

Data Book 2

Disaster Management Exercise Manual



**COMPREHENSIVE STUDY ON DISASTER MANAGEMENT
IN SRI LANKA**
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Disaster Management Exercise Manual (October 16, 2008)

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Disaster Management Exercise Manual

October 2008

Disaster Management Centre
supported by
JICA Study Team

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Abbreviations

DDMCU	District Disaster Management Coordinating Unit
DG	Director General
DM	Disaster Management
DMC	Disaster Management Centre
DOI	Department of Irrigation
DOM	Department of Meteorology
DS	Divisional Secretariate
EOC	Emergency Operation Centre
GA	Government Agent
G.N.	Grana Niladhari
HQ	Headquarters
JICA	Japan International Cooperation Agency
JOH	Joint Operation Headquarter
NBRO	National Building Research Organization
OIC	Officer in Charge
SLBC	Sri Lanka Broadcasting Corporation
SLRC	Sri Lanka Rupavahini Corporation

1. Outline of the Exercise

1.1 Outline of Exercise

The exercise is composed of following two activities.

- “Information Transfer Exercise” : for governmental organizations
- “Evacuation Drill” : for selected communities

Date: October 16th (Thursday) 10:00-13:00

Target Districts: Ratnapura, Kalutara and Galle

1.2 Objective

The objectives of the “Information Transfer Exercise” are:

- 1) To confirm the information transfer procedure.
- 2) To familiarize with equipments.
- 3) To communicate with responsible officers of related organizations.

The objectives of the “Evacuation Drill” are:

- 1) To confirm the information transfer procedure from GN level to individual level.
- 2) To check the appropriateness of evacuation activities.
- 3) To enlighten the community people.

1.3 Participating Organizations

National Level Organizations:

DMC, DOI, DOM, NBRO, Police

Sub-national Level Organizations:

District Secretariat and DDMCU (Ratnapura, Kalutara, Galle)

Divisional Secretariat (Ratnapura, Nivithigala, Dodangoda, Horana,

Bulathsinhala, Baddegama)

GN (Mudduwa, Mahawala, Waniwatta, Ukwatta, Nagalakanda,

Niggaha, Baddegama)

Other Related Organizations

Media (SLRC, SLBC)

1.4 Place of Exercise

Exercise will be held at participants’ own office except for selected DM committee members. Exercise locations are shown in Table 1-1

Table 1-1 Exercise Locations

Organization	Location/Room	Participants
DMC	EOC	Participants from DMC
DOI	Hydrology Division	Participants from Hydrology Division
DOM	Early Warning Center	Participants from DOM
	Command Center	Participants from Command Centre
	Police Division	Participants from Police Division
Police	Police Station	Participants from Police Station
	Community	Participants from Police Station for Evacuation Drill
DDMCU	District EOC	Participants from DDMCU Representative from Police Division Irrigation Engineer, DOI Field Officer, NBRO Representative from DS office
DS	DS office	Participants from DS
GN	GN office	GN
Community People	Community	Participants to evacuation drill

1.5 Date and Time of Exercise

Date: October 16, 2008

Time: 10:00am – 13:30pm (Information Transfer Exercise)

11:30am – 12:30pm (Evacuation Drill)

The exercise starts at 10:00am on October 16, 2008. All participants shall be ready for exercise at least 15 min. prior to the commencement of exercise.

[Rehearsal of Exercise]

Date and Time: October 2, 2008 10:00am

Place: EOC at DMC and DDMCU Rathnapura

[Evaluation Meeting]

Date and Time: October 17, 2008 10:30am

Place: Trans Asia Hotel, Colombo

1.6 Exercise Coverage

The exercise covers advisory, warning and evacuation instructions as shown in Figure 1-1, and will not cover emergency response activities.

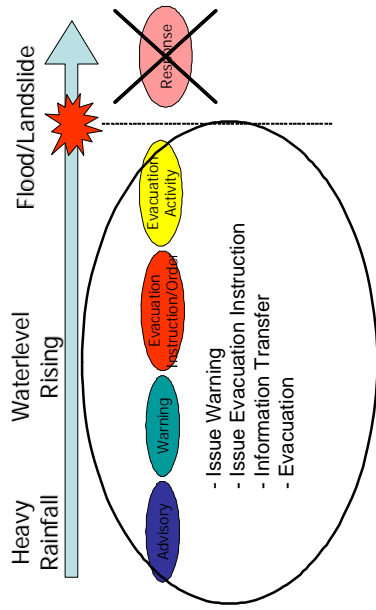


Figure 1-1 Exercise Coverage

1.7 Scenario for Exercise

1.7.1 Target Disaster for the Exercise

- (1) Flood in Kalu and Gin River

Flood in 2003 and 2008 which are the biggest flood in recent years are set as the target flood for exercise.

- (2) Landslide in Ratnapura and Kalutara District

Rainfall amount during 2008 flood (more than 200mm/day and 300mm/2days) is set as the target weather condition for exercise.

1.7.2 Disaster Situation and Exercise Scenario

Followings are assumed situations of rainfall, flood and landslide for the exercise.

- Water levels at Ratnapura, Ellagawa, Putupaula gauging stations in Kalu are already more than minor flood level. And they will increase to major flood level like flood in 2003 and 2008.
- Water levels at Tawalama and Agaliya gauging stations in Gin are already more than minor flood level. And they will increase to major flood level like flood in 2003.
- Rainfall amount during last 24 hours at several stations in Ratnapura and Kalutara district exceed 200mm and expect more than 100mm during next 24 hours. Possibility of Landslide is very high due to this amount of rainfall.
- Some community people have already started to evacuate due to above condition.

Based on the assumed situations, three different stages are set to accomplish the overall exercise objective. The objective of each stage, actions to be taken in the organizations and general flow of information are summarized in the Table 1-2.

2. Actions Taken by Each Organization during Exercise

2.1 General

Table 1-2 Objective, Activity and General Information Flow of each Stage

Stage	Objective	Activity		Information Flow
		Government / Organization	Community People	
1	<ul style="list-style-type: none"> To confirm the information flow from national level to local level. 	<ul style="list-style-type: none"> Early Warning Message Dissemination <ol style="list-style-type: none"> Bad weather advisory by DOM Flood warning by DOI Landslide warning by NBRO 		
2	<ul style="list-style-type: none"> To confirm the procedure to issue the evacuation instruction the information flow from district level to national, local level, and community people. the evacuation activity by community people 	<ul style="list-style-type: none"> Preparation of Evacuation Instruction Message and its Dissemination <ol style="list-style-type: none"> Evacuation instructions to affected area specified by District Disaster Management Committee by DDMCU (GA) 	<ul style="list-style-type: none"> Information Dissemination Evacuation Activity 	
3	<ul style="list-style-type: none"> To confirm the information flow from local level to national level. To exercise the various information. to have a press conference. 	<ul style="list-style-type: none"> Reporting and Consolidation of Local Conditions <ol style="list-style-type: none"> Situation Report by each level Conducting Press Conference 		

Actions taken by each organization during exercise will be done in accordance with the flow diagram presented in this chapter.

To accomplish the objective, to confirm the information transferring procedure, procedures presented in this manual are simplified and information will be sent to selected organizations, while the procedures will become much complicated during an actual flood situation.

Another thing that should be mentioned is there are still discussions on standard procedure of information transfer and decision making for issuing warnings and evacuation instructions. Therefore, please note that the diagrams presented in this manual are exercise purpose use only and shall be modified for actual operation. Such modification will be done through further discussion with organizations concerned.

2.1.2 Documents

All organizations participated in this exercise shall prepare necessary documents by using their own resources.

Documents shall be prepared by following manner for exercise purpose as shown in Figure 2-1.

- All documents prepared in this exercise shall have "EXERCISE" on right top with capital and bold letters more than 20pt font size.
- All documents prepared in this exercise shall have the following sentence at the top and bottom of document.

"CONTENTS OF THIS DOCUMENTS ARE EXERCISE PURPOSE ONLY"
- Title and contents of the message shall be easily understandable to avoid any confusion.

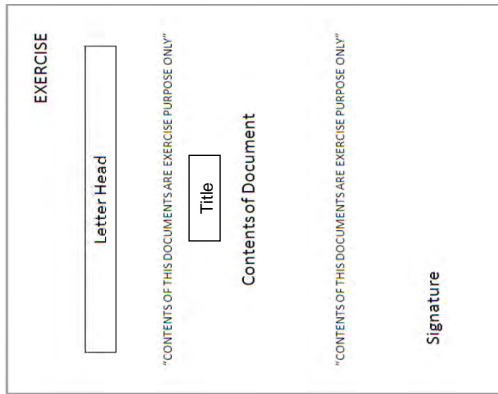


Figure 2-1 Document Preparation Rule

Documents which shall be prepared in the exercise are shown in the following sections by exercise stages.

2.1.3 Intra-Governmental Network (IGN)

All organizations in which the Intra-Governmental Network (IGN) is installed shall use IGN as FAX and Telephone. Notice Board in IGN shall be also used as information dissemination method.

2.2 Actions Taken by Participating Organizations

The following figures show the diagram of information flow in each stage of the exercise. Based on the diagrams, each organization will take action including preparation of documents presented in the tables which are following the diagrams.

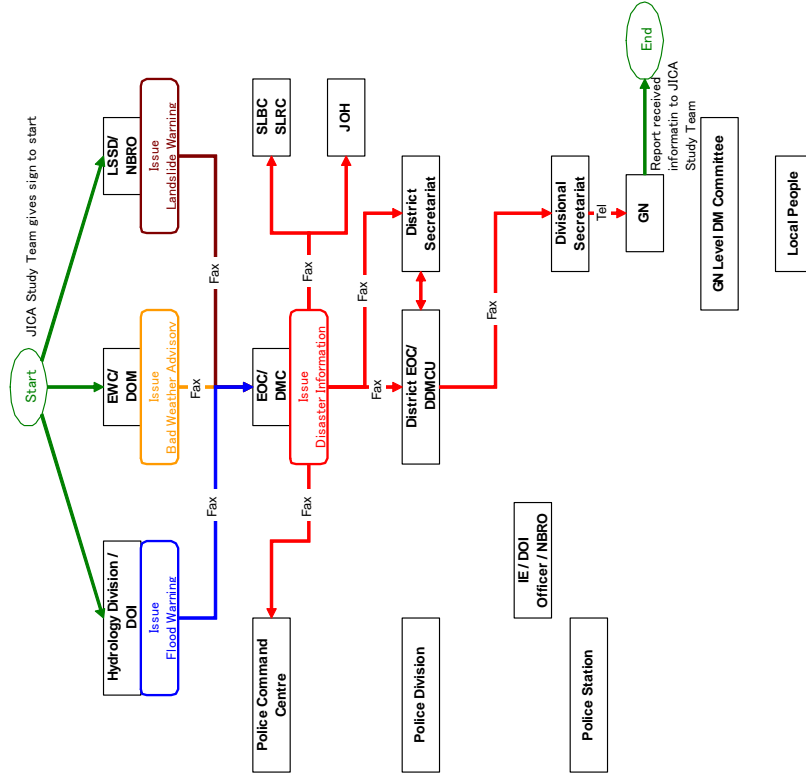


Figure 2-2 Information Flow Diagram for Stage 1

Table 2-1 Documents Prepared in Stage 1

Organization	Documents Prepared	Description	Remarks
DOM	Bad Weather Advisory	A Bad Weather Advisory will be issued after instruction by JICA Study Team.	Prepared in advance
DOI	Flood Warning	A Flood Warning will be issued after instruction by JICA Study Team.	
NBRO	Landslide Warning	A Landslide Warning will be issued after instruction by JICA Study Team.	
DMC	Disaster Information	By compiling the Bad Weather Advisory, Flood Warning, and Landslide Warning, Disaster Information will be prepared.	
DDMCU	Disaster Information (DDMCU)	Based on the Disaster Information, DDMCU will prepare a Disaster Information (DDMCU) for DS and other related organizations.	

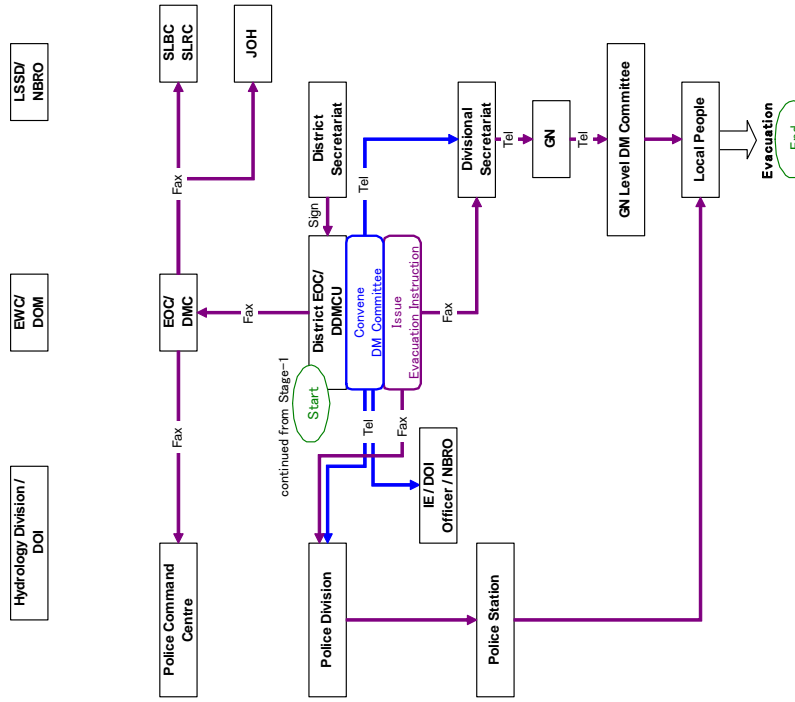


Figure 2-3 Information Flow Diagram for Stage 2

Table 2-2 Documents Prepared in Stage 2 in Each Organization

Organization	Documents Prepared	Description
DDMCU	Evacuation Instruction	Based on the Disaster Information and the result of discussion at District DM Committee, DDMCU will prepare Evacuation Instruction.

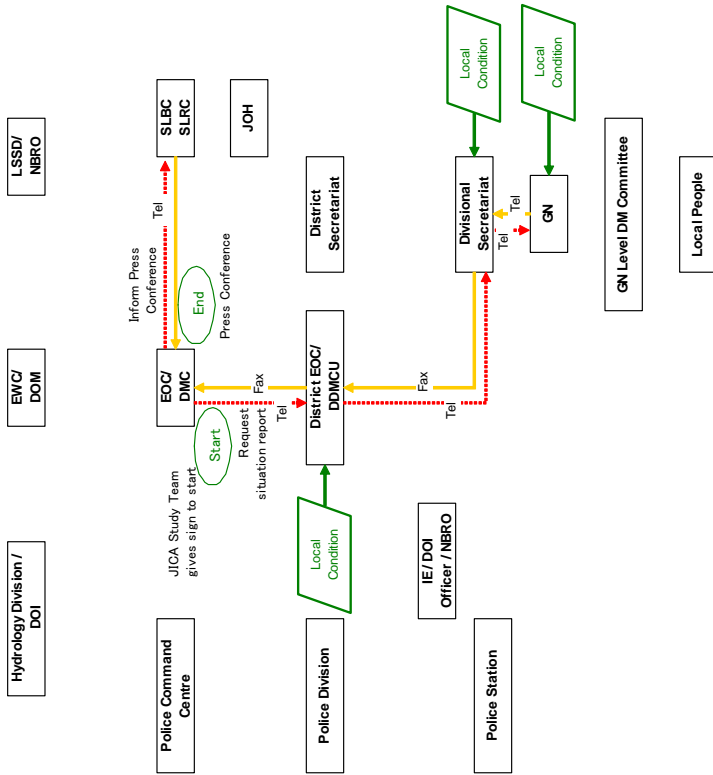


Figure 2-4 Information Flow Diagram for Stage 3

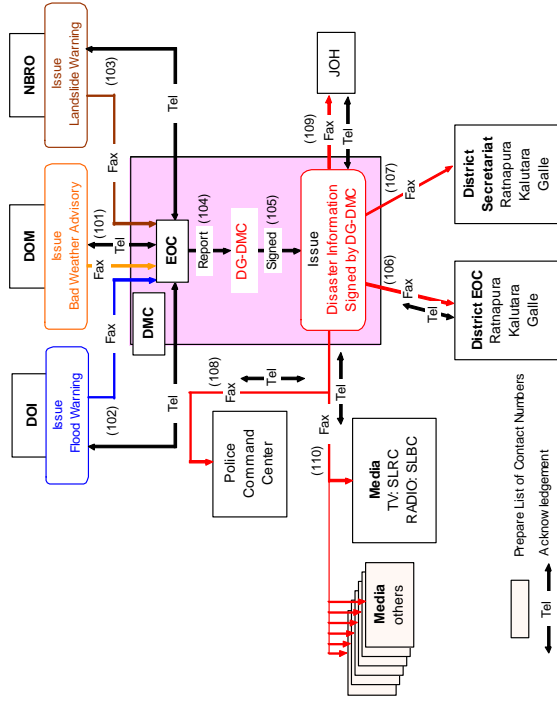
Table 2-3 Documents Prepared in Stage 3 in Each Organization

Organization	Documents Prepared	Description
DS	Situation Report (DS)	A Situation Report (DS) will be prepared based on the information provided by GN and evaluator.
DDMCU	Situation Report (DDMCU)	A Situation Report (DDMCU) will be prepared by compiling the information provided by DS and Evaluator.
DMC	Situation Report (DMC)	A Situation Report (DMC) will be prepared by compiling all the information provided by DDMCU.

2.3 Information Diagrams and Procedures for Each Organizations

Information flow diagrams and procedures for each organization by the exercise stage are instructed as follows.

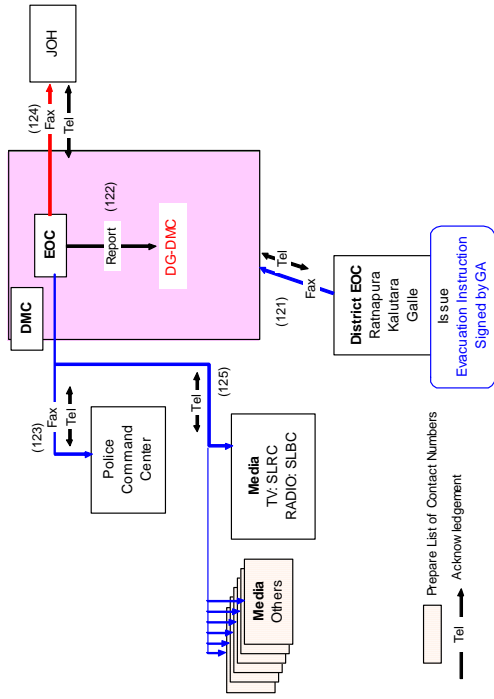
Actions taken by EOC-DMC



List of Actions

- 101: EOC receives Bad Weather Advisory from DOM by Fax and tells acknowledgement by telephone.
- 102: EOC receives Flood Warning from DOI by Fax and tells acknowledgement by telephone.
- 103: EOC receives Landslide Warning from NBRO by Fax and tells acknowledgement by telephone.
- 104: EOC reports these messages to DG-DMC
- 105: EOC prepares the Disaster Information (Bad Weather Advisory, Flood Warning, and Landslide Warning) and get signed by DG-DMC
- 106: EOC sends Disaster Information to District EOC Ratnapura, Kalutara and Galle by Fax and receives acknowledgement by telephone.
- 107: EOC sends Disaster Information to District Secretariat Ratnapura, Kalutara and Galle by Fax.
- 108: EOC sends Disaster Information to Police Command Centre by Fax and receives acknowledgement by telephone.
- 109: EOC sends Disaster Information to JOH by Fax and receives acknowledgement by telephone.
- 110: EOC sends Disaster Information to SLRC and SLBC by Fax (show the list of media to send information in the real situation to the Evaluator) and receives acknowledgment by telephone.

