air Pollution> • Air Pollutant Index Management System (APIMS) for haze has been developed by Development of Environment (DOE) in Ministry of Natural Resources and Environment. DOE has published air pollutant index (API) in the website.*25 <Forest fire> • MMS observes smog caused by open burning, forest fire, etc., which spreads across the regions and border, and provides the weather information including satellite images as well as the images of breakpoints of the forest fire to various government agencies related to disaster prevention, observation and rescue measures. *12 • Aerial surveillance is implemented to find out the forest fire, *12 • Based on Smog Prevention Agreement concluded among ASEAN nations, forest fire early warning system utilizing the satellite images has been developed.*16				
	7.3 Evacuation plan	Social Welfare Department manages total of 3,417 relief evacuation centers.			5	5	3
	7.4 Establishment of Emergency Response System	Central Level	<Current Level> • In case of a disaster, "On Scene Command Post (OSCP)" is established as a command structure and control. Royal Malaysia Police appoints the officer to head OSCP. • OSCP mobilizes its communication items to create communication network and coordinates with "Disaster Operations Control Centre (DOCC)" at each management level. DOCC are set up according to level of disaster. Below are disaster levels and DOCC locations: a) Level 1 Disaster (a disaster struck within district managed by DDMRC) - District Office; b) Level 2 Disaster (a disaster struck in wider areas than a district managed by SDMRC) – State NSC Operations Room; c) Level 3 Disaster (a disaster struck in wider areas than a state managed by CDMRC) – NSC Operations Room. • NSC has "Special Malaysia Disaster Assistance and Rescue Team (SMART)" since 1995. They are composed of teams to conduct rescue operations when a disaster level is more than what local disaster management level can handle and when a request comes nation-widely especially in the Monsoon season. • Department of Irrigation and Drainage (DID) implements coordination of flood rescue activities at the respective levels of federal government / state / district (in 1997, it was tied-up with National DMRC to implement the said coordination). *1 • Disaster relief / restoration works are under the control of the Department of Social and Welfare (based on NSC Instruction No. 20 concerning disaster management / relief policies and mechanism); it implements the supply and allocation of relief /aid goods including foods, clothes and other necessary goods to sufferers, sufferers registration for resettlement of habitation, provision of health care to sufferers, assessment of damages, formulation of rehabilitation / restoration programs. *1*12 <Forest fire / smog> • Activity Center that coordinates the activities has been established. The Ministry of Fire Service and Rescue mobilizes the firemen equipped with special devices and equipment; army, police and personnel of the local governments are mobilized to back up the firemen; aerial water spray is implemented, too. *12		5	5	3

		Local Level	• The Ministry of Social and Welfare has installed and controlled 3,417 relief /evacuation centers (seating capacity: 943,000 persons) and 348 stockpile bases. [*12]				
		Training etc.	• Disaster drills for the communities are conducted regularly.	• Expansion of trainings through international assistance and cooperation, implementation of training programs to core officers and support to staffs for improving capacity to respond to disasters are important issues			
	7.5 Rescue plan	• SMART deals with the operations which are beyond local management capacity.			5	5	3
	7.6 Relief plan	• Social Welfare Department manages total of 3,417 relief evacuation centers and a total of 348 forward-supply bases, provides and distributes relief assistance items, registers disaster victims, provides counseling services to the affected victims, evaluates the damage involved, draws up rehabilitation programs/plan.			5	5	3
Assistance to challenges	8. Records of Major Assistance by JICA	<Experts> • Tsunami Early Warning Engineering (2006) <Technical Cooperation project> • Research and Development for Reducing Geo-Hazard Damage in Malaysia caused by Landslide and Flood (2011.6-2016.6) <Studies> • Study for Sewerage & Drainage Project (1976-1978) (Report on preliminary soil investigation) • Study for the Flood Forecasting and Warning System in Sabah and Sarawak (1978-1980) (Feasibility report) • Study on Water Management Training Plan (1977.9-1986.3) • Sewerage and Drainage System Project in Alor Setar and its Urban Environs (1978-1980) (Vol. 1, Vol. 2, Vol. 3, Vol. 4, Master plan Vol. 1, Vol. 2, Vol. 3, Vol. 4, Vol. 5, Vol. 6, Vol. 7, Vol. 8) • Kinabatangan river basin development project (1979-1981) (Main report, Supporting report) • Study on Sewerage and Drainage Plan in Klang Area (1980-1982) • Study for Krang River Basin Flood Control (1986-1988) (Drawings, Main text, Annex) • Study on Revill Dam Plan (1986-1987) (Transferred by JICA Study Team) • Study for Kelantan River Basin Flood Control (1987-1989) (Part. I-1, Part. I-2, Part. II-1, Part. II-2, Part. III, Part. IV, Data book) • Study for Flood Mitigation and Drainage in Penang (1988-1990) (Summary, Supporting report, Main report, Data) • Study for Integrated Muda River Basin Management (1993-1995) (Vol. 1, Vol. 2, Vol. 3, Vol. 4) • Study for River Basin Information System (1996-1998) (Vol. 1, Vol. 2, Vol. 3, Vol. 4) • Study for Integrated Urban Drainage Improvement (1998-2000) (Vol. 1, Vol. 2, Vol. 3, Vol. 4, Vol. 5, Vol. 6) • Study (D/D) on Flood-control Plan in Muda River (1999) (Transferred by JICA Study Team) • Study on Improvement of Planning Capability in Sewerage Sector (2007.3-2008.10) (Main report, Manual) <Training> • River and Dam Engineering (1997-2001,2004) • Disaster Prevention (1997-2001, 2004) • Emergency/Disaster Medicine (1997) • Sewage Works Engineering (1998-1999,2001,2003) • Port and Harbour (1998,2001-2002,2004-2005) • Preparedness and Disaster Response Management (1998-1999) • Disaster assistance (1999) • Emergency disaster rehabilitation system (2003) • Global Seismonological Observation II (2006) • Operating Management of Earthquake-Tsunami-Volcano Eruption Observation System (2006) • Flood Hazard Mapping (2006) • Integrated Water Resources Management (2006) • Information Management for Maritime Activity and Disaster Prevention (2006) • Tsunami Disaster Mitigation (2006) • Meteorology (2006) • Training for Mental Health Services after Disasters (2006)				
	9. Records of Assistance by other Development Partners	• USA: Preparation of Kuala Lumpur Flood Mitigation Plan (1973) UNDP/WMO: Introduction of flood early warning systems into 4 major rivers in Peninsula Malaysia (1971~1974)					
	10.International Networking	• MMS, in cooperation with ASEAN Meteorological Center, conducts monitoring and long-term forecasting in ASEAN region putting emphasis on drought caused by El Nino. [*12] • Malaysia signed The Agreement on Cooperation for Disaster Prevention and Civil Safety with French Government in 1998. [*12] • Joint search & rescue exercise of SMART and SCDF of Singapore was conducted in Malaysia in 1997. Both countries agreed to sign MOU on disaster management and aid. [*12] • Intergovernmental Coordination Group for the Indian Ocean tsunami Warning and mitigation System was established in 2005 under the coordination of IOC UNESCO. [*33]				
ASEAN Cooperation	11. National Policy on ASEAN (ACDM, ARPDM, AADMER) cooperation in Disaster Management, Emergency Response in case of disasters in other ASEAN countries or ASEAN region	• Signed AADMER in 2007(ASEAN Agreement on Disaster Management and Emergency Response) (AADMER stipulates mutual cooperation in case of disaster.) • Participation in ARF meetings on disaster management, monthly ACDM meetings, ARDEX(ASEAN Regional Disaster Exercise)and ASEAN regional technical cooperation Project • SASOP (Regional Standing Arrangement and Standard Operating Procedures) started in 2007. • Agreement on trans-boundary haze was signed by ministers of ASEAN countries in 2002 and came into effect in 2003. It stipulates forest fire monitoring, prevention, coordination mechanism, communication system, mutual emergency support and establishment of ASEAN coordination center. Action plan for capacity building of fire fighting in the region and early warning system utilizing satellite images were developed. [*1*6*34] • Malaysia signed MOU on mutual understanding about disaster cooperation and support with Indonesia in 1997. It targets not only haze but other disaster management and aid. [*31]				
	12. Resources useful for other ASEAN countries	• Technology on satellite imagery observation and analysis • Training on emergency response • (Financial assistance)					
	13. Needs for External Assistance from the point of view of Regional Cooperation						

[1] ADRC, Country Report (2008)
[2] Website of ADRC: (http://www.adrc.asia/latest_j/index.php) (accessed on 23 March 2009)
[3] Website of ADRC: (http://www.adrc.asia/nationinformation_j.php?NationCode=458&Lang=jp&NationNum=16) (accessed on 28 June 2012)
[4] JICA, “Survey Report for Flood Control Plan in Kelantan River Basin in Malaysia” (1989)
[5] JICA, (Preliminary Survey Report for Survey on Flood Control in Clun River Basin in Malaysia” (First and Second Phase) (1987)
[6] JICA, “Preliminary Survey Report for Flood Forecast /Warning System in Sabah/Sarawak in Malaysia” (1979)
[7] JICA, “Preliminary Survey Report for Survey on the Information System Plan along River Basin” (1997)
[8] JICA, “Summary Survey Report for Comprehensive Management of Muda River Basin” (1995)
[9] JICA, “Preliminary Survey Report for Development Plan of Kinabatangan River Basin” (1980)
[10] JICA, “Preliminary Survey Report for the Survey on Flood Control Plan of Kelantan River Basin in Malaysia” (1988)
[11] JICA, “Preliminary Survey Report for the Survey of Comprehensive Urban Drainage Improvement Plan in Malaysia” (1998)
[12] ADRC, Country Report (1999)
[13] ADRC, Country Report (2011)
[14] JICA, “Preliminary Survey Report for Comprehensive Development Plan of Nation Water Resources in Malaysia” (1979)
[15] JICA, “Summary Survey Report for Comprehensive Improvement Plan of Urban Drainage in Malaysia” (2000)
[16] Institute of Global Environmental Strategies (IGES); “2003 Momentous News in Asia” (2004)
[17] Institute of Global Environmental Strategies (IGES); “2005 Momentous News in Asia” (2006)

[18] Malaysia (2011) National Progress Report on the Implementation of the Hyogo Framework for Action (2009-2011)
[19] DID presentation data, “Introduction to Flood Hazard Maps, Department of Irrigation and Drainage, October 2010”
[20] JICA, “Summary Survey Report for Information System Plan along River Basin in Malaysia” (1999)
[21] JICA, “Report on the Comprehensive Development Plan of National Water Resources, Volume 2 ‘Development and Utilization of Water Resources’” (1982)
[22] JICA, “Preliminary Survey Report for Sewage / Drainage Plan in Clun Area in Malaysia” (1981)
[23] Website of DID: (http://www.water.gov.my/our-services-mainmenu-252/flood-mitigation-mainmenu-323/programme-aamp-activities-mainmenu-199?lang=en&start=1) (accessed on 28 June 2012)
[24] JICA, “Survey Report (summary) for Flood Control Plan of Clun River Basin in Malaysia” (1989)
[25] JICA, ““Data Collection Survey on ASEAN Regional Collaboration in Disaster Management ” (2012): Interview to NSC (2012.03.19)
[26] ADRC, Country Report (2010)
[27] JICA, “Data Collection Survey on ASEAN Regional Collaboration in Disaster Management ” (2012): Interview to MMD (2012.03.20)
[28] JICA, “Report on the Comprehensive Development Plan of National Water Resources, Volume 1 ‘Master Action Plan’” (1982)
[29] Website of DID: (http://publicinfobanjir.water.gov.my/main-page.cfm?bam=2) (accessed on 28 June 2012)
[30] JICA, “Data Collection Survey on ASEAN Regional Collaboration in Disaster Management ” (2012): Interview to DID (2012.03.21)
[31] Institute of Global Environmental Strategies (IGES); “2008 Momentous News in Asia” (2009)
[32] JICA, “Data Collection Survey on ASEAN Regional Collaboration in Disaster Management ” (2012): Interview to PWD (2012.03.20)
[33] Indonesia, interim national progress report on the implementation of the Hyogo Framework for Action (2008)
[34] Institute of Global Environmental Strategies (IGES); “2002 Momentous News in Asia” (2003)

	Inventory				HFA		AADMER
					PforA	IofP	
Current Situation and Challenges	1. Features of Disasters	• Possible Natural Disasters *[1] (No. of disasters/ year, Total no. of deaths) (Statistics period 1970-2009)): Flood (0.43, 364), Tropical Cyclone included storm surge (0.18, 138,864), Landslide (0.05, 41), Forest Fire (0.05, 8), Earthquake (0.05, -), Tsunami (0.03, 71) • Numbers of disasters in the period of 1988~2003.1 (excluding fire) are 1,478; out of which flood: 411 (38%), tropical storm: 541 (50%), high tide: 124 (12%) and others. *[2] • Frequent Natural Disasters: EM-DAT Disasters (1980-2011): 26 nos.; Out of these Flood (50%), Tropical Cyclone included storm surge (23%), Landslide (12%), Earthquake/ Tsunami (15%) *[3] • Flood is one of the largest natural disasters in Myanmar, which shares 11% of total damages caused by natural disasters. *2 Flood occurs mostly in the following 3 periods; June, August, latter half of September – October. *[3] • Flood (river and flash flood) occurred at 7 regions and states in 2011 (Ayeyarwady region, Bago region, Kayin state, Rakhine state, Magway region, Sagaing region, Mandalay region). The hardest-hit area was Magway region and approximately 36,000 people are affected with about 150 casualties and about 2,500 houses totally destroyed. *[4] • There were 6 times of storm surge disaster since 1968. The largest peak surge was 5.86m in Nargis (2nd -3rd May 2008). *[5] • Long west coast area along the Bay of Bengal is prone to tropical cyclone. *[1] • In the mid of monsoon season, from August to October, Myanmar has frequent floods*[3]. 4 major rivers flow from the north to the south. Southern part of the nation, especially delta area, is frequently flooded in monsoon season. Floods tend to occur when high tide and heavy rain come at the same time. *[2]*[6] • Myanmar is situated in seismic belt from the Mediterranean Sea to Himalaya, where 15% of world's earthquakes occur, and has earthquakes. There are 3 major epicenters in the nation and had many earthquakes in the past. 23 tremors are monitored in 3 and half years from May 2001 to December 2004. Big earthquakes have occurred in 1930: Bago, 1970: Yangon, 1975L Pagan, 1983: Amerapura, 2011: Tachilek. *[7]				
	2. Administrative Division	7 Regions (taing detha gyi)/7 States (pyi ne) –63 Districts (kha yaing)－324 Townships (myo ne)－312 Towns (myo)/2548 Wards (yat kwe)/13742 Village-tracts (kyay ywa ok su) <as of 2001>					
	3. Development of Legislative Framework and Disaster Management Policy & Plans		Current Situation	Challenges	1.(i)	1.(i)	2.1
		Development of Legislative Framework	<Fundamental Law> • Rehabilitation Board Act (1950) • Disaster Management Bill (drafted and expected to be approved by June 2012) < Laws in Relevant Sectors> • Board of Development Affairs Act (1993) • Epidemic Diseases Prevention Act (1995) • Implementation of Insurance Act (1996) • Fire Services Act (1997)				
		Disaster Management Policy	The apex body then called National Disaster Preparedness Central Committee was established in 1995 for disaster management.				
		Disaster Management Plans	<National Level> • Standing Order (2009) • Myanmar Action Plan on Disaster Risk Reduction (MAPDRR) 2009-2015 *[8] <Local Level> • Regional/ State Flood Protection Plans	• New Act for disaster management will require some revision of Standing Order and MAPDRR. • Comprehensive Disaster Management Plans and/or Action Plans at the local level have not been prepared yet.			
	4. Establishment and Enhancement of Disaster Management System	Institutional Framework	Current Situation	Challenges	1.(ii)	1.(ii)	2.1 4
		Central Level	• Name and organization have been changed from "Natural Disaster Prevention / Relief / Resettlement Central Committee" to "Myanmar Disaster Preparedness Agency". So far, the chairman of the committee was the Prime Minister; however, with the translocation to the presidential government system, the new organization is chaired by the Minister of Social Welfare, Relief and Resettlement. <u>Myanmar Disaster Preparedness Agency (MDPA)</u> • Chair: Minister of Social Welfare, Relief and Resettlement (MSWRR) • Co-vice-Chairs: Minister of Defense and Minister of Home Affairs • Secretariat: Director-General, Relief and Resettlement Division (RRD), MSWRR <u>Working Committee</u> • To supervise the implementation of disaster management activities and Sub-Committees <u>Sub-Committees:</u> (1) News and Information (2) Emergency Supervising (3) Emergency Communication (4) Health Care (5) Search and Rescue (6) Rehabilitation and Reconstruction (7) Emergency Supply and Shelter (8) Security (9) Confirmation of Damage and Losses (10) Psychological Support in Rehabilitation (11) Transportation and Route Clearance (12) Finance (13) International Relations (14) Purchasing <u>Disaster Preparedness Management Committee of Ministries</u> *[3]	• Chairmanship of "Working Committee" needs to be designated with appropriate authority in Disaster Management Bill.			
			<u>Organizations in charge of Non-structural Measures for Disaster Risk Mitigation and Preparation</u> • Earthquake: MSWRR, Ministry of Health, Ministry of Education, DMH (Department of Meteorology and Hydrology, Ministry of Transport), and Myanmar Engineering Society • Tropical Cyclone: DMH • Tsunami: DMH, RRD, Department of Educational Planning and Training • Flood: Irrigation Department (Ministry of Agriculture and Irrigation), DMH, RRD • Landslide: Irrigation Department, DMH, RRD • Drought: Irrigation Department, DMH, RRD, Dry Zone Greening Department (Ministry of Forestry) • Forest Fire: Fire Service Department, Department of Forestry <u>Organizations in charge of Structural Measures for Disaster Risk Mitigation</u> • Earthquake: Ministry of Construction, Irrigation Department, Municipalities • Flood: Irrigation Department • Forest Fire: Fire Service Department, Local authority **Inter-organizational arrangement:** In Standing Order (2009), guidelines concerning coordination of government activities and their implementation are shown to the Committee for Coordination among Ministries and Agencies.				



Source: JICA Study Team

Note: *New name "MDPA" is used here as it is mentioned among related government officers in Myanmar. As it is still under reform, name of organizations at local level are indicated both possible new names and current names.

Figure Myanmar's Disaster Management Structure

	Local Level	<u>State/Region Disaster Preparedness Committee</u> ・ Chair: Chief Minister <u>District Disaster Preparedness Committee</u> ・ Chair: District Administrator ・ Disaster Preparedness Committee at Township, Towns/Wards/Village-tract	・ The institutional arrangements including the chairmanships and memberships at various local government levels are supposed to be clearly vested.			
	Inter-organizational Arrangement	・ Standing Order (2009) gives the guideline for inter-Ministerial Coordination Committee in terms of coordination of the government activities and operations.	・ Standing Order (2009) is a subject for revision, which may affect the formation of the coordination Committee.			
	Financial Preparation	・ Ministry of Finance : Special fund for rehabilitation works ・ Ministry of Social Welfare, Relief and Resettlement (MSWRR): Budget allocation for relief activities and capacity building	・ Financial resources are not sufficient. Fund allocation for disaster management needs clear policy guideline.			
5. Policy on Community-based Disaster Management	・ Myanmar Action Plan on Disaster Risk Reduction includes community participation programs. ・ International organizations, Red Cross and NGOs have provided grass-roots level assistance to the Communities affected by Cyclone Nargis in 2008.		・ External support, on which Community-based Disaster Management depends, has been partial to the cyclone disaster prone areas. ・ The followings are required: (1) Promotion of CBDRR volunteerism; (2) Establishment of CBDRR Resource Center; (3) Development of community based natural resource management programs, and; (4) Documentation of CBDRR Good Practices.	1.(iii)	1.(iii)	2.6 4
6. Prevention and Mitigation	Current Situation		Challenges	-	-	-
6.1 Flood	Identification of Disaster Risks	・ Irrigation Department (ID) of Ministry of Agriculture and Irrigation is the responsible agency to conduct hazard mapping. ID did study of hazard mapping in Bago Township but there are no hazard or risk maps for the whole country level. ・ 48 townships are being pointed as flood prone township.		2.(i)	2.(i)	1.1
	Monitoring	<Monitoring on a normal basis> ・ Key agency for flood monitoring, weather forecasting is Department of Meteorology and Hydrology (DMH) of Ministry of Transportation. ・ [Monitoring in the normal period] ・ There are 142 meteorology and hydrology /agricultural meteorology observation stations all over the country. *4 ・ Department of Agricultural Meteorology Observation has been observing daily rainfall level manually in more than 200 dams for the last 20-30 years. ・ Observation stations under controlled of DMH are: metrological station 63, metrology and hydrology station 39, agro meteorological station 17, aeronautical meteorological office 8, tide gauge station 2. ・ There is a monitoring room, which was built with the equipment and materials granted by WFP, in the Department of Relief and Resettlement. In this room, weather information is always monitored with Internet-connected PC. ・ Observation organization of DMH is; 63 general meteorology observation stations, 39 hydrological observations stations, 17 agricultural meteorology observation stations, 8 aviation weather observation stations, and 2 tidal level observation stations. *7 Data Center is located in Naypyitaw where the head office of DMH is located, too. Data for upper Myanmar is collected in Mandalay and those of lower Myanmar are collected in Yangon; those collected data are transferred to Naypyitaw. ・ 37 stations of meteorology routinely disseminate every 3 hourly to Global Meteorological Observing System. ・ Observation frequency in the observation station for domestic weather forecast is 3 hours, too. ・ The Ministry of Irrigation has installed 120 hydrological observation stations along 8 main rivers. ・ Sampling data at other national climate forecast purposed stations also 3 hours. ・ Sampling interval of hydrological observation is 3 times a day. ・ Ministry of Agriculture installed 120 hydrological stations for the remote and rural area in the eight river basins. <Monitoring at disasters> ・ Sampling interval at meteorological and hydrological stations will be changed to 30min-1 hour in principally at disaster state. But the sampling time can also be changed under necessity of disaster site, requests of local authority and head office of DMH.		2.(i)	2.(ii)	1.3
	Non-structural Measures	・ The Ministry *9 of Forest *1 takes charge of deforestation amount control. ・ ID and Forest Department are cooperating to undertake the conservation and reforestation activities in the important watershed areas. *7 ・ As community level initiatives, Myanmar Red Cross Society is the leading force in implementing Community Based Flood Management Program, capacity building programs in selected flood vulnerable areas in the country. *5		4.(i)	4	2.2

			• There was a case example where a part of a farm village was moved to the upland. • RRD conducts Disaster Management Training at Regional and State level alternatively to educate people on disaster preparedness and management.				
		Structural Measures	• Irrigation Department takes charge of the maintenance/reinforcement work of dykes, protective walls, and casting up earthworks. • Key agency for flood risk mitigation in the country is ID. • ID operates the multipurpose dams and maintains embankment system at 14 sites for flood damage protection of agricultural lands and irrigation facilities in the rainy season. • In Bago area, Irrigation Department is studying flood measures against overflow of Bago River (intended for Bago Township) and Sittoung River (intended for Pyuntazar flood plain).		4.(i)	4	2.2
	6.2 Earthquake / Tsunami	Identification of Disaster Risks	• The nationwide small-scale seismic zone map and the tectonic map in Myanmar were developed by MEC in 2004 and by MGS in 2012 respectively. • MEC developed seismic zone map in Mandalay-Amarapura, Bago-Oaktha, Taunggyi until 2006. • The earthquake hazard map in Mandalay has been developed in collaboration with the Norwegian government. • Tokyo University and Kyoto University in Japan have researched about seismic activity history in collaboration with MES and conducted a trench survey along Sagaing fault. • Any organization has not developed the tsunami hazard map.	• DMH is in charge of the earthquake hazard map, but they haven't started yet. • There is a need to develop more detailed map and to improve the accuracy of existing maps.	2.(i)	2.(i)	1.1
		Monitoring	• DMH takes charge of observation /analysis of earthquakes and transmission of data. • In the period from 1962 to 1985, drum recording type seismometers were installed in 4 places; Yangon, Mandalay, Dawei, Sittway; observations are being implemented in 3 stations except for Sittway. • Total eight broadband seismographs have been installed by Myanmar government, CEA, Yunnan Seismic Bureau (YSB), RIMES and JICA. • The seismographs installed by Chinese CEA in Namsang, Myitkyina haven't worked at present (as of 2012.2) due to breakdown of battery. Seismometer installed by CEA must be analyzed using software by CEA. • Only 2 digital broadband seismographs installed by DMH budget and 3 analog seismographs installed by JICA from 1962 to 1985 have been available for seismic observation. Earthquake observation data by means of Kelunji system are sent to Naypyidaw via Internet and the software of Kelunji is used to specify earthquake source. *12 • CEA and RIMES have planned to increase seismographs, and some of both proposed stations are duplicated. There is no coordination between them. *12 • DMH has only 13 stuffs for seismic observation and analysts. • To specify the hypocenter, both CEA and Kelunji systems use the exclusive software, respectively. It takes 45 minutes to 1 hour. In addition, the accuracy is very low because of the small number of observation stations. *12 • The strong motion accelerographs were installed at 11 observatories by JICA. Data of strong motion accelerographs are gathered by collecting PCMCIA card once in a month. The collected records are sent to Nay Pyi Daw. However, DMH doesn't analyze these data transmitted from each observatory sufficiently. • Regarding tsunami observation, there is 2 tide gauges installed in Myanmar by Hawaii Sea Level Center. The data is sent by VSAT to PTWC in Hawaii. The data are also provided to IOTWC. But the observation data can't be received directly in the country. They are received via Internet in real time from Hawaii. For it, as the power source, solar batteries are used. The tide gauge is acoustic type. • The organization for observation consists of Yangon Office (13 staffs for earthquake section) and Mandalay Office (3 staffs for earthquake section); they work in around-the-clock system. *12 • Broadband seismograph installed by RIMES has been operated; however, it does not function now, because the server in Bangkok has stopped to function due to flood *12 in addition, earthquake observation data by RIMES cannot be received in Myanmar.	• The number of seismograph is lacking severely and need to be increased. • There is a need to conduct tsunami simulation for detecting tsunami immediately. It is also necessary to capacity development of engineer to operate the earthquake and tsunami monitoring system. • They need to be integrated and analyzed data from the seismograph installed by different organization comprehensively, and the accuracy of hypocenter and magnitude decision needs to be improved. • In DMH, recording data of strong motion earthquake having been accumulated since the installed seismograph has not been put in order. • In earthquake observation and seismic degree observation, accuracy and speed of observation / analysis / information transmission have not reached the sufficient level.	2.(i)	2.(ii)	1.3
		Non-structural Measures	• Preparedness such as evacuation drill for tsunami disaster prevention has been addressed by national and local government cooperatively.	• The quake-resistance standards and seismic-resistant design have to be established and improved.	4.(i)	4	2.2
		Structural Measures	• In the delta area where the tsunami in 2004 and cyclone Nargis hit and damage largely, the tsunami evacuation shelters were built by donated fund from citizen and private company. • The tsunami evacuation drills have conducted hold by DMH and local government in October 2011 and many citizens participated proactively. • Myanmar government has promoted to plant mangrove as countermeasure to reduce tsunami damage along the front of delta area.	• The evacuation sign and evacuation route based on tsunami hazard map need to be developed.	4.(i)	4	2.2
	6.3 Sediment disaster (Landslide, Debris flow)	Identification of Disaster Risks	• MGS produced a small-scaled sediment disaster hazard map of whole Myanmar, based on the geological and topographical distribution. Community-based risk assessment has not conducted by any organization. • Some researchers have conducted their study individually.	• There is a need to anticipate sediment disaster damage on the important arterial road.	2.(i)	2.(i)	1.1
		Monitoring	• DMH issues heavy rain warning, but DMH and any other organization don't conduct monitoring for sediment disaster. *12	• There is a need to develop a hazard map to identify the landslide susceptibility area and to establish observation system and early warning system.	2.(i)	2.(ii)	1.3
		Non-structural Measures	• MES and MGS held a landslide work shop in some area. • Rescue and relief for affected people are the major activities as well as flood after disaster occurrence.		4.(i)	4	2.2
		Structural Measures		• The countermeasures along the arterial road like Asian Highway, which is an important for supply chain, should be implemented	4.(i)	4	2.2
	6.4 Volcano	Identification of Disaster Risks	There is no active volcano in Myanmar.		2.(i)	2.(i)	1.1
		Monitoring	N/A		2.(i)	2.(ii)	1.3
		Non-structural Measures	N/A		4.(i)	4	2.2
		Structural Measures	N/A		4.(i)	4	2.2
	6.5 High Tide /Storm Surge (Cyclone/ Typhoon)	Identification of Disaster Risks			2.(i)	2.(i)	1.1
		Monitoring			2.(i)	2.(ii)	1.3
		Non-structural Measures			4.(i)	4	2.2
		Structural Measures	• 8 earthen embankments which consist of refuge shelters and drinking water ponds were constructed in cyclone prone areas.		4.(i)	4	2.2
	6.6 Other	Identification of Disaster Risks			2.(i)	2.(i)	1.1