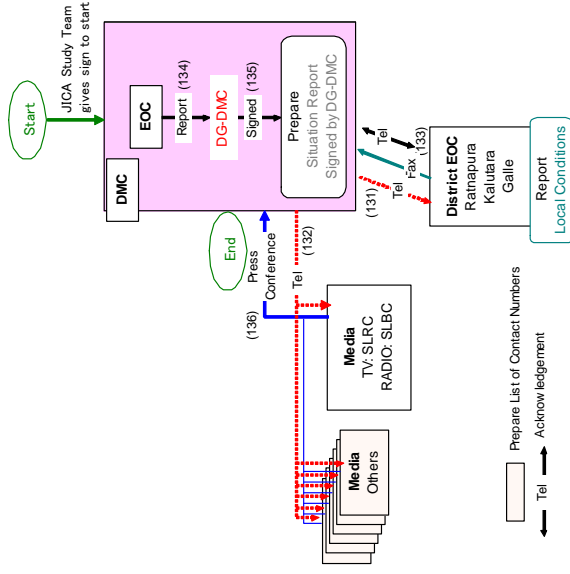
Actions taken by EOC-DMC at Stage-1



List of Actions

- 121: EOC receives Evacuation Instruction from District EOC by Fax and tells acknowledgement by telephone.
- 122: EOC reports this message to DG-DMC
- 123: EOC sends Evacuation Instruction to Police Command Centre by Fax and receives acknowledgement by telephone.
- 124: EOC sends Evacuation Instruction to JCH by Fax and receives acknowledgement by telephone.
- 125: EOC sends Evacuation Instruction to SLRC and SLBC by Fax (shows the list of media to send information in the real situation to the Evaluator) and receives acknowledgement by telephone.

Actions taken by EOC-DMC at Stage-2

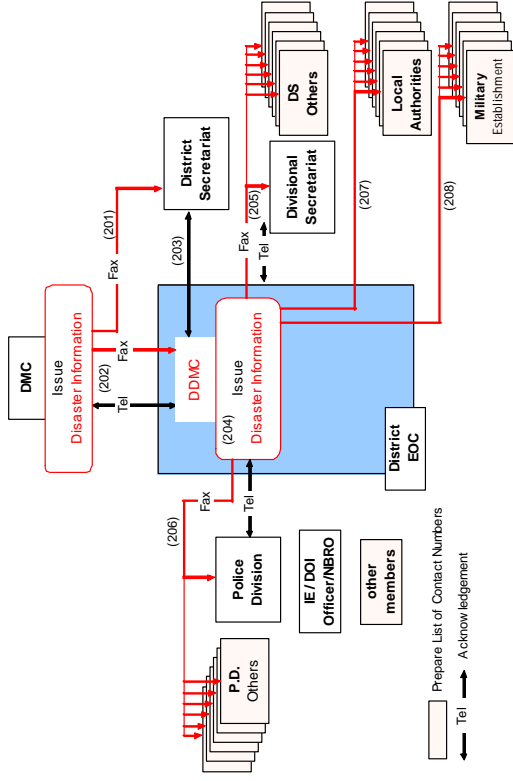


List of Actions

- 131: EOC requests District EOCs to prepare the situation report after instruction by JICA Study Team.
- 132: EOC informs SLBC and SLRC to conduct Press Conference after one hour. (shows the list of media to inform in the real situation to the Evaluator)
- 133: EOC receives situation reports from District EOCs by Fax and tells acknowledgement by telephone.
- 134: EOC reports these information to DG-DMC
- 135: EOC compiles all the received information and prepares the Situation Report and get signed by DG-DMC
- 136: EOC conducts Press Conference in front of people from SLBC, SLRC and Evaluators

Actions taken by EOC-DMC at Stage-3

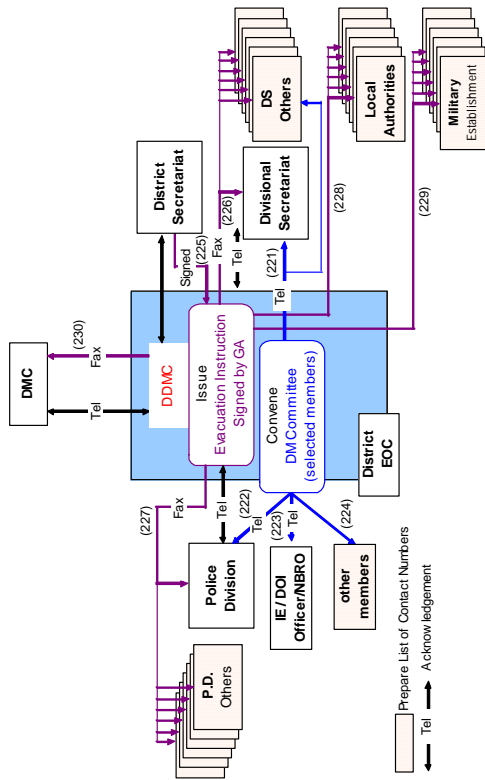
Actions taken by District EOC / District Secretariat



List of Actions

- 201: District Secretariats receive Disaster Information (Bad Weather Advisory, Flood Warning, and Landslide Warning) from DMC.
- 202: District EOCs receive Disaster Information from DMC by Fax and tells acknowledgement by telephone.
- 203: District EOCs and District Secretariats inform the receipt of information each other.
- 204: District EOCs prepare Disaster Information.
- 205: District EOCs send Disaster Information to relevant Divisional Secretariat (Rainapura, Nivithigala, Dodangoda, Horana, Bulatshihala, Baddagama). (show the list of Divisional Secretariats to send information in the real situation to Evaluator). District EOCs receive acknowledgement by telephone.
- 206: District EOCs send Disaster Information to relevant Police Division. (show the list of Police Divisions to send information in the real situation to Evaluator). District EOCs receive acknowledgement by telephone.
- 207: District EOCs show the list of Local Authorities to send information in the real situation to Evaluator.
- 208: District EOCs show the list of Military Establishments to send information in the real situation to Evaluator.

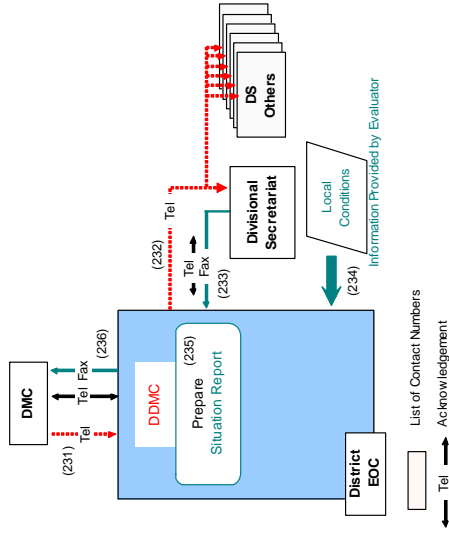
Actions taken by District EOC / District Secretariat at Stage-1



List of Actions

- 221: District EOCs convene the District Disaster Management Committee members from relevant Divisional Secretariat. (DM committee members from relevant Divisional Secretariat are at the District EOC from the beginning of the exercise.) (show the list of members from other Divisional Secretariats in the real situation to Evaluator)
- 222: District EOCs convene the District Disaster Management Committee members from relevant Police Division. (DM committee members from relevant Police Division are at the District EOC from the beginning of the exercise.) (show the list of members from other Police Divisions in the real situation to Evaluator)
- 223: District EOCs convene Irrigation Engineer and field officer, NBRO as members of District Disaster Management Committee. (DM committee members from DOI and NBRO are at the District EOC from the beginning of the exercise.)
- 224: District EOCs show the other necessary members of District DM Committee for Early Warning and Evacuation activity in the real situation to Evaluator.
- 225: District Disaster Management Committee makes discussions and prepares the Evacuation Instruction and gets signed by GA.
- 226: District EOCs send Evacuation Instruction to relevant Divisional Secretariat. (show the list of Divisional Secretariats to send information in the real situation to Evaluator). District EOCs receive acknowledgement by telephone.
- 227: District EOCs send Evacuation Instruction to relevant Police Division. (show the list of Police Divisions to send information in the real situation to Evaluator). District EOCs receive acknowledgement by telephone.
- 228: District EOCs show the list of Local Authorities to send evacuation instruction in the real situation to Evaluator.
- 229: District EOCs show the list of Military Establishments to send evacuation instruction in the real situation to Evaluator.
- 230: District EOC sends Evacuation Instruction to DMC and receives acknowledgement by telephone.

Actions taken by District EOC / District Secretariat at Stage-2

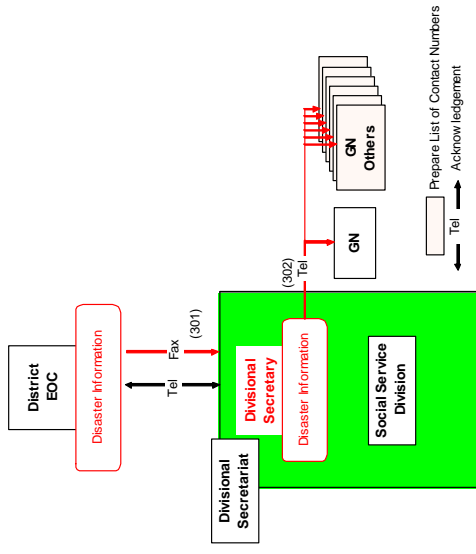


List of Actions

- 231: District EOCs receive request from DMC to prepare situation report by telephone.
- 232: District EOCs request relevant Divisional Secretariats to prepare situation report by telephone. (show the list of Divisional Secretariats to request situation report in the real situation to Evaluator)
- 233: District EOCs receive situation report from relevant Divisional Secretariats by Fax and tel acknowledgement by telephone.
- 234: District EOCs receive situation reports of other Divisional Secretariats prepared by Evaluator.
- 235: District EOCs compile all the received information and prepare the Situation Report.
- 236: District EOCs send the Situation Report to DMC by Fax and receive acknowledgement by telephone.

Actions taken by District EOC / District Secretariat at Stage-3

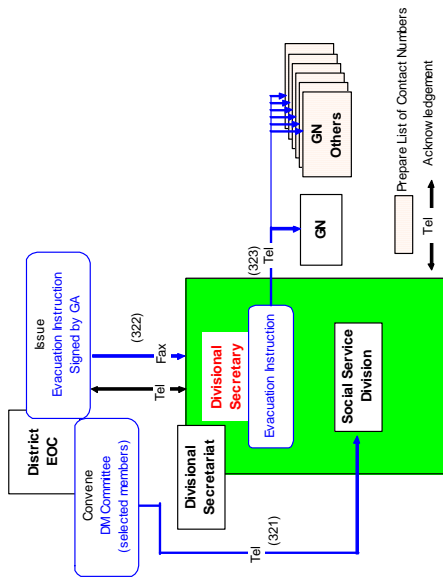
Actions taken by Divisional Secretariat



List of Actions

- 301: Divisional Secretariats receive Disaster Information (Bad Weather Advisory, Flood Warning, and Landslide Warning) from District EOCs by Fax and tell acknowledgement by telephone.
- 302: Divisional Secretariats inform Disaster Information to relevant GNs by telephone. (show the list of GNs to disseminate information in the real situation to Evaluator)

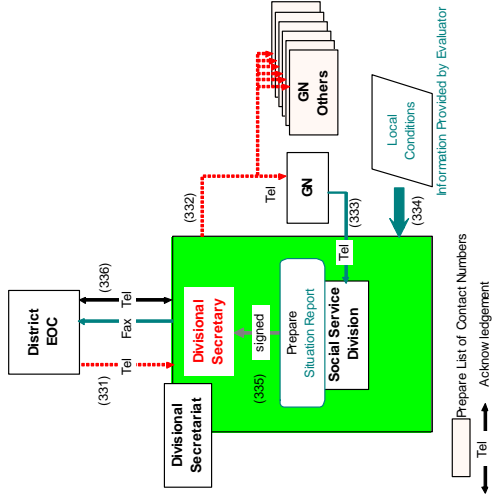
Actions taken by Divisional Secretariat at Stage-1



List of Actions

- 321: Members of District Disaster Management Committee in Divisional Secretariats are convened by District EOCs. (these members are at District EOCs from the beginning of the exercise.)
- 322: Divisional Secretariats receive Evacuation Instruction from District EOCs by Fax and tell acknowledgement by telephone.
- 323: Divisional Secretariats inform Evacuation Instruction to relevant GNs by telephone. (show the list of GNs to disseminate information in the real situation to Evaluator)

Actions taken by Divisional Secretariat at Stage-2

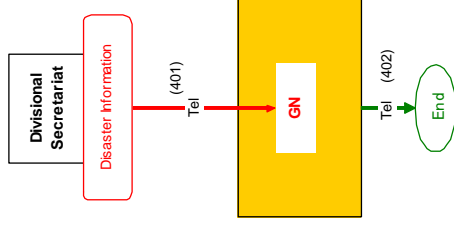


List of Actions

- 331: District EOCs request Divisional Secretariats to prepare situation report by telephone.
- 332: Divisional secretariats request relevant GNs to inform local situation by telephone. (show the list of GNs to request to inform local situation in the real situation to Evaluator)
- 333: Divisional secretariats receive Local Situations from relevant GNs.
- 334: Divisional secretariats receive Local Situations of other GNs prepared by Evaluator.
- 335: Divisional secretariats compile all the received information and get signed by Divisional Secretary.
- 336: Divisional secretariats send the consolidated situation reports to District EOCs by Fax and receive acknowledgement by telephone.

Actions taken by Divisional Secretariat at Stage-3

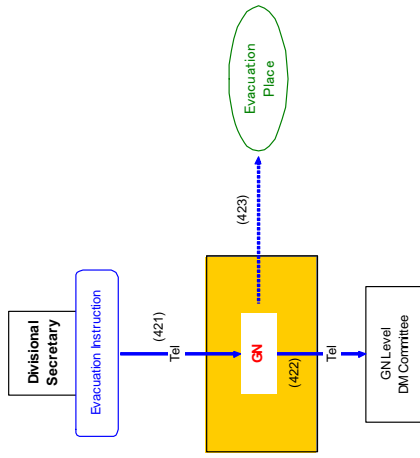
Actions taken by Grama Niladhari



List of Actions

- 401: GNs receive Disaster Information from Divisional Secretariats by telephone.
- 402: GNs report the contents of information to JICA Study Team office by telephone. (Ms.Aruni at JICA Study Team office: 011-2697796 or 077-4290622)

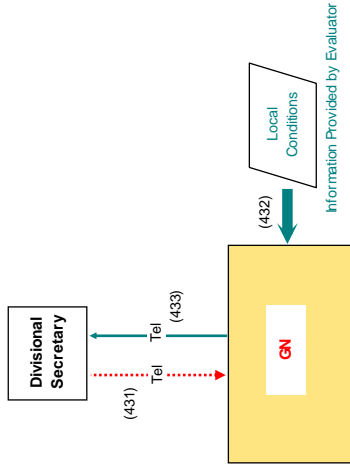
Actions taken by GN at Stage-1



List of Actions

- 421: GNs receive Evacuation Instruction from Divisional Secretariats by telephone.
- 422: GNs inform Evacuation Instruction to the members of GN level DM committee by telephone.
- 423: GNs go to Evacuation Place to support community people to evacuate.

Actions taken by GN at Stage-2

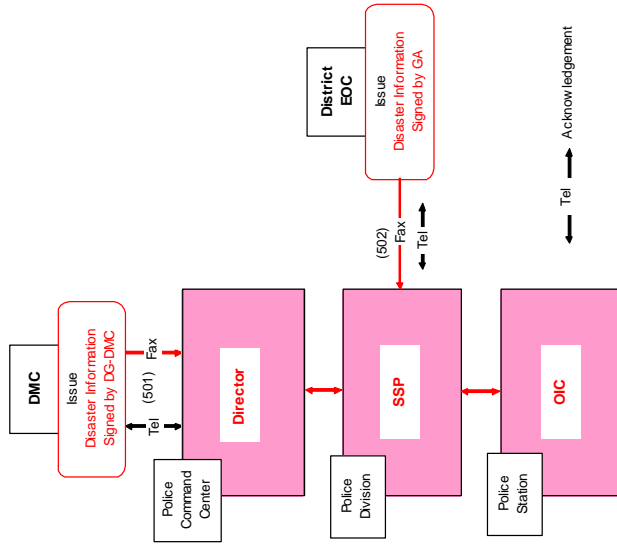


List of Actions

- 431: Divisional Secretariats request GNs to inform local situations by telephone.
- 432: GNs receive Local situations from Evaluator.
- 433: GNs report Local situations to Divisional Secretariats by telephone.

Actions taken by GN at Stage-3

Actions taken by Police

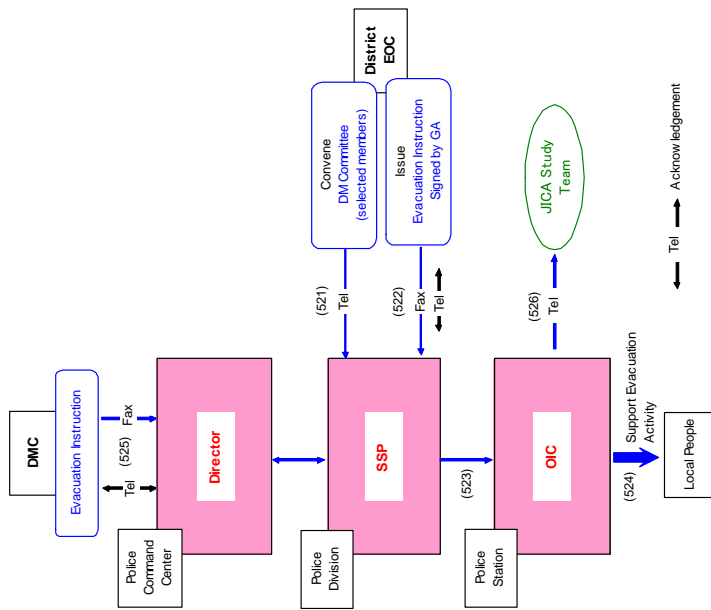


List of Actions

- 501: Director, Police Command Centre receives Disaster Information (Bad Weather Advisory, Flood Warning, and Landslide Warning) from EOC-DMC by Fax and tells acknowledgement by telephone.
- 502: SSPs, Police Divisions receive Disaster Information from District EOCs by Fax and tell acknowledgement by telephone.

(Other information flow will be followed by internal procedure of Police)

Actions taken by Police at Stage-1



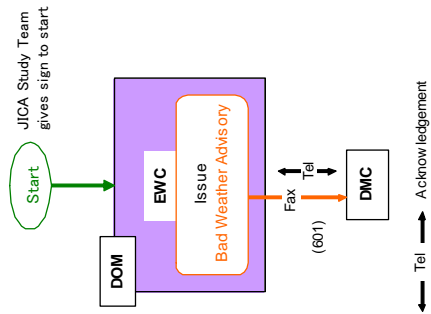
List of Actions

- 521: Members of District Disaster Management Committee in the Police Divisions are convened to committee by District EOCs. (members are at District EOCs from the beginning of exercise.)
- 522: SSPs, Police Divisions receive Evacuation Instruction from District EOCs by Fax and tell acknowledgement by telephone.
- 523: SSPs, Police Divisions inform Evacuation Instruction to relevant Police Stations.
- 524: OICs of relevant Police Stations start to support the evacuation activities of community people.
- 525: Director, Police Command Centre receives Evacuation Instruction from EOC-DMC by Fax and tell acknowledgement by telephone.
- 526: OICs of relevant Police Stations inform JICA Study Team office by telephone when the evacuation drills finish.
(Ms.Aruni at JICA Study Team office: 011-2697796 or 077-4290622)

(Other information flow will be followed by internal procedure of Police)

Actions taken by Police at Stage-2

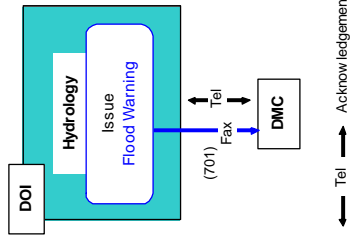
Actions taken by DOM



List of Actions

- 601: EWC (Early Warning Centre), DOM prepares Bad Weather Advisory and sends it to DMC by Fax after the instruction by JICA Study Team and receives acknowledgement by telephone.