	Disasters	Monitoring			2.(i)	2.(ii)	1.3
		Non-structural Measures			4.(i)	4	2.2
		Structural Measures			4.(i)	4	2.2
	6.7 Common items for Disaster	Non-structural Measures	・ There is not a comprehensive DMIS and disaster loss database in Myanmar. But, hazard profiles are conducted (title of report is "Hazard Profile of Myanmar"). The report includes historical data of natural disaster and results of the analysis of each natural hazard in Myanmar. *[10]*[11]		4	4	2.2 2.5
					4	4	2.8
		Structural Measures			4	4	2.3.2 2.3.3
		Climate Change Adaptation	・ Responsible body: N/A ・ NFP: NATIONAL Commission on Environment		4.(i)	4.(i)	2.7
		Public Awareness Research and Development /Human Resource Development / for Disaster Management	・ The Relief and Resettlement Department has been conducting State and Division Level short-term TOT Disaster Management Courses for the public education and awareness on natural disaster reduction with the co-operation of other department concerned such as Meteorology and Hydrology Department, Health Department, Irrigation Department, Myanmar Red Cross Society, Myanmar Police Force and Fire Services Department. Within the International Decade for Natural Disaster Reduction, 23 courses were conducted in the cities of 11 States and Divisions from 1990-1991. 1998-99 fiscal year. *[2] ・ Local people take refuge in high mounds and shelters to avoid storm surge and strong wind. *[3] ・ At the primary level, one of the five main areas of Life Skills Subject is 'Environmental Education' and there is a chapter on DRR called 'Caution in Emergencies' that explains human-made and natural disasters. ・ The Ministry of Education (MoE) has revised General Science Subject of the lower secondary school curriculum (Grade 6 to 9) and included the main area of study 'Earth and Space' with lessons on storms. The lower secondary Life Skills includes Flood, Emergencies, Earthquake, Tsunami, Landslides and Fire. ・ The revised upper secondary school subjects include a lesson titled 'Earthquake' in Grade 10 English and 'Earth Surface Process' in Grade 11 Geography.		3	3	2.3.1
	7. Preparedness and Response	Current Situation		Challenges			
	7.1 Disaster Response plan / Emergency Financial Measure	Central Level	<Emergency Operation Plan(EOP), Contingency Plan(CP) .etc> ・ Standing Order (2009) <Emergency Financial Measure> ・ Emergency Fund (prepared at the Presidential office)	・ Standing Order is to be revised. Institutional arrangements for emergency operation are supposed to be re-structured.	5	5	3
		Local Level	<Emergency Operation Plan(EOP), Contingency Plan(CP) .etc> <Emergency Financial Measure> ・ Emergency response budget is received according to the scale of a disaster.	・ Contingency Planning and Coordination, Camp Management, Damage and Need Assessment, Recovery Planning are necessary.			
	7.2 Early Warning	General Warning and Forecast/Communication	・ Forecast of heavy rainfall is issued by DMH. ・ The forecast information is issues from DMH to relevant agencies according to transmission flow by FAX, Phone and SSB (Single Side Band). DMH also delivers early warning to mass media. ・ DMH disseminates to public through TV, radio, website, and so on. Public also receive early warning from local staffs riding motorbikes and bicycles with loudspeakers.	・ Early warnings don't act on effectively because systematic means of dissemination to risk prone communities has not been implemented.	2.(ii)	2.(ii)	1.2
		Flood	・ Flood forecast is issued by Meteorology and Hydrology Department (DMH). *[12] ・ Myanmar has 162 meteorological / hydrological monitoring stations and 18 meteorological monitoring stations for agriculture. *[12] ・ DMH announces early warning through media such as TV, radio, website, newspapers and so on. Public also receive early warning from local staffs riding motorbikes and bicycles with loudspeakers. *[12] ・ Meteorology and Hydrology Department announces early warning through media such as TV, radio and newspapers. *[12]				
		Earthquake / Tsunami	・ Earthquakes are monitored at 11 monitoring stations. *[12] ・ In Yangon Office with 14 staffs in earthquake section and Mandalay Office with 3 staffs in earthquake section, 24-hour monitoring system is in place. *[12] ・ The occurrence of earthquakes is informed from these 2 offices to the director of DMH. Head Office of DMH collects information through internet and satellite TV and transfers it to ministries and agencies. In case of region-wide earthquake, Myanmar gets information on Tsunami from Japan Meteorological Agency, PTWS, ADPC in Thailand and China by facsimile. *[4]*[12]	・ Accuracy and speed of earthquake monitoring, analysis and information communication have room for improvement. ・ Communication measures between earthquake monitoring station and the head office of DMH should be enhanced in terms of power supply and dedicated line connection.			
		Sediment disaster (Landslide, Debris flow)	・ The early warning system for sediment disaster has not been development except for heavy rain warning issued by DMH. *[12]				
		Volcano	N/A				
		High Tide /Storm Surge(Cyclone/ Typhoon)	・ Forecast of cyclone and storm surge are issued by DMH. *[12]				
		Other disasters	<Forest Fire> ・ Based on ASEAN Agreement on Prevention of Trans-boundary Haze, early warning system utilizing satellite image was developed. *[13]				
	7.3 Evacuation plan				5	5	3
	7.4 Establishment of Emergency Response System	Central Level	[Current state] ・ Standing Order (2009): In case of disaster, Development Association, Schools, Army, Reserved Volunteers, Myanmar National Committee for Women's Affairs and Police Force engage in response activities.		5	5	3
		Local Level		・ Local level arrangements may need to be included in Standing Order			
		Training etc.	・ Search and rescue drills are provided for Township level by Fire Services Department.				
	7.5 Rescue plan	・ National Search and Rescue Committee (established in 2011) is responsible agency.			5	5	3
	7.6 Relief plan	・ Foods and supply stocks are kept by Relief and Resettlement Department in 17 Stock piling centers in state and divisions and in central warehouse in Yangon. ・ Non-food items for 55,000 households are stocked nationally. ・ Safe shelters are constructed in disaster prone areas.			5	5	3
Assistance to challenges	8. Records of Major Assistance by JICA	<Technical Assistance/Dispatch of Experts/Emergency Support> ・ Capacity Improvement Project on Seismic Observation (2007,2009) ・ Adviser on Tropical storm Forecasting and warning (2009) <Studies>					

		・ The Study on Water Supply System in Mandalay City and in the Central Dry Zone in the Union of Myanmar (2001.3-2003.7) (Vol. 1, Vol. 2, Vol. 3, Vol. 4) ・ the Project for Construction of Primary School-cum-Cyclone Shelter in the Area Affected by Cyclone "Nargis" (2009) (Vol. 1) ・ Urgent Project for Rehabilitation of Yangon Port and Main Inland Water Transport (2009) ・ Project for Preservation of Farming Area for Urgent Rehabilitation of Agricultural Production and Rural Life in Areas Affected by Cyclone Nargis (2009) (summary, Main report, Appendices) <Trainings> ・ Earthquake Engineering (2000-2002) ・ Port (2000-2003, 2005) ・ Meteorology (2000) ・ Sewerage Engineering (2002) ・ Emergency Disaster Rehabilitation System (2003) ・ River and Dam Engineering (2005) ・ Earthquake, Quake-resistance and Disaster Mitigation Engineering (2006) ・ River and Dam Engineering III (2006) ・ Port Development and Planning (2006) ・ Mental Health Service after Disaster (2006) ・ Project on capacity development for disaster rescue and relief (2010)
	9. Records of Assistance by other Development Partners	・ WHO: Funding for the development of flood preparation action plan in Bago Taing by Department of Health ・ UNDP: Comprehensive Multi-hazard Programme and National Action Plan on Disaster Risk Reduction(2010) ・ ECHO: ECHO for natural disaster(1994-2011) ・ ECHO: ECHO for flash flood (1994-2011) ・ AusAid: Cyclone giri (2010-2011) ・ AusAid: Northern Rakhine State floods (2010-2011) ・ AusAid: Asia Regional Disaster Risk Management (2007-2011) ・ NZAid: Regional programme-Disaster Management and Emergency Response (2009-2012)
	10. International Networking	・ In case of region-wide earthquake, Myanmar gets information on Tsunami from Japan Meteorological Agency, ADPC in Thailand and China by facsimile. ・ Myanmar is a panel member country of WMO (World Meteorological Organization). DMH serves as the focal point.
ASEAN Cooperation	11. National Policy on ASEAN (ACDM, ARPDM, AADMER) cooperation in Disaster Management, Emergency Response in case of disasters in other ASEAN countries or ASEAN region	・ Signed AADMER in 2007(ASEAN Agreement on Disaster Management and Emergency Response) (AADMER stipulates mutual cooperation in case of disaster.) ・ Participation in ARF meetings on disaster management, monthly ACDM meetings, ARDEX (ASEAN Regional Disaster Exercise)and ASEAN regional technical cooperation Project ・ SASOP (Regional Standing Arrangement and Standard Operating Procedures) started in 2007. ・ Agreement on trans-boundary haze was signed by ministers of ASEAN countries in charge of environment in 2002 and came into effect in 2003. It stipulates forest fire monitoring, prevention, research, coordination mechanism, communication system, information exchange, mutual emergency support and establishment of ASEAN coordination center. Action plan for capacity building of fire fighting in the region and early warning system utilizing satellite images were developed. *13*14
	12. Resources useful for other ASEAN countries	
	13. Needs for External Assistance from the point of view of Regional Cooperation	

[1] Website of ADRC: (http://www.adrc.asia/latest_j/index.php) (accessed on 23 March 2009)
[2] ADRC, Country Report (2002)
[3] ADRC, Country Report (2006)
[4] JICA, “Completion Report of Dispatched Experts (3 persons) for Enhancement of Analysis Capacity of Seismic Observation Data” (2008)
[5] Hazard Profile of Myanmar (2009)
[6] Local RRD document (2012)
[7] Presentation documents of DMH officer
[8] Myanmar Action Plan on Disaster Risk Reduction 2009-2015 (2009)
[9] Institute of Global Environmental Strategies (IGES); “2006 Momentous News in Asia” (2007)
[10] Myanmar, National progress report on the implementation of the Hyogo Framework for Action (2009-2011) – Interim, 2010
[11] JICA, “Data Collection Survey on ASEAN Regional Collaboration in Disaster Management ” (2012)
[12] JICA, “Data Collection Survey on ASEAN Regional Collaboration in Disaster Management ” (2012): Interview to DMH (2012.02.15)
[13] Institute of Global Environmental Strategies (IGES); “2003 Momentous News in Asia” (2004)
[14] Institute of Global Environmental Strategies (IGES); “2002 Momentous News in Asia” (2003)

Disaster Management in Philippines

[PforA] Priorities for Action, [IofP] Indicators of Progress

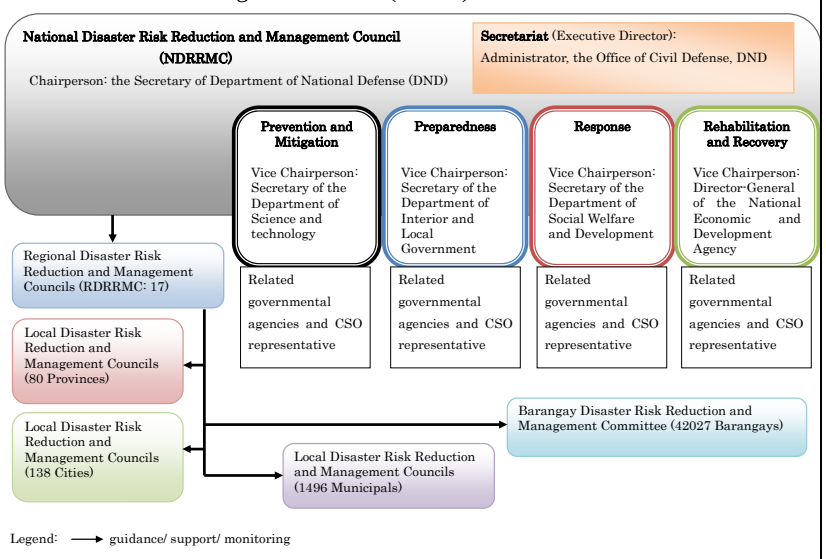
Inventory					HFA		AADMER
					PforA	IofP	
Current Situation and Challenges	1. Features of Disasters	• Possible Natural Disasters[1i]: Earthquake (2000~ 2007.9) ratio of number of sufferers (0.3%). Volcanic eruption (0.8%), Flood (5.3%). Typhoon / rain-storm (92.5%), Drought (0.0%), Natural fire (0.2%), Slope disaster (0.9%), Tidal wave / high tide (0.0%) • Frequent Natural Disasters: 1980-2011 EM-DAT, total nos. 384,; out of these, Storm (55%), Flood (28%), sediment disasters (8%), others (9%). • Annually some 30 tropical cyclones are formed near the Marian Trench. Some 20 out of 30 approach to Philippines. 4-5 out of 20 hit Philippines and bring storms, floods and sediment disasters.[*1] • One of the countries in the South-East Asia that have many natural disasters.[*1] • It is said that Philippines is the fifth largest among the nations in Asia Pacific Region that are influenced by natural disasters caused by climate change [*1] • Total length of coast line is 34,000km, which is the longest in the world[*1]; there are Manila Trench and Philippines Trench around her. • It is located in the circum Pacific seismic belt and, along the ocean trenches that contact the archipelago, there are earthquake sources and distribution belt of volcanoes.[*1] • There are many rivers that flow down from the mountain area to the sea steeply; their lengths are also short. [*1] • There are about 220 volcanoes and 22 out of them are active volcanoes. [*1]				
	2. Administrative Division	• 17 Region (mere administrative division)- 80 Provineces-138 City- 1496 Municipalities - 42,027 Barangay (as of March 31, 2012)[*1]					
	3. Development of Legislative Framework and Disaster Management Policy & Plans	Development of Legislative Framework	Current Situation	Challenges	1.(i)	1.(i)	2.1
			<Fundamental Law> • Presidential Decree No.1566 (Formulation of national program regarding enhancement of disaster management ability and preparedness of the community against disasters: Basic Law (1978): Principle is systematic self-help efforts against disasters by DCC. • Local Autonomy Law RA7160 (1991) (concerning enhancement of roles and authority of the local government: this law provides roles of the local government (head) in disaster response and that the local government is responsible to the practice of disaster prevention activity. Also it gives authorization to the local government so that it may use or increase the budget as well as the fund by its own discretion in the emergency case*[2]. • Republic Law No.10121 (Disaster Risk Management Act) (27th May 2010) (Law concerning establishment of National Disaster Management Committee, institutionalization of National Disaster Risk Management Plan, strengthening capacity related to disaster risk management of Philippines by appropriating the fund for and related to the above-mentioned matters.) • Presidential Decree No.888 (dated 7th June 2010 concerning the adoption of Strategic National Action Plan (SNAP) for disaster risk mitigation in the period of 2009 ~ 2019). • Republic Act No. 9729 (Climate Change Law) (2009) <Laws in Relevant Sectors> • The Land Subdivision Law (PD 957): Regulating land development for housing and commercial use. • National Building Code (PD 1096): It provides minimal requirements to protect architectural structures from natural disasters and design standards of building construction, etc. Structural Code, which is a part of Construction Code, has been amended in 2001; this code is the standard based on the latest knowledge to the general RC architectural structures. [*3] • The Environmental Policy Law (PD 1151): It provides natural environmental preservation for prevention of soil erosion, storm and flood. • The Water Law (PD 1067): it provides construction of flood management facilities and management of flood plain. [*2] • Local Government Code • Fire Prevention Code (PD 1185): It provides safety measures to prevent fire of architectural structures, duties of the responsible person and so on. • River Basin Act (PD 1515): It provides matters concerning river basin preservation.	• There are duplications as well as contradictions between the legal frameworks. Especially in the Mining Act, there are many contradictions and conflicts with the disaster risk management. [*4] • The Water Law does not reflect the circumstances in Philippines but was created for ideal management of water / river; it is considered that it does not coincide with the actual circumstances. [*3] • In the Water Law, there are almost no descriptions on flood. The river administrator is not defined clearly. River zones are not provided, too. [*2] • Understanding / awareness of the necessity of land use control for mitigation of sediment disaster by controlling the outflow of earth and sand when rain falls. Relevant legal system has not been prepared, too. [*2]			
		Disaster Management Policy	• Strategic National Action Plan 2009-2019 • MMDCC has adopted 2004 “Manila Declaration for Earthquake Disaster Countermeasures”. [*5]	• Integration of Strategic National Action Plan 2009-2019 into government policy is needed. • Integration of disaster risk reduction and Climate Change Adaptation is requested (especially policies and planning in the local level).			
		Disaster Management Plans[6]	<Central Level> • National Calamities and Disaster Preparedness Plan. • Medium-Term Philippines Development Plan (MTPDP 2004-2010): It sets to strengthen disaster prevention measures in the non-physical aspects such as strengthening disaster prevention organization and flood early warning system and so on. [*7] • Strategic Plan to Integrate Community-based Disaster Risk Management (CBRRM) (2007-2011) • Guidelines on Mainstreaming Disaster Risk Reduction in Sub-National Development and Physical Planning in the Philippines (draft). • Besides the above-mentioned “National Calamities and Disaster Preparedness Plan”, countermeasures plan to respond to various disasters such as drought, tsunami, landslide, earthquake, tropical storm, cyclone, flood, volcanic eruption and high tide will be formulated (as of 1992) [*8] • National Disaster Risk Reduction and Management Plan 2011-2028: With the establishment of Disaster Risk Management Act 2008, National Disaster Risk Management Framework has been propounded to promote comprehensive and community-based disaster management approach. • National Climate Change Action Plan 2010-2018 <Local Level> • Based on new disaster management law, all administrative agencies shall create Emergency Response Plan[*1]; to cope with it, training for organizers of formulation of “Calamities and Disasters Preparedness Plan” has been implemented for the members of local disaster prevention council. [*9] • The workshop for formulation of “Calamities and Disasters Preparedness Plan” for the local disaster prevention council has been implemented. [*9] • Emergency Response Plan has been formulated in 50 communities. [*1] • MMDCC has developed 1994 “Manila Metropolitan Earthquake Disaster Prevention Plan” by accepting the proposal of PHIVOLCS. [*10] • It is instructed to formulate local level plan based on the guidelines for the formulation of Local Disaster Risk Reduction Plan (under planning as of 2012.2).	• Preparation of implementation plan of National DRRM plan • Preparation of a guideline of planning for local disaster risk reduction plan • Integrated river basin management is emphasized in MTPDP. Enhancement and expansion of network and coordination with multiple organizations will be required.			

	4. Establishment and Enhancement of Disaster Management System	Institutional Framework	Current Situation	Challenges	1.(ii)	1.(ii)	2.1 4
		Central Level	<u>National Disaster Risk Reduction and Management Council (NDRRMC)</u> ・ Chair: Secretary of Department of National Defense (DND)[*1] ・ Vice co-chairs: (1) Secretary of the Department of Science and Technology (Prevention and Mitigation); (2) Secretary of the Department of Interior and Local Government (Preparedness); (3) Secretary of the Department of Social Welfare and Development (Response); (4) Director-General of the National Economic and Development Agency (Rehabilitation and Recovery) ・ Executive Director: Administrator of Office of Civil Defense (OCD) ・ Taking charge of making policies on national level disaster management and coordination work. [*9] ・ Mandating formulation of disaster prevention plan, response to disasters, and rehabilitation works. [*9] ・ Giving advice and proposal such as advice to impose Declaration of State of Emergency on Disaster as well as payment of National Emergency (Disaster) Fund and so on.[*1*9] ・ Department of the Interior and Local Government (DILG): Organizing DCC in the respective levels, establishing /supervising Disaster Operation Center, and training of DCC of the local governments. ・ Department of Public Works and Highways (DPWH): Restoration of public facilities, provision of operational equipment and materials to rescue/relief activities. ・ Department of Transportation and Communication (DOTC): Controlling transportation and communication in emergency cases, restoration of transportation and communication facilities. ・ Department of Social Welfare and Development (DSWD): Training of DCC in cooperation with OCD and Department of Interior and Local Government, rescue/relief activities, organizing shelter construction activities. Establishing national plan related to community disaster preparedness. [*1] ・ Department of Agriculture (DA): Estimating amount of damages related to agriculture and fisheries, technical supports to suffering farmers and so on. ・ Department of Education (DepEd): Supporting disaster prevention publicity activity, utilizing school building as a shelter. ・ Department of Finance (DOF): Establishing regulations regarding disaster prevention fund of the local government. ・ Department of Labor and Employment (DOLE): Giving guidance to disaster prevention organization of factories, providing emergency employment to sufferers. ・ Department of Trade and Industry (DTI): Commodity price control in emergency case and securing commodities. ・ Department of Health (DOH): Conducting medical /hygiene affairs, giving guidance to disaster prevention organization of hospitals. ・ Department of Science and Technology (DOST): Flood forecast and warning /typhoon warning (PAGASA), monitoring earthquake / volcanoes (PHIVOLCS). ・ Department of Budget and Management (DBM): Management of budget required for disaster prevention activities. ・ Department of Environment and Natural Resources (DENR): Re-tree planting in flood probe areas. ・ Philippine Information Agency (PIA): Publicity relating to disaster prevention ・ Philippine National Red Cross (PNRC): Conducting disaster prevention drill and supporting training of DCC. ・ Department of National Defense (DND): Securing communication, supporting emergent restoration and rescue/relief activities. ・ National Economic and Development Authority (NEDA): Assessment of social economic damages caused by disasters, formulation of re-construction plan including construction of new communities and so on. ・ National Housing Agency (NHA): Securing houses in emergency cases, and so on. ・ Department of Tourism (DOT): Security of tourist in emergency, and so on. <u>Office of Civil Defense (OCD):</u> ・ Executing agency and secretariat of NDCC. Its roles are: a. Execution organization of NDCC to cope with disasters, Defense Activity Center of Citizens. b. Coordination between government agencies/local government and respective disaster management committees. c. Development of disaster preparedness plan / disaster drill program d. Research and study of disaster management. e. Conveying information received from agencies that issue disaster information / warning to relevant agencies. f. Management / coordination / monitoring of research and study project as well as execution project related to formulation of policies on disaster risk management, in which multiple departments and agencies are involved.[*1] ・ Numbers of staffs: exceeding 301 persons (as of 2009.2), among them, 50% is deployed in the central office and remaining 50% is deployed in the local offices. Within the establishment of new disaster management law, it is planned to increase the number of staffs to 400 or so. *[11] ・ OCD consists of the following 4 departments. a. Administration / finance department: Management of the entire activities, human resources management, financial management. b. Planning department: Coordination / management /monitoring of projects conductedjointly with other ministries and agencies, formulation of policies. c. Training department: Systematic and physical CD of post-disaster response agencies, education program of citizens. d. Emergency response department: Broad-based operation of emergency response activities after disaster has occurred. ・ By establishment of NDMC, drastic changes in organization to cope with new responsibilities are scheduled to make within 5 years. [*1] <u>Organizations in charge of Non-structural Measures for Disaster Risk Mitigation and Preparation:</u> ・ Earthquake: Philippine Institute of Volcanologist and Seismology (PHIVOLCS), OCD, Department of Public Works and Highways (DPWH), Housing and Land Use Regulatory Board (HLURB), National Economic and Development Authority (NEDA), Department of Education (DepEd), and Department of Health (DOH) . ・ Tsunami: PHIVOLCS, OCD, Phil Coast Guard, Armed Force, Police and Local Government Units (LGU) ・ Volcano Eruption: PHIVOLCS, OCD, Armed Force, Police and LGU ・ Flood: Philippine Atmospheric, Geophysical and Astronomical Services (PAGASA),/Department of Science and Technology (DOST), OCD, DPWH, law enforcement agencies, LGU and Mines and Geosciences Bureau (MGB) ・ Debris flow: PHIVOLCS, PAGASA,/DOST, Department of Environment and Natural Resource (DENR), OCD, river basin control offices, DPWH and law	・ There are two policies i.e. Integrated Risk management policy of NDCC and National development plan and local development plan and its relevant programs of NEDA. No coordination or integration mechanisms are n established[*1].			

enforcement agencies and LGU
- Landslide: PHIVOLCS, PAGASA, MGB, OCD, LGU and law enforcement agencies
- Drought: PAGASA, Department of Agriculture (DA), dam operators & water resource management offices, Department of Trade and Industry, DOH
- Forest Fire: Bureau of Fire Protection, LGU, OCD, law enforcement agencies, DOH, Forest Management Bureau

<u>Organizations in charge of Structural Measures for Disaster Risk Mitigation:</u>
- Earthquake: PHIVOLCS, DPWH, Department of Transportation and Communication (DOTC), LGU, Department of Energy (DOE), HLURB
- Tsunami: PHIVOLCS, DPWH, LGU, DENR, DOTC
- Volcano: PHIVOLCS, DPWH, Department of Social Work and Development (DSWD), LGU, DA and DENR
- Flood: DOST-PAGASA, DPWH, DA, LGU, DENR
- Debris flow: PHIVOLCS, PAGASA, MGB, DPWH, DA, LGU, DENR
- Landslide: PHIVOLCS, PAGASA, MGB, DPWH, DA, LGU, DENR

Forest fire: Forest Management Bureau (DENR)



Source: JICA Study Team.

Note: Local level disaster risk reduction and management councils are supposed to be established as follows: (1) 17 RDRRMCs (Region) (2) LDRRMCs (80 provinces, 138 cities, 1496 municipalities, (3) BDRRMCs (42027 *Barangays*. RDRRMCs are chaired by OCD Regional Directors, while other respective level is chaired by the Local Chief Executives.

Figure The Philippine's Disaster Management Structure

	Inter-organizational arrangement: • In 2006, as an agency to coordinate and integrate administrative functions on the flood management, NFMC has been established. NFMC is scheduled to develop an outline of National Plan for Flood Control by July 2006 to submit it to the President; for this purpose, cross-sectional flood measures execution system is being strengthened. *[12] • River Basin Control Office (RBCO) of the Department of Environment and Natural Resources (DENR) is the highest agency to implement orientation, management, regulation and coordination on the entire water-related program and projects. Flood Mitigation Committee (RBC) , which is the lower organization of RBCO, promotes participation of communities in flood control projects. [*1] (Relationship of this agency with the Department of Public Works and Highways is unknown). • OCD with supports of EU/UNISDR/UNDP is establishing a mechanism, to which stakeholders related to disaster mitigation are involved. [*1] • NWRB develops "National Water Information Network = NWIN" for comprehensive collection and sorting arrangement of water-related data / information by receiving financial assistance from the World Bank; this network is connected to 8 agencies (BRS: Bureau of Research and Standard of DPWH, EMB: Environment Management Bureau of DENR, MGB, LWUA: Local Water Utilities Agency, NIA, NEDA, PAGASA, and WSSPMO). [*3]	• In medium-term national development plan, comprehensive management of river basin is emphasized; the management shall be made with joint efforts of several agencies such as DENR, DPWH, MMDA, and so on. The challenge is to strengthen and expand cooperation with many organizations including local government, NGOs and groups of citizens. [*1] • Exchange of data and information between DPWH and relevant agencies are not enough. [*1] • There is no cooperation system in disaster prevention activities between local governments. *[13]
Province level / Regency / Municipal Level	< Local Level> • Based on the fact that the roles of local government are clearly stipulated in the Local Autonomy Law (1991), establishment of Local Disaster Prevention Council has been promoted throughout the nation. [*1] <u>Regional Disaster Risk Reduction and Management Councils (RDRRMC:17)</u> • Function: Coordination, integration, supervision and evaluation of the activities of the Local Disaster Risk Reduction and Management Councils • Operating Facility: Regional Disaster Risk Reduction and Management Operation Center (to be established when necessary) • Chair: Regional Directors of OCD • Vice chairperson: Regional Directors of (1) Department of Social Welfare and Development (in charge of disaster response), (2) Department of Interior and Local Government (in charge of preparedness against disaster) , (3) DOST (in charge of disaster prevention / reduction), and (4) NEDA (in charge of restoration / reconstruction) <Province level> <u>Local Disaster Risk Reduction and Management Councils (LDRRMC: 80 Province, 138 Cities, and 1496 Municipalities)</u> • Chair: State Governor / City Mayor / Head of municipality)	• Local Disaster Prevention Council copes with disasters on a day-to-day basis; most of local governments do not have a permanent office for disaster management. [*1] • A Framework of cooperation is available between relevant agencies as DCC; but most are not enough functioning, for example, no regular meeting or no enough data. DCC needs to be activated to strengthen procedures for alteration of plans and/or making decision; besides strengthening horizontal communication and mutual support system [*5]

		Level below Regency / Municipality	Local Disaster Risk Reduction and Management Councils (LDRRMC: 80 Province, 138 Cities, and 1496 Municipalities) Barangay Development Council (42027 Barangays) ・ Chair: State Governor / City Mayor / Head of Municipality /Head of Barangays Development Council ・ Member: Leading persons in the community In the period of 2002 ~ 2003, based on the agreement with DPWH, flood control facilities as well as equipment existing in the Metropolitan area have been shifted from the Metropolitan Bureau of DPWH to MMDA. *3 Inter-organizational Arrangement ・ NDRRMC serves as the multi-sectoral platform with overall supervision of its network of Local Disaster Risk Reduction and Management Councils and offices. ・ NDRRMC also engages all government agencies based on their technical expertise and existing mandates to address the requirements for disaster risk reduction and management. ・ CSO or NGO and private sector participation is also ensured to provide a more comprehensive analysis and appreciation of situations and in coming up with an appropriate intervention to manage disaster risks. ・ NDRRMC coordinates through the Office of Civil Defense (OCD) whose personnel operates the NDRRM Operations Center on a 24/7 basis to coordinate the requirements for disaster risk management.	・ The existence of a local government, which has not recognized even the fact that the local government has do not have responsibility /authority to conduct operation on disaster prevention. *4 ・ Qualities of the local disaster management organizations are all different; there are many that have not functioned at all. There are also many that do not have an office. *4			
		Financial Preparation /	<Annual Budget> ・ The Act 101211 renamed former Calamity Fund into “Disaster Risk reduction and Management Fund” available even for disaster mitigation and prevention activities. ・ At local level, 5% of expected revenue from regular resources is set aside for “Local Disaster Risk Reduction and Management Fund (LDRRMF)”. <Contingency Fund> ・ 30% of “Disaster Risk reduction and Management Fund” is allocated for “Quick Response Fund (Stand-by Fund)” ・ 30% of “Local Disaster Risk Reduction and Management Fund (LDRRMF)” is allocated as “Quick Response Fund (Stand-by Fund)”.	・ Utilization of disaster risk reduction fund by Local government needs a guideline. ・ A number of local governments do not know that LCF becomes spendable for disaster mitigation / prevention. *4 ・ The local government does not like to use LCF for disaster mitigation / prevention in fear of audit. *4 ・ LCF has not been spent systematically and strategically; every year, about 50% of it is left unused all over the nation. *4 ・ Most of the Local Development Fund is used for the development / repair of regional infrastructure; quota for disaster prevention is limited. *1 ・ Research and study on the economical impact of the past disaster and their documentation as well as cost effectiveness analysis of the projects for restoration from disaster and reconstruction plan, which are needed as the preparation for the coming disaster, are lacking. *1 ・ Purpose of use of Priority Development Support Fund (Pork Barrel Fund) depends on assembly members; therefore, projects are executed regardless of Medium-term Pubic Investment Plan provided by DPWH.*1 ・ Awareness / understanding to flood control and Sabo is low; said sector shares only 8 ~ 15% of annual budget of DPWH. *11 ・ Bond issuance for improvement of the local government’s financial situation is restricted by Local Government Law; large scale flood control and drainage construction project is almost impossible to be realized unless there is improvement in financial situation. *3			
	5. Policy on Community-based Disaster Management	・ In the Medium-Term Philippine Development Plan (MTPDP: 2004-2010), a policy to institutionalize the community-based disaster prevention mechanism is proposed. *1 ・ With the establishment of Disaster Risk Management Act (2008), it is planned to promote establishment of community-based Disaster Preparedness Committee, strengthening disaster prevention volunteer system to accelerate disaster prevention in the community, and participation of NGO. *1 ・ Strategic Plan to Integrate Community-based Disaster Risk Management (CBDRM) (2007-2011) has been formulated. *4 ・ Strategic Plan to Integrate Community-Based Disaster Risk Management (CBDRM) (2007-2011) was developed. ・ CBDRM is adopted in National Disaster Risk Reduction and Management Plan 2011-2028 ・ Metro Manila has implemented community support through LGU such as “Flood control Bayanihan zone alliance”, which promotes community activities of construction, rescue and communication in different stages of flood disaster.		1.(iii)	1.(iii)	2.6 4
	6. Prevention and Mitigation	Current Situation	Challenges	-	-	-
	6.1 Flood	Identification of Disaster Risks	・ Flood hazard maps are developed for several river basins by DPWH, DENR and local administrative agencies. *7 ・ Various hazard maps for 22 provinces for earthquake, tsunami, landslide, flood and volcano have been developed based on the existing maps prepared by NAMRIA (National Mapping and Resource Information Authority) through READY Project, which was funded by UNDP and AusAID. The project was initiated by NDRRMC (National Disaster Risk Reduction and Management Council) in cooperation with other bodies, and completed in December 2011.*14 ・ NDCC has designated 954 municipalities as Flood Prone Area; however, the number has not been fixed, because relevant data are renewed as needed. *12 ・ National Flood Management Committee (NFMC)*12 takes charge of integration / coordination of flood control administration functions. ・ Department of Science and Technology (DOST), the Philippine Atmospheric Geophysical and Astronomical Services Administration (PAGASA) and Flood Forecasting Bureau (FFB) take charge of meteorological observation, development of flood hazard maps, and flood forecast /warning. ・ DCC publicizes 954 municipalities designated as Flood Prone Area in its web	・ Inventory survey of flood/sediment disasters is needed. *1 ・ The basic data such as records of the past disasters, topographic maps, etc. are not sufficient; therefore, it is impossible to specify dangerous areas. *8 ・ Flood hazard maps are developed on the individual basis; on the whole, they are not enough. *2 ・ Awareness /understanding is lacking on what kinds of data must be collected and what shall be acquainted to the public. *1 ・ Flood hazard maps available for	2.(i)	2.(i)	1.1

			site. [*3] ・ There are some areas where community-based flood hazard maps are developed by NGO such as PNRC, and so on. [*2]	evacuation activities have not been prepared. [*15]			
		Monitoring	・ Hydrological monitoring is conducted by PAGASA [*16]. ・ PAGASA is telemetric flood forecasting and warning systems (FFWS) have been installed in the 4 river basins. There are 45 rainfall stations and 31 river water level stations in total [*16]. ・ In addition, one more FFWS has been established and operated by MMDA [*17]. ・ National Irrigation Agency (NIA) and National Power Corporation (NPC), which have large dams under their control, have developed flood forecast/warning system for the operation of dams in cooperation with PAGASA [*18]; however, due to retrenchment of expenditures and reduction of number of staffs, observation has been suspended until recently (~ 2000). In PAGASA as well as Survey and Standard Bureau of DPWH, too, due to the same reason as above, a little less than 650 observation stations have been discontinued in doing their observation [*3]. Currently, local offices are being strengthened by increasing 78 rainfall observation points, which have been less than 150 so far. [*11] ・ 5 radars have been repaired by the Philippine Atmospheric Geophysical and Astronomical Services Administration (PAGASA). [*9]		2.(i)	2.(ii)	1.3
		Non-structural Measures	・ DENR is strengthening monitoring of illegal deforestation, which caused flood, flash flood and sediment disasters. [*4] ・ The urban planning manual developed by NLRB states necessity of analysis of the past disasters, identification of dangerous areas, regulating development in the dangerous areas, and cooperation of engineers related to flood (as of 1992). [*8] ・ Local District Bureau of National Economy Development Agency (NEDA) and Department of Environment and Natural Resources (DENR) take charge of mainstreaming of disaster risk mitigation in land utilization sector as well as management and development [*18] of flood prone area. ・ As seen in the flood in Zambales State (2009) as well as Surigao Del Sur State (2011), flood disaster mitigation by community-based disaster prevention efforts have been effective. [*19] ・ In some areas, land use control to the flood dangerous area such as shallow water section of river banks has been provided. [*19] ・ By Philippines Water Code, it is prohibited to live within 3m from the dyke. [*20] ・ In MTPDP 2004-2010, “Renewal of Land Use Policy based on Assessment” is set as the Flood Prevention Target. [*12]	・ A number of people have lived in the dangerous area; it is impossible to set out the dangerous area. [*8] ・ The basic data such as records of the past disasters, topographic maps, etc. are not sufficient; it is impossible to set out the dangerous area. [*8] ・ In the zoning system there is not clear criteria on disaster prevention (as of 1992). [*8] ・ Due to the fact that land registration as well as designation of river basin area is not made adequately, land acquisition and relocation of inhabitants are not progressed smoothly. [*1] ・ Land use control in the dangerous area is not enforced strictly. [*11] ・ River channel area and flood prevention areas are not designated. [*21] ・ DPWH has developed several master plans including management of flood plain; however, it has not reached the stage to execute flood plain management as well as officially announced management guidelines. [*3] ・ Land use control has been provided; however, it was not understood and controlled adequately by the local government. [*19]	4.(i)	4	2.2
		Structural Measures	・ The Medium-Term Philippines Development Plan states the policy aiming to maintain the capacity of flow of the current drainage channel as well as drainage channel by implementing bank revetment, dredging, removing illegal dwellers in the area, where flood /sediment disaster are likely to occur; besides that, it shows priority projects on measure to be taken to structures. [*1*12] ・ In the small scale flood countermeasures taken by local district office of DPWH, in many cases, countermeasures to structures are taken. In some river basins, excavation of drainage /river channel is executed to reduce flood disaster in the downstream areas. [*12] ・ FCSEC has developed a draft of technical standard (survey, planning, design), which has been officially approved by DPWH in July 2002 and has been distributed [*22] to all relevant departments (relevant divisions, sections related to the headquarters and all local construction offices in the entire regions). Headquarters of DPWH plan to review the guidelines for design, which has been developed in 2005, aiming to completion in 2006. [*2] ・ In Barangay units, flood prevention construction methods based on experiences such as piling up sandbags as well as timber floating method are executed as volunteers’ work. [*2] ・ Department of Public Works and Highways takes charge of planning / construction/ maintenance of flood control facilities. ・ Large scale flood control and Sabo projects are executed by 27 project management offices, which are under the direct control of the Headquarters (Flood Control and Sabo Technical Center: FCSEC is one of them.) ・ Local offices of DPWH take charge of small scale flood issues in the main rivers. [*12] ・ It takes charge of 13 rivers (total area of the river basin is more than 1,000 km^2)*[18]. ・ In addition to survey, planning, design, execution plan, cost estimating, supervision of execution of work, FCSEC implements demonstration test of soil property, hydraulics model test, close checking of guidelines, and technical training of engineers of the said Department. <u>State / Municipalities</u> ・ Among medium and small rivers other than what are referred to in the preceding paragraph; those, that flow crossing multiple municipalities, are under the control of the State and those that do not cross the municipalities are under the control of the respective municipalities. *[18] <u>National Irrigation Agency (NIA) / National Power Corporation (NPC)</u> ・ They take charge of the management of dams for irrigation /power generation. *[18]	・ Department of Public Works and Highways gives priority to road projects; flood control projects (which shares 8-14% of budget of the said Department) relies on the outside assistance (ratio of foreign loan is 90%). [*1] ・ Many of countermeasures for flood taken by local offices of DPWH are emergency measures against sections that have fractured or are going to fracture; many insufficient works have been observed. *[3]*[12] ・ According to the agreement with the local government, DPWH shifts flood control facilities of medium and small rivers to the local government; however, there are cases that some local governments do not agree, where maintenance of those facilities become an issue. *[3] ・ With most of rivers, master plan has not been formulated. [*1] ・ Flood area of each river has not been set out, and data, with which flood control business can be evaluated from the viewpoint of benefit, have almost not been prepared. Even DPWH has no experience to have formulated a project strategy based on the social benefit. *[12] ・ Recognition on collection / analysis of hydraulic / hydrological data required for flood control / Sabo plan is low. *[23] ・ Guidelines for designing flood control / Sabo structures (standard and criteria /flood control and drainage facilities) exist; however, they are not familiarized in DPWH (especially in between the center and the local offices); design and execution of works are not made	4.(i)	4	2.2

				in accordance with the guidelines. *2*3 ・ Main business of DPWH is to reduce disaster risk by measures taken to structures; however, it is not in charge of estuary management; accordingly it does not implement hydrological analysis and flood analysis by using observation data; which means it does not have an organization that presides over and manages disaster prevention of rivers. *1*24 ・ In executing projects and maintenance, role sharing /scope of responsibilities between central government agencies and local government is not clear. *1 ・ There are not sufficient staffs for maintenance of flood control facilities both in local offices of the Department and local government.*1			
	6.2 Earthquake / Tsunami	Identification of Disaster Risks	・ Department of Science and Technology (DOST), Philippine Volcano and Seismological Institute (PHIVOLCS) take charge of development of hazard maps, mapping of active faults, development of a plan for preventive measures, education for earthquake, survey on the vulnerability of social and infrastructure, assessment of risk and damages. ・ In the READY project, hazard maps are developed in 22 states. READY project supports CBDRM based on the hazard maps such as setting evacuation routes, preparing sign boards on the evacuation routes, and so on. ・ In Manila Metropolitan Area, based on the development survey implemented by JICA by 2004, micro-zoning hazard maps with the scale of 1:5,000 have been prepared.*25. In addition, PHICOLCS starts to renew the micro-zoning hazard maps in 2012, which is schedule to complete in 2013. ・ In the Tsunami Mitigation Program 2006-2007, PHIVOLCS has implemented Tsunami Simulation. Based on this, Tsunami Hazard Maps with contraction scale from 1:100,000 to 1:50,000 have been developed. ・ PHIVOLCS is developing a software called REDAS (Rapid Earthquake Damage Assessment), which can assess/estimate the damage after the strong earthquake has occurred*1*2 . It also gives a course to LGU and other relevant authorities and agencies.	・ Since no sounding maps are developed, accuracy of the hazard maps, which have been developed in the READY Project, was low. There are not enough tsunami detective sensors; because of this, accuracy of forecast/warning of tsunami after it has occurred is low, too. For the future analysis of tsunami, developing a highly accurate sounding is needed. *26 ・ Studies /documentation of trend analysis among values such as magnitude, frequency, damages, etc. are not enough*1. ・ Almost all recommendations for mitigation of seismic damages in Manila Metropolitan Area have not been implemented*4.	2.(i)	2.(i)	1.1
		Monitoring	・ Philippine Institute of Volcanologist and Seismology (PHIVOLCS) of Department of Science and Technology (DOST) takes charge of building up observation network, precognition of occurrence of earthquake and relevant crustal deformation, analysis of mechanism of earthquake occurrence. ・ PHIVOLCS has 66 earthquake observation stations. It is planned to increase at least 83 observation stations by 2016. *26 ・ By EQ-Plotter as well as REDAS software developed by studies of PHIVOLCS and PCIEERD, at the occurrence of earthquake, determination of earthquake source / magnitude as well as estimation of damages is made automatically; within 15 minutes or so after the occurrence of the earthquake, information on the earthquake is known to the public. *27 ・ In the SATREPS projects by JICA-JST, “Earthquake / volcanoes Observation Capacity Strengthening Project”, it is planned to grant 100 sets of broad band seismograph, 10 sets of strong motion seismograph. This is made for the purpose of improving observation density of earthquake and improving the accuracy of determination of earthquake source and magnitude by replacement of equipment. ・ One set of tsunami detection sensor (WET sensor) has been installed in Lubang Island since May 2007*4. WET sensor was installed by gratis-in-aid by Finland; it has been installed and operated by PHIVOLCS*1*4. It is planned to install 5 more WET sensors. *26 ・ High accuracy tide level observation is implemented by NAMRIA. However, regarding utilization of the data to tsunami warning, there is no tie-up with PHVOLCS. *26 The SATREPS projects by JICA-JST, “Earthquake / volcanoes Observation Capacity Strengthening Project” (2010-2015) is being implemented; in the fields of earthquake and tsunami, the following activities are implemented /planned. - Installation / observation of broadband seismograph and strong motion seismograph, and real time seismic meter; - Adoption /operation of high-degree earthquake source analysis system; - GPS observation; - Survey intended for inland earthquake / trench type earthquake; - Implementation of tsunami simulation in various cases and compiling database; - Improvement of REDAS. ・ Development of simple tool for diagnosis of earthquake resistance of housing.		2.(i)	2.(ii)	1.3
		Non-structural Measures	・ Proceedings for building permit as well as inspection at execution of building works are provided in NBC*10. The Association of Structural Engineers of the Philippine (ASEP) and the Philippine Institute of Civil Engineers (PICE) are reviewing Building Standard Act. *4 ・ Based on the instruction in 1992, DPWH has been applying ASSHTO (American Association of State Highway and Transportation Officials) for design of highways and applies on it the seismic region coefficient. This standard for earthquake resistance standard has been amended in 2004. As to structures built before 1992, earthquake strengthening is applied sequentially. *10	・ Laws (building ordinance, land use /classification ordinance) are not applied appropriately. *1 ・ In the structure method, adequate consideration has not been given to the concrete used for general housing and bonded structures of light weight concrete blocks. *2 ・ As to local development plan, policy and investment, there is no domestic standard on how to include disaster risks in them; training of the office in charge is needed. *1*4	4.(i)	4	2.2
		Structural Measures	・ DPWH and UNDP jointly have executed survey for earthquake strengthening of schools / hospitals /government architectural structures; training on seismic diagnosis has been implemented, too. *2 ・ In Manila City, construction of public buildings is restricted in the area where there is fear that liquefaction could occur. *28 ・ DPWH individually implements earthquake-resistant construction of bridges; however, such construction work is limited to light works such as drop-prevention device of bridge beams, repair work of bridge piers and so on. In the Develop Plan Survey Type Technical Assistance by JICA, “Survey Project for Improvement of Bridges for Mitigation of Damages by Large Scale Earthquake”, survey of seismicity, development of draft revision of earthquake-resistant design and support for earthquake-resistant works will be	・ Earthquake strengthening has not been realized due to high costs. Bring up engineers in LGU and dissemination of earthquake resistance diagnosis technology is needed. *2 ・ In the feasibility study and final design of infrastructural structures, introducing disaster risk assessment and training of local officer in charge are needed. *4	4.(i)	4	2.2

		implemented to the bridges both inside and outside Manila Metropolitan area. *28				
6.3 Sediment disaster (Landslide, Debris flow)	Identification of Disaster Risks	・ Mining and Geological Science Bureau (MGB) of the Department of Environment and Natural Resources (DENR) takes charge of development of sediment disaster hazard maps and campaign for information education. ・ Sediment disaster hazard maps have been developed in READY project with the scales of 1:50,000 and 1:10,000. Based on the topographic map developed by NAMRIA, MGB implements morphological analysis and site survey; they have developed about 750 sheets of maps*29. The hazard maps are publicized in the web site of MGB, which can be downloaded. *30 ・ When the site survey for development of the hazard maps has been completed, MGB has issued, as needed, Threat Advisory to Barangay. Then, the hazard maps have been sent to City Government and Village Offices. *29	・ Who is responsible to sediment disaster countermeasures is ambiguous (2000). *13 ・ The hazard map with scale of 1:50,000 is too small scaled, with which pattern of occurrence of the hazard as well as location of occurrence cannot be identified clearly; it is not useful for the practice of disaster prevention countermeasures. In order to develop more detailed hazard map, development of large scaled basic maps with the scale of more than 1:10,000, and improvement of hazard map production capacity in MGB are needed.	2.(i)	2.(i)	1.1
	Monitoring	・ Monitoring such as dynamic state observation of landslide has not been implemented. ・ By forecast on rainfall amount made by PAGASA, warning is imposed by Barangay.*26		2.(i)	2.(ii)	1.3
	Non-structural Measures	・ In READY project, MGB implements educational campaign such as holding workshops, installation of signboard showing dangerous areas, and so on. *29 ・ In 2006, with the support by JICA, “Assessment/Management Plan Survey on Risk allowance on Sediment Disaster on Roads” has been implemented; at the same time, structural and non-structural countermeasures related to the slope of roads have been introduced to DPWT; transfer of technology has been implemented, too. *31 ・ Major countermeasures taken to sediment disaster other than what were taken to roads are; removal of sediment after occurrence of disasters, evacuation and relocation of inhabitants, and so on. *29		4.(i)	4	2.2
	Structural Measures	・ Countermeasures including simple ones are not implemented against sediment disasters. *29。		4.(i)	4	2.2
6.4 Volcano	Identification of Disaster Risks	・ The Ministry of Science and Technology (DOST) and Philippine Volcano and Seismological Institute (PHOVOLCS) take charge of developing hazard maps and a plan for preventive measures. ・ PHOVOLCS has developed hazard maps on 14 volcanoes with the contraction scale of 1:25,000. The hazard maps are developed with the items such as ash fall, lava flow, pyroclastic flow, lahar, etc., which are utilized for evacuation plan, emergency response, land use, and so on. *2626	・ Since the hazard maps are developed on the base drawing, which is the enlarged drawing of topographic maps with contraction scale of 1:50,000, accuracy of topographic information is not enough. It needs to improve accuracy of topographic information*26	2.(i)	2.(i)	1.1
	Monitoring	・ Philippine Institute of Volcanologist and Seismology (PHIVOLCS) of Department of Science and Technology (DOST) takes charge of building up observation network, detection of volcanic activity, forecasting volcanic eruption, and clarification of mechanism of volcanic eruption. ・ Observation stations are installed at 6 volcanoes out of total 22 active volcanoes, namely, Taal, Pinatubo, Mayon, Bulusan, Hibok-hibok, and Kanlaon; where observation is implemented with observation system*1. Observation items are seismic motion, deformation of ground, and analysis of gas /quality of water, specific resistance and electromagnetic wave. In 2 volcanoes, Parker and autumn, observation is made by installing one set of seismograph. ・ Based on the observation of eruption by PHIVOLCS, warning information is issued. Warning level of the volcano is set in 5 levels by volcano depending on pattern of eruption, situation around the volcano, and so on. *26 ・ By one of the SATREPS projects by JICA-JST, “Project for Enhancement of Observation Ability of Earthquake / Volcanoes (2010-2015)”; it is planned to provide observation equipment, installation of them, and observation. In the field of volcanoes, the following activities are implemented /planned. - Installation of broadband seismograph and infra-sound monitor; - Introduction / operation of transmission in real time / analysis system of earthquake / infrasound data; - Installation /observation of GPS meter; - Installation of geomagnetic earth current meter and total magnetometer, introduction / operation of transmission in real time /analysis system; - Building up portal site of disaster information and transmission of information. ・ Implementation of seminar/training.	・ As to the active volcanoes, with which observation has not been implemented, it needs to develop an observation network*26.	2.(i)	2.(ii)	1.3
	Non-structural Measures	・ PHIVOLCS has set the two-stage dangerous zone in Mayon Volcano, where living as well as entry is limited*13.		4.(i)	4	2.2
	Structural Measures	・ DPWH takes structural measures in Mt. Pinatubo as well as Mayon Volcano, etc. such as construction of check dams, Maga dikes, Super dikes, and so on*2. ・ PHIVOLCS and DPWH implement evacuation drills of CBDRM with Project units*26*28.		4.(i)	4	2.2
6.5 High Tide /Storm Surge (Cyclone/ Typhoon)	Identification of Disaster Risks			2.(i)	2.(i)	1.1
	Monitoring			2.(i)	2.(ii)	1.3
	Non-structural Measures			4.(i)	4	2.2
	Structural Measures	・ DPWH is constructing sea walls as a countermeasures to high tide, storm surge at coast section of the Roxas Boulvard in Manila City*28.		4.(i)	4	2.2
6.6 Other Disasters	Identification of Disaster Risks	・ Based on Forest Act, the land with slope of more than18% is provided as statutory forest area or non-assignable land. In the National Integrated Protected Areas Act, the land with slope of more than 50% is designated as statutory protected area. *32		2.(i)	2.(i)	1.1
	Monitoring			2.(i)	2.(ii)	1.3
	Non-structural Measures			4.(i)	4	2.2
	Structural Measures	<Forest Management> ・ Since 1995, DENR has been implementing “Community –based Forest Management (FBFM). *33*39	・ Incentive of inhabitants for participation in CBFM is lacking. *33 ・ There are no natural resources management system established in the community level; destruction of forest caused by shifting cultivation has been continuing. *32	4.(i)	4	2.2
6.7 Common items	Non-structural Measures	・ The policy is stated in Medium Term Philippines Development Plan (MTPDP: 2004-2010) that the risk assessment is carried out regularly*1.	・ Knowledge of local governments on disaster risk evaluation &	4	4	2.2 2.5

	for Disaster		• The policy is stated in Medium Term Philippines Development Plan (MTPDP: 2004-2010) that the mapping of landslide disaster hazardous areas (development of geo-hazard map); for the remaining 13 regions, the work is intended to be completed by 2010. *1*11 • Hazard maps are being prepared in 28vulnerable provinces.*1*4 • The risk assessment having been made so far covering about 1/5 of the national land. *4 • NDRRMC has established the Operations Center. The Operation Center has installed a DMIS that is connected with relevant agencies and local governments. In emergency situations, the center collects and integrates information on damages from and responses to the disaster to take advantage of the DMIS.*15 • There is the Rapid Earthquake Damage Assessment System (REDAS) as other disaster management system which has developed by PHIVOLCS in 2002-2004.*26 • Manila Observatory (non-profit making research body in the private sector) is developing a Disaster-vulnerable Land Use Classification Map. *4 • OCD collects /stocks disaster information data; they operate and manage the database so-called CALAMIDAT.PH. *4 • National Mapping and Information Resources authority (NAMRIA) takes charge of development of maps. *1	monitoring and importance of hazard mapping & early warning system should be enhanced.*1 • Local governments' understanding on information dissemination (what kind of data to be collected and what information to be informed to people) should be enhanced.*1 • In most of local governments except for those covered by READY project, past disaster information data are not available. *4 • Detailed maps to be the basis are not in existence except for Manila; accuracy of the hazard map is rough. *11 • There is no clear standard for the hazard maps; standard differs depending on the agencies that produce those maps. *7 • Land use control for the purpose of controlling discharge of sediment at rainfall so as to reduce sediment disaster is almost not enforced. *2			
					4	4	2.8
		Structural Measures	• In the Medium-term Philippine Development Plan 2004-2010, policy is set to promote mainstreaming of the reduction of disaster risk in the infrastructure sector such as development plan, land use, roads. Receiving assistance of UNDP, etc., it implements development of guidelines, formulation of a plan emphasizing DRR (the 2nd local district), making use of the risk assessment method (the 4th local district), and training of land use planner in 400 regions and states and so on. *1 • In the Medium –term Philippine Development Plan (MTPDP 2004-2010), soil stabilization measures are implemented in landslide dangerous areas (re-forestation, tree plantation on the river bank, etc.); technical assistance is provided by DENR to 64 local governments. • In the selected sectors, it supports the mainstreaming of disaster reduction. *1	• Due to financial restrictions as well as order of priority of the development, adequate number/amount of staffs / budget have not yet been thrown in. *1	4	4	2.3.2 2.3.3
		Climate Change Adaptation	• DOST developed National Science Intervention Plan, which will be a guideline for policymakers to build strategies based on climate change vulnerability assessment. PAGASA will lead efforts of geo-hazard mapping, data collection and capacity development of researches on climate change. *34 • Climate change task force directly under the President was formed.*4 • Local Governance Resource Center of DILG started 3-days program in 2008 to deepen the understanding of local governments on the response to be taken by them to cope with or mitigate/accommodate to the impact brought about by climate change. *4 • Responsible body: Inter-Agency Committee on Climate Change (1991), Presidential Task Force on Climate Change (2007), Advisory Council on Climate Change Mitigation, adaptation and Communication • NFP: Presidential Task Force on Climate Change • The Medium Term Philippine Development Plan (MTPDP) for 2004-2010 refers to climate change adaptation within the context of disaster risk reduction. • Updated MTPDP 2004-2010 (2009) showed a progress in the mainstreaming of climate change adaptation. • The Philippine Climate Change Act of 2009 recognizes the inter-linkage between climate change and disaster risk reduction and mandates the integration of disaster risk reduction into climate change programs and initiatives. • Climate change adaptation is addressed in the 12-year National Framework Strategy and Program on Climate Change (2012-2022). • The Philippine Information Agency is responsible for disseminating information on climate change, local vulnerabilities and risk, relevant laws and protocols and adaptation measures.		4.(i)	4.(i)	2.7
		Public Awareness Research and Development /Human Resource Development / for Disaster Management	• Publicity campaign to heighten disaster prevention culture is implemented. *9 • Disaster prevention seminar is held. *9 • Teaching regarding natural disaster is implemented intended for 5~6 grades of primary school in the science class for several hours a year (as of 1996). *35 • DRM module is introduced in the curriculum of junior high school. *1 • In the branch level of the Philippine National Red Cross (PNRC), there are some branches which implement community level disaster prevention drill as well as disaster prevention education to the school children (as of 1992). *8 • PNRC implements "Comprehensive Community Disaster Prevention Plan Formulation Project (CDPP)" (development of predictive inundation map by GIS, evacuation route maps, evacuation drill, development and distribution of educational pamphlets, etc) intended for mainly flood in the local villages. The same type of program is schedule to start in Quezon City (Payatas district) (2002). *10 • In the Instruction of the Department of Education Article 14 (1997), it provides that disaster response team shall be formed in all schools. In most of the schools, evacuation drill is carried out regularly, in which teachers and students shall participate. *5 • PAGASA implements individually education of inhabitants to strengthen evacuation system. *2 • Department of Education is in charge of school education. There are Primary school and Secondary school curricula on disaster prevention and mitigation.*36 • Philippine Information Agency (PIA) is primarily responsible for public awareness and capacity building in communities.*15 • About awareness of tsunami, people learn by pamphlet of tsunami and website. Signboards are installed in evacuation sites. Evacuation drills are carried out in schools and communities nationwide.*26 • PHIVOLCS has exhibited learning materials for natural disaster. PHIVOLCS invites school students and teaches them natural disaster.*26 • PNRC has its own human resources development program such as bringing up regional disaster prevention team (6 persons / team), training for lecturers on emergency service,/relief technique, disaster seminar intended for volunteers as well as staffs of local government, and so on (as of 1992). *8 • In MTPDP 2004-2010, it is stated as targets of flood prevention that "initial stage education and training on the disaster management shall be implemented intended for staffs/agencies of local government".*12 • FCSEC implements development of design manuals, training for bringing up of human resources for flood control / Sabo, on-the-job-training, survey of the state of damages, and so on. *2*11 • Several universities have major course for disaster prevention. *4	• Importance of flood control projects in medium and small rivers is not understood appropriately by the government as well as general public. *1*3 • In the school, efforts for earthquake disaster prevention are not made positively; there are many requests from persons concerned to education to improve the quality of disaster education as well as strengthening of functions of the disaster response team in the school. *5 • Project-based education for disaster prevention in the school executed at Mayon Volcano, which is made by the supports of Italy, will be discontinued when the project is finished due to lack of fund. *2 • In Manila Metropolitan Area, importance of improvement of functions for training as well as strengthening disaster prevention capacity is recognized by the respective disaster prevention organizations; however, improvement of guidelines and supporting items are made very little. *5 • In the case of Planning Division of OCD, it needs to strengthen the capacity to respond to the needs in the field of disaster risk management such as enhancement of specialized staffs and development of GIS equipment, and so on. *1	3	3	2.3.1

			・ Through OCD and joint with Department of Health, NDCC implements a training program “Disaster Prevention in Hospital” intended for local governments. [*4] ・ The Crisis Management Institute (CMI), which is below organization of National Defense College of the Philippines (NDCP), has disaster management related course. [*4] ・ The National Scientific Technology Plan 2002-2020 of DOST; disaster prevention study is included as one of the strategic fields of National Fundamental Researches. [*4]	・ Almost all members of BDCC do not have knowledge / technology specialized for disaster prevention business, for which one is responsible. They will not function unless they receive specific training (as of 1992) [*8] ・ As to flood control, local government does not have enough technique. Technical level of local office of DPWH, which is in charge of giving guidance to the local government, is also low. [*12] ・ It needs to build up capacity of local staff of DPWH. [*37]			
7. Preparedness and Response		Current Situation		Challenges			
	7.1 Disaster Response plan / Emergency Financial Measure	Central Level	<Emergency Operation Plan(EOP), Contingency Plan(CP) .etc> ・ It is planned to prepare “National Disaster Response Plan” which is scenario-based disaster preparedness plan including the system of search, rescue and recovery of the rescue areas. <Emergency Financial Measure> ・ Financial reserves for emergencies are secured under “Disaster Risk Reduction and Management Fund” both national and local government levels as “Quick Response Fund” or “Stand-by fund” for relief and recovery programs.		5	5	3
		Local Level	<Emergency Operation Plan(EOP), Contingency Plan(CP) .etc> ・ Emergency Response Plans were prepared in 50 communities. <Emergency Financial Measure> ・ Financial reserves for emergencies are secured under “Disaster Risk Reduction and Management Fund” both national and local government levels as “Quick Response Fund” or “Stand-by fund” for relief and recovery programs.	・ A Disaster Preparedness Audit to survey Local government units resulted that 33% of Provinces, 34% of cities and 60% of municipalities are not prepared in terms of functionality of LDRRMC, availability of evacuation centers, appropriate equipage, and quality of the disaster risk management plan			
	7.2 Early Warning	General Warning and Forecast/Communication	・ Early warnings related to severe weather is announced by PAGASA. When the weather forecast reaches the level of early warning, PAGASA issues immediately the weather forecast. [*15*16] ・ When Operation Center of NDRRMC receives early warning information from PAGASA, it conveys warning to the citizens through the local government (Barangay). Captain of Barangay conveys the information by means of gong as well as a church bell. PAGASA conveys information to inhabitants on its website or through mass media and SNS (face book, etc.). [*15*16] ・ In 27 States, community level early warning system is being built up. ・ OCD collects / consolidates information related to community-base disaster risk management (some examples are shown as follows). a) Monitoring of the state of community disaster prevention as well as development of disaster prevention maps; b) Checking capacity and pleasantness of the evacuation center; c) Confirmation of dangerous area; d) Integration and development of a ledger of information on Barangay level warning system and equipment; e) Confirmation and survey of dangerous buildings and infrastructural facilities; f) State of establishment of local government’s ordinance, regulations, etc. for mitigation of disaster risks. [Communication system] ・ Information such as warning is conveyed mainly by radio, which functions even during power failure, as well as radio transmission. At Barangay level, communication is made by means of a gong or a church bell. [*4*11*38] ・ Each government agency has an individual radio transmission network, which is installed at local office of the government agencies and the office of local government as well (as of 1992). [*8] ・ OCD installs wireless radio at 16 OCD District Office all over the country with a focus on Citizens Defense Operation Center in Manila, and in 44 disaster prone States/Districts. For short distance communication around Manila, it has prepared several sets of portable wireless radios (as of 1992). [*5*8] ・ In the case of Philippine National Red Cross, its headquarters in Manila and 37 branches all over the nation are connected by wireless radio (as of 1992). [*8] ・ There are many amateur radio operators’ groups; they cooperate with government agencies when a disaster occurs (as of 1992). [*8] ・ There are cases where community-based radio station has been opened. [*4]	・ Designated evacuation centres are not always the place of safety [*3*4*8]。 Numbers of evacuation centres are not enough, too [*3*39]. ・ 45% of the public buildings in Manila Metropolitan area have been considered that they have problems in seismicity [*5]. ・ It is the challenge to utilize information collected by OCD to the future formulation of policies and measures. It is also the challenge to secure technical supports, personnel / equipment for building up of the strategic database. ・ There is a weak point in systematic evacuation guiding system (as of 1992) [*8]. ・ The radio broadcast service stops at 24:00; if a disaster occurs in the mid night, there is no way to distribute information to the residents (as of 1998) [*38]. ・ Radio facilities owned by OCD are too old; there are many that cannot be used due to trouble of equipment (as of 1992) [*8]. ・ Due to shortage of staffs, the local communication centres do not always work around-the-clock (as of 1992) [*8]. ・ When disaster occurs, since it is not enough to collect information urgently only by the radio communication network of OCD; to cope with it; the radio communication network of other government agencies as well as that of the private sector is used. However, tie-up with CDOC has not been arranged (as of 1992) [*8]. ・ When disaster occurs, there is almost no communication means from CDCC/MDCC to BDCC (as of 1992) [*8]. ・ Rather low priority is given to build up a disaster prevention communication system in the Metropolitan area. There is no common information system among local governments in Manila Metropolitan area [*5]. ・ When disaster occurs, in the case where communication means are tied up; there is almost no alternative communication means to distribute warning, evacuation instructions, etc. from the local government to the residents [*4]. ・ Communication between PAGASA and OCD has been shut down due to blockage by newly built buildings (as of 2007) [*7].	2.(ii)	2.(ii)	1.2