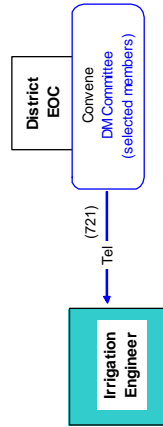
Actions taken by DOI



List of Actions

701: Hydrology Division, DOI prepares Flood Warning and sends it to DMC and receives acknowledgement by telephone.

Actions taken by DOI at Stage-1

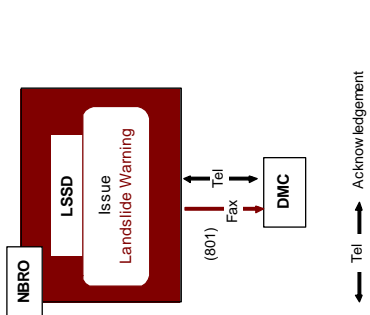


List of Actions

721: Irrigation Engineers at relevant districts are convened to District EOCs as members of District DM committee. (members are at District EOCs from the beginning of exercise.)

Actions taken by DOI at Stage-2

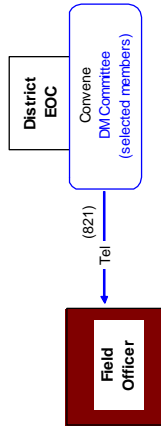
Actions taken by NBRO



List of Actions

801: LSSD, NBRO prepares Landslide Warning and sends it to DMC and receives acknowledgement by telephone.

Actions taken by NBRO at Stage-1

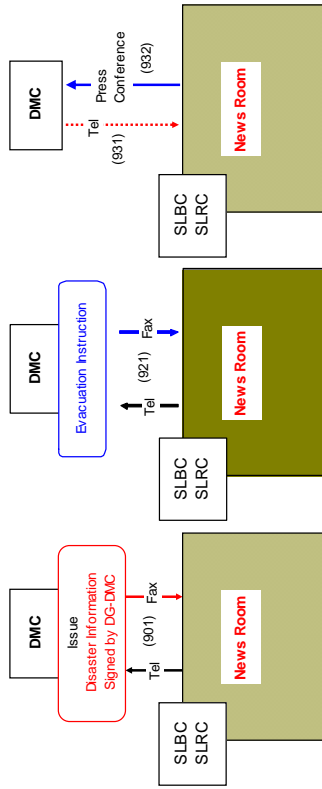


List of Actions

821: Field officers, NBRO at relevant districts are convened to District EOCs as members of District DM committee. (members are at District EOCs from the beginning of exercise.)

Actions taken by NBRO at Stage-2

Actions taken by Media



List of Actions

901: Medias receive Disaster Information (Bad Weather Advisory, Flood Warning, and Landslide Warning) from DMC and tell acknowledgement by telephone.

Actions taken by Media at Stage-1

List of Actions

921: Medias receive Evacuation Instruction from DMC and tell acknowledgement by telephone.

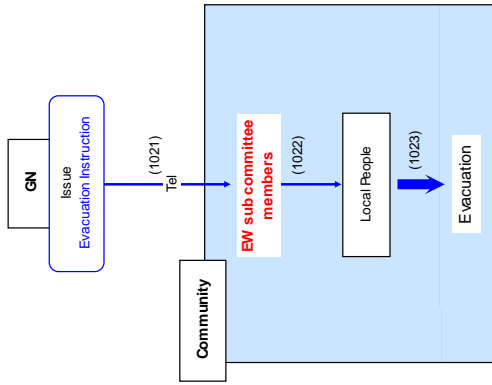
Actions taken by Media at Stage-2

List of Actions

931: DMC informs Medias that DMC will conduct press conference at EOC after one hour.
 932: Officers from Medias go to EOC and participate in the press conference.

Actions taken by Media at Stage-3

Actions taken by Community People



List of Actions

- 1021: Early Warning Sub Committee members are informed Evacuation Instruction from GNs by telephone.
- 1022: Early Warning Sub Committee members disseminate Evacuation Instruction to community people.
- 1023: Community people start to evacuate to evacuation place.

Actions taken by Community People at Stage-2

3. Exercise Administration

3.1 Responsible Persons

DMC organizes this Disaster Management Exercise with the JICA Study Team for the Comprehensive Study on Disaster Management in Sri Lanka.

The following persons are in charge of the exercise.

Chief of Exercise:

Major General Gamini Hetiarrachchi (DG, DMC)

Responsible Officers of Exercise:

Ms. Lalani Imbulana (Director, DMC)
077-395-7898

Exercise Secretariat:

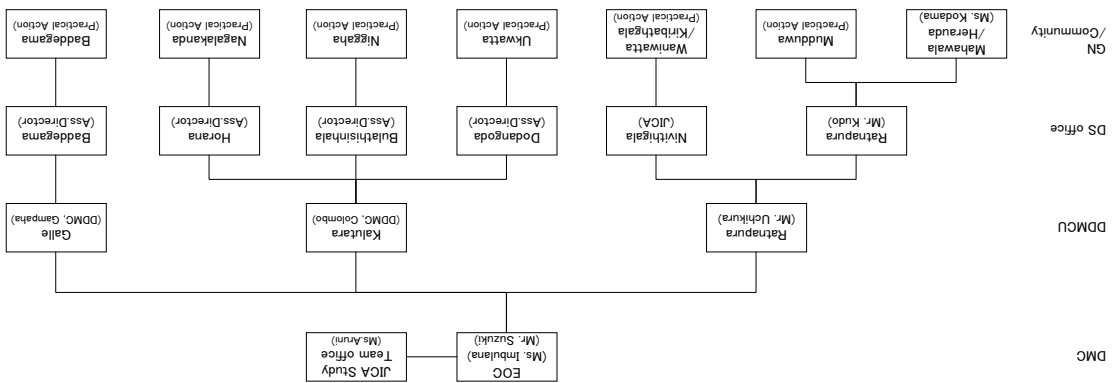
JICA Study Team on the Comprehensive Study on Disaster Management in Sri Lanka

Mr. Yoshihiko Uchikura (Deputy Team Leader, Exercise Coordinator)
077-548-4429

3.2 Evaluators and Contact Numbers at each Location

Actions taken by each participant are evaluated by "Evaluator". The name and telephone number of the evaluators and their locations are shown in the following figure.

Location	Name	Affiliation	Telephone
EOC	Ms. Lalani Imbulana	Director, DMC	077-3957898
EOC	Mr. Koji Suzuki	JICA Study Team	077-9491502
DDMCU Ratnapura	Mr. Yoshihiko Uchikura	JICA Study Team	077-5484429
DDMCU Kaitiara		DDMC, Colombo	
DDMCU Galle		DDMC, Gampaha	
Ratnapura DS office	Mr. Toshiaki Kudo	JICA Study Team	
Ratnapura DS office		JICA Study Team	
Nivithigala DS office		JICA Study Team	
Dodangoda DS office		Ass. Director, DMC	
Bulatishihala DS office		Ass. Director, DMC	
Horana DS office		Ass. Director, DMC	
Baddegama DS office		Ass. Director, DMC	
Horana DS office		Ass. Director, DMC	
Baddegama DS office		Ass. Director, DMC	
Mahawela GN, Heranda	Ms. Miki Kodama	JICA Study Team	
Mudduwa GN		JICA Study Team	
Waniwatta GN, Kiribathgala		JICA Study Team	
Ukwatta GN		JICA Study Team	
Nigaha GN		JICA Study Team	
Nigaha GN		JICA Study Team	
Nigalkanda GN		JICA Study Team	
Baddegama GN		JICA Study Team	
JICA Study Team office	Ms. Aruni Cooray	JICA Study Team	011-2697796



Data Book 3

Questionnaire of Interview Survey

**Questionnaire Survey Sheet
(Flood Disaster and Damage)**

COMPREHENSIVE STUDY ON DISASTER MANAGEMENT
IN
DEMOCRATIC SOCIALIST REPUBLIC OF SRI LANKA

QUESTIONNAIRE SURVEY for ORGANIZATION

Respondent : _____ Date : _____ / _____ / _____
(Name of Respondent) Month Day Year

Position : _____ Name of Interviewer _____

Name of Organization: _____

District : _____

Sample No. Org-

3-1

SECTION I COMMON QUESTIONS

Q1 Mandated Function and Office Employees

1-1 What are main activities of your office for disaster management in normal condition?
 (regular meeting, evacuation drill, etc.)

1-2 Organization Chart (to be in separated sheet): Available or Not available

1-3 Responsibility of each department (division) and number of employees

Division	Responsibility	Number
(1) _____	_____	_____
(2) _____	_____	_____
(3) _____	_____	_____
(4) _____	_____	_____
(5) _____	_____	_____
(6) _____	_____	_____
(7) _____	_____	_____
(8) _____	_____	_____

C-1

Q2 Disaster Preparedness and Relief Activities

2-1 What kind of activities is mandated (or current operated) for disaster preparedness?

2-2 What kind of activities is mandated (or currently operated) for disaster relief?

2-3 Do you have any coordination with the District Secretary's Office? Yes No

2-4 What is the serious problem in disaster management (flood disaster) in the Region?

2-5 Who issue the warnings and evacuation orders?

2-6 How the issuance of warnings and evacuation orders are decided?

2-7 How the warnings and evacuation orders are informed to local people?

Information Flow: _____
Equipment: _____

2-8 Are the evacuation places and evacuation route defined?

2-9 Are there any plan or system like "evacuation plan" to show above topics?

2-10 Is the evacuation conducted properly or are there any problems?

C-2

Q3 On-going Program and Project in the Region

3-1 What program/project is in progress for flood management in the Region? (Name of the program/project and their principal feature with list and location map)

Q4 Budget

4-1 How much is an annual budget for construction of flood management structures and disaster mitigation activities in last 5 years? (with breakdown, if available)

Year 2001 : Rs.	_____	Total Rs.	_____
Year 2002 : Rs.	_____	Total Rs.	_____
Year 2003 : Rs.	_____	Total Rs.	_____
Year 2004 : Rs.	_____	Total Rs.	_____
Year 2005 : Rs.	_____	Total Rs.	_____

4-2 How much is an annual budget for disaster preparedness and relief activities?

(1) For disaster preparedness : Rs. _____ / year
 (2) For relief activities : Rs. _____ / year
 (3) Source of budget : _____

SECTION II ADDITIONAL QUESTIONS

(DISTRICT SECRETARIES' OFFICE ONLY)

Q5 Inundation Conditions and Flood Damage Record

5-1 Major flood events hit your District (order of seriousness of (1) as the worst)

(1) Year ____ Date _____
 (2) Year ____ Date _____
 (3) Year ____ Date _____

5-2 Total affected area (km²) : _____ (km²)

5-3 Number of affected people : _____

5-4 Name of affected villages : _____

5-5 Damaged infrastructure : _____

5-6 Flood damage and its breakdown by village and by item in your districts (different flood events, if available) (separate sheets)

5-7 Inundation maps

5-8 Expenditure for relief and rehabilitation/reconstruction

!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!Thank you very much for your cooperation!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!

Questionnaire Survey Sheet

(Flood Disaster and Damage)

COMPREHENSIVE STUDY ON DISASTER MANAGEMENT

IN
SRI LANKA

QUESTIONNAIRE SURVEY for RESIDENTS

River basin: Kelani, Kalu, Gin, Nilwala Sample No.

Respondent : _____ Date : _____ / _____ / _____
 (Name of Respondent) Month Day Year
 Village : _____ Name of Interviewer
 Division/GN : _____
 District : _____

SECTION I: GENERAL INFORMATION

Q1 Sex: a. Male b. Female

Q2 Age:

Q3 Number of household members (dependents):

Sketch of the location interviewed (relation between house and any landmark)

N

r of

5 Others (Specify: _____)

Total annual family income (in 2005)

	Rs.	/	Year
a. Agricultural income (1)	Rs.	/	Year
b. Off-farm income (2+3+4+5)	Rs.	/	Year
c. Total Income [a. + b.]	Rs.	/	Year

Q5 Where is your house?

- At the river side or creek
- Near the main road
- In the town center
- In the farm land area
- In the elevated area
- In the lowland area

Q6 How many years/months have you been living here? ___ years

SECTION II : FLOOD DAMAGE

Q7 Did you experience a flood in (April 1989, May 2003)? ___Yes, ___No

Q8 How were the inundation conditions of the flood?

- Q8-1 Location of your house
- Distance from _____River : ___m far from river
 - Distance from tributary : ___m from tributary
 - Coordination : x: _____ y: _____
 - Structure of your house : Wood, Brick, Concrete, Reinforced Concrete, Other _____
 - Detailed location : _____
(for example, ...m far from xxxx road/ xxxxx village hall, etc.)
- Q8-2 Inundation condition around your house
- Inundation depth : ___cm maximum
 - Inundation period : ___(hrs., days)
 - Inundation area (in your house) :
 - Inundation speed : 1) very fast (within a few minutes)
2) fast (within one hour)
3) slow (within a few hours)
4) very slow
- e. Current direction : From _____ To _____
- f. Current velocity : _____ cm/sec
- g. Others :

Q9 Flood/inundation damages in the flood

- Date: _____
- House totally destroyed : ___Yes ___No
 - House partially destroyed : (specify: _____)
 - Flooded above floor level : (highest height above floor ___cm)
 - Flooded below floor level : (highest height above ground ___cm)
 - Movable assets destroyed : (specify: _____)
 - Crops totally lost : (specify: _____)
 - Crops partially lost : (specify: _____)
 - Livestock totally lost : (specify: _____)
 - Livestock partially lost : (specify: _____)
 - Family members died : (specify: _____)
 - Family members injured : (specify: _____)
 - Infrastructures damaged (near your house) : (specify: _____)
 - Road : (specify: _____)
 - Dike (Flood bund) : (specify: _____)
 - Others : (specify: _____)
 - Others : (specify: _____)

SECTION III : FLOOD DISASTER EXPERIENCES AND LESSONS

Q10 Behavior after Flood Disaster

- 10-1 Do you have something in your mind that you did at the time of the flood disaster in May 2003 (or April 1989) in order to save yourself and your properties ?
- Yes (What?): _____
 - No (Why?): _____
- 10-2 Having experienced the flood disaster in May 2003 (or April 1989), do you think you will have the same damages if it happens again?
- Yes (What?): _____
 - No (Why?): _____
- 10-3 Are there any changes in your daily life which made you to move prepared for flood disaster?

a. Yes (What?): _____

b. No (Why?): _____

10-4 Did you talk with your family members about preparation for future flood disaster?

a. Yes b. No

10-5 If "Yes", how or what does your family prepare for future flood disaster?

10-6 What are the lessons from the last flood disaster?

10-7 Do you talk with neighbors about preparation for future flood disaster?

a. Yes (What?): _____

b. No (Why?): _____

Q11 Recognition on flood management structures and their function

11-1 Are there any flood management structures (such as flood bund, pumping station, causeway, etc.) near your house?

a. Yes (What kind structure?):

(Where?) :

b. No or do not know: _____

11-2 Do you think the structures do function well at present?

a. Yes

b. No (why?): _____

11-3 Do you know (or think) who is responsible for maintenance and operation of such structures?

a. Yes (What agency?) _____

b. No.

Q12 What do you expect Central/Local Government for disaster mitigation?

a. Construction/reinforcement of flood management structures

(Specify what kind of structures needed):

b. Early warning (timely and accurate information) to impending disaster and emergency case

c. Proper instruction for disaster preparedness

d. Mobilization of the staff in charge of disaster mitigation

e. Supporting services for evacuation (ex. transportation means)

f. Others (Specify): (f-1) _____

(f-2) _____

(f-3) _____

12-1 Please prioritize in the order of importance in the activity items a. to f. as above.

1	2	3	4	5	6
---	---	---	---	---	---

SECTION IV : EVACUATION AND EARLY WARNING

Q13 Current status of evacuation activities

13-1 Have you evacuated from flood? : Yes No

If Yes

13-2 When was it?

13-3 What made you evacuate?

- Issuance of warning by (police, GN, AGA, community or others (_____))

- Inundation height was (0-50cm, 50cm-1.0m, or 1.0m over)

- Others (_____)

13-4 Where did you evacuate? (evacuation place, others (_____))

- 13-5 How did you evacuate? (on foot, by car, others (_____))
- 13-6 How long did it take for evacuation? (0-5 min, 5-10 min, 10-15 min, 15-30 min, 30 min- 1.0 hr, 1.0 hr more)

If No

On May 2003 (or April 1989), big flood happened around this area

- 13-7 Why didn't you evacuate?
- a. Too late to evacuate
 - b. No issuance of warning
 - c. Small depth of inundation (___cm)
 - d. Flood is the ordinary event
 - e. Others (_____)

- 13-8 Did you hear the warning for evacuation? Yes No
- 13-9 If you are properly informed to evacuate, do you evacuate? Yes No
- 13-10 (If No) Why don't you evacuate?

- a. No evacuation plan (do not know where and how to evacuate)
 - b. Flood is the ordinary event
 - c. Others (_____)
- 13-11 When do you start to evacuate?
- a. Inundation depth is (___cm)
 - b. Flood warning is issued
 - c. Others (_____)

3-5

Q14 Evacuation Plan

- 14-1 Do you know the evacuation plan? Yes No
- Do you know where and how to evacuate? Yes No

If Yes

- 14-2 How did you know it?
- Instruction by (police, GN, AGA, community or others (_____))

- 14-3 Do you follow the plan if the flood happens? Yes No
- 14-4 (If No) Why don't you follow the plan?
- _____
- _____

- 14-5 How do you receive the flood information such as warning?
- By (siren, telephone, community, speaker or others (_____))

- 14-6 Are there any problems in the plan?
- a. Evacuation plan is not proper
 - b. Plan is not properly operated
 - c. Others (_____)

If No

- 14-7 Do you think the evacuation plan is necessary? Yes No
- 14-8 (If No) why is it not necessary?

Q15 Have you participated in the evacuation drill? Yes No

Q16 What kind of facilities and stockpiles are prepared at the evacuation place?

Q17 What do you primarily want to protect from Flood?

Life, House, Furniture, Car, Crop field, or others (_____)

////////////////////////////////////

Thank you very much for your kind cooperation

////////////////////////////////////

To: JICA Study Team on Disaster Management in Sri Lanka
 Attn.: Mr. Yoshihiko Uchikura Fax Number: 011-269-7796

FAX

To: From: JICA Sri Lanka Office
 Attn.: Mr. Ms. Mr. Ms.
 Telephone No.: 011-230-3700
 No. of Pages: 5 Pages
 Memo:

Interview Survey on Evacuation Condition by Tsunami Warning

JICA Study Team on Disaster Management in Sri Lanka

The Tsunami Warning issued on Sep 12th was a chance to evaluate the various activities that have been done after the Indian Ocean Tsunami Disaster in 2004. Fortunately no Tsunami occurred this time. However the Media pointed out some problems. The study team would like to know the local conditions such as activities done by local government and evacuation conditions of the local people, those are not precisely reported, through this kind of interview survey. The study team will utilize the result for further study. Thank you for your cooperation.

1. Information on Interviewee

- 1.1 Nationality: Japan / Sri Lanka
- 1.2 Sex: Male / Female
- 1.3 Age: Below 20 20' s 30' s 40' s 50' s over 60
- 1.4 Occupation: Fishery Agriculture Merchantry Service Job
 Hotel Business Civil Officer Company Employee House wife
 Student Disemployment Others: _____
- 1.5 Address: Division: _____ District: _____
- 1.6 Distance from coast line to your house
 0 - 100m 100 - 500m 500m - 1km 1 - 2km 2km -
- 1.7 Were you suffered from the Indian Tsunami in 2004?: Yes / No
 (In case of "Yes") What kind of damage were you suffered? (Check all that apply):
 House was totally destroyed House was half destroyed
 House was partially destroyed Relatives were dead or injured
 yourself were injured Others: _____

2. Regarding Issuance of Tsunami Warning at night of 12th

- 2.1 When did you receive Tsunami Warning? :
 17:00~17:30 17:30~18:00 18:00~18:30 18:30~19:00
 19:00~19:30 19:30~20:00 20:00~20:30
- 2.2 How did you receive Tsunami Warning? (Check all that apply) :
 TV Radio Internet Speaker Telephone Police
 Family Friends Neighbors Community Leader
 Others: _____

2.3 What did Tsunami Warning say? : _____

- 2.4 Who issued Tsunami Warning? : _____
 Department of Meteorology Disaster Management Centre
 GA AGA Police Others: _____

3. Regarding Evacuation Condition

- 3.1 Did you evacuate after receiving Tsunami Warning?: Yes / No
 (In case of "Yes" for the Questionnaire 3.1, please answer following questions.)
- 3.2 Did you evacuate right after Tsunami Warning? : Yes / No
- 3.3 (In case of "No") Why didn't you evacuate right after warning? (Check all that apply) :
 Tsunami Warning was doubtful.
 You thought that Tsunami might not come soon.
 You did not know what to do. You went home to pick up some stuff.
 Others: _____
- 3.4 Where did you evacuate? :
 Temple School High Building Small Hill Others: _____
- 3.5 How did you evacuate? :
 on foot Bicycle Motor Bike Car Others: _____
- 3.6 What did you take for evacuation? (Check all that apply) :
 Water Food Cloths Cash Passbook Others: _____
- 3.7 Have you already known the evacuation place? : Yes / No

3.8 (in case of "Yes") How did you know the evacuation place? :

- Evacuation Drill Hazard Map Community or Family meeting
 Others : _____

3.9 (in case of "No") Why did you evacuate to that place?