		Flood	• FFB Operation Center of PAGASA predicts floods by collecting and analyzing data of water level / rainfall amount from its sub-center and conveys announcement of flood warning to OCD, DPWH and NWRB, according to the warning level. The data are also conveyed to media, local offices of DPWH, local districts and disaster prevention council of the State from the sub-center, which are installed in the river basin of the respective rivers. *1 • The FFWS operated by PAGASA (Philippine Atmospheric, Geophysical and Astronomical Services Administration) have been established for the strategic 4 river basins of Pampanga, Agno, Bicol and Cagayan.(as of 2012)*16*23 • Once flood forecast is completed by PAGASA, the result is reported to OCD and concerned organizations. There is an attempt to disseminate warning information issued by OCD to the public through local government networks, while real time information is also available through PAGASA's website, mass media and SNS.*16 • In addition, there is one more FFWS for the Marikina river basin under the control of MMDA (Metro Manila Development Authority).*17 • In the medium and small rivers where flood occurs frequently, in cooperation with local administrative agencies, PAGASA is developing community-based flood forecast and warning system. *7	• The hazard maps are not used effectively in flood forecast and warning system of PAGASA *7 • Communication device of NIA, which consist of a part of communication network of PAGASA, is interrupted when power failure occurs. Since staffs are not stationed permanently, if it is damaged in times of emergency, it cannot be restored. *7 • It needs to integrate flood forecast and warning system implemented by PAGASA and that implemented by the dam administrator for the purpose of operation of the dam*40. In the Water Code, there is no provisions concerning operation of a dam in the following way; dam shall be operated in accordance with appropriate operation rules so that it may not cause artificial flood. Tie-up among the relevant ministries and agencies in this regard are requested.*2 • There is no provision on flood control as official disaster prevention organization that may support volunteer-like flood control activities by inhabitants of Barangay. Materials and equipment are not enough, too. *2 • The systems in Bicol and Cagayan have not been well-functioned due to malfunction of gauging devices, inadequate update of H-Q curves, and inappropriate setting of warning water level.*16			
		Earthquake / Tsunami	• Issuance of early warning of tsunami and volcanic eruption is under responsibility of PHIVOLCS.*26 • When large scale earthquake occurs, PHIVOLCS specifies magnitude, center of earthquake source, depth and strength by seismograph network system. State of damages having been reported is gathered up in the earthquake flash report, which is provided to media. In addition, information exchange is made with OCD and DCC in the afflicted district. *10 • PHIVOLCS has a Network of earthquake monitoring stations. Tsunami warning is issued by PHIVOLCS based on those observation data. • Tsunami warning system is set up for Manila Bay area.*1 • PHIVOLCS disseminates tsunami warning to mass media (TV, radio) through OCD and LGU.*26				
		Sediment disaster (Landslide, Debris flow)	• There is no early warning system for sediment disaster. • In the Medium-term Philippine Development Plan 2004-2010, it states that development of community-based forecast and warning system in the landslide hazardous area shall be accelerated. This policy is being implemented in 27 States, to which importance was attached. *1	• Conveyance of step-by-step typhoon information from District Office of OCD to the respective DCC takes long time, because of the restriction in communication methods, etc. (as of 1992) *8			
		Volcano	• When Pinatubo Volcano has erupted, based on the hazard map developed by LOGUVIKCS, alert has been imposed by radio from RDCC; it has functioned effectively. *35 • Manned observation stations are set up and regular monitoring is conducted in 6 volcanoes.*26 • PHIVOLCS has a Network of volcano observatories. Volcano alert is issued by PHIVOLCS based on those observation data. However, the volcano which has been real-time monitoring systems totals to only 6 volcanoes out of 23 active volcanoes. Other 17 volcanoes are observed only seismic activities.*26 • Volcano alert levels are established in consideration of eruption type and local circumstances in each volcano and are classified in 5 levels.*26	• By decentralization, warning /evacuation when volcanic mud flow arises must be dealt with local government; however, the response is not unified among the local governments*23. Damage data are not accumulated and criteria to impose alert are ambiguous. *39 • PHIVOLCS desires to prepare instruments for carrying out emergency observation for those 17 volcanoes if their activity went up.*26			
		High Tide /Storm Surge (Cyclone/ Typhoon)	• As typhoon approaches, 4 level alerts are imposed and is conveyed from PAGASA to citizens (mainly broadcast by radio, but TV and newspapers are also used) and persons in charge of disaster prevention (by FAX) (as of 1992). *8 • There is no forecast / warning system for high tide. PAGASA implements observation at several places for the purpose of research (as of 1992) *8				
		Other disasters	(Forest fire) • Based on Smog Prevention Agreement concluded among ASEAN nations, forest fire early warning system utilizing the satellite images has been developed. *41				
	7.3 Evacuation plan				5	5	3
	7.4 Establishment of Emergency Response System	Central Level	• Education of staffs of Office of Civil Defense (OCD) ; • Education of Civil Defense Officers (CDO); • Online Comprehensive Disaster Management Framework Course is implemented as intended for experts of disaster management as well as person in charge of execution. *9 • Special skill training (Search & rescue course in collapsed site, emergency measures course) is implemented. *9 • OCD organizes 358 technical training conventions all over the nation regarding disaster simulation /drill as well as warning system and emergency measures. *1 • In June 2002, it implemented map exercise on a large-scale earthquake occurs directly under the urban area by inviting 80 persons from NDCC affiliated relevant agencies*2. The second event was held in January 2004 jointly with UNOCHA, where the event was implemented as the drill of International Search and Rescue Advisory Group (INSARAG) by inviting international agencies. In 2008, Asia Pacific Region Disaster Response Drill was implemented by INSARAG; in which 18 countries, 52 agencies, 270 individuals participated. *4 • DSWD that is in charge of rescue has many staffs in local area and have acted	• When disaster occurs, there is a limit of capacity for rescue operation made by the central government and local government as well. *1 • In the local government level, permanent emergency medical service is lacking or not implemented. *1 • Equipment and materials of nationwide emergency medical service team, for example, an ambulance car equipped with survival equipment is lacking. *1 • In a school that had been built long time ago has no toilet facilities; which mean its	5	5	3

			vigorously; however, because of decentralization, its authority, budget and most of the staffs were transferred to the local governments (as of 1993)[*20]. Activity of NGO is vigorous. *[8] ・ DSWD operates Disaster Response Operation Monitoring Information Center (DROMIC), which plays a role of focal point for collection and distribution of information for making decision when disaster occurs. *[4] ・ NDRRMC has operation center with constant staffing, which functions as emergency operation center (EOC) during disasters. Member organizations of NDRRMC send focal persons to EOC during disasters for quick coordination and information management.*[4]	functions are not enough for an evacuation center. *[11] ・ Contact for receiving or distribution of relief goods is not integrated; coordination on relief system is not enough (as of 1992).*[8] ・ There is shortage in transportation means; relief goods cannot be distributed quickly (as of 1992) *[8] ・ In most of the local governments and BDCC, the Standard Operation Procedures (SOP) to be guidelines to execute ambulance and rescue services is not available. In addition, there is no Disaster Prevention Center, which plays central role in the collection, analysis, conveyance of disaster information. *[5] ・ In many local governments, they have no stockpile for emergency. *[5] ・ In Manila Metropolitan Area, no emergency transportation network is confirmed even among the government agencies. It needs to designate 1st and 2nd road network in emergency cases. *[5]			
		Local Level	・ The Act 101211 (SEC 15) provides a guide for local coordination during emergencies: LGU are primary responsible organizations which are supported by LDRRMCs. Private Sector and Civil Society Organizations works in accordance with the coordination mechanism and policies set by LDRRMCs.	・ Permanent and reliable emergency medical services are necessitated at local level across the nation.			
		Training etc.	・ OCD holds emergency response drills and training on alarming system and technical emergency response in the whole country. ・ Drills are regularly conducted in schools and hospitals by Departments of Education and Health.*[37]				
	7.5 Rescue plan	・ It is observed that rescue items are reserved within containers under the bridges or spaces as such. (a case of Metro Manila)			5	5	3
	7.6 Relief plan	・ It is observed that stockpiles are reserved within containers under the bridges or spaces as such. (a case of Metro Manila)			5	5	3
Assistance to challenges	8. Records of Major Assistance by JICA	<Technical Assistance/Dispatch of Experts> ・ Flood –control and Sediment Disaster Center (1997) (Transferred by JICA Study Team) ・ Flood –control and Sediment Technical Disaster (1998-2001) (Transferred by JICA Study Team) ・ Improvement of Earthquake and Volcano Monitoring System (1997) ・ The Project for Enhancement of Capabilities in Flood Control and Sabo Engineering of the Department of Public Works and Highways (2000.1-2005.6) ・ The Project for Strengthening of Flood Forecasting and Warning Administration (2004-2006) ・ The Project for Strengthening the Flood Management Function of DPWH (2005-2010) ・ Flood-control Government Improvement Expert (2006) (Transferred by JICA Study Team) ・ The Project for Improvement of Earthquake and Volcano Monitoring System(2004-2006) ・ Dispatch of Study Team of Cooperation Project for Disaster Assistance (2004) (Transferred by JICA Study Team) ・ Disaster Prevention Plan Expert (2005.1) (Transferred by JICA Study Team) ・ Capacity Development Project on Water Quality Management in the Philippines (2006.1-2011.1) ・ The Project for Flood Disaster Mitigation in Camiguin Island (2007.4-2009.3) (Vol. 1) ・ Strengthening of Flood Forecasting and Warning System for Dam Operation (2009.10-2012-11) <Studies> ・ Study for River Dredging Project (1974) ・ Study for the Flood-Forecasting Systems in the Agno, Bicol and Cagayan River Basins (1975-1977) (Progress report I, Progress report II, Main report, Appendix I, Appendix II) ・ Study on Comprehensive Development Plan for Small River System (1976-1978) (Transferred by JICA Study Team) ・ Study on Basic Volcanic Sediment Disaster Prevention Plan In Mayon Volcano (1978-1980) (Transferred by JICA Study Team) ・ Study on Development Plan in Cotabato andAgusan River Basin (1980) (Transferred by JICA Study Team) ・ Study on Plan of Volcanic Sediment Disaster Prevention and Flood-control (1981-1982) (Transferred by JICA Study Team) ・ Nationwide River Dredging M/P (1982) ・ The Panay River Basin-Wide Flood Control Study (1982-1985) (Summary, Main report, Supporting report ; 1, 2, 3, 4) ・ Study on Flood-control Plan in Bikol River Basin (1983) (Transferred by JICA Study Team) ・ Study on Development Plan for San Roque Multi-purpose Dam (1983-1985) (Transferred by JICA Study Team) ・ Study on Integrated Development Plan for Water Resources in Aguno river Basin (1984) (Transferred by JICA Study Team) ・ Study (F/S) on Amunai Multi-purpose Project (1984) (Transferred by JICA Study Team) ・ Study on Development, Flood-control and Drainage Plan in Upper Agusan River (1984) (Transferred by JICA Study Team) ・ Study of Ambuklao Dam Rehabilitation Project (1985-1987) (Vol. 1) ・ Study of Caliraya Dam Rehabilitation Project (1986) (Vol. 1) ・ Study of Angat Dam Rehabilitation Project (1986-1988) (Summary, Vol. 1) ・ Study of Binga Dam Rehabilitation Project (1986-1988) (Vol. 1) ・ Study on the Cagayan River Basin Water Resources Development (1987) (Summary, Main report, Supporting report) ・ Study on Flood-control Plan in Manila (1987-1989) (Transferred by JICA Study Team) ・ Study of Agno River basin flood control (1988-1991) (Vol. 1, Vol. 2, Vol. 3, Vol. 4, Vol. 5, Vol. 6) ・ Study on Flood-control and Irrigation Plan in Pampanga Delta (1989) (Transferred by JICA Study Team) ・ Study on Flood Control and Drainage Project in Metro Manila (1987-1990) (Vol. 1, Vol. 2, Vol. 3, Vol. 4) ・ Study on Flood Control and Irrigation Development Project in Bicol River Basin (1991) (Summary) ・ Study on Ilog-Hilabangan River Basin Flood Control Project (1989-1991) (Vol. 1, Vol. 2, Vol. 3) ・ Study on the Flood Control for Rivers in the Selected Urban Center(1992-1994) ・ Study on Flood and Mudflow Control for Sacobia-bamban Abacan River Draining from Mt. Pinatubo (1992-1996) (Summary, Main report, Appendix ; I, II, O&M manual, Data book) ・ Study on Sabo and Flood Control in the Laoag River Basin (1995-1997) (Vol. 1, Vol. 2, Vol. 3-I, Vol. 3-II, Vol. 4-I, Vol. 4-II) ・ Basic design study report on flood mitigation project in Ormoc City (1997-2001) (Vol. 1) ・ Project Formulation Study “Disaster Management” (1998) ・ Study on Comprehensive Disaster Prevention around Mayon Volcano (1998-2000) (Vol. 1, Vol. 2, Vol. 3, Vol. 4, Vol. 5, Technology transfer achievement report) ・ The Project for Rehabilitation of the Flood Control Operation and Warning System in Metro Manila (1999-2001) ・ Study on Actual Condition of Drainage Network in Metro Manila (1999-2000) (Transferred by JICA Study Team) ・ Study on Flood-control Project Plan in Ormoc City (1999) (Transferred by JICA Study Team) ・ The Project for Construction of a Hydraulic Laboratory Building (1999-2000) (http://www.mofa.go.jp/mofaj/gaiko/oda/data/zyoukyou/h_13/010627_1.html) ・ The Feasibility Study of the Flood Control Project for the Lower Cagayan River (1999-2001) (Vol. 1, Vol. 2, Vol. 3-I, Vol. 3-II, Vol. 3-III, Vol. 4) ・ Study for Watershed Management in Upper Magat and Cagayan River Basin (2000-2003) (Vol. 1, Vol. 2, Vol. 3) ・ Study on Flood-control Plan in Iloilo City (2001-) (Transferred by JICA Study Team) ・ Project for Rehabilitation of Cagayan Irrigation Facilities (F/S)(2002) (Vol. 1) ・ Study on Sabo and Flood Control for Western River Basins of Mount Pinatubo (2002-2003) (Vol. 1, Vol. 2, Vol. 3-I, Vol. 3-II, Vol. 4) ・ Earthquake Impact Reduction Study for Metropolitan Manila, Republic of the Philippines (2002.8-2004.3) (Vol. 1, Vol. 2, Vol. 3, Vol. 4, Vol. 5, Vol. 6, Supporting report CD, Data book CD-1, Data book CD-2, Maps, Photos) ・ Project for Upgrading of Flood Forecasting and Warning System in the Pampanga and Agno River and Basins (2003, 2006) (Vol. 1) ・ Study on the Improvement of Existing Bridges along Pasig River and Marikina River (2003.10-2004.6)				

		・ Study on Risk Management for Sediment-Related Disaster on Selected National Highways (2005-2007) ・ Program Formulation Study in Disaster Management (2004) ・ Basic Study on the Disaster Prevention and Reconstruction Project for Camiguin Island, Mindanao (2004) ・ Basic Study on the Disaster Prevention of Non-Structural Measures for Camiguin Island, Mindanao (2004.3-9) ・ Study on Risk Management for Sediment-Related Disaster on Selected National Highways (2006.3-2007.6) ・ Study on Actual Condition of Concentrated Heavy Rain Disaster (2004.12) (Transferred by JICA Study Team) ・ Study on Drainage Improvement in the Core Area of Metropolitan Manila (2002-2004) (Summary, Main report, Supporting repot ; Vol. 1, Vol. 2, Vol. 3, Datebook ; 1, 2) ・ The Basic Design Study on the Project for Rehabilitation of the Flood Control Operation and Warning System in Metro Manila ・ Basic Study on Drainage Improvement Plan in Metro Manila (Transferred by JICA Study Team) ・ Study on Potential Collection for Flood-control Project in Whole of Philippines (2005) (Transferred by JICA Study Team) ・ Study on the Nationwide Flood Risk Assessment and the Flood Mitigation Plan for the Selected Areas (2006.9—2008.3) (Vol. 1, Vol. 2, Vol. 3, Vol. 4) ・ Follow Up Collaboration for Landslide Disaster in South Leyte Province (2006.4-2007.3) (Transferred by JICA Study Team) ・ Study on Comprehensive Flood Mitigation for Cavite Lowland Area (2006-) (Vol. 1, Vol. 2, Vol. 3, Vol. 4) ・ Study for Pasig-Marikina River Channel Improvement Project (II) (2006-) ・ Pinatubo Hazard Urgent Mitigation Project (Phase III) (2007-) ・ Project Formulation study on Program for the Disaster prevention(2007-2008) ・ Project for Flood Disaster Mitigation in Camiguin Island (2008.7-2009.3) ・ Project for the Improvement of the Meteorological Rader System (2009) ・ Study on Flood Disasters Caused Typhoons No. 16 (Ondoy) and No. 17 (Pepeng) (2010-) (Vol. 1) ・ Study on Integrated Water Resources Management for Poverty Alleviation and Economic Development in Pampanga River Basin(2009.2-2011.2) (Vol. 1, Vol. 2, Vol. 3, Vol. 4) ・ Study for Improvement of Water Supply and Sanitation in Metro Cebu(2009.1-2010.8) (Vol. 1, Vol. 2, Vol. 3) <Trainings> ・ Volcanology/ Volcanic sediment disaster prevention engineering (1997-2005) ・ Earthquake Engineering (1997,1999-2005) ・ Sewage Works Engineering(1997-2001, 2004-2005) ・ River and Dam Engineering(1997-2005) ・ Port and Harbor(1997-2004) ・ Disaster Prevention(1997-2001, 2003, 2005) ・ Emergency/Disaster Medicine (1997) ・ Emergency disaster rehabilitation system (1998, 2000, 2003) ・ Disaster Medicine(1998-2000, 2004-2005) ・ Seismological and Volcano Logical Observation Systems of Maintenance and Management(2000-2003) ・ Meteorology(2000-2003) ・ Development of Volcanic/ seismic monitoring network (2003-2005) ・ Training on strengthening flood early warning (2003-2005) ・ Civic participation disaster crisis control in coastal big city (2003) ・ Integrated Water Resources Management (2004-2006) ・ Seminar on Integrated Water Resources Management (2006) ・ Seminar on Emergency/Disaster Medicine II(2004.11, 2007.1-2) ・ Seismology, Earthquake Engineering and Disaster Mitigation (2004.9-2006) ・ Mitigation Strategy for Mega-Urban Earthquake Disaster (2005.10-11) ・ Earthquake Mitigation (2005.11-12) ・ Training on disaster mitigation and strengthening measures in the field of disaster medical care (2006.1-2) ・ Volcanology and Comprehensive Sediment-related Disaster Prevention Measures (2006) ・ Operating Management of Earthquake-Tsunami-Volcano Eruption Observation System (2006) ・ Disaster prevention management (2004.10) ・ Sewage Works Engineering and Stormwater Drainage Technology (2006) ・ River and Dam Engineering III(2006) ・ Flood Hazard Mapping (2006) ・ Information Management for Maritime Activity and Disaster Prevention (2006) ・ Sustainable Port Development and Planning (2006) ・ Disaster prevention management plan (2006) ・ Seminar on Disaster Management II (2006)
	9. Records of Assistance by other Development Partners	・ WB: Recommendation of disaster management framework in the turning point of paradigm shift from disaster response to pre-disaster preparation and mitigation. ・ ADB/UNDP: Nationwide assessment of the situation of DRM/Preparation of DRM framework ・ EU/UNISDR/UNDP: Preparation of SNAP/Setting up of Mechanism for Stakeholders Participation in Disaster Mitigation ・ UNDP/AusAID/:READY Project(Preparation of Hazard Map and CBDRM)(2006-2011) /USAID: Urban Disaster Risk Reduction Project (1995-2004) ・ ECHO/ADPC:DRM Mainstreaming in Education Sector /Finland: Support for Setting up Tsunami Warning System in Manila Bay Area ・ ECHO/UNDP:DRM Mainstreaming in Development and Land Use/Physical Planning at Region Level ・ ADPC: Prioritization of Projects in Infrastructure Sector in the context of DRM Mainstreaming (Risk Assessment) ・ ADRC: Training on emergency logistics management (2003), Joint Training with PHIVOLCS on Disaster Management for stakeholders in Education Sector ・ WB: Disaster Risk Management Development Loan with a CAT DDO(2011-2014) ・ WB: Climate Change Adaptation Program (2010-2015) ・ WB: Disaster Risk Reduction City-To-City Sharing Initiative for Developing Countries (2009-2012) ・ UNDP: Integrating Disaster Risk Reduction and Climate Change Adaptation in Local Development Planning and Decision -making Processes(-2012) ・ UNDP: Building Community Resilience and Strengthening Local Government Capacities for Recovery and Disaster Risk Management (2012) ・ UNDP: Early Recovery and Rehabilitation for Central Mindanao (-2012) ・ ECHO: Improving Forest Governance and Sustainable Upland Development through Climate Change Mitigation Financing Strategies in Southern Palawan (2010-2012) ・ ECHO: Integrated Community Disaster Preparedness Program (ICDPP) in four provinces of Philippines(2010-2011) ・ ECHO: Strengthening Assets and Capacities of Communities and Local Governments for Resilience to to Disasters, Year 2 (ACCORD 2) (2008-2010) ・ ECHO: Disaster Risk Reduction in the Eastern Visayas Region (2008-2010) ・ ECHO: Community Based Disaster Risk Reduction in Bicol Region – Philippines (2008-2010) ・ AusAid: Building the Resilience and Awareness of Metro Manila Communities to Natural Disasters and Climate Change Impacts (BRACE Program) (2010-2017) ・ AusAid: Disaster and Climate Risks Management (2006-2014) ・ AusAid-UNDP: Hazard Mapping and Assessment for Community-Based Disaster Risk Management (READY II) (2006-2010) ・ Netherlands: Preparedness for Climate Change Programme (PfCC) - Phase 1(2006-2009)
	10. International Networking	・ PTWC (Pacific Tsunami Warning Center) has network with NDCC and provides information on Tsunami.
ASEAN Cooperation	11. National Policy on ASEAN(ACDM, ARPDM, AADMER) cooperation in Disaster Management, Emergency Response in case of disasters in other ASEAN countries or ASEAN region	・ Participation in ARF meetings on disaster management, monthly ACDM meetings, ARDEX (ASEAN Regional Disaster Exercise)and ASEAN regional technical cooperation Project ・ SASOP (Regional Standing Arrangement and Standard Operating Procedures) started in 2007. ・ Agreement on trans-boundary haze was signed by ministers of ASEAN countries in charge of environment in 2002 and came into effect in 2003. It stipulates forest fire monitoring, prevention, research, coordination mechanism, communication system, information exchange, mutual emergency support and establishment of ASEAN coordination center. Action plan for capacity building of fire fighting in the region and early warning system utilizing satellite images were developed. ・ ASEAN Agreement on Tran boundary Gaze Pollution was signed by ASEAN Member Countries. The Agreement is the first regional agreement in the world that brings a groupe of contiguous states to tackle trans-boundary haze pollution resulting from land and forest fires. *41*42
	12. Resources useful for other ASEAN countries	・ FCSEC (Flood Control and Sabo Engineering Center) has hydrological experiment facilities and 15 technical experts who can provide lectures in international training courses.
	13. Needs for External	

	Assistance from the point of view of Regional Cooperation	

[1] JICA, Asia First Part: “Survey Report for Program Formation in the Field of Disaster Prevention in the Republic of Philippines” (2008).

[2] JICA, “Main Report of the Final Survey Report for Promotion of Programming Disaster Prevention in Philippines” (2004)

[3] JICA, “Main Survey Report (summary) on Improvement of Implementation System of Flood Control Project of Medium and Small Rivers in the Project for Enhancement of Flood Control/Sabo Technological Capabilities” (2004).

[4] Philippines, Interim national progress report on the implementation of the Hyogo Framework for Action (2008).

[5] JICA, “Volume 7 (Summary) of the Final Survey Report on the Plan for Countermeasures to Earthquake Disaster Prevention in Manila Metropolitan Area in Philippines” (2004).

[6] “Disaster Prevention System in Asian Countries” (arranged by Disaster Prevention Department).

[7] JICA, “Survey Report for Basic Design for Improvement of Flood Forecast / Warning System in Pampanga /Agno River in Philippines (2007).

[8] Disaster Prevention Bureau of National Land Agency, Engineering Consulting Firms Association (ECFA), “Survey on Promotion of Disaster Prevention System Development in Developing Countries –intended for Tropical Strom Disaster in Philippines” (1992).

[9] ADRC, Country Report (2006).

[10] JICA, “Preliminary Survey Report for the Survey of the Plan for Countermeasures to Earthquake Disaster Prevention in Manila Metropolitan Area in Philippines” (2002)

[11] JICA, “Data Collection Survey on ASEAN Regional Collaboration in Disaster Management ” (2012): Interview to OCD (2012.03.13).

[12] JICA, “Preliminary Survey Report for the Survey on National Flood Disaster Risk Assessment and Flood Damage Mitigation Plan in Specific Areas in Philippines” (2006).

[13] JICA, “Summary of Final Survey Report for Comprehensive Disaster Prevention Plan at Mayon Volcano in Philippines” (2000).

[14] Website of AusAID: (http://www.ausaid.gov.au/publications/pubout.cfm?ID=9625_567_8925_6086_7461&Type=PubKADRR) (accessed on 30 March 2012).

[15] JICA, “Data Collection Survey on ASEAN Regional Collaboration in Disaster Management ” (2012): Interview to OCD (2012.03.13).

[16] JICA, “Data Collection Survey on ASEAN Regional Collaboration in Disaster Management ” (2012): Interview to PAGASA (2012.03.14)

[17] Website of JICA: (http://www.google.co.jp/url?sa=t&rct=j&q=&esrc=s&source=web&cd=1&ved=0CFIQFjAA&url=http%3A%2F%2Fwww.jica.go.jp%2Factivities%2Fevaluation%2Foda_loan%2Fafter%2F2001%2Fpdf%2Fproject_54_all.pdf&ei=ujbsT4qBA4ramAXJibnLAg&usg=AFQjCNGhSbpLItCoE1CWTfAXfZT3_ev5uQ&sig2=zVdtglcNXi7TwDncJtn-Rg) (accessed on 28 June 2012)

[18] JICA, “Preliminary Survey Report on the Survey of the Plan for Flood Control Countermeasures in the Downstream of Cagayan River in Philippines” (2000)

[19] PAGASA-POST Presentation Data “Lessons Learned from the 2011 Floods (The Philippines Country Report), South-East Asia Flood Risk Reduction Forum 20 February 2012, Bangkok, Thailand”.

[20] Disaster Prevention Bureau of National Land Agency, Engineering Consulting Firms Association (ECFA), “Survey on Promotion of Disaster Prevention System Development in Developing Countries –intended for Tropical Strom Disaster in Philippines (the Second Fiscal Year)” (1993).

[21] JICA, “Final Report (summary) on Survey of the Plan for Flood Control Countermeasures in the Downstream of Cagayan River in Philippines” (2002).

[22] JICA, “Assessment Report at the End of Stage 1 of the Project for Enhancement of Flood Control/Sabo Technological Capabilities in Philippines” (2002).

[23] JICA, “Preliminary Survey Report for Survey on the Plan for Flood and Mud Flood Control in the Western River Basin of Mt. Pinatubo in Philippines” (2002)

[24] JICA, “Preliminary Survey Report for Improvement of Flood Forecast / Warning System in Pampanga /Agno River in Philippines” (2004)

[25] JICA, “Survey Report on the Plan for Countermeasures to Earthquake Disaster Prevention in Manila Metropolitan Area in Philippines” (2004).

[26] JICA, “Data Collection Survey on ASEAN Regional Collaboration in Disaster Management ” (2012): Interview to PHIVOLCS (2012.03.14).

[27] JICA, “Assessment Report at the End of the Plan for Development of Earthquake and Volcanoes Observation Network” (2006).

[28] JICA, “Data Collection Survey on ASEAN Regional Collaboration in Disaster Management ” (2012): Interview to DPWH (2012.03.16).

[29] JICA, “Data Collection Survey on ASEAN Regional Collaboration in Disaster Management ” (2012): Interview to MGB (2012.03.15)

[30] MGB Geological Database Information System: (http://gdis.denr.gov.ph/mgbviewer/) (accessed on 3 August 2012)

[31] JICA, “Survey on Assessment / Management Plan of Risk Allowances of Sediment Disaster on Roads” (2006)

[32] JICA, “Main Survey Report for Management Plan of the Upstream Areas of Magat River and Cagayan River in Philippines” (2004).

[33] JICA, “Preliminary Survey Report (I/A Conference) for Management Plan of the Upstream Areas of Magat River and Cagayan River in Philippines” (2001)

[34] Institute of Global Environmental Strategies (IGES); “2007 Momentous News in Asia” (2008).