- Police directed you to that place. Everybody evacuated to that place.
 You have evacuated there before.
 There were not other places to evacuate. Others: _____

(In case of "No" for the Questionnaire 3.1, please answer following question)

3.10 Why did not you evacuate? (Check all that apply):

- You thought that Tsunami might not come.
 You were worried about the household stuff.
 You did not know where to evacuate?
 You did not know what to do? Others: _____

4. Regarding Cancellation of Warning

4.1 What time did you leave the evacuation place? :

- 19:00 19:00 - 20:00 20:00 - 21:00 21:00 - 22:00 22:00 -

4.2 Why did you leave the evacuation place? (Check all that apply) :

- You received "Cancellation of Warning".
 People said that Tsunami would not come.
 You judged that Tsunami would not come.
 You were worried about household stuff.
 You wanted to go home Others: _____

4.3 Have you received "Cancellation of warning"? : Yes / No

(In case of "Yes", please answer following questions.)

4.4 How did you receive "Cancellation of Warning"? (Check all that apply) :

- TV Radio Internet Speaker Telephone Police
 Family Friends Neighbors Community Leader
 Others: _____

4.5 What did "Cancellation of Warning" say? :

4.6 Who issued "Cancellation of Warning"? :

- Department of Meteorology Disaster Management Centre
 GA AGA Police Others: _____

5. Regarding Hazard Map and Evacuation Drill etc.

5.1 Have you seen the Tsunami Hazard Map? (Map with inundation area, evacuation place and route etc.) : Yes / No

5.2 (in case of "Yes" for 5.1) Where did you see it? (Check all that apply) :

- Governmental Office Evacuation Drill Community Activity
 House Others: _____

5.3 (in case of "Yes" for 5.1) Did Hazard Map assist you this time? : Yes / No

5.4 Have you participated in the Tsunami Evacuation Drill? : Yes / No

5.5 (in case of "Yes" for 5.4) Did the experience of Evacuation Drill assist you? : Yes / No

5.6 (in case of "No" for 5.4) Why didn't you participate in the Drill? (Check all that apply) :

- You did not know the drill. The Drill was not conducted.
 You know where and how to evacuate. You are busy.
 Others : _____

5.7 Will you participate in the next evacuation drill? : Yes / No

5.8 (in case of "No") What is the reason not to participate? (Check all that apply) :

- You know where to evacuate. You are busy.
 You have participated in the drill before. Others: _____

5.9 Will you evacuate right after receiving the Tsunami Warning from now on? : Yes / No

5.10 (in case of "No") What is the reason not to evacuate? :

- Tsunami will not come. You are worried about household stuff.
 Others : _____

6. Regarding Other Information on Tsunami

6.1 How many times have you received the Tsunami Warning on 12th and 13th September? :

- Never Once Twice Three times more than four times

6.2 Have you received Tsunami Warning issued in the early morning of 13th? : Yes / No

6.3 (in case of "Yes") When and how did you receive Tsunami Warning ?

When: ~6:30 6:30~7:00 7:00~7:30 7:30~8:00 8:00~8:30 8:30~
How: TV Radio Internet Speaker Telephone Police
 Family Friends Neighbors Community Leader
 Others : _____

6.4 What did you do after receiving 2nd and more Tsunami Warning?

Evacuated Prepared to evacuate and wait for next information
 Did nothing Others : _____

6.5 Were there any changes of mind and actions between when you received first warning and when you received second and more warning? : Yes / No
(in case of "Yes") What kind of changes was that? :

Tsunami does not seem to come.
 It seems not necessary to evacuate.
 Others : _____

6.6 Some schools were closed on 13th. Have you received such information in advance? :

Yes / No

6.7 (in case of "Yes") When and how did you receive that information? :

When: ~12th 20:30 ~12th 24:00 ~13th 6:00 13th 6:00~
How: TV Radio Internet Speaker Telephone Police
 Family Friends Neighbors Community Leader School
 Others : _____

7. Others

7.1 How many percentages of the neighbors have evacuated? (by your estimation)

0~25% 25~50% 50~75% 75~100%
7.2 What and who was the most reliable regarding the information transferring and evacuation activities? (Check all that apply) :

Government Police Community Friends Family TV
 Radio Internet Telephone Mobile Phone
 Others : _____

7.3 Could you use the mobile phone during the Tsunami Warning period? : Yes / No

7.4 Could you use the home telephone during the Tsunami Warning period? : Yes / No

7.5 Was there any confusion around you? : Yes / No

(in case of "Yes") What kind of confusion was it? :

You received the different information from real situation.
 There was a conflict at the evacuation place.
 You did not know where your family was. There was a theft.
 Others : _____

7.6 If you have any comments, please describe them below.

Thank you for your cooperation.

Interview Survey on Evacuation Condition by Flood Warning

JICA Study Team on Disaster Management in Sri Lanka

Southwest part of Sri Lanka faced flood twice this year in the end of April, and the end of May to beginning of June, and the scale of flood was severe as 2003 flood. This was an opportunity to see the result of several activities of disaster management which have been conducted in Sri Lanka since the 2004 Indian Ocean Tsunami. The study team would like to understand the local evacuation conditions and psychology of the local people by the time of evacuation through this questionnaire survey. The result of this survey will be used to improve the early warning information dissemination system in the further study. Please answer honestly, your answer will not be used in any other purposes. Thank you for your cooperation.

1. Information on Interviewee

- 1.1 Sex: Male / Female
- 1.2 Age: Below 20 20' s 30' s 40' s 50' s over 60
- 1.3 Occupation: Fishery Agriculture Merchantry Service Job
 Hotel Business Civil Officer Company Employee House wife
 Student Unemployed Others: _____

1.4 Address: GN: _____ Division: _____ District: _____

1.5 Which is your residence?
 one story house 2 story house basement floor in apartment
 above 2nd floor in apartment Other: _____

1.6 What was the highest level of flood from the ground at your house?
 not inundated ankle high knee high
 waist high breast-high body height
 ceiling top of the house higher than _____m

1.7 What was the duration of flood and day and time of maximum height of the flood?
 Duration: _____ day _____ A.M./P.M./night ~ _____ day _____ A.M./P.M./night
 Maximum: _____ day _____ A.M./P.M./night

1.8 What were the damages by the flood? (answer all that apply)
 No any damage Family member died Family member injured
 House was totally destroyed House was half destroyed

- House was partially destroyed
 Damage to house and shop equipment and facility
 Damage to commercial products./goods Damage to food
 Damaged to furniture
 No house damage but flooded the floor
 Work./business was not possible Could not live in the house
 Furniture was not usable Shortage of food and water
 Road was flooded and could to move Nothing particularly
 Other: _____

1.9 When was the worst flood experience before, and what was the height of the flood?
 When: (_____)year____month)

How height: ankle high knee high
 waist high breast-high body height
 ceiling of the house higher than _____m

1.10 How often does the flood affect you?
 _____ times / year Once / _____ year
 First time

1.11 Did you have any activities for flood? (choose all it apply)
 Nothing Rain gauge water level hazard map
 installing siren/speaker workshop evacuation drill
 other: _____

2. Regarding a response before flood (One day before to the day of the flood)

2.1 Where were you by the time of flooding? (choose only one):
 at home at work other than flooded area other: _____

2.2 One day before to the day of the flood, did you think it is going to be flood? (only one) :
 surely thought not much never
 thought a little thought

2.3 One day before to the day of the flood, how did you feel? (choose only one) :
 very worried not
 worried a little worried much

2.4 Why you did not think that it will become flood? (Choose all it apply)

- Thought it was a usually rain
- This area has never flooded before
- Thought it won't be so serious even though it becomes flood
- Cause no flood information
- Though water would not come until my house
- Thought I can evacuate when it is necessary and possible
- Other: _____

2.5 Have you prepared before the flood? (choose all it apply) :

- Did not prepare
- Evacuated before the flood
- Put up furniture to up stairs
- Watching TV and listening Radio carefully
- Prepare for evacuation
- Talk and discuss with family and neighbors
- Asked condition for local government (Who: _____)
- Went to up stairs or roof of house
- checked surrounding situation
- Other : _____

3. About Evacuation activity (*up stairs/roof of house is not consider as evacuation)

3.1 Did you evacuate? : Yes No

3.2 When and What time did you leave your house to evacuate? ____day ____A.M./P.M./night

3.3 By the time you evacuate, what was the highest level of flood from the ground at your house?

- Not inundated
- Ankle high
- Knee high
- Waist high
- Breast-high
- Body height
- Ceiling of the house
- Higher than _____m

3.4 What made you to decide to evacuate? (choose all it apply)

- Thought myself and family are in danger
- Boat came to help
- Thought house would be flooded
- Because house was flooded
- Because heard flood warning
- Because heard evacuation instruction
- Recommended by family and neighbor
- Recommended by community leader
- Instructed by Policy and DS officer
- Saw everyone was evacuating
- Other: _____

3.5 Where did you evacuate?

- Temple/Musk
- School
- High building
- hill and higher place

Family and relative house

3.6 By what did you evacuated?
 On foot Bicycle Motorbike Boat Car Other: _____

3.7 Why did you evacuated to that location? (choose all it apply)

- Knew by evacuation drill
- Discussed with community and family before
- Knew by hazard map
- Knew from past experiences
- Because Police guided
- Because everyone evacuated to that place
- There was no other place to evacuate
- Other: _____

3.8 Who answer "No" in Q3.1, what were the reasons you did not evacuate (could not evacuate)? (choose all it apply)

- Never evacuated before
- Thought it was a usually rain
- This area has never flooded before
- Worried about variables at home
- Never thought about it becomes flood so quickly
- Thought it would be difficult to evacuate with children/elderly
- Thought it would be no problem because house is located at higher place
- Waited family member to come back home
- Not sure about physical capacity
- Thought it would be save if go up 2nd floor
- Went back house to take belongings
- Preparing the belongings took some time
- By the time by noticing the flood, it was not able to evacuate with flood
- Did not think it will be big flood
- Thought it would be more dangerous to evacuate
- Did not know evacuation place and its routes
- Did not know what to do
- Other: _____

3.9 How did you feel when you were evacuating from flood situation? (choose all it apply)

- Felt a fear because hard to see the street at night
- Felt a fear evacuating while flooding
- Worried about my poverty and belongings at home
- Worried about my family
- Worried about children and elderly
- Unpleasant to evacuate while flooding
- Did not feel anything
- Other: _____

4. About Flood Information

4.1 When did you first received the flood information and what was the contents?

Date: ____ day ____ A.M./P.M./night Did not receive flood information
Contents: There is a heavy rain There is a danger of flooding
 The river water level will increase The river water will decrease
 Other: _____

4.2 How and from Who did you receive/get information about flood? (Choose all it apply)

How: TV Radio Internet Speaker speaker Vehicle
 Mobile phone Landline telephone Verbal
Who: Police Family Friends Neighbors Community Leader
 Government officer Others : _____

4.3 Who or Which organization was the source of information about flood? (Choose all it apply)

Irrigation department Metrology department DMC GA AGA
 GN police I don't know Other: _____

4.4 How was the situation when you first heard about flood information?(Choose one) :

Not inundated Ankle high Knee high
 Waist high Breast-high Body height
 Ceiling of the house Higher than _____m

4.5 How did you feel when you first heard about flood information?(Choose all it apply)

It is going to be flood Better to evacuate
 It won't be a flood It is not necessary to evacuate
 It is nothing special but as usual rain
 Though better to check the neighboring situation Other: _____

4.6 When did you first heard addressing the evacuation?

Date: ____ day ____ A.M./P.M./night Did not receive any

4.7 How and from Who did you receive/get addressing the evacuation? (Choose all it apply)

How: TV Radio Internet Speaker speaker Vehicle
 Mobile phone Landline telephone Verbal
Who: Police Family Friends Neighbors Community Leader
 Government officer Others : _____

4.8 Who or Which organization was the source of addressing the evacuation? (Choose all it apply)

Irrigation department Metrology department DMC GA AGA
 GN police I don't know Other: _____

4.9 How was the situation when you first heard addressing evacuation?(Choose one) :

Not inundated Ankle high Knee high
 Waist high Breast-high Body height
 Ceiling of the house Higher than _____m

5. Regarding Flood Information and future

5.1 Is there any response of government and local authorities that was dissatisfactory for current flood?(choose all it apply) :

Did not receive flood information Did not receive evacuation instruction
 Too late to send flood Information
 Too late to give evacuation instruction No information about rain
 Evacuation place was flooded Did not know flooding area
 There was no or not enough boat Nothing specific
 その他: _____

5.2 When and with What information will you evacuate before flooding considering current flood experience (choose all it apply) :

When: One day before 6 hours before 3 hours before
 1 hour before 0 to 30 minutes before
What: Expected river rater level Predicted amount of rainfall
 Become flood or not Evacuation Instruction

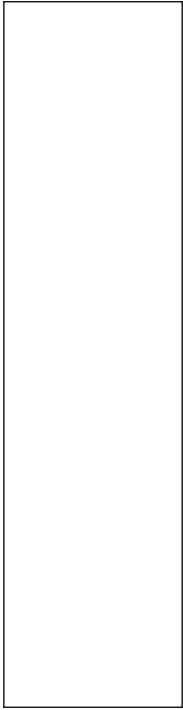
Expected flooding locations Expected Flooding time
 Won't evacuate even any information given (check and decide by myself)
 Other: _____

5.3 Who is the most reliable person regarding the information dissemination (choose all it apply)

Neighbor Family and Relative GN Police
 Government officer (DS) School Teacher
 Committee member DDMCU TV Radio Other: _____

5.4 Please answer "Yes" or "No" for following answer.

- (1) Do you wan to have early warning information and evacuation instruction even though the warning it too early or becomes actual flood? Yes No
(2) If you or your community can forecast/predict flood, are you willing to take an initiative to do some activity? Yes No



Thank you very much for your cooperation

Data Book 4

**Questionnaire
and Result of Community Survey**

4.1 Results of the Survey

The collected data was tabulated by each community and analyzed by each target area for selection of 15 pilot communities as shown in Table 1. Significant findings about the characteristics of communities are presented below.

Table 1 Disaster Type and Number of Pilot Communities for Activities

Type of Disasters	Target Areas	Number of target communities for the Survey	Number of pilot communities to be selected
1) Flood Vulnerable Communities	1) Kelani River Basin	4	2
	2) Kalu River Basin (Ratnapura District)	4	2
	3) Kalu River Basin (Kalutara District)	2	1
	4) Gin River Basin	2	1
	5) Nilwara River Basin	2	1
2) Sediment Disaster Vulnerable Communities	1) Ratnapura District	4	2
	2) Kalutara District	4	2
3) Tsunami Vulnerable Communities	1) Matara District	4	2
	2) Ampara District	4	2

(1) Flood Vulnerable Communities

1) Kelani River Basin

The target communities in the Kelani River basin have basically developed as towns located on the outskirts of capital city Colombo. The population of these communities is on the increasing trend. Around 25% of respondents are getting their income as small entrepreneurs.

Besides, almost all respondents in these areas, except in the Ranala community, have experienced severe flood disasters in 1989. During this disaster, houses of more than 50% of the respondents were inundated to depths of more than 3 meter. Considerable number of the respondents answered that flooding of the road and undeveloped drainage system caused serious problems.

Figure 1 shows the comparison of the four target communities based on the survey items related to vulnerability to disasters. The items include 1) Absence of leadership, 2) Unpreparedness for disasters, 3) Not good condition of mutual support, 4) Lack of acknowledgement of community organization, 5) Low monthly income, 6) Receipt of subsidies, 7) Unavailability of TV & Radio, 8) Unavailability of phones. In Kittanpahua, the information and communication facilities such as phones and TV & radio are relatively well equipped in many of households. Income level is also comparatively high in the Kittanpahua community. In the community in Biyagama, the community-based organization is relatively active and 15% of respondents acknowledge this organization.

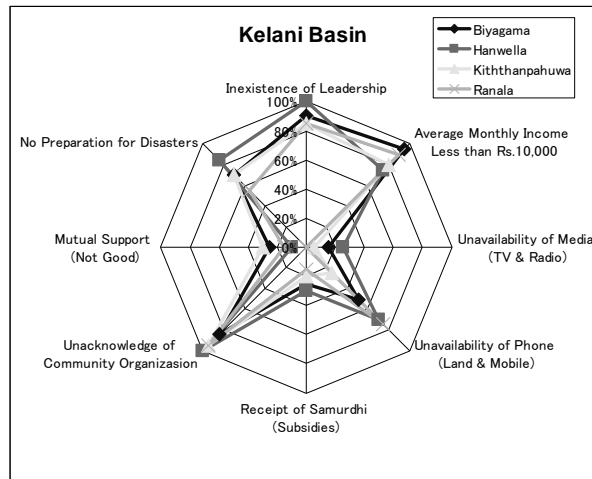


Figure 1 Comparison of some survey items related to vulnerability to disasters (Kelani)

2) Kalu River Basin in Ratnapura District

Main industry of the four target communities in Kalu River Basin in Ratnapura District is tea cultivation. In Raddala, coconut, rubber and paddy cultivation are also popular. In Mudduwa, 50% of the respondents are small scale entrepreneurs while in Kahangama and Raddala, around 50% of the respondents work as unskilled laborers. The populations of the Angammama, Kahangama and Mudduwa are increasing, while the population of Raddala is decreasing.

All of the target communities have experienced severe flooding disasters in 2003 although human casualties were not reported in the Survey. In particular, in the Mudduwa community, most of the respondents responded that their houses were inundated to depths of more than 3m.

As shown in Figure 2, the community in Raddala is weak in most of the survey items on vulnerability except mutual cooperation spirit; on the contrary, the community in Mudduwa is relatively strong in them.

The establishment of the village-level disaster management committee is acknowledged in Angammama and Mudduwa.

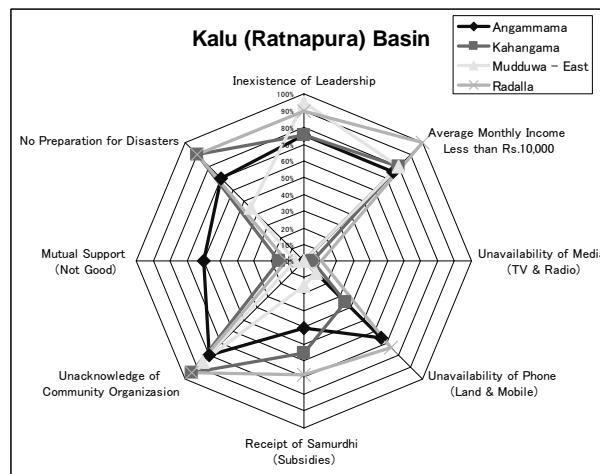


Figure 2 Comparison by some survey items related to vulnerability to disasters (Kalu-R)

3) Kalu River Basin in Kalutara District

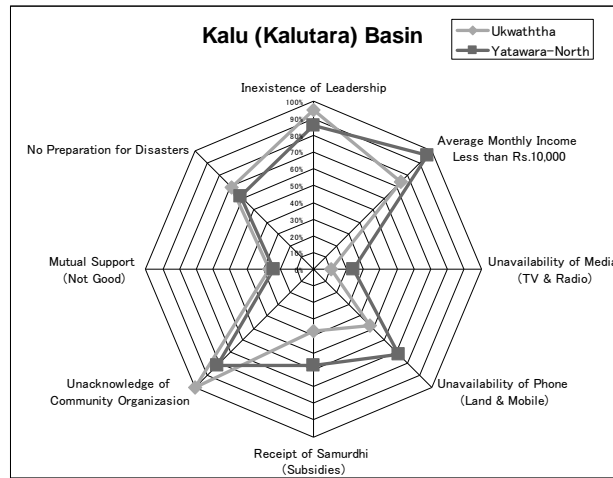


Figure 3 Comparison by some survey items related to vulnerability to disasters (Kalu-K)

Main industry of the community of Ukuwatta is rubber cultivation, while in the community in Yatawara, paddy cultivation is popular. Unskilled laborers comprise most of the respondents from both communities while at the same time, around 25% of them are unemployed. Both of the communities are traditional villages; however, the population of Yatawara is increasing while that of Ukuwatta is in the decreasing trend.