[35] JICA, Summary Survey Report on the Plan for Flood and Mud Flood Control in the Eastern River Basin of Mt. Pinatubo in Philippines” (1996).

[36] Philippines, National progress report on the implementation of the Hyogo Framework for Action (2009-2011) interim, 2011.

[37] JICA, “Report on Conference regarding Implementation of Project for Enhancement of Administrative Functions for Flood Control in Philippines” (2006).

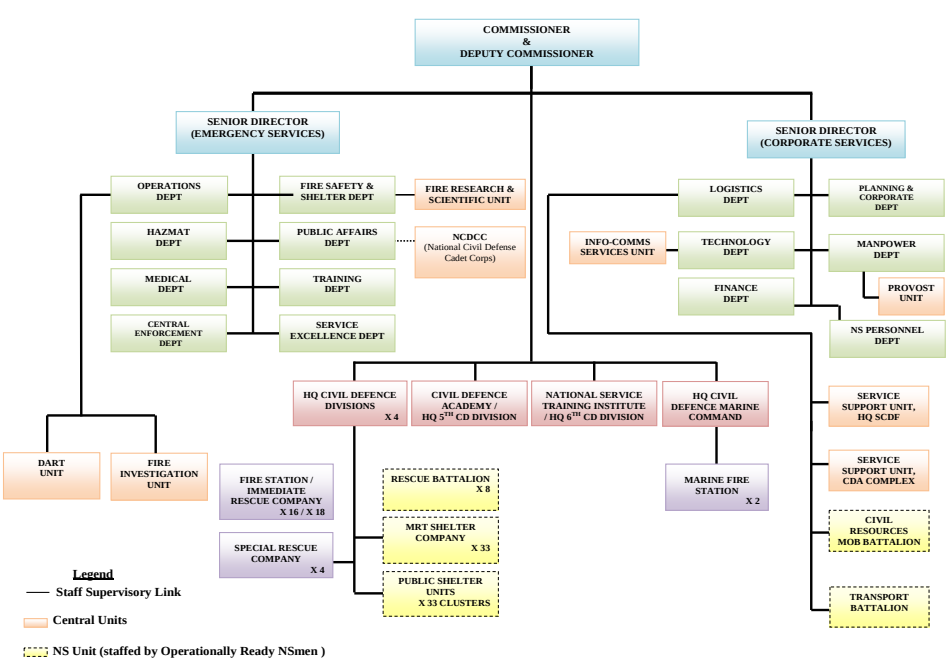
[38] JICA, “Preliminary Survey Report on the Survey for Comprehensive Disaster Prevention at Mayon Volcano in Philippines” (1998).

[39] JICA, “Final Report (summary) for Survey on the Plan for Flood and Mud Flood Control in the Western River Basin of Mt. Pinatubo in Philippines” (2003).

[40] JICA, “Assessment Report at the End of the Project for Guidance and Enhancement of Flood Forecast and Warning Service in Philippines” (2006).

[41] Institute of Global Environmental Strategies (IGES); “2003 Momentous News in Asia” (2004).

[42] Institute of Global Environmental Strategies (IGES); “2002 Momentous News in Asia” (2003).

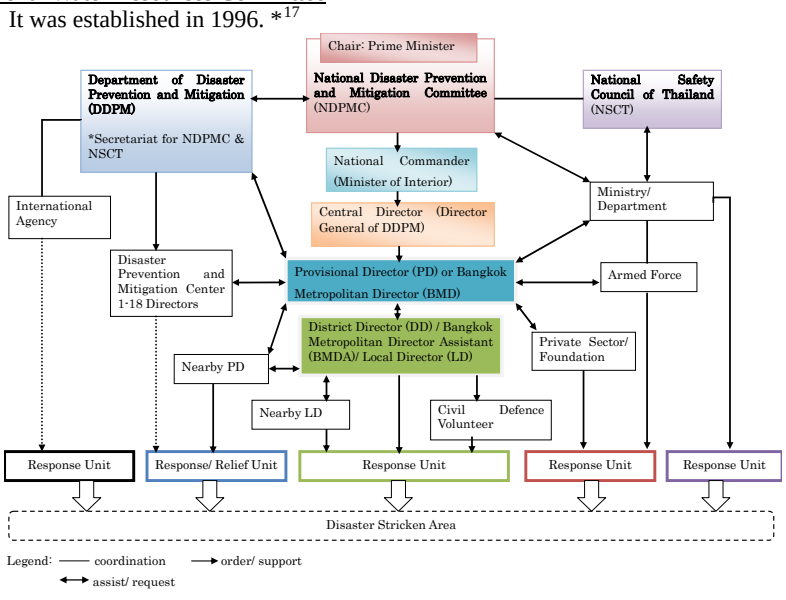
Inventory					HFA PforA	HFA IofP	AADMER
Current Situation and Challenges	1. Features of Disasters	• Singapore does not have tropical cyclone, earthquake nor volcano eruption. (Possibility of man-made disasters in urban area where various human activities concentrate.) *1*2*3					
	2. Administrative Division	5 Community Development Council Districts- 48 Constituencies					
	3. Development of Legislative Framework and Disaster Management Policy & Plans		Current Situation	Challenges	1.(i)	1.(i)	2.1
		Development of Legislative Framework	<Fundamental Law> • Fire Safety Act (1986): It provides the framework for responding to preparedness of commercial and industrial facilities when fire occurs. • Environmental Pollution Control Act (2002): It provides the management of environmental contamination and harmful substance. • Civil Defense Act (1986) (It provides the legal framework for the declaration of a state of emergency and the mobilization and deployment of operationally ready national service rescuers) *1 • Civil Defense Shelter Act (1997) (It provides the legal framework for provision of buildings with civil defense shelters during a state of emergency) *1				
		Disaster Management Policy					
		Disaster Management Plans	• Operations Civil Emergency (Ops CE) Plan: (Formulated by SCDF): It coordinates the operations of SCDF and all 22 relevant agencies (RA) in the management of a large scale disaster. *1 • National Tsunami Management Plan (establishment of early warning system is discussed). *4				
	4. Establishment and Enhancement of Disaster Management System	Institutional Framework	Current Situation	Challenges	1.(ii)	1.(ii)	2.1 4
		Central Level	<u>Home-front Crisis Management System</u> • Home-front Ministry Group • Home-front Crisis Executive Group • Statutory Board <u>Ministry of Home Affairs: (MHA)</u> *1 • Permanent Secretary: the chair of Home-front Crisis Executive Group • Main policy making organization for safety and defense of the nation • When disaster, SCDF is responsible for coordination among relevant organizations that plan and/or implement the responses against the disaster according to their competences. <u>Singapore Civil Defense Force (SCDF)</u> *1 • National organization for emergency response in charge of fire fighting and rescue • It commands and coordinates response of organizations concerned with advice by joint planning staffs. • It has 5,600 staffs (1,700 regular staffs, 200 civil staffs, 3,700 national service persons). In an emergency, more than 8300 stand-by national service persons can be mobilized. • There are 16 fire fighting offices over the nation divided into 4 divisions. In these offices, fire fighters and search and rescue staffs are deployed. Command center in SCDF head office decide and order to the nearest team to g for operation. • SCDF has established the Disaster Assistance and Rescue Team (DART), a specially trained unit that can undertake high-risk fire fighting and rescue operations.				
							
			Source: SCDF (The organizational chart as of November 1, 2011) **Organizational Structure of Singapore Civil Defense Force**				
			<u>Organizations in charge of Non-structural Measures for Disaster Risk Mitigation and Preparation</u> • Department of Meteorology of the National Environment Agency(NEV)(provision of weather information, management of haze monitoring center) <u>Organizations in charge of Structural Measures for Disaster Risk Mitigation</u> • National Critical Infrastructure Authority				
		Local Level	<u>Civil Defense Execution Committee (CDEC)</u> • CDEC is grassroots entities that help to promote civil defense messages at the community level and assist in organizing various civil defense programs. *1 <u>Community Emergency Response Teams (CERT)</u> *1 • CERT is emergency response units consisting of residents living within a particular neighborhood's vicinity. • During emergencies, the CERT will work hand in hand with the police and SCDF to mitigate the impact of the emergencies on the community.				
		Inter-organizational Arrangement	<u>"Home-front Ministry Group" is organized under Home-front Crisis Management System</u> • In an emergency, SCDF is vested with the authority to direct all response forces under a unified command structure*4. • With the coordination by SCDF, pre-planning activities and mitigating operations during an incident are undertaken by 18 other ministries and statutory boards under a unified framework of Operation Civil Emergency*5*6. • Exercises are regularly conducted to test the effectiveness of the multi-agency response and typically involve several hundred participants*4.				
		Financial Preparation /	<Contingency Fund> • The Budget size for SCDF on national level is about SGD$300 million.				
	5. Policy on Community-based Disaster Management	• SCDF also aims to work hand in hand with the community to be more involved in their own safety and security. *1 • Community Emergency Preparedness Program (CEPP): Basic First Aid, One-Man Cardio-Pulmonary Resuscitation (CPR) & Automated External Defibrillator (AED), Fire Safety & Casualty Evacuation, Emergency Procedures and Terrorism. • Civil emergency handbook is provided to the public.			1.(iii)	1.(iii)	2.6 4
	6. Prevention and Mitigation	Current Situation		Challenges	-	-	-
	6.1 Flood	Identification of Disaster Risks	• Flood risk maps covering the whole country are being developed currently*7. • On the other hand, 58 flood prone areas have been identified by Public Utilities Board (PUB), and the map is available on the website. The total area is estimated at 49 ha. *8		2.(i)	2.(i)	1.1

	Monitoring	• Responsible organization for flood monitoring is MSS (Meteorological Service Singapore) for meteorological observations and PUB for hydrological observations. There are 64 rainfall stations and 150 sensors for monitoring of the drainage system. *7 • NEV provides meteorological information to civil aviation- and/or marine-related agencies		2.(i)	2.(ii)	1.3
	Non-structural Measures	• Past flash flood records have been accumulated and disclosed on Pub's website. The recorded items are; location, extent (depth, width, length and impact to traffic), findings and follow-ups. *9		4.(i)	4	2.2
	Structural Measures	• PUB adopts three key strategies for flood management, namely i) providing adequate drainage ahead of new developments, ii) implementing flood protection measures, and iii) continual drainage improvement in flood prone areas. In accordance with the strategies, necessary measures such as drainage systems and flood barriers have been developed and maintained. *10		4.(i)	4	2.2
6.2 Earthquake / Tsunami	Identification of Disaster Risks	• Historically, big earthquake disaster and tsunami disaster are not recorded. *4 • Tsunami risk assessment was completed. Some beaches vulnerable to the risk of Tsunami were identified.		2.(i)	2.(i)	1.1
	Monitoring	• The seismic monitoring network in Singapore currently comprises four sensors located at Bukit Timah, Jurong West, Tekong Island and Toa Payoh.		2.(i)	2.(ii)	1.3
	Non-structural Measures			4.(i)	4	2.2
	Structural Measures			4.(i)	4	2.2
6.3 Sediment disaster (Landslide, Debris flow)	Identification of Disaster Risks			2.(i)	2.(i)	1.1
	Monitoring			2.(i)	2.(ii)	1.3
	Non-structural Measures			4.(i)	4	2.2
	Structural Measures			4.(i)	4	2.2
6.4 Volcano	Identification of Disaster Risks	• There is no active volcano in Singapore.		2.(i)	2.(i)	1.1
	Monitoring	N/A		2.(i)	2.(ii)	1.3
	Non-structural Measures	N/A		4.(i)	4	2.2
	Structural Measures	N/A		4.(i)	4	2.2
6.5 High Tide /Storm Surge (Cyclone/ Typhoon)	Identification of Disaster Risks			2(i)	2.(i)	1.1
	Monitoring			2.(i)	2.(ii)	1.3
	Non-structural Measures			4.(i)	4	2.2
	Structural Measures			4.(i)	4	2.2
6.6 Other Disasters	Identification of Disaster Risks			2.(i)	2.(i)	1.1
	Monitoring	• Office of Meteorological Service of the National Environment Agency takes charge of operation of the Smog Monitoring Center.		2.(i)	2.(ii)	1.3
	Non-structural Measures			4.(i)	4	2.2
	Structural Measures			4.(i)	4	2.2
6.7 Common items for Disaster	Non-structural Measures	• SCDF does not need DMIS and a disaster loss database for natural disaster because a large disaster has not occurred so far. *4 • SCDF has established the Emergency Operation Center (EOC). In emergency situation, SCDF manages the situation of disaster response. *7 • The Building and Construction Authority of Singapore has strict building codes and conducts regular checks to ensure their compliance. *7		4	4	2.2 2.5
				4	4	2.8
	Structural Measures	• National Critical Infrastructure Authority is responsible to assist major buildings and infrastructure risk assessment. *4		4	4	2.3.2 2.3.3
	Climate Change Adaptation	• There is a study on-going on the impact of climate change on Singapore. *4 • Responsible body: National Climate Change Committee (2007), National Climate Change Secretariat (2010) • NFP: Ministry of Environment and Water Resources • National adaptation policy is embodied in the National Climate Change Strategy (2008)		4.(i)	4.(i)	2.7
	Public Awareness Research and Development /Human Resource Development / for Disaster Management	<Disaster Awareness Raising/Disaster Education/Drills> • Since 1982, the SCDF has been reaching out to people with the objectives of enhancing the awareness of the whole population in Civil Defense. Under the Civil Defense Public Education Program, the SCDF aims to have at least one member of every household trained in civil defense skills. *1*5 • The Meteorology Service has in place all standard of procedures for various types of disasters. *4 • SCDF oversees the civil defense shelter construction program. *1*5*11 • Public education takes place via the distribution of the Civil Defense Emergency Handbook. *1 • Methods of educating the public include the conduct of annual Community Exercises and the Home Fire Safety Visit Program. The former familiarizes the grassroots volunteers and residents on how to deal with large scale emergencies within their neighborhood, while the latter provides personal fire safety advice from CD volunteer personnel to registered residents. *1 • To sensitize and get the community more prepared for terrorist acts, the SCDF conducts modular-based instructional training for the public under the Community Emergency Preparedness Program (CEPP). *1 • SCDF constantly recruits volunteers from the community. They are trained to assist the SCDF in operational and public educational activities. *1 • SCDF and other MHA agencies have established the Community Safety and Security Program (CSSP), a framework that encourages the community to look after its own safety and security through self-help and mutual support. *1 • SCDF works closely with the Ministry of Education to incorporate emergency preparedness as a subject within the Civics and Moral Education Syllabus for students in the primary and secondary levels. Since 2005, SCDF has reached out to the youths in secondary schools through the formulation of the National Civil Defense Cadet Corps. In 2007, SCDF started to reach out to primary school students through a Fire Station Engagement Program. *4		3	3	2.3.1
7. Preparedness and Response	Current Situation		Challenges			
7.1 Disaster Response plan / Emergency Financial Measure	Central Level	<Emergency Operation Plan(EOP), Contingency Plan(CP) .etc> • The Ops CE is a national-level contingency plan. The Ops CE is activated when pre-defined emergency event occur. • SCDF has a comprehensive set of emergency preparedness plan, which includes Community Emergency Preparedness Program		5	5	3
	Local Level					
7.2 Early Warning	General Warning and Forecast/Communication	• The National Environment Agency (NEA) provides weather surveillance and multi-hazard warning services on a 24/7 basis to the public, industry and relevant agencies in Singapore. • NEA established the Meteorological Service Singapore (MSS). MSS provides weather forecasts, heavy rain warnings, smoke haze advisories, and information of earthquake/tremor/tsunami. *7 • SCDF has a Public Warning System (PWS) to provide early warning to the general population of any imminent threats that could endanger lives and property. PWS is in place with an island wide network of more than 240 outdoor sirens mounted strategically on high rise buildings. *7 • Radio and TV stations broadcast advisory message from SCDF. *7 • MSS has implemented "my ENV iPhone App" in July 2011 to provide environmental information (including weather information) to iPhone users. *7 • The Heavy Rain SMS Alert System is implemented in July 2011 in collaboration with the PUB (national water agency) to provide SMS alerts of heavy rain and high water levels in canals to the public. *7		2.(ii)	2.(ii)	1.2
	Flood	• MSS provides warnings of heavy rain as well as real-time rainfall data from its network of 64 rain gauges around the island for the purpose of flood monitoring. In contrast, PUB has 150 water level sensors for monitoring of the drainage system. Warnings are disseminated via SMS, fax and internet. *7				
	Earthquake / Tsunami	• MSS provides information of earthquake/tremor/tsunami. *7				

			• Tsunami early warning system was developed in 2008. It is able to receive data in real-time from more than 20 seismic stations in the region. [*7]				
		Sediment disaster (Landslide, Debris flow)	• Not a major disaster, no information available				
		Volcano	• MSS monitors and issues advisories/alerts about volcanic ash fallout to aviation sector and the public. [*7] • Alerting and assessments are based on advisories from Volcanic Ash Advisory Centers (VAAC) and dispersion models run in-house. [*12]				
		High Tide /Storm Surge(Cyclone/ Typhoon)	• Not a major disaster, no information available				
		Other disasters	• MSS carries out routine monitoring of the forest fires/ haze situation in the region using data from the polar-orbiting satellites. MSS advises the Haze Task Force on risk of trans-boundary haze affecting Singapore. [*12]				
	7.3 Evacuation plan	• Ops CE plan • "Community Emergency Preparedness Program" provides evacuation methods.			5	5	3
	7.4 Establishment of Emergency Response System	Central Level	• SCDF provides effective 24-hour fire fighting, rescue and emergency ambulance services. [*4] • In an emergency, SCDF is vested with the authority to direct all response forces under a unified command structure. [*1] • With the coordination by SCDF, pre-planning activities and mitigating operations during an incident are undertaken by 18 other ministries and statutory boards under a unified framework of Operation Civil Emergency. [*1]		5	5	3
		Local Level					
		Training etc.	• Exercises are regularly conducted to test the effectiveness of the multi-agency response and typically involve several hundred participants.				
	7.5 Rescue plan	• Ops CE plan • Country Emergency Rescue Team (CERT) is formed by community volunteer.			5	5	3
	7.6 Relief plan	• Ops CE plan			5	5	3
Assistance to challenges	8. Records of Major Assistance by JICA	<Experts> • Disaster Management/Medical and Humanitarian Emergencies (2006.4-2007.3) <Studies> • Study mission on disaster assistance cooperation projects (2004-2005)					
	9. Records of Assistance by other Development Partners						
	10. International Networking	• Intergovernmental Coordination Group for the Indian Ocean tsunami Warning and mitigation System was established in 2005 under the coordination of IOC UNESCO. *[13]					
ASEAN Cooperation	11. National Policy on ASEAN(ACDM, ARPDM, AADMER) cooperation in Disaster Management, Emergency Response in case of disasters in other ASEAN countries or ASEAN region	• Signed AADMER in 2007(ASEAN Agreement on Disaster Management and Emergency Response)(AADMER stipulates mutual cooperation in case of disaster.) • Participation in ARF meetings on disaster management, ACDM meetings, ARDEX (ASEAN Regional Disaster Exercise)and ASEAN regional technical cooperation Project • SASOP (Regional Standing Arrangement and Standard Operating Procedures) started in 2007. • SCDF has assisted Philippines in the Baguio Earthquake rescue operation in 1990 and Malaysia in rescue operation in the collapse of the Highland Towers in 1993, and Taiwan in 921 Earthquake rescue operation in 1999. [*5] • Agreement on trans-boundary haze was signed by ministers of ASEAN countries in 2002 and came into effect in 2003. It stipulates forest fire monitoring, prevention, coordination mechanism, communication system, mutual emergency support and establishment of ASEAN coordination center. Action plan for capacity building of fire fighting in the region and early warning system utilizing satellite images were developed. [*12] *[14]					
	12. Resources useful for other ASEAN countries	• International Search and Rescue Advisory Group (INSARAG) register SCDF as an international Search and Rescue Advisory Group. Since April 1999, the Singapore Civil Defense Force registered two of its disaster management experts to be part of the United Nations Disaster Assessment and Coordination (UNDAC) Team. • SCDF offers training courses, such as the Urban Search and Rescue Course, Fire Fighting and Hazmat Course and Emergency Behavior Management Course, to its international partners. To date, some 263 participants from 37 countries have attended courses at the Civil Defense Academy. Overseas participants in CDA courses include personnel from the fire and rescue departments in Taiwan, Brunei Fire Services and the Special Malaysia Disaster Assistance and Rescue Teams (SMARTS).					
	13. Needs for External Assistance from the point of view of Regional Cooperation						

[1] ADRC, Country Report (2006)
[2] Website of ARDC: (http://www.adrc.asia/latest_j/index.php) (accessed on 23 March 2009)
[3] Website of Emergency Events Database: (http://www.emdat.be/Database/CountryProfile/countryprofile2.php) (accessed on 23 March 2009)
[4] Singapore, Interim national progress report on the implementation of the Hyogo Framework for Action, 2008
[5] ADRC, Country Report (2003)
[6] ADRC, Country Report (2001)
[7] JICA, "Data Collection Survey on ASEAN Regional Collaboration in Disaster Management " (2012): Interview to SCDF (2012.04.05)
[8] Website of PUB: (http://www.pub.gov.sg/managingflashfloods/fpa/Pages/default.aspx) (accessed on 28 June 2012)
[9] Website of PUB: (http://www.pub.gov.sg/managingflashfloods/Pages/recent.aspx) (accessed on 28 June 2012)
[10] Website of PUB: (http://www.pub.gov.sg/managingflashfloods/fms/Pages/default.aspx) (accessed on 28 June 2012)
[11] ADRC, Country Report (2002)
[12] Institute of Global Environmental Strategies (IGES); "2003 Momentous News in Asia" (2004)
[13] Indonesia, Interim national progress report on the implementation of the Hyogo Framework for Action, 2008
[14] Institute of Global Environmental Strategies (IGES); "2002 Momentous News in Asia" (2003)

Inventory					HFA		AADMER
					PforA	IofP	
Current Situation and Challenges	1. Features of Disasters	• Frequent Natural Disasters *[1]*[2]: 1980-2011 EM-DAT Disasters 104 nos.; Out of these flood (58%), Storm (29%) • Possible Natural Disasters: Torrential Rain and Flood (14 times during the last decade since Jan. 1999), Flash Flood/Landslide/Mud Flow(5 times in the last decade), Tsunami (1 times 2004), Tropical Cyclone (1 time per annum), Drought (1 time), Earthquake (M5.9 in 1983), Surge, Forest Fire, Windstorm. *[3] • Many flash floods, landslide and mud slide occurs in the Northern mountainous area. The North-Eastern part is a dry plateau area, where, in the rainy season, flash floods as well as flood occur. In the central plain area, river floods, inundation in the urban area, occur in the rainy season. The South area consists of mountains and narrow plain field along the coast; there occur flash floods, mud slide, tropical storm, and forest fire.*[1] • In the Citizen Defence Plan 2005, it quoted flood, tropical storm, drought, and landslide as the natural disasters with the highest risk. *[3] • Numbers of death by tsunami in 2004 were 8,400. • A large-scale flood in these years occurred in 1975, 1978, 1983, 1995, 1998, 2000 and 2002.*[4]*[5] • In Bangkok, flood damages become a serious issue ; floods have occurred by ground settlement (5 ~ 10cm per year) as the results of excessive pumping up of underground water and such circumstances have been caused by urban development, delay in preparation of drainage system, decrease in water storage capacity with reclamation of canals and delay in development of municipal water supply. Changes in the type of building from elevated floor type assuming waterway traffic to the low floor type building with raised ground level for road traffic also lead to the expansion of damages. *[6]*[7]*[8]*[9] • 36% of national land is Mekong River Basin. Most of the other area is Chao Phraya River Basin *[10]. In mid-downstream basin of Chao Phraya River, flooding proceeds slowly and continues for 3-5 months.*[7] • In Phuket City, rainfall flows out from mountains close to the urban area at an instant as flash flood; flood occurs every year correlatively with the low flow capacity of the river (as of 1989). *[11] • It is hit by drought in the interval of once in every 3 years. *[7] • Tropical storm hit the country 4 times in a year in average. Tropical storms in 1998 have caused large flood damages. *[12] • In 1983, earthquake of M5.9 occurred. *[12] • Coast erosion became serious issue in the cities along the coast line of Thailand. *[13] • Floods have become the most devastated disaster of the country and according to past 30 year statistics data (1970-2009), average occurrence no. of disaster is 1.48 which is the highest value among the natural disasters in the country with 67.1 of yearly average of casualties. Floods are the dominant risk in Thailand with economic AAL (Average Annual Loss) of $164.4 million, followed by tsunami ($50.6 million), storms ($36.8 million) and droughts ($20.5 million).*[14]			
	2. Administrative Division	77 Provinces (changwat) – 878 District (Amphoe)－7,254 Tambon – 69,307 Community (Muban) *[15]					
	3. Development of Legislative Framework and Disaster Management Policy & Plans		Current Situation	Challenges	1.(i)	1.(i)	2.1
		Development of Legislative Framework	<Fundamental Law> • Disaster Prevention and Mitigation Act (2007): DPM Act*[1]: It has been established newly in the place of Civil Defense Act (1979): (1) it provides an agency for the formulation of major policy /plan for the Nation, State and Bangkok Metropolitan Area, (2) it provides the Prime Minster or designated vice minister as the commander of the nation, (3) it enhances Department of Disaster Prevention and Mitigation (DDPM) as the center player of the National Disaster Management, (4) it grants responsibility on disaster prevention to the local governments based on the disaster prevention plan of the State. <Laws in relevant sectors> • Water Resources Act				
		Disaster Management Policy	• Based on National Civil Defense Plan 2005, after consultation with other relevant agencies, DDPM implements preparedness to disasters, emergency response, re-construction and disaster prevention based on the concept of integrated disaster risk management. *[15] • In the Policy Division of DDPM, a working group for development of the White Paper for Disaster Prevention has been established; the White Paper for Disaster prevention has been developed, published and distributed. *[1] • Policy is reviewed in the light of Flood disaster in 2011 • As one of the 9 basic policies announced by the Prime Minister in March 2005, the importance of disaster prevention management has been shown. *[15]				
		Disaster Management Plans	<Central Level> • Strategic National Action Plan for Disaster Risk Reduction 2010-2019 (SNAP) • National Disaster Prevention and Mitigation Plan 2010-2014 (NDPMP): it is formulated by DDPM as the secretariat of the National Disaster Preparedness and Mitigation Committee every 3 years after consultation with relevant ministries and agencies, local governments and private sectors. This plan becomes the basis for Disaster Preparedness and Mitigation Plan of States as well as that of Bangkok. The main subjects are: (1) guidelines, methods and budget for execution of disaster preparedness and mitigation, (2) provision of short-term / long-term supports and development of guidelines and methods for disaster impact reduction (people and administrative services, evacuation procedures of local governments, health care / public services for sufferers including support on communication means), (3) relevant government organizations as well as local governments shall perform the respective duties according to the above (1) and (2) and efforts must be made to secure the necessary budget, (4) matters to be implemented to execute disaster preparedness and mitigation regarding person in charge of the support / equipment and materials / allocation of goods, capacity building of person in charge of disaster prevention and (5) guidelines for post-disaster reconstruction of community. • National Civil Defense Plan B. E. 2548 (2005)*[1]*[15]: it is approved by National Civil Defense Sub-Committee. This is revised by DDPM every 3 years and is approved by the National Disaster Preparedness and Mitigation Committee. This is the master plan when disaster-related organization intends to develop its action plan or when the guidelines are provided. It is made of 2 parts; disaster preparedness and mitigation and national defense. By the time when National Disaster Preparedness and Mitigation plan is formulated, the current National Civil Defense Plan 2005 is applied. • Flood / Storm /Landslide Response Master Plan for Prevention of Natural Disaster and Support for Sufferers (2008-2012) has been formulated jointly by National Economy and Social Development Board (NESDB), Ministry of Home Affairs and Ministry of Natural Resources and Environment and has been approved by the Cabinet. Main subjects are: (1) deciding measures for support of sufferers and establishing policy for risk damage mitigation, (2) improvement of efforts of self-help in the regional society and initial disaster prevention capacity, (3) early recovery of metal health of sufferers; it consists of 4 strategies, namely 1) prevention / mitigation of disaster, 2) protection from disaster, 3) risk management and 4) post-disaster management. *[16] • National Tsunami Response Plan: It stated on tsunami early warning, mitigation of tsunami damages, emergency response and disaster education. *[7] • Flood, storm and landslide prevention master plan for natural disaster prevention and relief of affected people (2008-2012) was approved by the Cabinet. <Local Level> • Preparation of Provincial Disaster Prevention and Mitigation Plan (Disaster Prevention and Mitigation Act stipulates it compulsory. Plan of state level is needed to be formulated by a committee, which is chaired by the head of Province and consists of representatives of municipalities and Tambon. *[15] • Disaster Preparedness and Mitigation Plan*[1]: Main subjects are: (1) establishment of Special Command Center at occurrence of disaster (a control tower of disaster preparedness and mitigation activities), (2) procurement plan and proceedings of commodities such as instruments, equipment and materials, commodities and means of transportation required for the execution of disaster preparedness and mitigation activities by the local government, (3) procurement plan and proceedings of equipment of disaster early warning system to the community and the people and (4) cooperation plan with NGOs and so on. • Bangkok Disaster Preparedness and Mitigation Plan*[1]: Main subjects are; (1)	• DDPM is planning to prepare integrated disaster prevention and mitigation action plan with the purpose of participation of all the stakeholders such as states, ministries and agencies, private sectors, government agencies, financial groups, NGOs and other relevant organizations*[1].			