The two target communities have experienced severe flooding disasters in 2003 with only one death reported only in Ukuwatta. The height of the flooded water in the two communities was not higher than the level reported in the survey in Ratnapura District.

As shown in Figure 3, the community of Yatawara is rather weak in information communication facilities

4) Gin River Basin

Main industry of the target communities in Gin River Basin is mixed cultivation such as tea, cinnamon and paddy. In Baddegama, 25% of respondents are either retired or active government employees and 35% of them are small-scale entrepreneurs. In Agaliya, around 25% of them are unemployed. In both communities, demographic movement has been stagnated.

The two target communities have experienced severe flooding disasters in 2003 but no human casualties were reported in the Survey. A total of 65% of the respondents of Baddegama responded that the 2003 flood water reached up to more than 2.5m high.

Figure 4 shows that the community of Baddegama is relatively well-equipped with the information communication facilities. Their income level is comparatively higher than the level of Agaliya.

The village-level disaster management committee is established in both communities.

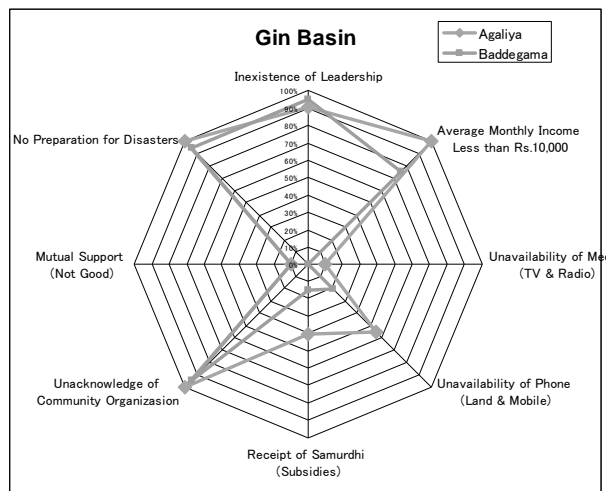


Figure 4 Comparison by some survey items related to vulnerability to disasters (Gin)

5) Nilwara River Basin

Main industries of the two target communities in Nilwara River Basin are tea, rubber and cinnamon cultivation. In Athuraliya, 20% of respondents are farmers and 20% are small-scale entrepreneurs. In Kadduwa, 15% of the respondents are farmers, 25% are retired government employees and 20% are unemployed. The population of both communities is in the increasing trend at a normal growth rate.

The two target communities have experienced severe flooding disasters in 2003. Several respondents answered that there were some injuries due to the disaster. The economic damages were considerably heavy.

The village-level disaster management committee has been established in both communities. While well-acknowledged in the community of Kadduwa, it is not recognized by the respondents of Athuraliya, as shown in the Figure 5.

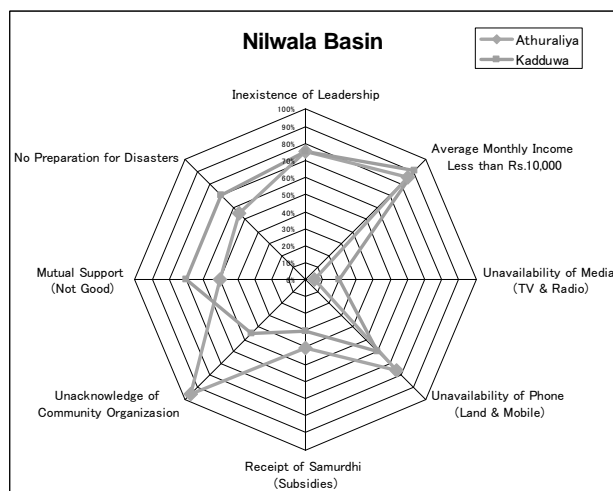


Figure 5 Comparison by some survey items related to vulnerability to disasters (Nilwala)

(2) Sediment Disasters Vulnerable Communities

1) Ratnapura District

Main industries of the four target communities in landslide prone areas in Ratnapura District are tea and rubber cultivation. Majority of the respondents are unskilled laborers in the target areas except Helauda where small-scale entrepreneurs are dominant. In all of the communities, the population is increasing.

The four target communities have experienced severe landslide disasters in 2003. Also, the communities in Helauda and Hapurugala were affected by flood disasters in 2003.

The village-level disaster management committee has been established in all the communities.

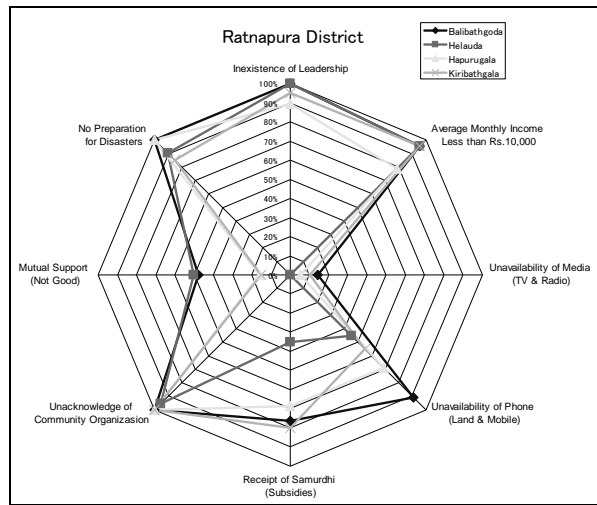


Figure 6 Comparison by some survey items related to vulnerability to disasters (Ratnapura)

As shown in Figure 6, most of the respondents of the communities are not aware of the community organization for disaster management although the village-level disaster management committee has been established.

2) Kalutara District

The four target communities in landslide prone areas in Kalutara District are in the tea, cinnamon and rubber cultivation region. Majority of the respondents are unskilled laborers in the areas except Govinna which is dominated by the unemployed. The population in Nagalakanda and Niggaha is stagnated, while the population of the other two communities, Govinna and Kosgulana, is increasing.

The four target communities have experienced landslide disasters in 2003. The communities in Helauda and Hapurugala were also affected by flood disasters in the same year. Landslide events occurred in Kosgulana in 2005 and in Niggaha in 2006.

The village-level disaster management committees have been established in all the communities; however, they are not well recognized by the respondents as shown in Figure 7. There is a satisfactory level of mutual support spirit in the target communities except for Niggaha community.

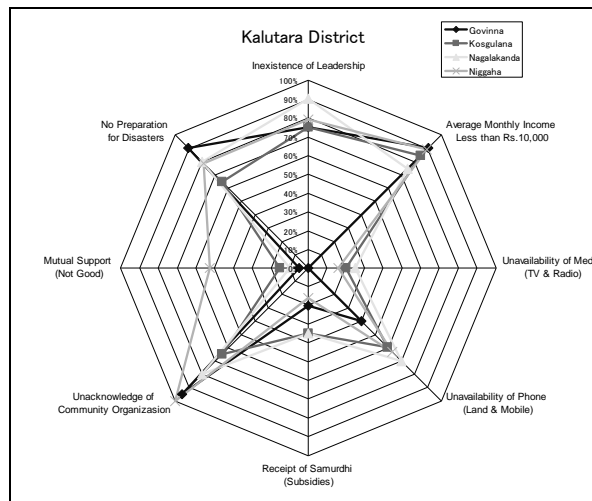


Figure 7 Comparison by some survey items related to vulnerability to disasters (Kalutara)

(3) Tsunami Vulnerable Communities

1) Matara District

Fishery is the main industry of the target communities prone to Tsunami in Matara District except Polhena where coconut cultivation is the main economic activity of the community. More than 50% of the respondents are fishermen from Gandara (90%), Sudduwalla (60%) and Thotamuna (55%). The population in Polhena, Sudduwalla and Thotamuna was reduced due to the regulation of buffer zone and aftermath of Tsunami disasters. The level of education is relatively low in Gandara where 80% of respondents are primary school graduates.

All of the target communities were affected by the Indian Ocean Tsunami in 2004. In most of the communities, a significant number of the respondents was hit by the wave of more than 2m height.

The village-level disaster management committees have been established except in Gandara community. In particular, the committee in Sudduwalla is well recognized among residents.

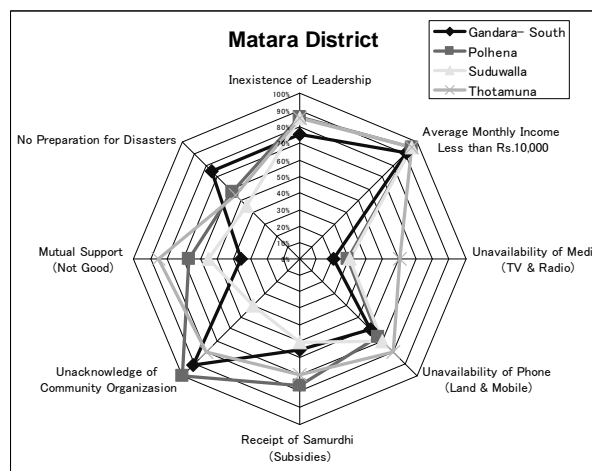


Figure 8 Comparison by some survey items related to vulnerability to disasters (Matara)

2) Ampara District

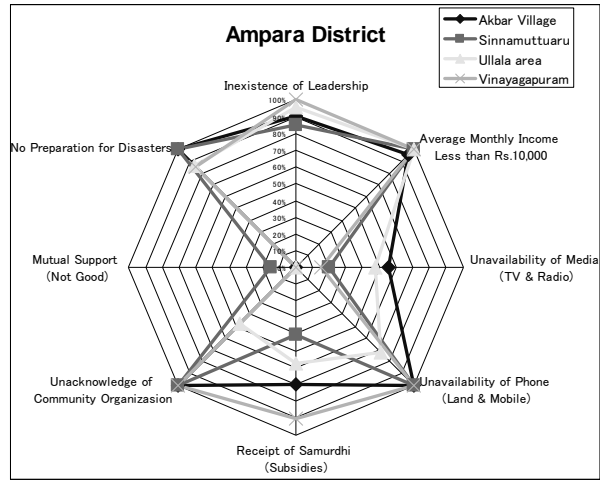


Figure 9 Comparison by some survey items related to vulnerability to disasters (Ampara)

In Ullala area and Sinnamutturu, majority of people are engaged in fishing. In Akbar village, many of them are conducting small businesses while 50% of respondents in Vinayagapuram are unemployed. The communities in Akbar village and Ullala were resettlement areas provided by the Government, while the communities in Sinnamutturu and Vinayagapuram were traditionally established.

The four target communities were severely affected by the Indian Ocean Tsunami in 2004. Since the roads in the target areas are still underdeveloped and the road network is very weak, the pace of the recovery from the impact of the Tsunami disaster is very slow.

A.7 Questionnaire for Community Survey

Comprehensive Study on Disaster Risk Management in Sri Lanka Household Questionnaire

Name of Interviewer	
----------------------------	--

1.0 General Information	
1.1 Name of the Household	
1.2 Name of the Village	
1.3 Grama Niladari Division	
1.4 Divisions Secretary Division	
1.5 Occupation	

2.0 Family

2.1 Relationship to the household	2.2 Age	2.3 Occupation	2.4 Education (Highest examination passed/ Grade in the school)	2.5 Male/Female

3.0 Infrastructure

1	Electricity- main grid	Please tick ()
2	Electricity-solar	
3	Water -Well	
4	Water -Tap	
5	Water - River	

4.0 School

4.1 Name of the closest school	
--------------------------------	--

4.2 Type of school	Primary	Secondary
--------------------	---------	-----------

4.3 Distance to School from your house		km
--	--	----

5.0 Main mode of transport

Bus	Train	Boat	owned vehicle			
			Car	Van	Motor bike	Other

6.0 Please describe if there is any specific issues / problems that you had to face regarding infrastructure and health facilities during the past 10 years?

Roads	eg. Road drainage system/ preparation with tar or concrete, flooding, unusable
Health Facilities	Malnutrition / mosquito treats, garbage dumping/ dumping industrial waste / hospitals
Education	Distance to school/ lack of teachers/ flood threats/ in adequate space and other physical facilities
Security	Threat from war/ elephants / snakes /
Public service	Permits, birth/death certificates, banks, post office, midwife, PHI, Samurdi, agricultural extension
market	Distance, availability of products for buying, opportunities for selling products , price of the products
Credit	Availability and accessibility / interest rate/ bank security/

7.0 Governance and Decision Making

7.1 Do you have any leadership in the community?

Yes	
No	

7.2 If yes;

7.2 Type of leadership	Political leader	Appointed leadership (GN)	From inheriting	Religious	Other
Formal					
Informal					

7.3 Community decision making

By leader	Please tick
Participatory	
Influence by unauthorized groups	
By govt involvement	
By political involvement	

7.4 Do you think is there any difference in gender, age, employment status in taking decisions?

Gender	Please tick ()
Age	
Employment status	
If possible, please specify:	

7.5 Average Monthly Income of the family

<Rs 5000	Rs. 6000 – 11000	Rs. 12000- 20000	21000-30000	Rs 30000<

7.6 Communication

	Yes	No
7.6.1 Do you have a Radio in your home		
7.6.2 Do you have a TV in your home		
7.6.3 Do you have a (land)phone in your home?		
7.6.4 Do you or your family member have mobile phone(s)?		

7.7 Reading and writing skills

	Very good	good	moderate	weak
7.7.1 Reading				
7.7.2 Writing				

7.8 Samurdhi benefits

At present are you a Samurdhi recipient/

Yes	
No	

8.0 Existing risk management measures and coping mechanisms against disasters in the target communities

8.1 Do you think is there any disaster risk management system existing at present in your community? Who is responsible for preparing/establishing such a system?

Disaster Management System at Community Level	Responsible Person (name, position and other details)
Availability of hazard map (Yes/No)	
Structural measures to reduce damages (please specify)	
Early warning system (Yes/No)	
Evacuation place (designated/not designated)	
Emergency stock (prepared/not prepared)	
Search and rescue facilities (Yes/No)	

8.2.1 According to your knowledge is there any disaster risk management organizations / groups exist at present in your community?

Yes	
No	

8.2.2 If any , please specify

Name of organization	
Type of organization (registered/ unregistered, formal/informal)	
Function/ roles	
Initiated by Govt/ NGO/ grass root level?	
No. of members	Male
	Female
Organization chart /structure (If yes, please provide it.)	Yes/No

Annual Budget in Rupees (average/approximately)	
Available Human resources	
Properties (Land/ vehicle/ building)	
Main place of the activities (eg. Community center, leader's home, Commercial building, temple, school, etc.)	
How are leaders appointed? (election=1, appointment=2, inheriting = 3)	
How are the decision making in the organizations/group? (by executive committee = 1/ members=2)	
Relationship with the Govt. (funding=1/ facilitating=2/ initiating=3)	
Relationship with other community organizations/groups	

8.3 Please provide following information on existing community organizations in your area

Name of Organization							
Type of organization (registered/ unregistered, formal/ informal)							
Function/ roles							
Initiated by Govt/ NGO/ grass root level							
Male	No. of members						
Female							
Organization chart /structure Yes/No (If yes, please provide it.)							
Annual Budget? Rupees (average/approximate)							
Available Human resources							
Properties (Land/ vehicle/ building)							
Main place of the activities Community center, leader's home, Commercial building, temple, school)							
How are leaders appointed? (election=1, appointment=2, inheriting = 3)							
How are the decision making with in the organizations? Group? By executive committee = 1/ members=2							
Relationship with the Govt.=1 Funding=2/ facilitating=3/ initiating=4							

9.0 Housing Characters of the respondent

9.1 Type of house

Individual house	
Apartment	
Annex / Room	

9.2 Type of structure

Type of material	Please tick ()
Cement	
Wooden bricks	
Thatched hut	
Corrugated sheets	

9.3 Materials used for the majority of exterior walls

Type of material	Please tick ()
Cement	
Wood bricks	
Clay	
Corrugated sheets	
Others	

9.4 Roof material

Type of material	Please tick ()
Tiles	
Asbestos	
Corrugated sheets	
Coconut Leaves	
Straw	

9.5 Floor material

Type of material	Please tick ()
Cement	
Floor tiles	
Clay	
Cow dung	
Concrete	

10.0 Social Capital: How do you think on followings?

10.1 Mutual Support of the community members

Excellent	Good	Moderate	Weak

10.2 Solidarity (unity, harmony, team spirit etc)

Excellent	Good	Moderate	Weak

10.3 Trust & Cooperation

Excellent	Good	Moderate	Weak

11.0 Past Natural Disasters

11.1 Have any of the following disasters affected this village? If yes, please specify the year(s) and month(s) of the disasters.

(pls. tick) Year(s) & Month(s)	Flood	Land slides	Cyclone	Tsunami	Other

11.2 Please provide information on the damage situations of the main 3 past disasters

(Year, Type of Disaster)	(disaster 1)	(disaster 2)	(disaster 3)
11.2.1 Hazard Observation at that time			
Amount of Rainfall			
Water Level (in case of flood)			
Wind Speed			
Height of the Wave (in case of Tsunami or High tide)			

Business area (Ac)

11.3.1 Did you have a disaster management system at that time?

Yes	
No	

11.3.2 If yes, please explain following:

	Yes	No	If yes, please provide details
Available Infrastructure to prevent the hazard (sand dune, trees, Natural forests, mangoes)			
Availability of Pre-disaster management plan			
Availability of warning systems			
Availability of evaluation system, route, place,			

11.4 Main problems during the disaster (please list main three problems according to the priority)

1.	
2.	
3.	

11.5 Main problems after disaster (please list main three problems according to the priority)

1.	
2.	
3.	

	(disaster 1)		(disaster 2)		(disaster 3)	
	Male	Female	Male	Female	Male	Female
11.2.2 Human suffering						
No. of deaths						
No. of missing						
No. of major injuries (hospitalized)						
No. of minor injuries						
No. people having psychosocial problems						
11.2.3 Material Damage						
	Approximate economic loss (Rs)	Approximate economic loss (Rs)	Approximate economic loss (Rs)	Approximate economic loss (Rs)	Approximate economic loss (Rs)	Approximate economic loss (Rs)
Fully damaged house						
Partially damaged house						
Fully damaged vehicle						
Partially damaged vehicles						
Furniture						
Kitchen items						
Agriculture equipments						
Electrical equipment						
Legal documents						
11.2.3 Economic / business losses						
	Approximate economic loss (Rs)	Approximate economic loss (Rs)	Approximate economic loss (Rs)	Approximate economic loss (Rs)	Approximate economic loss (Rs)	Approximate economic loss (Rs)
Poultry						
Crop						
Dairy						
Pigs						
Timber						
Industries						
Other Business (please specify)						
11.2.4 Affected area						
Road (Km)						
Living area (Ac)						
Agricultural lands (Ac)						
Industrial lands (Ac)						

12.0 Disaster recovery

12.1 How long has it taken for recovery from the disaster situation?	
--	--

12.2 Methodology of recovery

Method	Financial value (approximately)
Self recovery	
Community support	
Government support	
NGO Support	
Other (Please specify)	

13.0 Vulnerability to Disaster

13.1 At present have you realized any disaster risk to your life?

Vulnerable areas	Yes	No	If yes, please specific and provide details about the vulnerability to the disaster <small>Please describe in terms of magnitude of the rain (No. of days heavy rain/years, amount of rain, land use pattern and geographical conditions)</small>
Heavy Rain			
Flood			
Landslide			
Tsunami			
Wind			

14.0 Public awareness and knowledge of the disaster

	Yes	No
14.1 Do you know about disasters?		