			establishment of Command Center to obtain approval for disaster preparedness and mitigation measures to be taken in the place where disaster has occurred, (2) procurement plan and proceedings of commodities such as instruments, equipment and materials, commodities and means of transportation required for the execution of disaster preparedness and mitigation activities, (3) procurement plan and proceedings of signals to inform occurrence or sign of occurrence of disaster, (4) Bangkok Disaster Preparedness and Mitigation Activity Implementation Program and (5) cooperation plan with NGOs in Bangkok. • Formulation of Tanbon and village level disaster prevention plan is not obligated by law; however, head of province can give instructions to Tambon, etc., which has potential danger, to formulate disaster prevention plan. *15 • The template for disaster prevention plan has been developed; it has been distributed together with CDBRM. As to the template of district level, a lecture course was held concerning the formulation of disaster prevention plan intended for the representatives of district office of DDPM all over the nation. *15 • In 2 pilot sites (for flood and landslide), disaster prevention plan of the village level has been formulated. *15			
	4. Establishment and Enhancement of Disaster Management System	Institutional Framework Central Level	Current Situation <u>National Disaster Prevention and Mitigation Committee (NDPMC)</u> *1 • Chair : Prime Minister or designated Deputy Prime Minister • First vice-chair: Minister of Interior • Second vice-chair: Permanent Secretary of the Ministry of Interior • Member: Ministers of the relevant ministries and agencies such as Minister of Interior, Minister of Defense, Minister of Agriculture and Cooperation, Minister of Transport and Communication, Minister of National Natural Resources and Environment, Minister of Information, Communication and Technology, Minister of Health, Minister of Finance and so on. • Secretariat; Director General of Department of Disaster Prevention and Mitigation (DDPM) <u>Department of Disaster Prevention and Mitigation (DDPM)</u> *1 • It was established under the Ministry of Interior (MOI) in 2002, integrating organizations concerned with disaster prevention and mitigation (Civil Defense Division of State Administration Bureau, Rural Development Promotion Bureau, Social Welfare Division of Community Development Bureau and Secretariat of National Security Council). • It has 4,220 staffs (out of the said 4,220, 1,940 are civil officers, the remaining are regular /temporary employees) and 18 Regional Operation Centers & 75 Provincial Offices(as of 2008). • The role of this organization is to propose measures for the formulation of National Disaster Preparedness and Mitigation Plan, coordination among disaster prevention-related agencies including local governments. • By Article 11 of Disaster Preparedness and Mitigation Act, it is given the status of an organization that controls exclusively the national level disaster preparedness and mitigation under the control of the Ministry of Interior. • In the headquarters, besides Departments such as Human Resources, General Affairs, Accounting, there are Disaster Preparedness and Mitigation Measures Policy Bureau, Disaster Prevention Promotion Department, Disaster Preparedness Countermeasure Department, Disaster Mitigation Command Center, and Sufferers Support Department. *3 • Besides the headquarters in Bangkok, it has 18 district activity centers and 75 State Offices. Total numbers of staffs are 4,400 (headquarters: about 770, district center: about 1,770, prefecture: about 1,660, academic organization: about 160) *15 • Its roles are as follows. *15 - Formulation of policy, guidelines and standards related to disaster prevention; - Research, analysis and development of disaster prevention, warning and mitigation system; - Development of technical information for disaster prevention, warning and mitigation; - Promotion of participation of citizens toward disaster prevention and mitigation; - Arousing attention and preparation of citizens for disaster prevention and mitigation; - Disaster mitigation in afflicted districts, arrangement of drills for re-construction and support of sufferers; - Promotion and support of disaster prevention and mitigation activity and support to sufferers in the afflicted area for reconstruction; - Coordination and command of sufferers support activity in the area afflicted by large-scale disasters; - Coordination of disaster prevention, mitigation and reconstruction support activities implemented by organizations both inside and outside the nation. <u>National Water Resources Committee</u> • It was established in 1996. *17  Source: NDPMC “National Disaster Prevention and Mitigation Plan B.E. 2553-2557 (2010-2014)”, p.18. **Figure Thailand’s Disaster Management Structure**	Challenges • DDPM plans to formulate the organization ‘Emergency Response Team’, consisting 10 staff (1 team leader, 3 planers and 6 implementing stuffs, that coordinate directors and staffs of each disaster; *1 • DDPM plans to formulate rescue teams consisting of 10 staff, in each of 7,255 Tambon Administrative Organizations (local autonomy) *1	1.(ii)	1.(ii)	2.1 4

			Organizations in charge of Non-structural Measures for Disaster Risk Mitigation and Preparation: • General: (1) Ministry of Education, (2) National Disaster Warning Center • Flood, Tropical Cyclone: (1) Thai Meteorological Department, (2) Royal Irrigation Department (RID), (3) Department of Water Resources, (4) Department of Forestry/Department of Land Development, the Ministry of Agriculture and Cooperation (MAC), (5)Thai Power Agency • Sediment disaster: (1) Department of Mines and Resources, (2) Department of Water Resources, (3) Department of Forestry/Department of Land Development, MAC, • High tide: Thai marine transport authority ,(5), **Organizations in charge of Structural Measures for Disaster Risk Mitigation**: Flood, Sediment disaster, Tropical Cyclone: (1) Department of Public Works (Urban planning of local governments), (2) RID, (3) Department of Drainage and Sewerage, Bangkok Metropolitan Administration	• DDPM is planning capacity building of staffs in local government in charge of disaster management through trainings and exercises.[*1]			
		Local Level	• Local administrative organizations are responsible for planning and operation of disaster management activities at each jurisdiction. • Responsible person in the State: State Governor • Responsible person in the district: District Chief • Local responsible person: Executive Director of local administration • Local government is the responsible agency for planning / execution of disaster management. • Responsible person in the State: State Governor The Provincial Disaster Prevention and Mitigation Committee [*1*15] • Chair; Governor of the Province • Member: Representatives of provincial level disaster prevention-related organizations (appointed by the Governor of the Province) • Secretariat" Head of Disaster Preparedness and Mitigation Office • Roles: Formulation of provincial disaster prevention plan in line with guidelines for the National Plan, selection of disaster prevention projects, and preparation of evacuation center / evacuation route. The Bangkok Metropolitan Disater Prevention and Mitigation Committee[*1] • Chair: Governor of Bangkok • Member: Representatives of Bangkok Metropolitan City Hall, DDPM, universities, NGOs and communities (appointed by the Governor of Bangkok). • Roles: Formulation of Bangkok Disaster Preparedness and Mitigation Plan in line with the National Disaster Preparedness and Mitigation Plan and controlling disaster prevention activities. VDPM (Village Disaster Prevention Management Committee) [*15] • It has been established in 2 pilot sites (flood and landslide), where village level disaster prevention plan was formulated, based on the same plan.				
		Inter-organizational Arrangement	**Inter-organizational arrangement**: • NDPMP stipulates the management structure in a chart. • Local centers of DDPM is given the status as an organization to provide technical support and supplementary services to local governments' disaster prevention organizations.[*3] • Heads of local centers of DDPM are obligated to report to the headquarters of DDPM directly and are required to collaborate with Provincial Governors. In case of massive disasters which exceed the capacity of the state to respond to the said disaster; local centers of DDPM mobilize staffs and equipments. To enhance the linkage with Provincial governments, DDPM establishes provincial office and deploys staffs. Deployed staffs will go under the control by the Provincial Governor.[*3]	• DDPM plans to enhance the capacity of local government through trainings and/or exercises.[*1]			
		Financial Preparation	• Budget allocation and use of fund is decentralized to local administration.	• DDPM plans to allocate budgets for DM to local governments[*1].			
5. Policy on Community-based Disaster Management			• There are several projects on "Community-based Disaster Reduction Management (CBDRM)" implemented. • DDPM is implementing CBDRM projects continuously with governmental organizations, NGOs, private sectors, civil defense organizations and international organizations. [*1] • There are more than 1 million community-based civil defense volunteer over the nation. DDPM is planning to increase the civil defense volunteers.	• It is necessary to have a comprehensive monitoring and evaluation system to ensure the effect of the projects	1.(iii)	1.(iii)	2.6 4
6. Prevention and Mitigation			Current Situation	Challenges	-	-	-
	6.1 Flood	Identification of Disaster Risks	• Department of Water Resources started to prepare flood risk map for medium and long term flood relief plan which based on the existing graphical images of various department in 2008 • Mekong River Committee develops flood hazard maps. *[18] • In Chao Phraya River basin, 35,000km^2, 22% of the basin, is being pointed at flood risk area. *[19] • In cooperation with RID, Department of Water Resources (DWR) has developed /disclosed the flood hazard maps. For the management of river basin in the mountainous area, telemetry has been adopted; it takes charge of observation, support for post disaster restoration work of water resources and participation in the formulation of flood prevention plan.		2.(i)	2.(i)	1.1
		Monitoring	• Thai Meteorological Department (TMD) takes charge of weather observation (for main urban areas only), dispatching warning on heavy rainfall, storm, etc. (to the relevant ministries and agencies) and the publicity of post-disaster weather information and transmission of information on afflicted areas. • O&M Division / Hydrology Division of Royal Irrigation Department, the Ministry of Agriculture and Cooperative Union take charge of hydraulic / hydrological observation of main rivers (mainly observation at plain area by telemetry), estimation of water level at observation point based on discharge analysis (for main rivers), transmission of flood forecast on the web site, imposing warning and maintenance of equalizing basin. • Electric Generating Authority of Thailand (EGAT) takes charge of the operation of dams, observation of river water level and flood forecast and warning. [*6*20] • There are 33 rainfall observation stations in the river basin area of U-Tapao River. • In the river basin area of Chao Phraya River, there are about 600 rainfall observation stations; half of them are under the control of RID and the remaining half is under control of Thai Meteorological Department (TMD); in addition, other organizations such as NEA, EGAT, PWD also install rainfall observation stations . As to water level observation stations, there are 224 observation stations installed by RID, MD, HD, EGAT, Department of Energy Development (NEA). Out of the said 224 stations, at 107 observation stations, the flow rate observation by means of a current meter is implemented regularly. There is also an observation point where observation of the amount of flow sand is implemented (as of 1988).[*6*20] • As a part of the activities of Mekong Committee, hydrological and meteorological observation network has been developed; at each observation point, where flood in the coming 5 days is forecasted *[21] 569 observation points of water level/amount of rainfall are installed along Mekong River (as of 2000); among which, 153 points are within Thailand. The data are gathered at headquarters of the respective countries once in 3 ~ 6 months by means of mailing or mail through telephone line. In the period of flood assessment, data from important observation points are gathered everyday at the headquarters of		2.(i)	2.(ii)	1.3

				the respective countries to be sent to the Mekong Committee. At the part of the river that forms border line of Thailand and Lao PDR, an international joint observation is implemented based on the agreement concluded in 1999. *[22] <Monitoring on a normal basis> • Meteorological observations are being carried out by Thai Meteorological Department (TMD), Royal Irrigation Department (RID) and Department of Water Resources (DWR). • TMD is a key agency to supply weather forecasts for the entire country and the agency operates meteorological observation, upper weather observation, satellite imagery, metrological radar observation. • RID operates 536 metrology and hydrology stations at along major rivers but most equipments are old. • DWR has 120 telemetry stations for metrology and hydrology observation. Besides, CCTV for river monitoring system and observation stations for Early Warning System (EWS) are also being operated under control of DWR. • BMA is also operating metrological and hydrological observation under control of FCC (Flood Control Center). The equipments are C Band Radar 1 unit, rain gauge stations 127 unit, water level sensors in the main canal 113 unit.*[23] <Monitoring at disasters> • Subcommittee to monitor water situation and flood situation will be established among TMD and other relevant agencies.				
			Non-structural Measures	• Retention Basin, Land Use Control, Public Information and Education, Reservoir Operation, Flood Forecasting and Warning, Flood Fighting • Royal Forestry Department (RFD) of Ministry of Agriculture and Cooperative Union takes charge of the management of deforestation in flood and sediment disaster prone areas and re-plantation in the devastated land. • As examples of non-structural measures implemented in Thailand are the arrangement of flood control pond in the basin, land use control, conveyance of information to and education of inhabitants, stockpiling relief commodities, forecasting flood and warning system and flood fighting can be named.		4.(i)	4	2.2
			Structural Measures	• National roads which run through the national land from the north to the south functions as dike. *[6] • In Bangkok, various projects by BMA including raising the level of circle dikes and construction of pumping stations have decreased flood damages (as of 1996). • PWD implements circle dike construction projects in major cities. • RID implements river improvement projects, development of drainage system in lower delta area and construction of multi-purpose dams. • Department of ocean and coastal resources is planning prevention measures for shore erosion which is getting serious in coastal cities. It developed long-term strategy for shore erosion prevention.*[13] • As structural measures, installation of dam Pump stations, improvement of Polder Embankments, Dyke, Channel, installation of Drainage (inner pump/sub-channel/ drain pipe), Flood wall can be named. • As for flood mitigation work in BMA, dike along Chao Phraya River, Bangkok Noi Canal and Maha Sawat Canal was constructed with 75.8km length and 1.2km is under construction.*[23] • Drainage canals are also operated by BMA with main canal 211 (length 920km), minor canal 1,444 (length 1,686km), 369 pumping stations and gates (total pumping rate 1,531 m3/s). Drainage capacity of those pumping system is 60 mm/hr of rainfall intensity. • Drainage tunnels are also being constructed in BMA, in case of where the drainage system is insufficient. The tunnels will drain the exceed storm water through the tunnels lying 15-22m underground surface and pump out to the river by high capacity pumps. Now, there are 7 drainage tunnels with 19km long and 155 m^3/s of pumping capacity. *[23] • BMA has provided 21 detention ponds with total capacity 12.7 Mm^3 to keep storage volume for early rainfall detention in order to decrease peak runoff during rainfall. *[23] • Flood prevention dykes are constructed mainly in the downstream of Chao Phraya River and Bassac River. At the left bank of Chao Phraya River, a dyke with the height of more than 2m is constructed for total extension of 424 km (as of 1986). *[6*7] • BMA has implemented drainage measure project as a part of the center of the city in the area of 82 km^2 (1982~1987) *[8] • BMA plans to include the drainage measures to be implemented in the suburb of Metropolitan area in the 6th National 5-years Social Development Plan (1986 ~). *[8] • In Bangkok, flood damages have been decreasing by the construction /operation of a circle levee called 'green belt' (with construction period of 1983~1985), water gates and 21 drainage pumping stations (as of 1996). *[6*7*9] • BMA implements a project to raise the height of dykes around Bangkok corresponding to 100 years flood. *[17] • In Bangkok, dykes (under green belt project), 10 water gates, pumping stations , wooden closing water gates have been constructed in the period of 1983~1984 by Emergency Flood Measures Committee, which has been established after large-scale flood occurred in 1983. *[24] • In the upstream of Chao Phraya River, 2 multi-purpose dams (main purpose is flood control) have been constructed. There are 8 major dams in the nation, one of the purposes of which is flood control. *[6*7] • PWD implements construction project of circle levee corresponding to 100 years flood in major cities. *[17] • RID implements river improvement projects and project for the development of drainage system in the downstream delta, project for loop cut of Chao Phraya River in the neighborhood Bangkok port and multi-purpose dam construction project. *[17] • River structures are maintained jointly by O&M Division of RID headquarters and project offices of its regional bureau. Basic operation of the structures is provided for the supply of irrigation water. *[20] • Urban Planning Bureau of Public Works Division in the local government takes charge of construction of dyke, supervision of construction work and formulation of urban drainage plan. • Department of Drainage and Sewerage (DDS) of Bangkok Metropolitan Administration (BMA) takes charge of Metropolitan Area Drainage Project, flood prevention activity and repair of water channels. • Department of Public Works (DPW) of the Ministry of Interior (MOI) takes charge of general public drainage project.	• There is no organization that manages whole the river system. Systematic flood control has not been implemented. (as of 1986) *[6] • Comprehensive national flood control plan or master plan for each river system is not prepared (as of 1996) *[7.] • Flood plain that serve as storm water reservoir are designated as urban development area in land use plan. *[15] • As to the river dykes; since the flow rate of the design flood has not been provided, only sections that are deemed necessary are repaired partially. *[7] • In the river basin of Chao Phraya River, many river structures have been installed and maintained on the daily basis, which are reported to RID, too; however, most of them are for irrigation purpose; the use of them for flood control purposes are not considered. *[6] • Construction of dykes and dredging are the local countermeasures which are not implemented based on flood prevention plan consisted to the whole water system; accordingly, it makes the flood disaster in the downstream worsen (as of 1986). *[6] • In Phuket City cross sections of rivers and drainage channel are not enough. Flood occurs by deficiency of cross section of rivers caused by bridge clearance. *[11] • In Bangkok Metropolitan Area, rapid urbanization has caused unregulated expansion of urban area; for example, in the ill drained low swampy land has been urbanized by simply spreading earth on the ground. *[8] • In the budget for FY2003, DDPM plans to install water level meter at 2000 places; with the budget for 2004, it plans to install more water level meters and manual	4.(i)	4	2.2

				sirens. *[25] • Among the rainfall observation stations installed in the river basin of U-tapao River, the ones that have hourly rainfall depth records are only 3 stations.			
	6.2 Earthquake / Tsunami	Identification of Disaster Risks	• A large scale earthquake has not occurred in historical record. • DMR has produced the active fault distribution map and the earthquake risk map which was assessed in 4 levels. *[30] • DMR has conducted the survey about not only active fault distribution but also activity history by trench survey. *[30] • The tsunami hazard maps with a scale of 1:5,000 in 6 prefectures of the south Thailand have been developed based on tsunami risk assessment.	• There is a need to develop a micro zoning hazard map at main cities in the northern and western of Thailand. *[29]	2.(i)	2.(i)	1.1
		Monitoring	• According to the observation result of recent years, comparative small-scale earthquakes measured less than 6.5 on the Richter scale have occurred only in the northern and western area in Thailand. • The strengthening of earthquake and tsunami observation network in Thailand has been implemented after catastrophe of tsunami in 2004 and the observation network has been expanded. TMD installed total 41 broadband seismographs by own budget. • TMD has planned to increase each 20 stations of broadband seismograph and strong motion accelerograph. *[29] • Hypocenter and magnitude decision has been conducted by TMD using software "SeisComp3" manufactured in Germany, and TMD calculates them with about 10 minutes. In case of earthquake in abroad, it takes about 15 minutes. *[29] • The tsunami observation buoys were installed in DART project conducted by U.S from 2006. The tsunami observation system has some issues about maintenance. *[16] • Earthquake centered in Myanmar and LaoPDR surrounding Thailand also have some damages in Thailand. However, the seismic observation network in Myanmar and LaoPDR is less well-developed than Thailand. It is desirable to operate with RIMES and AEIC (ASEAN Earthquake Information Center) and monitor earthquake in Thailand and surrounding countries comprehensively. Similarly, tsunami observation system shall be operated in cooperation with IOTWS and Ina-TEWS of BMKG in Indonesia. • There is a need to increase the buoy for early detection of tsunami occurrence and identification of the tsunami scale or to install new tsunami observation system including submarine cable in order to observe without breakdown and reduce maintenance cost.	• Because tsunami warning recourse is chiefly depending on information from abroad, tsunami observation network has to be strengthened. *[29] • The number of observation station in the south Thailand where seismic observation density is low need to increase. *[29]	2.(i)	2.(ii)	1.3
		Non-structural Measures	• The tsunami evacuation drill has been conducted in school and hotel once a year. • The law regarding quake-resistance standards covered on 10 prefectures was enacted in 1997 and was amended that restraining area increase from 10 to 22 prefectures based on distribution of active fault and soft foundation in 2007. • The warning towers to alert, evacuation route sign and tsunami shelter have been built in tsunami disaster area.		4.(i)	4	2.2
		Structural Measures	• The countermeasures for tsunami are constructed even in disaster area in 2004 such as Phuket.		4.(i)	4	2.2
	6.3 Sediment disaster (Landslide, Debris flow)	Identification of Disaster Risks	• DMR has developed the sediment disaster hazard map on base map with a scale of 1:10,000 which was expanded original topographic map with a scale of 1:50,000. *[30] • The hazard maps of 70 sites were completed and ones of 190 sites are planned to produce in 2012. *[30] • DMR takes charge of development / publication of landslide hazard map, post-disaster site survey, publication of information on web site, early warning by means of exclusive local network, and participation in the development of landslide prevention plan. *[30]	• There is a need to limit the activities such as excavating rock and soil, deforestation and building new houses in the susceptibility area.	2.(i)	2.(i)	1.1
		Monitoring	• TMD has observed a river level and rainfall and issued warning based on meteorological and hydrological data. *[30] • DMR conducted an urgent survey of debris flow in mountain streams when the local government requests. *[30] • Some community has conducted rainfall observation using a simple rain gauge and visual monitoring of river level. The monitoring and observation has been conducted by volunteers of the community. *[30]	• There is a need to install the automatic rain gauge and the sensor detecting the debris flow and strengthen the monitoring system.	2.(i)	2.(ii)	1.3
		Non-structural Measures	• The evacuation and rescue drill against sediment disaster have been conducted by vigilante group organized with volunteers of the community. *[30] • DPPM is a leading agency for preparing emergency response for sediment disaster and directing other agencies in case of disaster. In community of mountainous area, DPPM has conducted the evacuation and rescue drill in collaboration with DMR, local government, school and hospital etc. *[30] • Royal Forest Department (RFD) of Ministry of Agriculture and Cooperation Union takes charge of control of deforestation in sediment disaster prone area, re-plantation in devastated land.		4.(i)	4	2.2
		Structural Measures	• The structural works against sediment disaster have been constructed by local government and road authority, which is retaining wall made of gabion walls on road slope and check dam on river with a danger of the debris flow. *[30]	• The structural work for sediment disaster has not constructed systematically and remains a small scale and simple level.	4.(i)	4	2.2
	6.4 Volcano	Identification of Disaster Risks	There is no active volcano in Thailand.		2.(i)	2.(i)	1.1
		Monitoring	N/A		2.(i)	2.(ii)	1.3
		Non-structural Measures	N/A		4.(i)	4	2.2
		Structural Measures	N/A		4.(i)	4	2.2
	6.5 High Tide /Storm Surge (Cyclone/ Typhoon)	Identification of Disaster Risks			2.(i)	2.(i)	1.1
		Monitoring	• Port Authority of Thailand (PAT) takes charge of tide level observation.		2.(i)	2.(ii)	1.3
		Non-structural Measures			4.(i)	4	2.2
		Structural Measures			4.(i)	4	2.2
	6.6 Other Disasters	Identification of Disaster Risks			2.(i)	2.(i)	1.1
		Monitoring			2.(i)	2.(ii)	1.3
		Non-structural Measures			4.(i)	4	2.2
		Structural Measures			4.(i)	4	2.2
	6.7 Common items for Disaster	Non-structural Measures	• DDPM has database on various disasters such as flood, rain storm, low temperature, drought, forest fire *[25]. In 2003, DDPM developed GIS-base database, which collect information of flood, sediment disaster. *[3.] • Hazard maps are prepared separately by DDPM, Department of Meteorology, RDI, and Mekong River Commission. • DDPM developed simple risk map with community people in some affected Provinces by Tsunami.	• In only limited Provinces, hazard maps are prepared. *[15] • Provincial hazard maps do not have enough accuracy for the utilization in	4	4	2.2 2.5

			• Division of Hydrology and Division of O&M of RDI publishes hydrology report on floods, inundation, and damages. *20 • GIS database that accumulated the information related to disaster/ disaster prevention in the pilot area has been built in the information center of DDPM. Hazard map in the pilot area in the district ~ community level has been developed. "Manuals for development of the hazard maps" and "Guidebook for the use of GIS database" have also been completed. *15 • Hazard maps are developed by the concerned respective agencies (DDPM: sediment disaster / flood, Thai Meteorological Department (TMD): hazard maps of individual project area, Mining and Resources Department: landslide / sediment disaster, Water Resources Department: sediment disaster/flood, Land Development Department: landslide / flood, Geographical Information and Space Technology Development Department: flood/ tsunami, etc., Royal Irrigation Department: flood*15). • As to the collection of disaster information, Disaster Prevention Command Center of DDPM, Information Technology Center and Database Building Committee (Research and Development Section) conduct activities, respectively. *15 • After the occurrence of tsunami, DDPM develops a simple risk map (afflicted area map) jointly with regional inhabitants in a part of afflicted prefecture (Phuket Prefecture) in cooperation with local government and other ministries and agencies. *26 • Thai Meteorological Department publishes information on the weather when disaster occurred and afflicted area. Mining and Resources Department conducts a site survey of the afflicted area and publishes them depending on the circumstances. Geographical Information and Space Technology Development Department publishes satellite image of the afflicted area. *13 • Geographical Information and Space Technology Development Association (GISTDA) takes charge of publishing analysis of the afflicted area by analyzing satellite images and information on the scale of damages. *15 • Ministry of Education takes charge of inspection of the school buildings that are vulnerable to disasters, disaster prevention education and disaster drill. *15 • Insurance Department of the Ministry of Commerce takes charge of arrangement of the statute regarding insurance in the disaster prone areas. *15 • National Disaster Warning Center takes charge of development of forecast / warning system, exchange of information with other agencies, development of disaster information database for determination of issuing forecast / warning. *15	communities. *15 • For formulation of strategic disaster mitigation plan, DDPM plans to renew information on the disaster risk areas. *1			
					4	4	2.8
		Structural Measures			4	4	2.3.2 2.3.3
		Climate Change Adaptation	• Responsible body: National Committee on Climate Change (1993), National Board on Climate Change Policy and Climate Change Coordination Unit (2007) • NFP: Ministry of Natural Resources and Environment; Office of Natural Resources and Environmental Policy and Planning (ONEP) • Strategic Plan on Climate Change (2008 -2012) includes capacity building for adaptation and reduction of vulnerabilities to climate change impacts. • National Mater Plan on Climate Change (2010-2019) was completed in 2009		4.(i)	4.(i)	2.7
		Public Awareness Research and Development /Human Resource Development / for Disaster Management	<Disaster Education/Drills> • Promotion of disaster preparation education is stated in national education plan 2007-2011 developed by the Ministry of Education.*15 • Working group composed of Office of Basic Education Committee (OBEC), Educational Service Area Office (ESAO) and teachers of model school, etc. developed textbooks of disaster preparation education (sub-textbook and guide for teachers) and distributed to all the public schools. In each model area, workshop has been held for 4 times. *15 • Large-scale evacuation trainings were implemented 3 or more times since 2006.*28 • In the period of January – April 2006, disaster prevention education project in the primary school has been implemented by the Ministry of Education of Tahi, Disaster Prevention Department and Asia Disaster Reduction Center (ADRC). The purposes include; a) strengthening disaster prevention education in the primary school, b) building up capacity of school personnel for preparation to and management of disasters and c) pervading knowledge on the natural disasters such as tsunami and others to school children. *27 • NDWC and TMD has created and distributed educational materials such as booklets, posters, and so on.*28 • As to tsunami, sub-textbook for the primary school children and guidebook for teachers are created by Asia Disaster Reduction Center; in addition, many pamphlets booklets are published by domestic organization of Thailand such as MOE, DMR, DDPM and international organizations such as UNICEF, UNESCO, Paua New Guinea University, etc., Harbor and Airport Technology Institute, Shanti Volunteer Association and so on. *15 • DPMA conducts activity to improve the awareness of inhabitants on disaster. *26 • After the occurrence of tsunami, DDPM develops regulations / manuals on selection of evacuation area /evacuation route as well as evacuation, execution of evacuation drill, etc. jointly with regional inhabitants *26 • In Phuket, National Disaster Warning Center (NDWC) has operated the tsunami warning system. Based on this warning system, evacuation /disaster reduction system, etc, has been established, too. *15 • In 3 pilot sites, Community-based Disaster Risk Management (CBRDRM) activity is implanted with regard to DDPM, DPMPO (Disaster Prevention and Mitigation Provisional Office) and inhabitants; CBDRM manuals as well as facilitator guide has been developed. • In 2 pilot sites (flood and landslide), village level disaster prevention plan has been formulated, and based on the same plan, early warning system has been introduced. *15	• DDPM is planning to prepare provincial evacuation plans at all the Provinces based on Provincial Civil Defense Plans. • School curricula, education material and trainings are not promoted widely. • It is necessary to create and announce hazard maps in high resolution, to identify high risk area, to consider and announce how to avoid the risk. It is important to prepare and share information related to disaster prevention and mitigation among all level stakeholders.	3	3	2.3.1
	7. Preparedness and Response	Current Situation		Challenges			
		7.1 Disaster Response plan / Emergency Financial Measure	Central Level	<Emergency Operation Plan(EOP), Contingency Plan(CP) .etc> • NDPMP (the strategies on "Preparedness arrangement" and "Disaster emergency management", and "Standing Orders on Disaster" and "Disaster Countermeasure Procedure" for 14 defined disasters are contained.) <Emergency Financial Measure> • Victim compensation budget and recovery budget for flood affected provinces	• At central level, the importance of capacity development of emergency response, especially search & rescue has been emphasized. • Responding to the flood disaster in 2011, DDPM will prepare more practical emergency response plan. • Also, disaster by disaster master plan is supposed to be prepared for effective response.	5	5	3