14.2 If yes, what kind of disasters do you know?

14.3 How do you know about disasters?	Media
	By experience
	News
	Other

14.4 Do you know when and how to evacuate in case of disaster?

Yes	No

14.5 Have you ever learned how to reduce disaster risk?

Yes (if yes, please specify how/when)	No

14.6 Have you ever participated in the community activities for disaster risk reduction?

Yes	No

14.7 If yes, please describe:

--

14.8 Do you prepare anything for future disasters? (e.g. stock of water/food/blanket, evacuation plan, reinforcement of houses)

Yes	No

14.9 If yes Please describe:

15.0 Mutual cooperation in case of emergency

15.1 Do you like to cooperate with others in emergency situation?

Yes	No

15.1.1 If yes, reasons:

15.1.2 If not, reasons:

15.2 Do you have any experience of mutual cooperation in emergency situation

Yes	No

16.0 Education on disasters

16.1 Have you heard any songs, legends, folk tales on disasters/disaster reduction?

Yes	No

If yes, please specify:

16.2 Do you think your children know about disaster risk management?

Yes	No

16.3 Do you think your children should learn disasters and disaster risk management issues in the school?

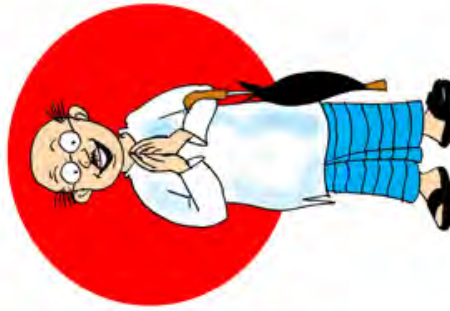
Yes	No

Data Book 5

***Handbook and “Flipchart”
(Flip Chart & Presentation) Material***

handbook “fliptation”

for CBDRM activities in Sri Lanka



Comprehensive study on disaster management in Sri Lanka

Published by:
Disaster Management Centre, Ministry of Disaster Management &
Human Rights, JICA Study Team, Practical Action

The “Fliptation” for CBDRM Activities with this handbook were compiled based on the result of CBDRM activities conducted under the JICA Comprehensive Study on Disaster Management in Sri Lanka. The activities were carried out together with Disaster Management Centre (DMC), in cooperation with Department of Meteorology (DOM), Department of Irrigation (DOI), and National Building Research Organization (NBRO) during October 2006 and December 2008. Practical Action and Sarvodaya Shramadana Movement supported the coordination of the activities. Especially, Practical Action made great contributions to the development of the “Fliptation”.

Taking this opportunity, we would like to extend our sincere gratitude to all who supported and participated in the activities, especially the participants of the 15 pilot communities in the Study. In addition, we would like to express our special thanks to Mrs. Lalani Imbulana of DMC and Mr. RMS Bandara of NBRO for their active involvement for successful implementation of the CBDRM activities in the Study.

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1) Let's learn about Tsunami	55	7) Structural Measures to Reduce Damages of Tsunami	58
2) Areas Prone to Tsunami	56	8) Non-Structural Measures: Tsunami Early Warning System	59
3) Causes of Tsunami Generation	56	9) Let's Evacuate to Safe Place	59
4) Speed and Height of Tsunami Wave	57	10) Where Tsunami Generate and How Long it Takes to Reach Sri Lanka	60
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CHAPTER 1 INTRODUCTION

1.1 Background of development of the “Fliptation”

When a disaster occurs, community members are inescapably the first responders. Sometimes how they respond at the initial stage determines the result of the situation. Further, local information is very important for taking necessary measures to prevent or mitigate disaster situations. Effective counter measures for disaster reduction can be considered only after sharing or utilizing local information related disasters among stakeholders, such as community members, local government officers, academia, and NGOs. Disaster reduction measures are most successful when they involve direct participation of the people most likely to be exposed to hazards. Moreover, initiatives of community people not only have impact on better react and response to disasters, but also enable them to make prompt recovery from damages and make their community resilient from disasters. Therefore, to enhance capacities of communities to deal with disasters is one of the most important factors for effective disaster risk reduction.

CBDRM activities have been conducted in the disaster vulnerable communities in Sri Lanka mostly as project-based activities by various organizations. However, after the establishment of Disaster Management Centre (DMC), Ministry of Disaster Management and Human Rights, there has been momentum for improving such ad-hoc implementation of activities and providing more systematic and horizontal distribution oriented CBDRM activities. DMC developed “Community Based Disaster Management – Modalities and Guideline” with professional contribution from the National Advisory Committee for CBDRM, including members from Practical Action, Sri Lanka Red Cross, UNDP Sri Lanka, and others. The document is providing necessary information for common approach to conduct CBDRM activities in the country.

Meanwhile, educational material easily utilized by the practitioners of the CBDRM activities have not been well developed. Each time, most of the practitioners have to prepare their own materials or use tools introduced in some books and manuals. To ensure common activities in the country, it is required to develop easily-understandable educational material for CBDRM in consideration of use under local conditions. In this point of view, an educational tool for the CBDRM named “Fliptation” was developed based on the experienced through the CBDRM activities conducted under the JICA Comprehensive Study on Disaster Management in Sri Lanka.

1.2 What is “Fliptation”

“Fliptation” is a combination word of “flip chart” and “presentation”. Like making presentations using PowerPoint material, the lecturers use “Fliptation” in the CBDRM activities.

As mentioned above, the main objective of the “Fliptation” is to make practitioners efforts for conducting CBDRM activities easier and provide standardized and easy-to-understand educational materials for CBDRM activities. Also it aims to ensure dissemination of appropriate knowledge about disaster mechanism and CBDRM processes to community people.

The “Fliptation” is a set of flip charts printed on A1 size durable material which can be easily carried to the local community and presented to a group of people without having to worry about availability of electricity in the venue. The “Fliptation” has short descriptions with many illustrations and pictures for introducing disaster risk management to the people. It comes with a handbook including scripts for examples of basic explanation for lectures and more detailed explanation on the contents of “Fliptation” which can be utilized for advance preparation of lectures. The handbook also provides some reference data, documents and presentations to deeply understand the subject in DVD as attachment.

The “Fliptation” for CBDRM is composed of 2 kinds of editions and the main content is shown in the table below. The content was developed in consultation with DMC, DOI, and NBRO. The sets of “Fliptation” can be used based on the disaster conditions in the area. For example, if the area is vulnerable to sediment disasters, the lecturers can use the “Fliptation” of CBDRM Activities and Sediment Disasters.

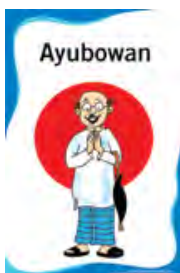
Theme	Main Contents
CBDRM Activities	<ul style="list-style-type: none"> Outline of CBDRM Activities Importance of Knowing Risks in the Community Community-based Hazard Mapping Activities Formation of Disaster Management Committee Disaster Management Drill Disaster Risk Management Plan
Mechanism of Disasters and Disaster Reduction 1: Flood 2: Sediment Disasters 3: Tsunami	<ul style="list-style-type: none"> Mechanism of Disasters Major Historical Disasters in Sri Lanka Structural Measures to Mitigate Disaster Damages Non-structural Measures to Mitigate Adverse Impact of Disasters

In the next chapter, each edition of “Fliptation” will be introduced in details. “Basic Explanation” provides you a sample explanation of each flip chart, and “Points” provides you further detailed explanation and references of the contents of each flip. “Reference Documents & Materials” provides you a list of the documents or the files in the attached DVD to be referred for deep understanding of the contents.

CHAPTER 2.1 GUIDANCE TO USE FLIPTATION

2.1 CBDRM “Fliptation”

1 Introduction



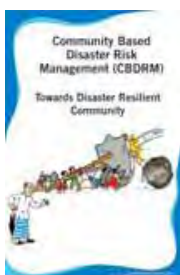
Basic Explanation

Hello.

This is uncle, Siripala. He is our guide today.

He is a member of community and is also very knowledgeable about disasters.

2 Community-based Disaster Risk Management (CBDRM) - Let’s Make Disaster Resilient Community



Basic Explanation

I am going to explain about Community Based Disaster Risk Management.

This is an opportunity for your community to discuss about disaster, and prepare for disaster to make your community disaster resilient.

I will explain how we can prepare for disasters step by step. We have to face disasters, but the important thing is we should prepare to face them successfully.

Community’s active involvement is one of the important factors to reduce disaster damage. Therefore, I need your active participation to think about your situation and your community.

Points

At first, to initiate the activities, the following basic concept of CBDRM should be briefly introduced to the participants for encouraging their active involvement.

Importance of CBDRM Activities

- To reduce damages caused by disasters, community’s own actions are indispensable.

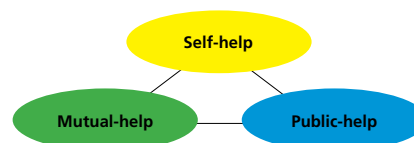
Not only public-help by governments, self-help by individuals, families and companies and mutual-help by neighborhoods and local communities are required. Good combination of actions in these three components can lead to effective disaster reduction.

- Active participation of community members is important for disaster reduction.

To ensure a sustainable and effective disaster risk management system in the community, utilization of indigenous & local knowledge and respecting local customs, as well as empowering residents to take necessary actions are important. Without active participation of community members, such a system cannot be established.

Reference Documents & Materials.

- “Community Based Disaster Management – Modalities and Guideline” (May 2008, DMC)



3 Purpose of the Activity



Basic Explanation

I would like to explain purposes of this community activity.

1. is to recognize our risks in the community. By proper understanding of the disaster risks in our community, we will be able to know how we can prepare and take action for future disasters.
2. is to make good network among the community and all the other stakeholders through exchanging knowledge.
3. is to have an appropriate early warning and evacuation system for the village. We can best use local customs and mechanism for establishing the system, such as the temple bell.
4. is to share our plan and knowledge among all the community members.

We have to get together and each person has to be responsible to take action for making a disaster resilient community.

Points

For successful activity, it is important to make the purposes of the activity clear to the participants. Purposes of the activity are as follows:

- a) To know risks in communities and prepare for future disasters. Basic understanding of mechanism of disasters, risk condition of the communities, and risk management is fundamental to take proper action and consider necessary measures for disaster reduction.
- b) To share current risk situation and local knowledge among all stakeholders such as GN (Grama Niladari), divisions (DS), local authority and others. Risk communication is an important step to make best use of available resources and consider improvement of the disaster risk management system. Strengthened relationship among stakeholders will work on good coordination in case of an emergency.
- c) To have a better understanding of the importance of community actions for improving current disaster risk & risk management situations in the community. Community actions can dramatically change the result of disasters (refer to the "Column 1")
- d) To make an evacuation plan for natural disasters on a community basis including establishment of the early warning dissemination system. Planning in advance for information dissemination and evacuation which is appropriate to local conditions is very important to reduce human damages.

- e) To disseminate what you have noticed and learned in the workshop to your community, and raise awareness of people and enhance the local capacity for disaster reduction

By taking these actions through several activities in the community, we can

- a) develop capabilities of the community for disaster risk management and
- b) make a disaster resilient community

It is most important that each person feels responsible for disaster preparedness and prevention/mitigation to make disaster resilient community.

4 What is Disaster?

Basic Explanation

When we talk about disaster management, there are some words that we should know.

There is a mountain, and stones are rolling down, this is a natural event and this is just **"a Natural Hazard"**.

This is identified as a disaster. Here you see people are affected and houses are destroyed. When a natural hazard strikes people and property, this becomes **"a Disaster"**.

When we think about rain, rain is essential for our life. However, heavy rainfall in a residential area may cause floods.

A disaster causes human loss, property loss and environmental loss. How to minimize those losses? Answer is **"managing the disaster."** Let's start learning!

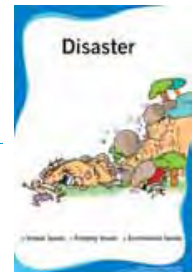
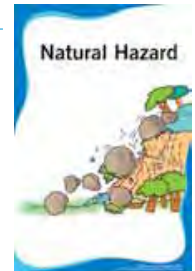
People think that disaster is a natural phenomenon. Is that always true?

There are causes for disasters. Sometimes disasters are caused by human activities like cutting trees or constructing houses on a hill, which destroys the balance of nature.

Points

At the beginning, the participants should know what a **"disaster"** is.

- NATURAL HAZARD events themselves do not necessarily mean disasters. A strong cyclone over an uninhabited island, or a big Tsunami in a no-man's land are just natural phenomena and not a disaster. Unusual heavy rainfall in a river-basin with appropriate



flood management systems may result in increase of water in reservoirs and not in loss of life or property. We must bear in mind that only when natural hazards strike vulnerable societies or communities that they translate into DISASTERS.

Disasters = function (hazard, vulnerability)

- This gives us great hope that if we can properly assess the disaster risk of a community and take necessary disaster prevention/reduction measures and reduce the vulnerability of the community, we would be able to lessen disasters or reduce their impact. This concept could be diagrammatically represented as follows.

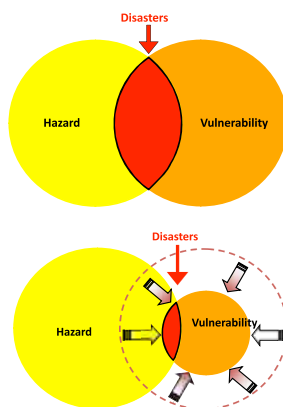


Figure 2.1.1 Correlation between Vulnerability and Disasters

5 What is Disaster Risk Reduction

Basic Explanation

So, how can we manage the disaster?

This shows disaster management activities.

After occurrence of disaster, there are 4 phases for disaster reduction. We can consider the disaster management from a **"Disaster Management Cycle"**.

After a disaster happens, we go into **"Response"** phase. We need to do search and rescue and first aid activities to save lives. Also, we need to secure people's lives by managing an evacuation place.

Then, in the **"Rehabilitation/Reconstruction"** phase, we rehabilitate and reconstruct infrastructures and houses. It is important that we ensure risk reduction from future possible disasters in those activities.

Occurrence of a disaster means another one might come. In the **"Prevention/Mitigation"** phase, taking action to minimize the damage against the next disaster is important. For example, the following measures are considered.

- Construction of water reservoirs and bank protection against a flood.
- Construction of retaining walls and forestation against landslide.

In **"Preparedness"** phase, we conduct activities and take measures for ensuring an effective response to disasters. For example, Hazard mapping and establishing early warning system.

We are now in the "Preparedness" and "Prevention and Mitigation" phases. This activity is to make your community to be better prepared for the disaster.

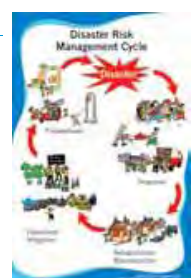
Well prepared means you and your community can respond to the disaster situation quickly and efficiently.

Points

For starting the CBDRM, people should gain basic concept of **"What is disaster reduction"**.

Disaster Risk Management Cycle

The **"Disaster Risk Management Cycle"** is commonly used to explain about general outline of disaster reduction. The cycle consists of four phases: **"Response/Recovery"** and **"Rehabilitation/Reconstruction"** in post-disaster stage, and **"Prevention/Mitigation"** and **"Preparedness"** in the pre-disaster stage.





Disaster **Response** is defined as combined action of coordination and quick & appropriate relief with local participation in assessment through strengthening the local level disaster response ability in order to ensure disaster relief as the platform for disaster recovery.

During Disaster **Rehabilitation** and **Reconstruction** phase, reconstruction work has to be well planned for the next such events. It should not be re-constructed as it was in the past in order to prevent similar disasters in future. Further, human renovation and structural and non-structural rehabilitation/reconstruction process should be ensured. Reconstruction process could be a good opportunity to improve quality of life as well as ensure sustainable development of the affected areas.

Prevention/Mitigation is defined as structural and non-structural measures undertaken to prevent or limit the adverse impact of natural hazards, environmental degradation and technological hazards.

Preparedness is defined as activities and measures taken in advance to ensure effective response to the impact of disasters, including the issuance of timely and accurate forecasts along with effective early warnings and the temporary removal of people and property from a threatened location.

Examples of measures taken in each phase are listed in Table 2.1.1. Taking appropriate measures based on the concept of disaster risk management in each phase of the cycle can reduce the overall disaster risk.

Reference Documents & Materials

- "Total Disaster Risk Management - Good Practices 2005 -" (ADRC, 2005)
http://www.adrc.or.jp/publications/TDRM2005/TDRM_Good_Practices/GP2005_e.html
 *Extract of the document is available

Phase / Disaster	Outline of activities	Flood	Storm incl. Cyclone	Landslide
Prevention/Mitigation	Efforts to be made for preventing or mitigating damage.	<ul style="list-style-type: none"> Construction of dike Building of dam Forestation Construction of flood control basins/reservoirs 	<ul style="list-style-type: none"> Construction of tide wall Establishment of forests to protect against storms Construction of retaining walls (community level) forestation and construction of small scale bridge to help smooth evacuation 	<ul style="list-style-type: none"> Construction of erosion control dams Construction of retaining walls (community level) forestation and construction of small scale bridge to help smooth evacuation
Preparedness	Activities and measures for ensuring an effective response to the impact of Hazards, including hazard mapping, establishment of early warning system, emergency drills and public awareness.	<ul style="list-style-type: none"> Construction and operation of meteorological observation systems Preparation of hazard maps Food & material stockpiling Emergency drills Construction of early warning systems Preparation of emergency kits 	<ul style="list-style-type: none"> Construction of shelter Construction and operation of meteorological observation systems 	<ul style="list-style-type: none"> Construction and operation of meteorological observation systems
Response	Activities such as rescue efforts, first aid and evacuation	<ul style="list-style-type: none"> Rescue efforts First aid treatment Fire lighting Monitoring of secondary disaster Construction of temporary housing Establishment of tent villages 		
Rehabilitation/Reconstruction	Considerations of disaster risk reduction should form the foundations for all activities to rehabilitate and reconstruct the lives of community and individual life.	<ul style="list-style-type: none"> Disaster resistant reconstruction Appropriate land use planning Livelihood support Industrial rehabilitation planning 		

Table 2.1.1 Outline and Example of Measures in Each Disaster Risk Management Phase

[Column 1]

"Community's increased awareness could save people's lives"

For starting the CBDRM, people should gain basic concept of "What is disaster reduction". Simeulue Island in Indonesia is located 40 km south of the epicenter of the earthquake on 26 December 2004. 3 to 10 meter high wave came to the island 10 minutes after shaking, and caused significant structural damages, destroying entire villages near the coast. However, death toll of the Simeulue Island by the Tsunami remained 7 people only.

This is thanks to the efforts of Simeulue people to transfer continuously learned lessons through the past bitter experience when they had devastating damages caused by the 1907 Tsunami. People who experienced the Tsunami developed a story which introduces Tsunami and how to protect lives from Tsunami and has delivered it by story-telling and singing.

This practice in Simeulue shows community's increased awareness provided an extraordinarily powerful mitigation tool that saved countless lives.



Result of survey after the 2004 Tsunami about knowledge of Tsunami



Map of Simeulue Island and epicenter of the 2004 Tsunami

The SMONG Story

Hear you all this story
 Once upon a time
 A place gone under the sea
 This is what happened

Find there would be a quake
 And then a wall of water
 A village goes under water
 In a flash

So, when the land shakes
 Run you all, run
 Find places that are high

SMONG that is
 Told by our great old ones
 Remember this and be aware
 Hear you, message from elders before us

SMONG is your bath water
 Quake is your gentle swaying lullaby
 Thunder is your tambourines
 And lighting is your sparkling light
 (Let's overcome together!)

SMONG story (song) orally transferred to next generation

6 National Disaster Management Mechanism

Basic Explanation

Now I would like to explain National Disaster Management Mechanism.

After the Tsunami in 2004, we established a special agency to coordinate disaster management in Sri Lanka. That is the Disaster Management Centre, DMC.

DMC's mission is to create a culture of safety among communities and the nation at large through systematic management of natural, technological and man-made disaster risks.

This figure is the composition and organization. These are several sections in DMC, Disaster Management Technology and Mitigation Unit, Forecasting Early Warning and Dissemination Unit, Preparedness and Planning Unit, Training, Education and Public Awareness Unit, and National Emergency Operation Center.



This 2nd figure shows linkage from local level to national level organizations. At local level, GN level Disaster Management Committee is formed to represent in Divisional level Disaster Management Committee. Then, Representatives of Divisional Disaster Management Committees are members of District level Disaster Management Committee.

There are various organizations responsible for disaster management. Meteorological Department is in charge of meteorological observation, Irrigation Department observes rainfall and river level, NBRO deals with landslide. DMC coordinates with many organizations to deal with disasters.

Points

To consider their own disaster risk management system, getting accurate knowledge about current official disaster risk management system is essential. In addition, when they face the problems which cannot be solved only by the community, they need support from the respective government organizations in charge of disaster risk management.

DMC

- **Mission:**
To create a culture of safety among communities and the nation at large through systematic management of natural, technological and man-made disaster risks
- **Objectives:**
To enforce, coordinate and monitor activities related to
 - 1) Hazard mapping and risk assessment,
 - 2) Information management,
 - 3) Forecasting, early warning and information dissemination,
 - 4) Emergency Operations Management, etc.,which are conducted through countrywide ministries, departments and public corporations, provincial councils and local authority administration; and district, division and Grama Niladhari administration

Other Major Ministries in Charge of Disaster Risk Management

- Department of Meteorology (DOM): Weather observation & early warning for weather related disasters and Tsunami
- Department of Irrigation (DOI): River management and flood warning
- National Building Research Organization (NBRO) Landslide Studies and Services Division: Sediment disaster risk management

Reference Documents & Materials.

- DMC Website: http://www.dmc.gov.lk/about_dmc.htm
- DOM Website: <http://www.meteo.sit.lk/index.html>
- DOI Website: <http://www.irrigation.gov.lk/>
- NBRO Website: <http://www.nbro.gov.lk/lssd.htm>

7 Importance of Knowing Risks in Your Community

Basic Explanation

Let's now start talking about Community-based Disaster Risk Management by knowing the risks of disasters in your community.

These maps show different risks in Sri Lanka.

First one is annual rainfall. When there is a large amount of rainfall, there is a high risk of flood. This rainfall also causes landslides. Also, rainfall is closely related to drought.

This brown map shows landslide risk areas. Landslide occurs mainly in the hilly and mountain areas.

One in the bottom shows tsunami affected divisions by 2004 Tsunami. Almost all the coastal areas are prone to Tsunami even though the areas are not marked in this map. The coastal areas are also prone to cyclone and high tide.

We have to pay more attention where the risk is greater.

[Explain Mechanism of "Flood" or/and "Landslide" or/and "Tsunami" accordingly to their community needs and situation]

Points

First step for disaster preparedness is to know the risks of disasters in the area they live.

- The maps show areas with significant potential risks of Flood, Landslide and Tsunami in Sri Lanka. Ask the participants locate their area in the maps, and realize the risk of disasters.
- Flood potential map: areas with very high annual rainfall can be considered have high potential for flood.
- Tsunami potential map: areas which affected by 2004 December Tsunami can be considered have high potential for Tsunami. But all the coastal areas are considered as Tsunami risk areas.
- http://www.statistics.gov.lk/Tsunami/maps/Map_affected%20DS%20Division.htm
- Landslide potential map: NBRO developed hazard map for sediment disaster based on their research & studies (Hazard maps by divisions are available at NBRO Website:
- <http://www.nbro.gov.lk/mapproc.htm> for Ratnapura, Kegalle, Kandy, Matale, Nuwara Eliya divisions)



Then, if someone has experience of the disaster(s), ask him/her to share his/her experiences with the others, which make them consider the disaster(s) relevant to them.

Using "Flipitation" of each disaster, explain basic mechanism and risk management of disaster(s) which the area has potential for occurrence.

8 Methods of Community Activity

Basic Explanation

There are several ways and methods that community themselves can do to prepare for disaster.

- Discuss disaster risks in community
- Draw a community map
- Conduct a field survey (Town Watching)
- Develop a community-based hazard map
- Conduct an evacuation drill
- Develop a community disaster management plan and an action plan

I now explain some methods in details.

Points

There are several ways and methods that community itself can do for creating disaster resilient community. Some basic activities are introduced in this page. The participants have a rough idea what they are going to do through the CBDRM activities.

a) Discuss disaster risks in community and draw a community map

This process is called "Disaster Imagination Game (DIG)". DIG is an easy but cost-effective methodology of table top exercise of disaster risk management. The method was invented in 1997 in Mie Prefecture, Japan. The main activities of DIG are as follows:

- Stand around "a big map" (if an area map is not available, use a large white paper and draw a community map by hand writing.)
- Write down participants' knowledge of the area on the map (natural condition, roads, bridges, public facilities, information of hazards and disasters, resources for disaster management, etc.)

- If available, add technical information of hazards (risk area of landslide, possible inundation area, etc.)
- Share and discuss together about ideas for disaster management plan and countermeasures in the area including early warning dissemination and evacuation.

b) Field Survey (Town Watching)

Once a draft community hazard map is developed through the activities of DIG, it is important to check current and latest conditions of risk and resources useful for disaster risk management, and confirm/reconsider the proposed evacuation routes.

c) Develop a Community-based Hazard Map

- A community-based hazard map is finalized by visualizing the observations and findings through the discussion and field survey.

d) Evacuation Drill/ Disaster Management Exercise

- It is essential to conduct drill/exercise to check the proposed evacuation route & plan.

e) Development of Community's Disaster Management Plan & Action Plan

Through the activities of mapping and drill/exercise, the participants will find problems and deficiencies in the community for effective disaster risk management. They need to discuss:

- 1) what are the problems,
- 2) how they can be solved,
- 3) who is responsible to solve them, and
- 4) what actions are required.

Reference Documents & Materials

- The JICA Study Presentation "Disaster Imagination Game (DIG)"



9 Let's Make a Hazard Map of the Community



Basic Explanation

At first, discuss about risks in your community and draw a hazard map. I now explain how to make a Community Hazard Map.

1. Get together with people in your community to prepare a basic community map to draw road, rivers, canals, houses, buildings, land use, etc.
 - Second, discuss about disaster risk and identify the current situation. Based on the discussion, add information about disaster risk areas such as inundated areas, landslide area and dangerous places when passing by, etc. Other people know of other areas that you don't know. Try to add all the possibilities of risks in the basic community map.
 - Third, Add information about the safe place and evacuation route, or other important facilities for disaster risk management.
2. Next step is to do a town watching (field survey). Walk around the community with developed basic community map. Check community risk areas and safe evacuation route and place.
 - In order to get detailed local information, interview local residents. We can get specific local information and past experiences, and identify disaster vulnerable persons like elderly, person with disabilities, mothers with babies. Local information is very important for community hazard map and disaster management plan! (Continue to next page)
3. Last step is to draw a hazard map.
 - Based on the town watching and field survey, you can identify where the risk areas are and location of vulnerable people in the community. Add this information to the Community Hazard Map.
 - Also, confirm and reconsider the proposed evacuation place and routes in case of disaster.
 - (Point out Hazard Map) This is a hazard map. This area is flooded. This arrow shows the evacuation route.

Points

To reduce their vulnerability to natural hazards, communities must know the risks that they face, and take action based on that knowledge. Activity of "Hazard Mapping" with community participation is the most

proactive method to improve current disaster risk situation of community and to establish people-centred Early Warning System.

Please note that, in fact, this mapping activities focus on the process of developing hazard maps, not just preparing them for distribution. The premise is that by working through the process, the participants will gain enhanced awareness of risks, thereby bridging the risk perception gap.

The basic flow of the activities is as follows:

- (1) Explanation of importance of "community-based hazard mapping" and its process
- (2) Explanation of "Tips of mapping and hazard mapping"
- (3) Making community's base map with some disaster and risk management information which the participants have already known.
- (4) Town-watching (field survey) to share latest information on disaster and disaster risk management of the area as well as check safe evacuation routes
- (5) Finalizing a community hazard map based on the information gained through town-watching and discussion among group members

In community, residents generally recognize their own risks and basic countermeasures to mitigate damages caused by disasters from past disaster experiences. However, their recognition of risks is sometimes underestimated and also not updated. Walking and watching the town with other members of the community, experts, and local government officers will provide a good opportunity to recheck and review the current condition for filling the gap.

Besides, in some communities, maps of community are not available, and their ideas for disaster risk management such as evacuation route remain just in their minds and sometimes wrongly recognized in terms of spatial perception. Through mapping activity, the participants can enhance spatial recognition and understanding of positional relation which are important for effective disaster risk management. Further, the mapping activity provides an opportunity to exchange their own idea in concrete images with other participants.

Steps for Mapping

- (a) Grouping: All the participants are grouped on an area basis. A group comprises 5-10 members, with each assigned a specific role: group leader, navigator, note-taker, presenter at the final presentation, etc.
- (b) Drawing a "Base Map": Each group develop a base map with the information of boundaries, road, rivers, canals, bridges, GN offices, houses, buildings, land use, and etc.



- (c) Add information on disaster situation: Estimated inundated areas, dangerous spots to pass by, etc. based on your experiences and other's experiences (two-story buildings for shelter during floods, evacuation routes, etc.) will be added.
- (d) Add information on the evacuation and disaster risk management: Evacuation place(s) and routes, and other important facilities for disaster risk management such as hospital, temple/mosque will be added on the maps by discussing among group members. Evacuation places should be located in risk-free area and buildings with capacities to accommodate sufficient numbers of people as well as equipped with water and sanitation facilities. However, if it is difficult to find such places near the residential area, primary evacuation places for saving lives should be decided. The places should be at least two-story building with stable structure in case of Tsunami and flood.
- (e) Add necessary information for a map: Scale size, direction (with compass), date of development, and name of producers should be added.

Town-watching (field survey)



Draft community hazard maps which is developed based on the participants' present knowledge should be confirmed by checking current and latest conditions by "Town-watching (field survey)". In addition, proposed evacuation routes should be reconsidered.

They should make observation for advantageous points (useful facilities for mitigating damages, evacuation site, evacuation routes, information

dissemination facilities, etc.), disadvantageous points (ill-maintained facilities such as blocked drainages and easily-broken walls, obstacles for evacuation, etc.), and past disaster record (inundated areas, etc.) for improving maps and considering their disaster risk management. Interview to local residents is also useful getting such information.

Finalizing a community hazard map

Based on the information gained through town-watching and discussion among group members, the draft map will be finalized.

If you want to distribute the map created by the participants, representatives of each group need to work together to combine the individual work into one large master map. In due course, the participants establish their own community based hazard map.

Some of sample maps are introduced in **Figure 2.1.3**, **Figure 2.1.4**, and **Figure 2.1.5**.

[Items to be prepared before starting the activities]

Following items should be prepared before the activities.

- Large-size white papers (preferably size of A0 or A1)
- A set of permanent color markers (at least 5 different color: black, blue, red, green, and yellow)
- Pencils and eraser for rough drawing
- Notepad and pens for memo during field survey and discussion
- Map of the area and/or technical hazard map of the area (if available)
- Whiteboard or Flip chart and scotch tape for presentation (if available)
- Tables for drawing maps (if available)

10 Tips for Making a Hazard Map



Basic Explanation

This is an example of Community Hazard Map in one community. Road, river, safe place, evacuation route are marked in this map. Also risk areas are defined.

There are some tips for making a good community hazard map.

1. To draw the map north side up and draw a compass.
2. Use different colours to draw such as roads by red and yellow, rivers by blue, agricultural land and trees by green, evacuation routes by red dotted line and arrow etc.
3. Use same icon for important buildings (hospital, temple/mosque, community center and etc)
4. Use same mark for locations of Sirens and Speakers.
5. Mark past disaster experienced area (inundated area and landslide location with hatched line).
6. Make Legend in the map. Legend explains the major buildings and facilities, meaning of coloured lines and what you expressed in the map. Legend will help everyone to understand the meaning of sign.

Anyone looking at this map can understand where risk areas are, and where the safe places and evacuation routes are.

Put this map in the board so that people in the community can see.

Points

Before the participants start mapping activities, they need to understand important points for making a good map. The developed map needs to be easily understood by anyone without further explanation. Therefore, direction, scale and meaning of symbols, line types, shapes, and colours used in the map should be clearly explained in the map by adding compass, scale and legend. Title of the map, producer's name, and production year & month are also described in the map.

Reference Documents & Materials.

- "Manual: Community Based Workshop for Disaster Reduction Using Town-Watching Method -Raising awareness and capacity of communities-" (2006, ADRC)



Figure 2.1.2 Sample of symbols using in map (Legend of map developed by Survey Department)



Figure 2.1.3 Sample Hazard Maps (Upper: Landslide Prone Area/ Bottom: Flood Prone Area)

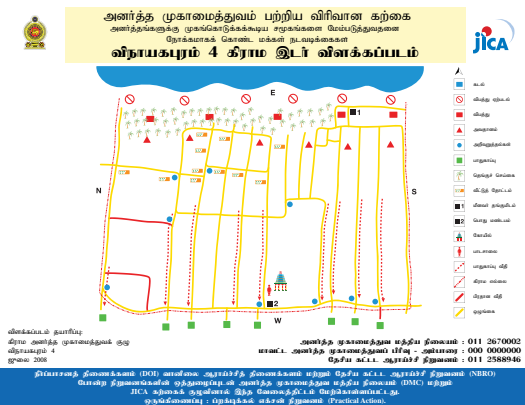


Figure 2.1.4 Sample Hazard Map (Tsunami Prone Area)



Figure 2.1.5 Sample of Draft Hazard Maps

11 Formation of Disaster Management Committee



Basic Explanation

Another good practice to prepare for disaster is to form a Disaster Management Committee. There are proposed compositions of sub-committees.

1. Early Warning Committee: Early warning committee is in charge of informing people about disaster situation.
2. Evacuation and Support Committee: When people get early warning information and evacuate to safe place, Evacuation and Support Committee support people to safely evacuate without any confusion.
3. First Aid Committee: First Aid Committee gives primary treatment and health care to injured or ill person.
4. Evacuation and Shelter Committee: Evacuation and Shelter Committee takes care of evacuation places such as managing facilities and providing food and water.
5. Patrol and Vigilance Committee: Patrol and Vigilance committee check and observe risk areas and to inform community members.

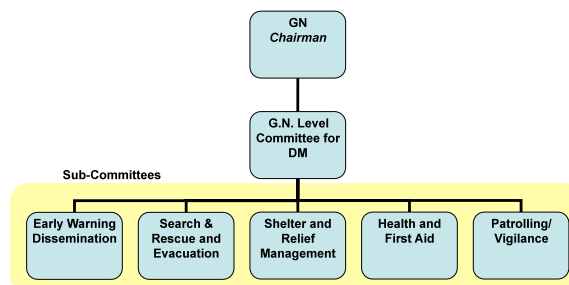
Let's discuss what kinds of committees are necessary and what are the roles of each committee. Some committees are combined into one. Then select members of each committee and make a list of names and contact. In case of emergency, information could be smoothly distributed to the Committee members.

Points

To ensure sustainable CBDRM activities, development of appropriate system should be considered. However, the system does not need to be newly established if the community can utilize existing organizations or systems. Improving and/or adding new functions to the existing system would be more effective in continuous efforts for disaster risk management.

Formation of disaster risk management committee

In case of emergency, quick action can save more lives and mitigate damages. In addition, systematic and well organized group action helps mitigate damages. It is quite effective to form a committee for disaster risk management and consider roles and actions to be taken in emergency in advance.



DMC is making efforts to help each disaster vulnerable GN to develop a "Grama Niladhari Level Disaster Risk Management Plan" including formation of a disaster management committee since 2007. Figure 2.1.6 shows formation of the committee. The committee is composed of 5 sub-committees, i.e., Early warning dissemination, Evacuation support, Health and first aid, Evacuation shelter management, and Patrolling and vigilance committees.

In case a committee has not yet been formed in the target GN, at first ask the participants to select members of each sub-committee tentatively. The members should be confirmed through community's formal decision making system. [Note] Please contact DDMCU in charge of the area, basic condition for forming the committee, in advance.

And then, ask the participants (even some of them are not the members of sub-committees) to discuss the roles of each sub-committee to activate the committee.

In addition, ask them to make a list of names and contact so that in case of emergency, information could be distributed promptly to the Committee members and to the community.

Outlines of responsibilities of the sub-committees are as follows:

- (a) Early Warning Dissemination Committee: Coordinating with community leaders/ groups and to ensure that; i) warning of the impending disaster reaches every single household, allowing people to take timely action to protect their lives and property, and ii) accurate information is provided
- (b) Search & Rescue and Evacuation Committee: Coordinating with community leaders/ groups; i) to trace and locate people who are physically trapped and distressed, people who are living in vulnerable low lying areas, coastal areas, on river banks etc., ii) to evacuate people on receipt of warning to pre-identified temporary shelter

- (c) Shelter and Relief Management Committee: i) To ensure readiness of pre-identified temporary shelter with essential facilities, ii) To coordinate first response to the disaster by establishing contact with GN/ main committee, Community leader/ groups, and NGOs, and organize distribution of assistance
 - (d) Health and First Aid Committee: Coordinating with community leaders/ groups to provide primary health care to the ill or injured until more advanced care is provided and the patient is transported to a hospital
- In addition, to ensure that
- i) minimum basic facilities such as temporary toilets and common bathing units are constructed in the relief camp,
 - ii) such facilities and surroundings are kept clean,
 - iii) garbage is disposed properly,
 - iv) dead bodies are taken to hospital/ cremated properly,
 - v) normal drainage systems function smoothly, and
 - vi) safe drinking water is available to humans and livestock.
- (e) Patrolling/ Vigilance Committee: To be vigilant of following & informing the relevant sub-committees or main committee, Divisional Secretary about i) any impending occurrence of natural disasters, ii) possibility of occurrence of man-made disasters: unusual happenings or incidents, unusual persons or objects in the area.

Reference Documents & Materials.

- "Grama Niladhari Level Disaster Preparedness and Response Plan" (DMC)

[Column 2]

The JICA Study "Installation of Community-based Observation System"

- For making prompt warning to community members -

Through discussion in the community workshops conducted under JICA Study community programme, the participants proposed some points to be improved, such as establishment of reliable early warning system to deliver prompt information to community and improvement of drainage management. As one of the activities of the Study, "Community-based Observation System" is introduced in some selected communities.

[Installation of simple rain gauges in landslide prone communities]

Rain gauge equipment was installed at the sediment disaster vulnerable pilot communities and observation & recording of data with the use of these equipments have been continuously carried out by community members.

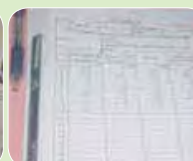
When the communities had heavy downfall of rain in November 2007 and April-May 2008, based on the formulated strategies, people in the village were able to make early warning message to the residents in the risk areas and they evacuate to a pre-decided gathering point before the event occurred.

Detailed information of this activity and the format of data record sheet are available in the "Resource data DVD".

[Installation of water level gauge in flood prone communities]

Water level staff gauge equipment was installed at two flood prone pilot communities to monitor the water level of Kelani River by community people. The accumulated observation data will be used for the criteria for their own early warning to residents. Similarly, continuous observation activities will enhance people's awareness and spirit of cooperation for disaster reduction.

Detailed information of this activity and the format of data record sheet are available in the "Resource data DVD".



12 How to Get Disaster Information? /How to Disseminate Information to Community?



Basic Explanation

When you receive disaster information and instructions for evacuation, how can you disseminate that information to people in the community promptly and accurately?

What kind of tools are necessary? What kind of arrangements are necessary for wide dissemination of the information?

If disaster occurs at night, how can you communicate?

Let's think about an actual evacuation situation. If there is a Tsunami or flood or landslide, how to get information? TV? Radio? Tsunami Tower? Telephone?