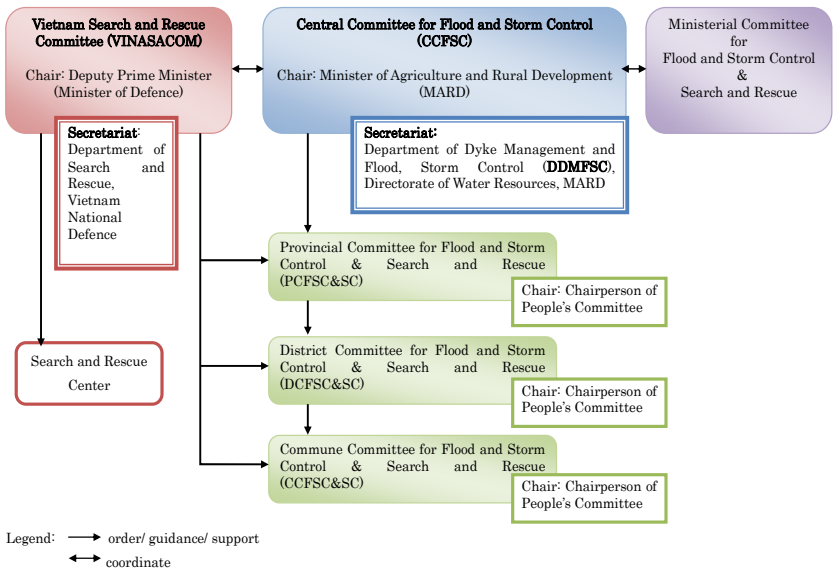
	Local Level	<Emergency Financial Measure> • Disaster management budget is decentralized for local administrative level to decide.				
7.2 Early Warning	General Warning and Forecast/Communication	• TMD issues weather forecast and early warning based on meteorological observation data, weather maps, satellite images, weather radars, and so on. TMD delivers forecast and warning to central government and relevant agencies, local governments, local meteorological observatories, mass media (e.g. television, radio, newspaper).*[29] • TMD disseminates early warning to public through mass media (e.g. television, radio, newspaper) and local government agencies. TMD is planning to add a way to disseminate early warning directly from TMD and local meteorological observatories to risk areas.*[29] • DDPM has intra-net, emergency telephone lines connecting head office, regional centers, provincial offices and relevant organizations. In addition, it secures 1,784 emergency private telephone lines. It is scheduled to increase the number of lines at its local centers and State Offices. *[25] • Local Administration Department (LAD) of MOI has own telephone lines and radio networks with provincial governments.*[20] • RID has radio network connecting head office with regional offices, project offices and major monitoring stations. • Thai Meteorological Department (TMD) installs 8 radar rain gage stations throughout the nation. *[20]	• NDMC plans to develop/improve the early warning system to expand the communication networks to coop with other multi-hazards than tsunami.	2.(ii)	2.(ii)	1.2
	Flood	• Flood warning is under responsibility of TMD. • TDM, RID and Department of Water Resources have monitoring stations in urban areas, major rivers, or mountain areas and provide forecasting and flood warning. • Mekong River Commission developed hydrology & meteorology monitoring network and provide flood forecast till 5 days ahead. • RID, MD, EGAT, BMA, etc. have their individual communication network. RID connects the head quarter with 12 regional departments, project offices and major observation stations by wireless radio. MD connects the head quarter, regional departments, and hydrological observation stations by wireless radio. Between EGAT and RID, there is no private line; observation data of dams are conveyed to the head quarter of RID by telephone or by person. *[6*20] • Bangkok Metropolitan Authority connects the pumping station with the head quarter of BMA by wireless radio. *[20] • Flood Monitoring Center of Department of Drainage and Sewage (DDS) of BMA installs 28 rainfall / water level observation stations in the basin areas of Chao Phuraya River to conduct the grasping state of flood and study of flood mitigation measures. *[7] • Flood forecast/ warning system is introduced in the river basin of 6 rivers throughout the nation (as of 1996). *[7] • TMD transmits early warning to the central government as well as relevant ministries and agencies, local administration bodies, local weather stations, mass media (TV, radio, newspaper, etc.). It is planned to convey information directly from TMD or local weather stations to the risk areas in the near future. • DWR introduces early warning system (EWS) in 2400 villages; in the future, it is planned to expand the said number to 6,000.	• NDMC plans to develop/improve the early warning system to expand the communication networks to coop with other multi-hazards than tsunami. • DDPM planned to purchase facilities for wireless communication systems*[25]. • Rainfall monitoring station owned by RID are mainly located around irrigation facilities and not sufficient for flood early warning. • TMD, DWR and RID responsible for monitoring meteorological, hydrological information and collect sets of data (e.g. rainfall, water levels, seismic data, etc.) using observation networks and manage the data on database systems. However, some of the databases are isolated.			
	Earthquake / Tsunami	• With the onset of Tsunami, cross-ministerial National Disaster Warning Center (NDWC) was established. Its major role is to issue Tsunami warning to people, authorities concerned and rescue workers who lead evacuation based on seismic observation / data analysis.*[26*27] • NDWC issues tsunami early warning based on input data from TMD, RID, Royal Thai Navy (RTN), international organizations (e.g. PTWC, JMA, USGS), NDWC Contact Center (e.g. Amateur Radio, General Public). NDWC delivers tsunami warning to central government and local government, rescue units, effected communities and people.*[28] • Means of dissemination are SMS (more than 20 Million Mobile phones), FAX (16ports), E-mail, mass media (television, radio), Warning Towers (328 Towers, installed also inland), local dissemination network (500 small towers and 1,500 special radios for leaders of village), and so on. Warning tower is 25m height and can broadcast siren and pre-recorded voice (multiple languages). The tower can cover up to 4km around with one. *[28] • TMD transfers the earthquake and tsunami information to relevant authorities within about 15 minutes after earthquake occurs. *[29] • The warning towers have been built in not only tsunami disaster area but also whole of country including mountainous area, which issue warning in 5 languages of English, German, Chinese, Japanese and Thailand in Phuket area.*[28]				
	Sediment disaster (Landslide, Debris flow)	• Landslide warning is under responsibility of DMR. *[30] • DMR Promoted to build the network of upstream and downstream to issue warning to each other in case of emergency.	• The warning level need to be improved based on scientific and technical study.			
	Volcano	N/A				
	High Tide /Storm Surge (Cyclone/ Typhoon)	• Cyclone warning is under responsibility of TMD. *[29]				
	Other disasters	(Forest fire) • By Smog Prevention Agreement among ASEAN nations, forest fire early warning system has been prepared. *[31]				
7.3 Evacuation plan	• DDPM is responsible for search and rescue, setting up evacuation camps, temporary housings and so on after disasters/			5	5	3
7.4 Establishment of Emergency Response System	Central Level	• After the occurrence of Tsunami, DDPM engaged in relief activities including search & rescue and setting up of evacuation camps.*[26] • DDPM is planning to establish emergency operation team for massive disaster composed of 10 members (1 team leader, 3 planners, 6 operation staffs) for each type of disaster. The team will coordinate directors at Provincial level and staffs of temporary command center. • In the central level, the necessity for capacity building in the emergency response after the occurrence of tsunami (especially, search /rescue and relief) is felt; emphasis is put on strengthening of the said capacity building. *[26] • After the flood in 2006, temporary evacuation center consisting of 3 stages, namely, preparation / operation /reconstruction has been established. *[32]	• DDPM plans to allocate materials/facilities to local government for DM.	5	5	3
	Local Level					
	Training etc.	• The simulated exercises are conducted at National, Cluster Provincial, Provincial and District levels every year by assuming a specific type of disaster				
7.5	• DDPM is planning to establish rescue team composed of 10 members in all the 7,255 Tambon local			5	5	3

	Rescue plan	governments.				
	7.6 Relief plan	• After the occurrence of Tsunami, DDPM engaged in relief activities including search & rescue and setting up of evacuation camps.		5	5	3
Assistance to challenges	8. Records of Major Assistance by JICA	<Projects/Experts/ Emergency Assistance > • Advisor for the enhancement of functions of Disaster Prevention and Mitigation Academy (2006) • Capacity Development Project for Disaster Management (2006-2008) <Studies> • Bangkok Sewerage System Project (1978-1982) (Vol. 1, Vol. 2, Vol. 3, Vol. 4, Feasibility study Vol. 1, Vol. 2, Vol. 3) • Flood Forecasting System in the Chao Phraya River Basin (1986-1988) (Summary, Main report, Supporting report, Drawings) • Study on the Water Management System and Monitoring Program in the Chao Phraya River Basin (1986-1989) (Main report, Annex-1, Annex-2&3, Annex-4, Annex-5, Annex-6) • The Study on Master Planning for the Sewerage Development Project for Lower Chao Phraya River Basin (1991-1993) (Vol. 1, Vol. 2-I, Vol. 2-II, Vol. 3, Vol. 4-I, Vol. 4-II) • Study for Bangkok Metropolitan Area Subsidence and Groundwater Management (1991-1994) (Operation manual for monitoring station, Groundwater database system manual, Summary, Main report, Supporting report, Data report) • Comprehensive Study for Chao Phraya River Basin Flood Mitigation and Agricultural Field Conservation (1997-1999) (Vol. 1, Vol. 2, Vol. 3, Vol. 4, Vol. 5, Vol. 6) • The Study on Emergency Flood Prevention Planning for Hat Yai District, in Khlong U-Taphao River Basin (2001－2002) (Summary, Main report, Supporting report) • Project on a Comprehensive Flood Management Plan for the Chao Phraya River Basin (20011.12-2013.6) <Trainings> • Earthquake Engineering (1997-1998, 2001-2004) • Sewage Works (1997) • Sewage Works Engineering (1997-2002) • River and Dam Engineering (1997-2002) • Port and Harbor (1997-1999, 2001-2005) • Disaster Prevention (1997-2003, 2005) • Emergency/Disaster Medicine (1997) • Comprehensive flood control (1998-2000) • Meteorology (1998, 2006) • Disaster Medicine (1998-2000, 2003-2004) • Disaster assistance (1999) • Emergency disaster rehabilitation system (2001-2002, 2005) • Integrated Water Resources Management (2004, 2006) • Global Seismological Observation III (2006) • Mitigation Strategy for Mega-Urban Earthquake Disaster (2006) • Flood Hazard Mapping (2006) • Tsunami Disaster Mitigation (2006) • Disaster Mitigation, Preparedness and Restoration for Infrastructure (2006) • Seminar on Disaster Management II (2006) • Seminar on Emergency/Disaster Medicine II (2006) • Training for Mental Health Services after Disasters (2006)				
	9. Records of Assistance by other Development Partners	• ADRC: Disaster education in elementary schools (2006) • Denmark: Assistance for introduction of flood early warning system in five river basins. • ADPC:TV program production for disaster awareness raising (2005) • USA: Dispatch of experts to flood emergency prevention and mitigation committee and BMA • ADB: Implementation of flood control and management plan in Bangkok with request from RNESDB • UNDP/ADPC: Capacity Development of DDPM in southern 6 Provinces(emergency response, risk management, damage evaluation and needs analysis)(2005.7-2006.12) • USA/ADPC: Program for Tsunami Warning System in Indian Ocean (2005.8-2007.9), Asia Urban Disaster Mitigation Program (1995-2004) *33 • ADPC/Italy: Tsunami risk analysis for the preparation of guideline for urban and regional development and construction in Southern Thailand (2005.5-2006.9) • EU-ECHO/ADPC:Capacity development at Provincial and District level in Lower Mekong for flood preparation program planning and implementation, funded by DIPECHO • ECHO: Capacity building of Thai food industries on "Carbon footprint labelling" to promote the development of low-carbon trade between EU and Thailand for climate change mitigation(2010) • ECHO: Response to natural disaster(2011)				
	10. International Networking	• DDPM and ADPC signed MOU on cooperation for human resources management, disaster prevention and mitigation and exchange of disaster management experts in 2003. • Mekong River runs through five countries in the ASEAN region; i.e. Thailand, Lao PDR, Myanmar, Cambodia and Vietnam. The Secretariat of Mekong River Commission (MRC) undertakes coordination among the countries. Initially, MRC mainly focused on development before the flood of 2000. Thereafter, MRC handles the issues of flood. The MRC prepared MRC Strategy of Flood Management and Mitigation. With the onset of massive flood in 2000, flood control has come to be one of the major issues for MRC. MRC developed basic strategy in 2001 and action plan in 2002 and formulated flood control and mitigation program. Flood vulnerability assessment and mapping project was started. This program consisted of: (1) establishment of regional flood management center (supported by Japan, Holland, USAID-OFDA and Danish), (2) Structural countermeasures (Supported by ADB and Holland), (3) Multi-national food management (Supported by Holland), (4) Capacity building for Emergency Response to Flood (Supported by German, EU-Echo, cooperated by ADPC), and (5) Land-use management (Supported by German). Flood vulnerability assessment and Mapping Project (FVAMP) was commenced in June and July of 2007 (Phase-I) *[34] • Intergovernmental Coordination Group for the Indian Ocean tsunami Warning and mitigation System was established in 2005 under the coordination of IOC UNESCO. *[35]				
ASEAN Cooperation	11. National Policy on ASEAN (ACDM, ARPDM, AADMER) cooperation in Disaster Management, Emergency Response in case of disasters in other ASEAN countries or ASEAN region	• Signed AADMER in 2007(ASEAN Agreement on Disaster Management and Emergency Response)(AADMER stipulates mutual cooperation in case of disaster.) • Participation in ARF meetings on disaster management, monthly ACDM meetings, ARDEX (ASEAN Regional Disaster Exercise)and ASEAN regional technical cooperation Project • SASOP (Regional Standing Arrangement and Standard Operating Procedures) started in 2007. • Agreement on trans-boundary haze was signed by ministers of ASEAN countries in 2002 and came into effect in 2003. It stipulates forest fire monitoring, prevention, coordination mechanism, communication system, mutual emergency support and establishment of ASEAN coordination center. Action plan for capacity building of fire fighting in the region and early warning system utilizing satellite images were developed. *5*[31]				
	12. Resources useful for other ASEAN countries					
	13. Needs for External Assistance from the point of view of Regional Cooperation					

[1] ADRC, Country Report (2008)
[2] Website of ADRC: (http://www.adrc.asia/latest_j/index.php) (accessed on 23 March 2009)
[3] ADRC, Country Report (2004)
[4] JICA, “Summary of Final Study and Survey Report on the Plan for Flood Prevention Countermeasures in Hat Yai City in U-tapao River Basin in Thailand” (2002)
[5] Institute of Global Environmental Strategies (IGES); “2002 Momentous News in Asia” (2003)
[6] JICA, “Preliminary Survey Report on the Survey for Flood Forecast System Plan in Chao Phia River in Thailand” (1986)
[7] JICA, “Preliminary Survey Report on the Survey on Comprehensive Plan for Flood Countermeasures in Chao Phraya River Basin in Thailand” (1996)
[8] JICA, “Preliminary Survey Report on the Plan for Countermeasures to Urban Drainage in Bangkok City in Thailand” (1983)
[9] JICA, “Preliminary Survey Report on the Plan for Countermeasures to Urban Drainage in Bangkok City in Thailand” (1984)
[10] Machito Mihara, Jangya, Sang-Arun Janya, Yu Mori, Eiji Yamaji, “Terrace Development and Soil Erosion in the Mountainous Area in Mekong River Basin at Northern Part of Thailand” (2004); the Japanese Society of Irrigation, Drainage and Reclamation Engineering, Academic Journal Volume 72, No.2
[11] JICA, “Preliminary Survey Report on the Survey of Sewage and Drainage Improvement Plan in Phuket City, Kingdom of Thailand” (1989)
[12] ADRC, Country Report (1999)
[13] Institute of Global Environmental Strategies (IGES); “2008 Momentous News in Asia” (2009)
[14] Synthesis Report on Ten ASEAN Countries Disaster Risk Assessment (2010)
[15] JICA, “Final Report on the Project for Improvement of Capabilities for Disaster Prevention in Thailand” (2008)
[16] Institute of Global Environmental Strategies (IGES); “2007 Momentous News in Asia” (2008)

[17] JICA, “Summary of Final Survey Report on the Survey on Comprehensive Plan for Flood Countermeasures in Chao Phraya River Basin in Thailand” (1999)
[18] Yoshiaki Otsubo, “Actual State of Severe Flood in the Downstream of Mekong River in 2002 and Issues to Flood (2004); the Japanese Society of Irrigation, Drainage and Reclamation Engineering, Academic Journal Volume 72, No.2
[19] Presentation document of local authority
[20] JICA, “Main Survey Report on the Survey for Flood Forecast System Plan in Chao Phia River in Thailand” (1988)
[21] Shin Utsumi, “Current Status and Direction of Activity of Mekong River Committee” (2004); the Japanese Society of Irrigation, Drainage and Reclamation Engineering, Academic Journal Volume 72, No.2
[22] Takao Masumoto, Huan Thain Hi; “Development Status and Future Outlook of Hydrological Weather Observation Network in Mekong River Basin”; (2004) the Japanese Society of Irrigation, Drainage and Reclamation Engineering, Academic Journal Volume 72, No.2
[23] Presentation document of BMA officer
[24] JICA, “Master Plan Report on the Survey of the Plan for Countermeasures to Urban Drainage in Bangkok City in Thailand” (1985)
[25] ADRC, Country Report (2003)
[26] JICA, “Preliminary Survey Report on the Project for Improvement of Capabilities for Disaster Prevention in Thailand” (2006)
[27] ADRC, Country Report (2006)
[28] JICA, “Data Collection Survey on ASEAN Regional Collaboration in Disaster Management ” (2012): Interview to NDWC (2012.02.20-21)
[29] JICA, “Data Collection Survey on ASEAN Regional Collaboration in Disaster Management ” (2012): Interview to TMD (2012.02.21)
[30] JICA, “Data Collection Survey on ASEAN Regional Collaboration in Disaster Management ” (2012): Interview to DMR (2012.02.21)
[31] Institute of Global Environmental Strategies (IGES); “2003 Momentous News in Asia” (2004)
[32] Institute of Global Environmental Strategies (IGES); “2006 Momentous News in Asia” (2007)
[33] Website of ADPC: (http://www.adpc.net/v2007/Programs/UDRM/Default.asp) (accessed on 10 April 2009)
[34] Website of Mekong River Committee: (http://www.mrcmekong.org/programmes/flood.htm) (accessed on 6 April 2009)
[35] Indonesia, Interim national progress report on the implementation of the Hyogo Framework for Action (2008)

Inventory					HFA		AADMER
					PforA	IofP	
Current Situation and Challenges	1. Features of Disasters	• 1980-2011 EM-DAT disasters: 154times; Out of these flood (41%), Storm (51%) • Possible Natural Disasters*[1]*[2]*[3]: Areas along Rivers and Coastal Areas / Storm, Floods, River Bank Erosion, Tornado • Inland Areas and Mountain Areas / Forest Fire, Landslide, Sediment Disaster • Records of Natural Disasters in the last 11 years: 50 events (23 Floods, 11 Cyclones/Storms/Torrential Rains, 11 Flash Floods/Sediment Disasters/Landslides, 2 Droughts, 1 Forest Fire) • Most densely-populated areas are prone to floods. 70% of population is living with risks of tropical cyclone, flood and surge. • Including tributary, numbers of river basin are 14, numbers of rivers are 2,500 and the total extension is 15,000 km. Flood damages are serious in rainy season especially in Central Region. Flood in Mekong Delta covers 25% of Mekong Delta Area and continues for more than 3 months. Flood damages in Red River and Mekong Delta reach 10-20% of the area under cultivation. 63% of stream flow is inflow from outside country.*[4]*[5] • Floods tend to occur when high river water level during rainy season and seal level rise by tropical storm as well as heavy rainfall come together. Viet Nam has 6.2 tropical cyclones per annum in average.*[4]*[6] • Large-scale flood occurred in Red River in 1971, 1986 and 2008. *[3]*[7] • In the districts located in the central part, flood occurs every year. Large-scale floods have occurred in 1932, 1952, 1960, 1962, 1964, 1983, 1999, 2005 and 2009. *[3]*[8]*[7] • In Mekong Delta, large floods occurred in 1961, 1066, 1978, 1984, 1991, 1995, 1996, 2000, 2001 and 2002.*[3]*[7] • Viet Nam is hit by tropical storm 4~6 times a year, which causes high tide, flood, flash flood, land and mud slides.*[7] • Dividing the nation into 5 blocks and classifying the kinds of flood disaster by regions. *[4] Northern mountainous area: flash flood, landslide Red River Delta flood during Monsoon, tropical storm Central part tropical storm, flash flood Central high land flash flood, landslide Mekong Delta tropical storm, flood from the upstream • DfID points out the possibility that Viet Nam will be the most affected country by sea level rise due to global warming.*[8]				
	2. Administrative Division	58 Provinces(tỉnh)+5 Centrally Governed Cities (thành phố trực thuộc trung ương)－Districts (huyện)/Provincial Cities (thành phố trực thuộc tỉnh)/Towns (thị xã) + Rural District (huyện)/Urban District (quận)－Towns (thị trấn)/Communes (xã) + Wards (phường)					
	3. Development of Legislative Framework and Disaster Management Policy & Plans	Development of Legislative Framework	<Disaster Prevention Basic Law> • Decree No.168 - aHDBT (1990) (It stipulates the roles and responsibilities of Central Committee for Storm and Flood Control (CCSFC) and relevant organizations and committees of all levels (State, District, and Village).*[9] • In the action plan of “the National Disaster Response and Mitigation Strategy” (2007~2020), it states the development of legal system (laws related to prevention of disasters, mitigation of damages, emergency response, rehabilitation and reconstruction, laws related to disaster prone areas, fund for disaster measures, disaster compensation, and so on). *[6] • Disaster Management Law (drafted and expected to be enacted in 2013) <Laws in Relevant Sectors> • Statutes on Dike Management and Measures for Flood and Typhoon: it stipulates responsibilities and authorities of relevant divisions and departments, controlling appropriate authority that controls development in the flood disaster prone areas. • Water Resources Act (1998) • Ordinance on Flood and Storm Control • Environment Protection Law (1993) • Ordinance on Water Resources Structures Protection • Water Resources Law (1998): it aims at integrative water management by river basin units. It stipulates the main body of water resources management (roles of MONRE and MARD, etc.), establishment of National Water Resources Council, and the concept of river basin system. *[5]*[6] • Forest Preservation / Environment Law (1991)		1.(i)	1.(i)	2.1
		Disaster Management Policy	• National Strategy for Natural Disaster Prevention, Response and Mitigation to 2020 (2007～2020)[10] : It emphasizes the policy shift from disaster prevention and mitigation based only on structural measures to the one including non-structural measures, from top-down to local government and community-based disaster management.	• Multi hazard coverage is necessary in disaster management policy.			
		Disaster Management Plans[11]	<Central Level> • Implementation Plan of the National Strategy for Natural Disaster Prevention, Response and Mitigation to 2020 (2009[*12]) • 9th Social and Economy Development 5-year Plan (2006~2010): it clearly states the measures to be taken to 3 disaster probe areas (River basin of Red River: river management / development of levee system, Central coast area: development of irrigation facilities that have flood damage mitigation functions, Mekong Delta: striking a balance between development of irrigation facilities and flood countermeasures and mitigation of damages in the coast and rivers) *[6] • Social and Economy Development 10-year Plan (2001~2010): it refers to 2 out of 6 strategic polices for the central part: (1) implementation of measures to mitigate natural disasters such as flood, drought and so on, (2) mitigation of flood damages by construction of reservoir and effective use of water resources. *[6] • “The 1st National Strategy and Action Plan” has been formulated in 1994*[9]. It stipulate the following phenomenon as the subject matters of disaster; flood of river, flood from the sea, increase in effusion, erosion and silting of the river bed, unsteady slope / mud flow / landslide, strong wind /intensive rainfall, damages of water retention structure, invasion of seawater into underground water. It covers the following matters and states about structural measures (structures, facilities, materials and equipment) and non-structural measures (organization, administration, laws, proceedings, survey, and training): forecast and warning, preparedness and release, relief of emergency conditions. *[7] • The 2nd Strategic Action Plan” (2001 ~ 2020): it aims to mitigation of disasters and reduction of impact of disaster. It provides responsibility of each execution agency[*9]. It also gives status to monitoring of tropical storm, speedy provision of information on heavy rain and establishment of short-time prediction technique as emergency issues. *[4] • “National Disaster Response /Mitigation Strategy” (2007 ~ 2020). The 2nd Strategic Action Plan has been revised. It designates Northern Red River Basin, Central Coast Area and Mekong Delta Basin as the strategic area for disaster countermeasures. It emphasizes the policy shift from disaster prevention and mitigation based only on structural measures to what includes non-structural measures, from top-down to local government and community-based disaster management. It also places much value on the relation between other development issues and disaster prevention. *[1]*[6] <Local Level> • (Provinces prepare respective implementation plan based on the Implementation Plan of the National Strategy for Natural Disaster Prevention, Response and Mitigation to 2020 (2009)) • In 1998, Presidential Decree has been issued requesting states to develop a preliminary plan for protection of infrastructure, flood control structures and agriculture from flood and storm. *[13]	• Basic data (hydrology, meteorology and geology), information and knowledge on integrated river basin development and management planning should be better equipped with.*[5] • Contents and Priority for Water Utilization / Development Plan of Basin for Water Utilization by number of donors are not clear. *[5]			

<table>
<tr><td></td><td>4. Establishment and Enhancement of Disaster Management System</td><td>Institutional Framework
Central Level</td><td><u>National Committee for Search and Rescue (NCSR)</u>*6*9
• Chair: Deputy Prime Minister (Minister of Defense)
• Secretariat: Department of Search and Rescue, Ministry of Defense
• NCSR is a coordination organization.
• After disaster, NCSR receives reports and approve the emergency assistance plan, request financial arrangement to MoFA and MPI*6.
<u>Central Committee for Storm and Flood Control (CCSFC)</u>
• Chair: Minister of Agriculture and Rural Development
• Secretariat: Department of Dyke Management, Flood and Storm Control (DDMFSC), Ministry of Agriculture and Rural Development (MARD)
• CCFSC was formed in 1990, the new organization of CCDM*6.
• Formulation of regulation, disaster management plan for typhoon and flood*9.
• Emphasizing on dyke protection and monitoring, coordinating relevant organization for urgent assistant, issuing warning instruction, having function of coordination of disaster related organization*6*9
• DMU has been established in CCFSC*7.
 

Source: JICA Study Team
Vietnam's Disaster Management Structure</td><td>• Each Province has only few officers in charge of disaster management.*1; for non-structural measurement or CBDRM*1*6.
• Capacity of disaster management organizations should be improved in order to deal with non-structural disaster mitigation and preparation measures and community-base disaster management.
• In the action plan of "National Disaster Response/Mitigation Strategy (2007 ~ 2020)"; it is held up to strengthen the disaster prevention system in each administrative level..</td><td>1.(ii)</td><td>1.(ii)</td><td>2.1
4</td></tr>
<tr><td></td><td></td><td></td><td><u>Organizations in charge of Non-structural Measures for Disaster Risk Mitigation and Preparation</u>
• Flood, Sediment disaster, Cyclone: (1) National Water Resources Board (2000-), (2) Department of Forest Management of Provincial Council, (3) Department of Dike Management and Flood Control,, MARD, (4) Meteorology and Hydrology Services(MHS) of the Ministry of Natural Resources and Environment, (5) river basin management organizations
<u>Organizations in charge of Structural Measures for Disaster Risk Mitigation</u>
• Flood, Sediment disaster, Cyclone: (1) Department of Infrastructure, Ministry of Planning & Investment, (2) Sewerage & Drainage Corporation, (3) Urban Drainage Corporation, (4) DDMFC of the MARD (64 local offices in provinces and municipalities)</td><td>• More efforts should be made to build linkage between disaster management and development issues, as well as disaster management organizations and other sectors*1.</td><td></td><td></td><td></td></tr>
<tr><td></td><td></td><td></td><td>**Inter-organizational Arrangement:**
• Central ministerial committee covers the entire matters related to flood / storm / search & rescue.
• In collaboration with the army, CCFCS tries to coordinate the roles of army in the flood response and relief activity in better way. *7</td><td>• Cooperation with other sectors and/or development issues is not sufficient*1.</td><td></td><td></td><td></td></tr>
<tr><td></td><td></td><td>Local Level</td><td><Provisional Level>
<u>Provincial Committee for Flood and Storm Control & Search and Rescue (PCFSC&SR)</u>
• Chair: the Chairman of People's Committee at province
• Vice-chairman: the Deputy Director of Department of Agriculture and Rural Development (DARD) in respective Province
• Secretariat: People's Committee
<District Level>
<u>DCFSC&SR</u>
• Chair: the Chairman of People's Committee at district
• Vice-chairman: the Deputy Director of Department of Agriculture and Rural Development (DARD) in respective District
• Secretariat: People's Committee
<Commune Level>
<u>CCFSC&SR</u>
• Chair: the Chairman of People's Committee at commune</td><td></td><td></td><td></td><td></td></tr>
<tr><td></td><td></td><td>Inter-organizational Arrangements</td><td>Ministerial Committee (for both flood and storm control & search and rescue)</td><td></td><td></td><td></td><td></td></tr>
<tr><td></td><td></td><td>Financial Preparation</td><td>• DDMFSC was allocated 200 Billion VND in 2011.*14
• The Ministry of Natural Resources and Environment (MONRE) is allocated some budget for meteorological and hydrological stations to establish.
• Flood and storm measure fund: it has been established in 1993 with contributing investment from all administrative level*9.</td><td>• DDMFSC budget is used for dykes in 19 out of 58 provinces. Provinces in Southern Viet Nam are not subject for DDMFSC budget in terms of dyke management.
• In the action plan of "National Disaster Response/Mitigation Strategy (2007 ~ 2020)"; it is held up to enhance the fund for disaster and disaster compensation system. *6</td><td></td><td></td><td></td></tr>
<tr><td></td><td>5. Policy on Community-based Disaster Management</td><td></td><td>• Networking of disaster volunteers is listed in Action Plan of NSDPRM2020.*6
• Community participation for disaster reduction management has been emphasised by the Prime Minister's Decision (Decision 1002/QD-TTg) in 2009.
• The Prime Minister's Decision in 2009 stipulates that Provinces' implementation Plan is to prepare and roll out Community-based Disaster Reduction Management (CBDRM) to 6000 out of 11111Communes (as of 2010) by 2020.
• With awareness that there is a limit in unified measures taken by administrative organs to the disaster that hits the nation regularly every year, after the "National Disaster Response and Mitigation Strategy (2007~2020) has been formulated, MARD and CCFSC played a central role to discuss the strategy of CBDRM (intending to improve the capacity of the community to tackle with disaster prevention through the formation of core organization consisting of CCFSC and MARD as well, supporting organization of community-based disaster prevention, establishment of disaster prevention information centre, etc.). This movement is in the preparatory stage for decision by the government; meeting to review strategy cantered by the core group is in progress. *6</td><td></td><td>1.(iii)</td><td>1.(iii)</td><td>2.6
4</td></tr>
</table>

	6. Prevention and Mitigation	Current Situation		Challenges	-	-	-
	6.1 Flood	Identification of Disaster Risks	• Flood hazard maps for the Mekong River basin has been developed by MRC based on the actual inundation areas for floods in 1995, 1996 and 2000. *[15]*[16] • Also flood hazard maps for 4 provinces including Thua Thien Hue province was prepared through Natural Disaster Risk Management Project in 2010.*[17] • National Water Resources Council (NWRC: established in 2000 consisting of 14 relative agencies)[*5] takes charge of management of river basin. • Viet Nam Institute for Water Resources Research (IWRR)[*5] takes charge of flood control design consulting. • Viet Nam National Mekong Committee (VNMC)[*5] takes charge of tie-up with other nations to implement "Agreement for Tie-up Regarding Sustainable Development of River Basin of Mekong River". • Each River Basin Management Organization (RBO)[*5] takes charge of water resources development plan by river basin units.	• Development of hazard maps in disaster-prone areas is identified as priority area in Action Plan for National Strategy for Natural Disaster Prevention, Response and Mitigation to 2020 (NSDPRM2020).*[6] • In the action plan of "National Disaster Response / Mitigation Strategy" (2007 ~ 2020), it is emphasized the development of hazard maps of disaster prone areas. *[6]	2.(i)	2.(i)	1.1
		Monitoring	• Hydro-meteorological monitoring, flood forecasting, conveyance of information, development of hazard maps}[4] are conducted by National Hydro- Meteorological Service (NHMS)*[6]. • There are 70 hydrological monitoring stations all over the country, which are under the control of NHMS.*[18] • NHMS carries on "Meteorological and Hydrological Observation Automation Plan". This is to automate observation instruments and equipment in the local meteorological and hydrological observation station. 20 automatic observation systems are in operation (as of 2001). *[4]	• The enough number of monitoring stations for both rainfall and river water level have not been developed. *[19] • Improvement of monitoring accuracy and data transmission system is also one of the issues.*[19]	2.(i)	2.(ii)	1.3
		Non-structural Measures	• In 10 years from 1971 to 1981, 45% of those who have lived outside the dyke have been relocated. *[7] • Program for squatter relocation from canals has been implemented since 1994.*[20]11 • Area of the forest has been reduced in these 12 years from 13,4 million ha. (1978) to 9.39 million ha. (1990). Since it has become a key factor of flood disaster, the government has adopted forestation program of 5 million ha. etc. As the result, area of forest has recovered to 11.98 million ha. in 1998. *[5]5 • Disaster Management Center (DMC)*[5] of Department of Flood Control and Dyke management of MARD takes charge of non-structural measures to the wind and flood damage. • At the time of the typhoon Ketsana in September 2009, there was a significant difference in damage situations depending on the response activities by each commune. In some communes such Binh Duong commune of Quang Ngai province, flood damages were quite limited since disaster response plan had been formulated in advance and had been well known to residents in workshops and meetings on a regular basis.*[21] • In Huong Tho commune of Thua Thien Hue province, a pilot project for community-based disaster management was carried out. A committee at commune level has been established, and they started the activity in 2010 after organization, information dissemination method, and hazard maps were developed.*[21]	• Forest Management Department of People's Commission in each Ministry is in difficulty to control illegal harvesting and to carry out forest preservation activity due to lack of manpower and operational fund. *[5] • There are many violators of Ordinance for Protection of Dykes. *[7] • In the action plan of "National Disaster Response / Mitigation Strategy (2007 ~2020)", it is stipulated to improve forest covering ratio in the national land to 42-43% by 2010 and to 47% by 2020 and promote tree plantation in the river basin areas. *[6] • In the action plan of "National Disaster Response / Mitigation Strategy (2007 ~2020)", it is provided the formulation of housing plan in the mountainous area where there is a risk of sediment disaster or landslide and land use plan in the river basin areas. *[6]	4.(i)	4	2.2
		Structural Measures	• Currently, there are dykes, of which total length reaches almost 8,000 km, all over the nation; out of which 6,000km are dykes and 2,000km are coastal dykes. In large rives, there are dykes with total length of 3,000km and in the major coast, there are coastal dykes with total length of 1,000 km. About 600 bank protections are implemented in various forms; 3,000 water gates are installed under the dykes. In order to control the flood in Mekong Delta and to prevent the seawater intrusion there are dykes with total extension of 500km (as of 12999) *[7] • River dikes for 100-year flood have been constructed along the Red River in Hanoi. They are maintained DDMFSC (Department of Dyke Management, Flood and Storm Control) by using systematic database.*[17] • In the Northern and central areas, both river dykes and coastal/estuary dykes are developed; while in Southern areas, coastal /estuary dykes are developed. *[6] • Urban drainage issues caused by development are being emphasized. To solve these issues, the phase 2 of drainage project in Hanoi is just getting underway.*[22] • Installation of structural measures for disaster management considering characteristics of the region as well as the kind of disasters, ii) construction and effective utilization of storm water reservoir for water level adjustment in the downstream, iii) improvement of facilities for river bank erosion prevention, irrigation channel for drainage of rainwater and dikes are listed in Action Plan of National Strategy for Natural Disaster Prevention, Response and Mitigation (2007-2020.*[6] • In "Water Resources Development and Management Strategy" developed by MARD, it is emphasized to enhance flood prevention facilities in Northern areas and Northern coast areas. *[6] • In 10 years from 1971 to 1981, about 7 million m^3 of soil has been removed from the high river banks; at the same time, many dropped bridges as well as sanken ships have been removed. *[7] • Flood damages are decreasing due to the progress of dike construction and improvement of river capacity in Mekong River Basin.*[23] • Infrastructure Department[*20] of the Ministry of Planning and Investment, Sewage and Drainage Corporation (SDC) of Hanoi City, Urban Drainage Company (UDC), Urban Planning Institute (UPI) in Ho Chi Minh City[*3] take charge of construction of drainage facilities. • Central Committee for Storm and Flood Control (CCSFC)[6] takes charge of protection, monitoring and maintenance of dykes. • Department of Flood Control and Dyke Management (it has branches in 64 local cities/provinces)[*5*6] of the Ministry of Agriculture and Rural Development (MARD) takes charge of flood measures / dyke management.	• Due to the defect of design and implementation of work of mound and its foundation, sand boiling, leaching of piping, landslide are observed at every part of dykes. In the case that large flood continues for a long time, there is fear that dykes could be damaged and collapsed. Nests of white ants and holes made by rodents made a large hole inside the dyke, which becomes weak points of the dyke.*[7] • Due to the aging of river banks, tremendous amount of maintenance costs are needed; maintenance level is low, too. *[24] • Manpower and facilities for monitoring and repair of dykes are not enough. Monitoring of dykes is made mostly by visual inspection; since major defects exist in the foundation of the dyke, it is difficult to find them by visual inspection. *[7] • Reservoir constructed in various area have functions to restrain discharge of earth and	4.(i)	4	2.2

				sand; however, because of aging, the functions have been lessened.*[6] • Consideration to the maintenance of structures is not enough. Considering the limit of administration ability, it is needed to consider community-based maintenance of the structure. *[6] • In the central areas, height of coastal dykes is low; there were many cases that the dykes were washed away. *[7] • Although river dikes for 100-year flood have been constructed along the Red River in Hanoi, the problem is that a number of families have settled in the riverside land since ole times. *[25]			
	6.2 Earthquake / Tsunami	Identification of Disaster Risks	• Earthquake risk assessment in Vietnam is not conducted yet. • If earthquake occurs, magnitude at more than 6near Hanoi, severe building damage is anticipated to taken place. • According to tsunami disaster research by experts, tsunami wave generated at Manila Trench will reach at the central coast of Vietnam such as Da Nang. Wave height is estimated at 3~5m at Da Nang.	• Earthquake research in Hanoi area is recommended at first and building damage assessment shall be followed on research result.	2.(i)	2.(i)	1.1
		Monitoring	• Broadband seismographs will be installed at another 15 stations in Vietnam. New seismographs will be networked together with existing system. • At Da Nang, tsunami monitoring and warning system is operated only at this moment.	• Tsunami forecasting and monitoring system is not fully installed yet. • More tsunami forecasting and warning system is necessary along the coastal area of central part of Vietnam.	2.(i)	2.(ii)	1.3
		Non-structural Measures	• Availability of seismic building code for residential building is not clear. Vulnerable buildings against earthquake shock are constructed and distributed thoroughly in Hanoi as for example. • In Vietnam, detailed disaster management plan is not prepared yet for earthquake and tsunami.	• The strict building code and construction permission system should be improved. • The community disaster management drill such as evacuation should be conducted at regular schedule in tsunami expected area.	4.(i)	4	2.2
		Structural Measures			4.(i)	4	2.2
	6.3 Sediment disaster (Landslide, Debris flow)	Identification of Disaster Risks	• SATREPS assisted by Japan for risk assessment of sediment disasters in the central highlands with satellite imageries.		2.(i)	2.(i)	1.1
		Monitoring			2.(i)	2.(ii)	1.3
		Non-structural Measures			4.(i)	4	2.2
		Structural Measures			4.(i)	4	2.2
	6.4 Volcano	Identification of Disaster Risks	There is no active volcano in Viet Nam.		2(i)	2.(i)	1.1
		Monitoring	N/A		2.(i)	2.(ii)	1.3
		Non-structural Measures	N/A		4.(i)	4	2.2
		Structural Measures	N/A		4.(i)	4	2.2
	6.5 High Tide /Storm Surge (Cyclone/ Typhoon)	Identification of Disaster Risks			2(i)	2.(i)	1.1
		Monitoring			2.(i)	2.(ii)	1.3
		Non-structural Measures			4.(i)	4	2.2
		Structural Measures			4.(i)	4	2.2
	6.6 Other Disasters	Identification of Disaster Risks			2.(i)	2.(i)	1.1
		Monitoring			2.(i)	2.(ii)	1.3
		Non-structural Measures			4.(i)	4	2.2
		Structural Measures			4.(i)	4	2.2
	6.7 Common items for Disaster	Non-structural Measures	• At the national level, a disaster monitoring system installed in Disaster Management Center (DMC) is in place to monitor, archive and disseminate data on key hazards and damages caused by disasters[26]. In addition, when flood disaster occurs, DDMFSC is supposed to receive disaster reports including damage information and needs (e.g. food, drinking water, seeds) from PCFSC&SC*[17]. • The CCFSC monitors the monitoring system and generates damage inventory reports after each disaster and consolidates into one annual national report*[26]. • The CCFSC website displays information on main disasters since 1989 – damage inventory reports. CCFSC maintains records for much longer but only on hard-copies*[26].	• In order to make effective use of flood hazard maps, it is desirable to integrate those maps on GIS and to be able to browse freely among disaster management agencies.	4	4	2.2 2.5
					4	4	2.8
		Structural Measures			4	4	2.3.2 2.3.3
		Climate Change Adaptation	• Responsible body: Ministry of Natural Resources and Environment; Thematic Ad Hoc Working Group on Climate Change Adaptation (Nov. 2007) • NFP: Ministry of Natural Resources and Environment; Department of Meteorology, Hydrology and Climate Change • National Strategy for Environmental Protection until 2010 and vision toward 2020' includes climate change adaptation measures. • The 'National Target Program (NTP) to Respond to Climate Change 2008' establishes directions for the development of sectoral and geographic adaptation action plans • The Ministry of Agriculture and Rural Development is also developing an Action Plan for Adaptation and Mitigation. • Increase of natural disaster events by climate change and difficulties in coping with them are reported in the 8th five-year social and economic development plan (2000~2005)*[6]. • National Goals Program on climate change and sea-level rise was approved in 2008. Besides national budget, Denmark and IUCN will fund*[27]. • Viet Nam is listed as one of the five countries that are most susceptive to negative impacts of climate change. It is estimated that average temperature has risen 0.7degree in the last half century and will rise 3 degree by 2100. Sea level is also		4.(i)	4.(i)	2.7

			estimated to rise 50-60cm by 2100. With 1m of sea-level rise, 5% of national land, 11% of population, 7% of agriculture are estimated to be affected and GDP is estimated to decrease 10%*[27]. • MORAM forecasts that sea level may raise up by 0.5-0.6 m by the year 2100, which may submerge cultivated field in the coastal area of the country*[27].				
		Public Awareness Research and Development /Human Resource Development / for Disaster Management	<Disaster Education/Drills> • DMU of CCFSC drafted community-based disaster preparation drills plan for school children*[7]. • There is not Primary school and Secondary school curriculum. However, there have been numerous educational projects led by Vietnam Red Cross (VNRC), donor countries and International Non-government Organizations (INGOs)*[26]. • One specific example is the successful program to provide swimming lessons for children in the flood prone areas (Mekong Delta and other central provinces)*[26].	• Community participation in disaster management is not active because top-down approach has been common*[6] • National Action Plan (2007-2020) aims to introduce disaster education to school, and information dissemination via media to people in disaster prone areas*[6]. • The Plan also aims to construct evacuation facilities for fishing ships*[6].	3	3	2.3.1
	7. Preparedness and Response	Current Situation		Challenges			
	7.1 Disaster Response plan / Emergency Financial Measure	Central Level	<Emergency Operation Plan(EOP), Contingency Plan(CP) .etc> • CCFSC and relevant ministries prepare the preparedness and response plans. <Emergency Financial Measure> • The budget for emergency response is set aside from 2-5% of national and provincial budget by the State Budget Law*[26].	• Enhancement of disaster management systems at all administrative level is identified as a priority area to be addressed.	5	5	3
		Local Level	<Emergency Operation Plan(EOP), Contingency Plan(CP) .etc> • Annually, 100 % of local entities from province to commune levels conduct the planning of the disaster preparedness and response.	• Planning is conducted chiefly by MARD and its branches with less effective coordination and participation. • Due to the report failure revealed by 8 provinces as for disaster situations, it was instructed to craft the standard manual for disaster assessment. • It is expected to prepare SOP as well in the process of preparing the manual.			
	7.2 Early Warning	General Warning and Forecast/Communication	<Weather and Communication System> • Weather forecast and early warning is under responsibility of National Hydro-Meteorological Service (NHMS)*[19]. • NHMS is obligated to provide relevant agencies various forecast such as weather forecast, 10 day forecast, 1 month forecast, seasonal forecast, marine forecast, etc. as well as tropical storm warning and flood forecast. *[4] • NHMS is consist of 9 Regional Hydro-Metrological Centers and 54 Provincial Hydro-Metrological Forecasting Centers and has observation station networks nationwide. It conducts surface weather observation (at 93 points), agricultural weather observation (at 26 points), rainfall observation (at 384 points), hydrological observation (at 232 points), agrological observation (at 9 points), meteorological radar observation (at 5 points), oceanographic observation (17 points at coast and 4 points by marine buoy)*[4]*[19] • Forecast /warnings of tropical storms, flood, etc. are created /announced / by NHMS and are conveyed (by Fax) to mass media such as TV, radio, etc., CCFSCC, and so on. NHMS has 2 channels for business use; it broadcasts weather information twice a day addressed to the local meteorological offices. *[4] • Warning tanking disaster prevention measures into consideration is conveyed from CCFSC to Central Committee for Storm and Flood Control in the State and mass media. Central Committee for Storm and Flood Control in the State conveys disaster prevention-related information to CCFSC of prefectural level as well as that of municipality level. In addition to Fax from NHMS, CCFSC accesses NHMS data server by telephone line to obtain information required for disaster prevention activity and so on. *[4] • In the action plan of “National Disaster Response / Mitigation Strategy (2007~2020), it list up development of flood forecast / warning system for Red River, Mekong Delta and major rivers in Central area and warning system for mud avalanche and landslide in the mountainous areas. *[6] • In “National Water Resources Strategy” by MONRE, it is held up to improve meteorological and hydrological observation and flood forecast / warning system. *[6] • In “Water Resources Development and Management Strategy” by MARD, it emphasizes necessity of non-structural measures for mitigation of wind and flood damages in Central areas and Mekong Delta. *[6] • DMU in CCFSC has established Central Database Center for disaster management by utilizing Internet web and GIS. It provides fund and human resources to build a disaster communication network that connects all prefectures and permanent secretariat of CCFSC. *[7] • HMS carries forward “Meteorological Radar Development Plan (1994~2010). In addition to the existing 5 sets, 2 more sets will newly be installed; with those 7 sets of radars, meteorological observation network to cover almost all area of the nation will be developed. With said network, movement of tropical storm as well as thunder cloud, heavy intensive rainfall, etc. can be observed. Finally, it has a plan to install 12 sets of meteorological radar. *[4] • CCFSC distributes early warnings in 3 warning level to PCSFC and media, taking into account disaster preparation operations. PCFSC distribute disaster management information to DCSFC/VCSFC • NHMS is promoting automation of local monitoring stations, enhancement of communication network and installation of weather radars by 2010. • NHMS disseminates to communities through mass media (e.g. television, radio), NHMS website and local governments.	• In the 2nd Strategic Action Plan (2001~2020), it gives status monitoring of tropical storm , providing information on heavy rain quickly, and developing short-time prediction technology as emergency issues. *[4] • Flood forecast /warning system as well as evacuation center has still not been enough from the nationwide viewpoint.*[4] • Comparing with the area of national land, the numbers of radar observation stations are small; no observation has been conducted in Central high land as well as in Mekong Delta. *[4] • Among 5 radar stations only 1 in Hanoi is able to transmit to National Center of Hydrological and Meteorological Forecast (NCHMF). From other station, information is obtained by telephone. *[4] • Observation cannot cope with Ever-changing weather phenomenon; short-term forecast, tropical storm warning, flood warning, etc. are not made appropriately. *[4] • Observation and reporting (transmission of data) are made manually; depending on the operator, decrease in reliability of the data, delay in reporting, lost/damage of data could occur. *[4] • As to hydrological observation of Mekong River, it is desirable to raise observation density in observation network in central part of Viet Nam. There is a plan to introduce meteorological radar to Southern area (which was requested to Japan). *[28]	2.(ii)	2.(ii)	1.2

		Flood	• Mekong River Commission developed hydrology and meteorology monitoring network and provides .flood forecasting. It receives monitoring data monthly (in rainy season, daily for major monitoring points). Monitoring facilities in Viet Nam are well maintained. • Flood forecast of 5-day advance is made every 6 hours by NHMS. The result of forecast is shown on the website with flood warning information that is categorized into three steps. • CCFSC provides flood warning criteria for rivers in 3 steps. *[4] • There are some river basins, where flood forecast / warning system and evacuation centers are prepared. *[4] • HMS carries forward "Communication System Development for Meteorological and Hydrological Observation and Data Collection Plan (1997 ~ 2010)". The purpose of this project is, in order to modernize forecast/warning operation for flood, tropical storm, etc.; enhancing communication network connecting the headquarters, 9 local meteorological and hydrological observation center and observations stations by high speed exclusive circuits. *[4] • As one of the activities of Mekong River Committee, meteorological and hydrological observation network has been developed; as the result, flood forecast for 5 days ahead can become possible*[29]. There are total 569 observation points (2000) for water level/rain amount in the downstream of Mekong River; out of the said 569 observation points, 103 points are in Viet Nam. Data are gathered in the headquarters of the respective nations once in a month by mail or e-mail via telephone lines. In the flood season, data from the important observation points are gathered every day at the headquarters of the respective nations and are sent to Mekong Committee. Observation facilities in Viet Nam are well managed.*[28]	• Monitoring typhoons, swiftly disseminating information on heavy rainfall and establishing technology on speedy forecasting is the issues in the National Action Plan (2001-2020) . • Central highland area and Mekong Delta area are not covered by weather radar.			
		Earthquake / Tsunami	• Tsunami early warning is under responsibility of Institute of Geophysics.*[30] • Institute of Geophysics has established the Operation Centre for Earthquake Information and Tsunami Warning and has installed 10 siren towers in Da Nang. The Operation Centre monitors whether there is possible to occur tsunami impact to Vietnam.*[30] • If there is possible to occur tsunami impact to Vietnam, early warning is issued and the Operation Centre disseminates the warning to Da Nang directly using siren networks. The Operation Center also delivers the warning to relevant agencies/organizations by e-mail, SMS and FAX.*[30]	• Tsunami is likely to come to the coastal area of Vietnam nationwide, but means of dissemination is installed in Da Nang only. Therefore, it is necessary to install tsunami observation network off the coast of Vietnam and to establish early warning system nationwide.			
		Sediment disaster (Landslide, Debris flow)	• SATREPS is being implemented (2012).				
		Volcano	• No volcanos				
		High Tide /Storm Surge(Cyclone/ Typhoon)	• NHMS sets 4 levels for typhoon warning. CCFSC starts taking action from warning level 3.*[5] • Based on the experience in the typhoon season in 1996 and 1997, in collaboration with Navy and Fishery Public Corporation, CCFSC has revised procedures for marine storm alert and emergency relief. *[7]	• Enhancement of short-term forecasting, typhoon and flood warning by following changing weather conditions in real time is an issue to be addressed.*[4]			
		Other disasters	(Forest fire) • Early warning system has been established with using satellite imagery, through an ASEAN agreement[31].				
	7.3 Evacuation plan	Under the Fatherland Front, mass organizations are networked strongly for response activities.			5	5	3
	7.4 Establishment of Emergency Response System	Central Level	• CCFSC coordinates emergency relief activities.*[6] • If it is a small scale, fund and relief commodities are distributed by Flood and Tropical Storm Control Committee of local State level (PCFSC), which plays a central role in such activities. *[6] • In case of massive disaster, PCFSC integrates needs for assistance and forward them to CCFSC. *[6] • In case where support of NGO is required, PCFSC applies request to PACCOM (People's Aid Coordination Committee), the contact of international NGO. *[6] • MARD, CCFSC, Provinces and PCFSC evaluate disaster damages and report it to NCSR. NCSR approves relief plan and requests contingency budget to Ministry of Finance and Ministry of Planning and Investment (MPI).*[6] • Damage inventory system is well established.		5	5	3
		Local Level	• In case of massive disaster, PCFSC integrates needs for assistance and forward them to CCFSC. • MARD, CCFSC, Provinces and PCFSC evaluate disaster damages and report it to NCSR. NCSR approves relief plan and requests contingency budget to Ministry of Finance and Ministry of Planning and Investment (MPI).				
		Training etc.		• Simulations and rehearsals are less conducted due to resource shortage.			
	7.5 Rescue plan	• Under the Fatherland Front, mass organizations are networked strongly for response activities.			5	5	3
	7.6 Relief plan	• CCFSC coordinates relief operations. In case of minor disasters, PCFSC will be the main actor in distributing funds and goods. • The requirement of the Ordinance is that every government agency and individual should stockpile sufficient material reserves such as rock, sand bag, stone, bamboo for rescuing infrastructure failure; life vest, lifebuoy, boat for rescuing people; and foods, fuel, medicines for surviving.			5	5	3
Assistance to challenges	8. Records of Major Assistance by JICA	< Technical Cooperation Projects/Experts> • Capacity Development Project for National Water Environment Management (2009-) • Development of Landslide Risk Assessment Technology along Transport Arteries in Viet Nam (2011.11~2016.11) • Project for Capacity Enhancement in Road Maintenance (2011.7-2014.1) <JICA Partnership Program > • Capacity Building for School Centered Community Based Disaster Risk Management in Central Vietnam (2010.3~2011.3) • Integrated Approach to the Vulnerable People to Cope with Natural Disasters in Central Vietnam (2010.10~2013~9) • Development and Implementation of disaster Education Programs in Hue City (2011.4~2014.3) <Studies> • The study on urban drainage and waste water disposal system in Hanoi City (1993.10~1995.2) • Study for Hanoi Drainage and Sewerage Development (1993-1994) • Study for Ho Chi Min Drainage and Water Environment Improvement (1999) • Study on National Water Resource Management Planning (2000) • Study on Weather Radar Network Development (1999-2000) • Study on River Bank Erosion Prevention (2006-) • The Study on Groundwater Resources Development in Southern Coast in Vietnam (2007.5-2009.3) • Project for Building Disaster Resilient Societies in Central Region (2009.3-2012.2) (Final Report) • Natural Disaster Management Capacity Enhancement Project Adaptable to Climate Change (2010) • Program for the Improvement of Capabilities to Cope with Natural Disasters Caused by Climate Change (2010-) <Trainings> • Integrated Water Resources Management (2004-2006) • Earthquake Engineering (1997, 2000, 2003, 2005) • Sewage Works Engineering(1997-1998, 2000, 2003)				

		• Port and Harbor(1997-2003) • River and Dam Engineering(1998, 2003, 2005) • Meteorology(1998, 2001) • Disaster Medicine(1998, 2001) • Disaster Prevention(1999-2000) • Disaster Assistance (1999) • Emergency Disaster Rehabilitation System (2003) • Operating Management of Earthquake-Tsunami-Volcano Eruption Observation System (2006) • Flood Hazard Mapping (2006)
	9. Records of Assistance by other Development Partners	• With the onset of flood in Central Region in 1999, Multi-donor joint assessment was implemented. In 2002, UNDP and Dutch Government facilitated the establishment of National Disaster Mitigation Partnership. MARD serves as a secretariat*1*5. • Assistance by Development Partners • WB：Natural Disaster Risk Management Program (2006-2012), Water Resource Management in Mekong Delta, Assistance to establish river basin management organizations, Trainings for safe dam operation*1*6 • ADB：Water resource management in Red River, Dong Nai River Basin Management, Assistance to establish river basin management organizations, Technical Assistance to National Water Resource Board, Natural Disaster Risk Management Project*1*5*6 • DANIDA：Water resource management in Red River, Ca River Water Resource Development and Management (2001-2005), Assistance to establish river basin management organizations, Technical Assistance to National Water Resource Board, Integrated Water Resource Management*5 • AusAID：Mekong Delta Water Resource Management, Assistance to establish river basin management organizations, Development of National Water Resource Information System, Technical Assistance to National Water Resource Board, Natural Disaster Risk Management Project (2003-2006)*5*6 • UNDP：Disaster Management System Assistance Project (1993-2001), Capacity Development for Disaster Risk Mitigation (2002-2005)*5 • UNDP/WFP：Rehabilitation and Construction of Coastal Bank in Northern and Central Region*7 • ADPC/DANIDA：Capacity Building of National Meteorological Services (2005.12-2008.12) /ADPC/OFDA：Extreme Climate Events Program (1998-2003) • ADPC：Enhancing Community Resilience to Natural Disasters in Southeast Asia。Support for Preparation of SNAP*32 • EU-ECHO/ADPC：Capacity Development for Flood Preparation Program Planning and Implementation in Provincse and Districtsin Lower Mekong • WB: Natural Disaster Risk Management Project (2005-2013) • WB: Vietnam Climate Change Development Policy(2012) • WB: Mekon Delta Water Management for Rural Dev (2011-2017) • WB: GRDRR-Vietnam DRM Capacity Building(2010-2012) • WB: Climate Change Partnership-Capacity Building Component (2011) • ADB: Climate Change Impact and Adaptation Study in the Mekong Delta(2010-2011) • UNDP: Strengthening Institutional Capacity for Disaster Risk Management in Viet Nam, including Climate Change related Disasters(2009-2011) • UNDP: Strengthening National Capacities to Respond to Climate Change in Viet Nam, Reducing Vulnerability and Controlling Green House Gases (GHG) Emissions(2009-2012) • UNDP: Strengthening Sustainable Development and Climate Planning(2009-2011) • ECHO: Response to natural disaster(1994-2011) • ECHO: Disaster preparedness (1998-2011) • AusAid: Climate Change and Coastal Ecosystems Program (CCCEP)(2011-2016) • NZAid: Regional programme-Disaster Management and Emergency Response(2009-2012)
	10. International Networking	• Through GTS, meteorological information is exchanged among Bangkok, Beijing and Moscow. Since 1997, numerical prediction information are provided from JMA and WMO*4. • With the onset of massive flood in 2000, flood control has come to be one of the major issues for MRC. MRC developed basic strategy in 2001 and action plan in 2002 and formulated flood control and mitigation program. Flood vulnerability assessment and mapping project was started*33.
ASEAN Cooperation	11.National Policy on ASEAN(ACDM, ARPDM, AADMER) cooperation in Disaster Management, Emergency Response in case of disasters in other ASEAN countries or ASEAN region	• Signed AADMER in 2007(ASEAN Agreement on Disaster Management and Emergency Response)(AADMER stipulates mutual cooperation in case of disaster.)*5 • Participation in ARF meetings on disaster management, monthly ACDM meetings, ARDEX (ASEAN Regional Disaster Exercise)and ASEAN regional technical cooperation Project • SASOP (Regional Standing Arrangement and Standard Operating Procedures) started in 2007*5. • Agreement on trans-boundary haze was signed by ministers of ASEAN countries in 2002 and came into effect in 2003. It stipulates forest fire monitoring, prevention, coordination mechanism, communication system, mutual emergency support and establishment of ASEAN coordination center. Action plan for capacity building of fire fighting in the region and early warning system utilizing satellite images were developed*31*34.
	12. Resources useful for other ASEAN countries	
	13. Needs for External Assistance from the point of view of Regional Cooperation	

[1] JICA Program Plans “Building Regions Strong to Disasters in the Central Part of Vietnam” (2008).
[2] Website of ADRC: (http://www.adrc.asia/latest_j/index.php) (accessed on 23 March 2009).
[3] Website of ADRC: (http://www.adrc.asia/latest_disaster.php?NationCode=704&Lang=jp&Mode=country) (accessed on 28 June 2012).
[4] JICA, “Survey Report on Basic Design for Development Plan of Meteorological Radar Network in Socialist Republic of Vietnam” (2001).
[5] JICA, “Preliminary Survey Report on the Survey of National Water Resources Development / Management Plan in Vietnam” (2001).
[6] JICA, “Position Paper in the Field of Disaster Prevention in Vietnam” (2008).
[7] ADRC, Country Report (1999)
[8] By interview to DARD: (Department of Agriculture and Rural Development, Hue on 26 March 2012).
[9] ADRC, Country Report (2006)
[10] National Strategy for Natural Disaster Prevention, Response and Mitigation to 2020.
[11] JICA, “Summary of Final Survey Report on the Survey of Sewage / Drainage Development Plan in Hanoi City, Vietnam” (1995).
[12] Implementation Plan of the National Strategy for Natural Disaster Prevention, Response and Mitigation to 2020.
[13] ADRC, Country Report (1998).
[14] Information obtained at Interview to DDMFSC on 28 March.
[15] Yoshiaki Otsubo, “Actual State of Severe Flood in the Downstream of Mekong River in 2002 and Issues to Flood (2004); the Japanese Society of Irrigation, Drainage and Reclamation Engineering, Academic Journal Volume 72, No.2.
[16] Website of Mekong River Committee: (http://ffw.mrcmekong.org/floodrisk.htm) (accessed on 28 June 2012).
[17] JICA, “Basic Information Collection / Survey Report on Cooperation for Regional Disaster Prevention in Asian Region / ASEAN Region” (2012): Interview to DDMFSC (2012.03.28)
[18] Website of National Center for Hydro-Meteorological Forecasting: (http://www.nchmf.gov.vn/web/en-US/67/96/Default.aspx) (accessed on 28 June 2012).
[19] JICA, “Basic Information Collection / Survey Report on Cooperation for Regional Disaster Prevention in Asian Region / ASEAN Region” (2012): Interview to NHMS (2012.03.29).
[20] JICA, “Preliminary Survey Report on the Survey of Urban Drainage Development Plan in Ho Chi Minh City, Vietnam” (1998).
[21] By interview to DARD: (Department of Agriculture and Rural Development, Hue on 26 March 2012).
[22] JICA, “On-Going Project Map in Vietnam (as of March 2012).
[23] Hajima Tanji, Takao Masumoto, Naoki Horikawa, “Current Status of Flood in Mekong River” (2004); the Japanese Society of Irrigation, Drainage and Reclamation Engineering, Academic Journal Volume 72, No.2.
[24] JICA, “Summary of Final Survey Report on National Water Resources Development in Vietnam” (2003).
[25] By site survey (Red River, on 24 March 2012).
[26] Vietnam, National progress report on the implementation of the Hyogo Framework for Action (2009-2011) – Interim , 2010.
[27] Institute of Global Environmental Strategies (IGES); “2008 Momentous News in Asia” (2009).

[28] Takao Masumoto, Huan Thain Hi; “Development Status and Future Outlook of Hydrological Weather Observation Network in Mekong River Basin”; (2004) the Japanese Society of Irrigation, Drainage and Reclamation Engineering, Academic Journal Volume 72, No.2.

[29] Shin Utsumi, “Current Status and Direction of Activity of Mekong River Committee” (2004); the Japanese Society of Irrigation, Drainage and Reclamation Engineering, Academic Journal Volume 72, No.2.

[30] JICA, “Basic Information Collection / Survey Report on Cooperation for Regional Disaster Prevention in Asian Region / ASEAN Region” (2012): Interview to Institute of Geophysics (2012.03.28).

[31] Institute of Global Environmental Strategies (IGES); “2003 Momentous News in Asia” (2004).

[32] Website of ADPC: (http://www.adpc.net/v2007/Programs/DMS/PROGRAMS/Capacity%20Building%20at%20the%20National,%20Provincial%20and%20District%20Levels/LANGOCA/Default-LANGOCA.asp) (accessed on 10 April 2009).

[33] Website of Mekong River Committee: (http://www.mrcmekong.org/programmes/flood.htm) (accessed on 6 April 2009).

[34] Institute of Global Environmental Strategies (IGES); “2002 Momentous News in Asia” (2003).