Let's think about from who and how you can get disaster information most effectively?

Disaster information also can be gained from DS officers, DDMCU, GN, police, and Disaster Management Committee.

Also think about what we can do in the community by themselves to get information promptly. Community can monitor rainfall or water level to make own judgment.

Discuss what the most suitable way to get information and what kind of arrangements are necessary for your community.



Points

Quick dissemination of early warning information will lead to prompt evacuation and make big differences for mitigating damages caused by disasters. Therefore, reviewing current information dissemination system existing in community and considering effective early warning system for the community is one of important aspects for effective disaster risk management. It ensures prompt and appropriate evacuation of residents.

Steps to consider community-based early warning systems are as follows:

- Imagine an actual evacuation situation

[Note]: If the participants have experience of disasters, ask them to think about the time. If not, you may need to give them some examples.

- Think about how the community can get disaster information most effectively? For example, by radio, by TV, by Tsunami Tower, by telephone/mobile phone, and/or etc.

[Note]: The national early warning system is developing day by day. You need to check the latest system which can be effectively used in the community (for example, Tsunami warning towers or early warning alarm system used mobile phone).

In addition, weather observations such as rainfall amount or river water level by community members should be considered as an optional valuable source of information. (see Column 2)

- Think about who is going to be the resource person/source of disaster information? For example, from GN, DDMCU, DS officer, police or from TV and Radio?
- Think about how the community can disseminate the information to all of the residents in risk areas when they receive disaster information and instructions for evacuation (by temple bells, by mosque speakers, by telephone, by calling at home?) Who is the best person to inform for wide dissemination of information? What kinds of tools are necessary? What kind of arrangement is necessary?

Figure 2.1.7 shows a sample of early warning system at GN level for landslide disaster. Early warning system for Tsunami needs good coordination of Meteorological Department, DMC, and media to give first warning regarding the disaster.

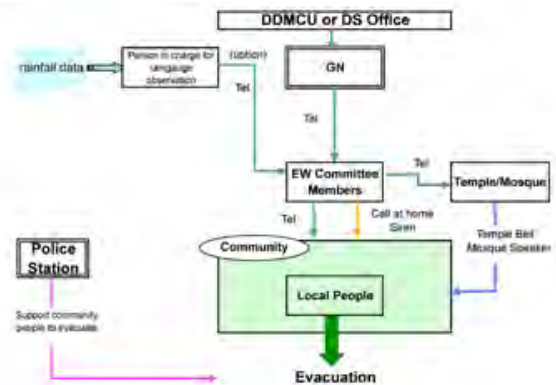


Figure 2.1.7 A Sample Early Warning System in Community

Comprehensive study on Disaster Management in Sri Lanka

13 Conducting the Evacuation Drill



Basic Explanation

Conduct an evacuation drill, after preparing a community hazard map, disaster management committee, and early warning and evacuation system.

After the evacuation drill, evaluate what is required to improve for the real situation.

- Check whether all the community people could hear disaster information by temple bell, siren or other method that was discussed in the community.
- Check whether community people could evacuate safely?
- Check how long people take to get to a safe place.

It is important that all the people in the community participate in the evacuation drill.

Points

Mock Drill is one of the important activities for checking and reviewing the current situation of disaster risk management. The designated information transfer system for early warning, evacuation methods, and other disaster risk management systems will be testified through the activity of the drill.

Besides, through the drill, the participants are expected to realize again the importance of disaster preparedness for their own safety. Further, coordination and working together with relevant organizations will provide opportunities to enhance risk communication among stakeholders.

There are several types and approaches for mock drill as follows:

[Various types of mock drills for disaster risk management]

- Drills for collecting & delivering emergency information
- Drills for countermeasure actions to mitigate damages (ex.: Sandbag compiling, Fire extinction)
- Drills for evacuation
- Drills for first aid/ medical treatment
- Drills for rescue activities
- Drills for preparing water & food, etc.

[Various approaches of mock drill for disaster risk management]

- Comprehensive drills involving all the stakeholders
- Desk-top simulation drill
- Mini drill which is conduct together with other community activities

- Drill at night
- Drill in collaboration with school

In any case of mock drill, it is important to make clear the envisioned disaster situation for the drill based on the hazard & vulnerability situation of community. And after the drill a review should be done for improving the present condition.

Reference Documents & Materials.

- JICA Study Presentation "DM Drill"
- JICA Study Document "Evacuation Drill" (MS-Word)
- JICA Study Document "Sample Program School Drill"

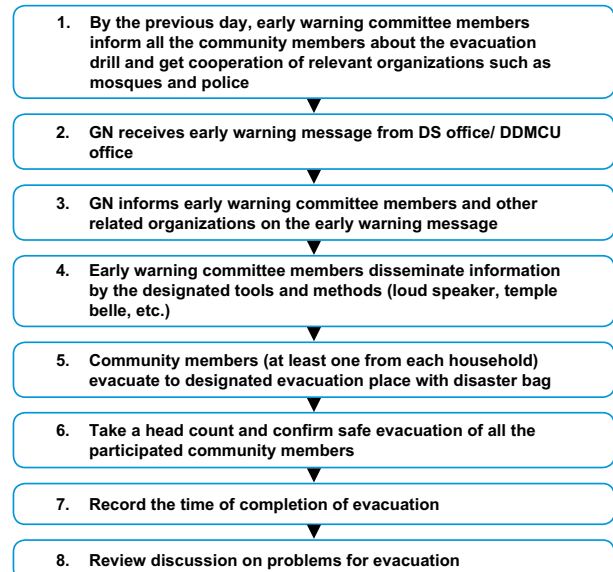


Figure 2.1.8 A Sample Flow of Evacuation Drill

Comprehensive study on Disaster Management in Sri Lanka

14 Let's Make an Action Plan



Basic Explanation

Now let's discuss about the Action Plan.

Through the activities, we have discussed many things. We identified problems and issues in the current situation. How can we solve or improve these problems?

At first let's list up and analyze the critical problems. Then, talk about how we can solve these problems and who can take initiatives and responsibilities. Also decide the timeline.

Matrix helps you to make an action plan.

Most important thing is that the community takes action and not rely only on government support.

Points

Through the activities of "Hazard Mapping" and "Evacuation Drill", the participants will find a lot of problems and deficiencies for effective disaster risk management in their areas.

They need to discuss and find out the way to improve the current situation and solve the problems. In addition, for effective disaster risk management in the community, they need to develop their own risk management plan including regular activities.

The steps for developing the Action Plan are as follows:

Step 1: Problem analysis

- (1) Review of current situation including identified problems and issues
- (2) Consideration of cause of problems/ issues
- (3) Studying stakeholders of the problems/ issues

Step 2: Planning for improvement of current situation/ solve the problem

- (1) Illustration of desirable situation and consideration of methods for solving the problem
- (2) Review of alternative solution

Step 3: Consideration of procedure to realize the plan

- (1) Decision of persons to lead the initiative
- (2) Formulation of proposed timeline
- (3) Consideration of constraints to proceed the plan
- (4) Identification of required support for training, awareness programme, & material

Step 4: Presentation

- (1) If the discussion is done by groups, the result of group discussions should be presented and shared in front of everyone.

In the discussion, it is required for them to think carefully what residents can do, what both residents and governments can do together, and what governments can do. It would be easier to make a matrix of problems, solutions and responsibilities to consider.

Problem	Solution	Person in charge	Timeline



Development of Community Disaster Risk Management Plan

If the community has capacities to proceed some more enhanced activities, it is desirable that a disaster risk management plan for the community is developed for continuous efforts for disaster reduction. It treats wide-range of strategy for disaster reduction of the community including of the previously mentioned committee formation and development of early warning information system. The contents to be included in the plan are as follows:

- (a) Formation of disaster risk management committee and its roles
- (b) Plans for improving knowledge of disaster risk management of people in the communities including conducting meetings, lectures, training, etc.
- (c) Plans for maintenance and improvement of equipment and material to be prepared in advance for disaster reduction
- (d) Plans for conducting disaster risk management exercise including evacuation drill on a regular basis
- (e) Development/upgrading of early warning systems
- (f) Ensuring safe and prompt evacuation of all community members
- (g) Plans for management of evacuation sites: water & food and sanitation management
- (h) Plans for stockpiling of necessary items against disasters

It is very important to update these plans periodically and make them realistic, based on the needs of the community.

Reference Documents & Material

- The JICA Study Document "Development Action Plan" (MS-Word)
- "Grama Niladhari Level Disaster Preparedness and Response Plan" (DMC)

15 Towards a Disaster Resilient Community



Basic Explanation

I think you now understand the importance of community based disaster risk management. By these efforts, let's make a disaster resilient community and save our community and country.

Let's start now!

Points

In the "Flitration", basic CBDRM activities are introduced. The most important point to be considered and understood by community through the activities is that "they need to make their best efforts to protect their lives and property by themselves".

Without their active and continuous involvement and leverage, we cannot make a disaster resilient community. Ask them to continue the activities by themselves even in a small way.

Reference: Additional Activities

As additional activities, small-scale disaster mitigation programme can be considered to be carried out, if community's capacity is enough for implementation. The landslide mitigation programme conducted under JICA Study scheme is introduced in the Column 3 for your reference.

[Column 3]

The JICA Study Small-scale Disaster Mitigation Programmes

- Sediment disaster prone communities -

Through three community workshops conducted in 2007, people in the pilot communities vulnerable to sediment disasters in Ratnapura learned their risks and how to mitigate damage caused by disasters. They developed plans to improve the current situation and proposed some mitigation measures for preparing future disasters. Mahawela (called Helauda) and Gamekanda, Wanniyawatte (called Kiribathgala) in Ratnapura were selected as the potential sites to implement a small-scale damage mitigation programme for sediment disasters.

DMC, NBRO and the JICA Study Team decided to provide technical and financial resources to conduct mitigation programmes for both communities.

[Helauda- Rehabilitation and Maintenance of Drainage Canal in Mahawala]

Community in Helauda proposed to restore a drainage canal to improve the drainage condition in the area, which would help to reduce the landslide risk. NBRO, DS, Municipal Council and DDMUC gave technical support for rehabilitation of the drainage canal. The mitigation programme was conducted by residents' active involvement. The people in the community cleaned up the canal by sweeping out stones and sludge to improve the condition.

[Kiribathgala - Improvement of Safe Evacuation Routes in Gamekanda, Wanniyawatte in September]

Community in Kiribathgala proposed to construct a bridge and a crossing for securing evacuation routes from the risk areas of sediment disaster in the community. JICA Study Team supported the construction of the crossing and improvement of access pathway for the evacuation routes based on the technical consideration of safe land condition. In the meantime, DMC and UNDP decided to support construction work of the proposed bridge. Construction of crossing was completed in October 2008. This improvement of evacuation routes ensures the safe evacuation of the residents who are living in the risk area in case of heavy rain and a disaster situation.



CHAPTER 2.1

2.1 Floptation of Flood

1 Introduction: Let's Learn About Flood

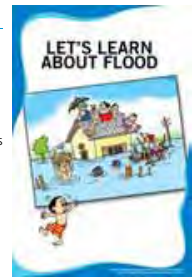
Basic Explanation

Every year many people are affected by floods, we have been facing floods so often that it is almost like an every year event, but in many cases, it causes human loss and property damage.

Recent years, climate has been changing. Rainy season sometimes begins earlier or ends later than it used be.

I am going to explain about Flood, why floods occur and how you can prepare for flood.

Discussion about flood with your family and community is important to become resilient to flood!



2 When we get rains

Basic Explanation

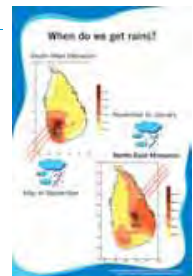
This map shows the two monsoon seasons and flood prone areas.

Sri Lanka is located in the Tropical Monsoon area. There are 2 monsoon periods and inter-monsoon periods that control the rainfall rhythm.

During May to September, South-West wind blow and onset the rain in South-West part of Sri Lanka. (Point at "top left figure")

During December to February, North-East wind blow and onset the rain in North-East part of Sri Lanka. (Point at "bottom right figure")

Therefore, there is a high chance of floods occurring during this period of time.



3 Damages Caused by Flood



Basic Explanation

Flood causes many damages such as deaths and damage to houses, agriculture products and infrastructure.

Flood also causes epidemics because of unpleasant environment conditions, for example, contamination or limitation of drinking water and breeding of mosquitoes in retained floodwater.

Also, because of flood, schools are temporary closed and it will affect the children's education.

As you see, flood influences your every day activities and economy directly and also indirectly. Also flood have negative impact to your life and economy in the long term.

3. Another one is "Local Flood".

Local Flood occurs when heavy rainfalls in a short period of time in a city or town area located at low land. Rainwater cannot flow into the river and remain in the city area because of poor drainage system.

With this flood, human lives are rarely at risk, but it occurs in the city areas like Colombo where many people are affected and has large impacts on their daily life and local economy.

4 Major Categories of Flood



Basic Explanation

There are three major categories of flood occurrence in Sri Lanka, 1. Flash Flood, 2. River Flood and 3. Local Flood.

1. "Flash flood" usually occurs in mountainous areas with steep riverbed slopes. When intensive rain falls, it concentrates and flows down very fast to the river. Because floodwater runs very fast and powerfully, it poses a greater risk to life and property and instantly damages infrastructure like bridges.

It is difficult to warn since this kind of flood is very local and there is very little time to take preparative action. However, these flood will not last longer.

2. 2nd one is "River Flood"

River Flood occurs when heavy rainfall continues for a long period of time (sometime 2 to 3 days, sometimes more than one week) in large areas. Rainwater flows into the river and river water level gradually increases. When discharged rainwater exceeds the flow capacity of the river, this causes the over flow of the river and it becomes a flood.

Even though there is low risk to human lives, floodwater remains on the ground for several days (in worst cases, it remains more than one week) and it affects daily lives, agricultural product and economic activity.

5 Flood Mitigation: Structural Measures

Basic Explanation

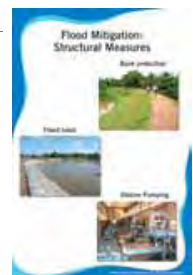
To protect human lives and properties from the flood, there are several measures.

One is the structural measure and the other is non-structural measure.

Constructing dam/water reservoir, bank protection, flood bund and pumping stations are examples of structural measures.

These measures are adopted at major rivers in Sri Lanka like along the basins of Kelani, Gin and Nilwala rivers to control inundation and the consequent damages.

However, construction of these structural measure takes time and cost. Also, it is not possible to construct these structures all along the river.



6 Flood Mitigation through Watershed Management and Land Use Regulation



Basic Explanation

There are several non-structural measures. Early Warning, Watershed Management, Land use regulation and Flood proof house etc.

Early warning is very effective if government and community establish close cooperation on flood warning. I will explain in detail later.

First, I explain watershed management and land use regulation. I would like to explain some wrong practices that people should avoid.

1. Trees in the mountain keep a balance of natural condition and river flow.
2. When people cut down trees or cultivate in a mountain or hilly area, rainfall cannot be absorbed into soil and flow down to the river. River cannot take a large amount of rainwater at once and it causes floods in the downstream area.
3. Another example is that wetland absorbs and holds excess water.
4. If people construct houses in the wetland, it means people are living in the reservoir, therefore, people face a high risk of flood.

Therefore, people should avoid cutting down trees, cultivating hills and constructing houses in wetland to avoid flood risk.

7 How to Adopt Your House for Flood



Basic Explanation

Another measure that you can do to reduce the flood risk is changing the structure of your house.

For a one story house, you can mound layering to increase the foundation of the land and construct a house with a floor elevated from the ground level.

Another measure is to make your house 2 stories, so that in case of a flood, you can evacuate to the 2nd floor and your belongings can be saved.

8 Formal Early Warning System for Flood

Basic Explanation

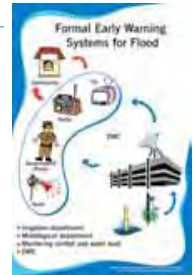
This non-structural measure is to evacuate before the flood.

Government has been establishing a flood early warning and evacuation system, which is to inform people about rainfall and flood warning for people to evacuate to a safe place before the flood.

Irrigation department is monitoring the rain and river water level to predict possibility of flood. When they observe the heavy rain and possibility of flood, DOI issues early warnings to DMC, local authorities and media like TV and Radio.

DMC disseminate this information to residents through the TV, Radio, Siren, Local government and police.

When you receive information about flood warning, you need to prepare and evacuate to a safe place.



9 Community Based Non-Structural Measures

Basic Explanation

It is important to know the possibility of flood in your community other than depending on government information.

People can understand the river behavior and may know when flood will occur by monitoring the rainfall amount and water level of major rivers continuously and make a record in the community.

There are several other ways that the community can prepare for floods.

One activity is to clean up and maintain the drainage system with the participation of community members.

Another is to discuss what to do by the time of floods in your community.

Also, how to and who disseminate flood early warning information to community people. Based on the flood warning, people in the community can prepare and evacuate earlier to a safe place.

Draw a hazard map to understand location condition and confirm the evacuation place and routes.

Cooperation with your community members is very important for making a flood resilient community.



CHAPTER 2.2

Fliptation of Landslides

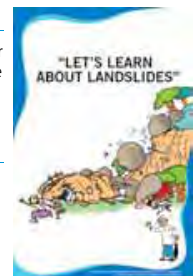
1 Let's Learn About Landslides

Points

In the "Fliptation", basic information for sediment disaster and sediment disaster risk management is introduced. The reference documents for explanation of the "Fliptation" are available in reference DVD.

Reference Documents & Materials.

- JICA Study Presentation "Landslide Management in Japan"
- JICA Study Presentation "Landslide Management in Sri Lanka" by NBRO
- Video on Landslide Risk Management by NBRO



2 Introduction to Landslides

Basic Explanation

A landslide is a movement of a mass of rock, earth or debris down a slope.

Landslides can kill people and destroy property.

This landslide in Abepura, Palawela killed 75 people and destroyed more than 35 houses. It also filled a paddy field with the material it brought down the slope. That tells us that landslides can cause an impact on our lives, resources, employment and economy also.

Therefore, let's learn about how a landslide can occur and what we can do to prevent or minimize the anticipated damage.



Information on Some Significant Landslides in Sri Lanka



Basic Explanation

It is important to know the possibility of floods in your community other than depending on government information.

People can understand the river behavior and may know when floods will occur by monitoring the rainfall amount and water levels of major rivers continuously and make a record in the community.

There are several other ways that community can prepare for flood. One activity is to clean up and maintain the drainage system with the participation of community members.

Another is to discuss what to do by the time of floods in your community.

Also, how to and who disseminates flood early warning information to community people. Based on the flood warning, people in the community can prepare and evacuate earlier to a safe place.

Draw a hazard map to understand location condition and confirm the evacuation place and routes.

Cooperate with your community member is very important for making a flood resilient community.

DISTRICT	LOCATION OF THE LANDSLIDE	DATE OF OCCURRENCE	DAMAGE
1 Ratnapura	Pathulpana kanda	June 8, 1982	9 deaths and damages to 3 houses and tea planted land
2 Badulla	Naketiya, Koslanda	July 1995 and November 19, 1997	Road traffic interrupted for weeks due to the damages on roads A16 and A4. (This is the largest landslide in size in Sri Lanka)
3 Kegalle	Thiyambarahena, Malmaduwa	May 1985	10 deaths and property damages
4 Nuwara Eliya	Ketiyaathana, Mathurata	January 06, 1986	13 deaths and damages to 2 houses
5 Matale	Palindagama, Pansalthenna	October 02, 1982	11 deaths and damages to 10 houses
6 Kandy	Weldambala, Pooliyadda	May 16, 1995	School building, a part of the irrigation system and 28 houses were destroyed
7 Hambantota	Saputhanthri kanda	May 17, 2003	19 deaths and damages to 5 houses
8 Matara	Diyadawa	May 17, 2003	19 deaths and damages to houses
9 Galle	Kolonthuduwa, Lankagama	May 19, 2003	3 houses and the temple were destroyed
10 Kalutara	Siridolawatta	June 01, 2008	4 deaths and property damages

Different Types of Landslides

Basic Explanation

There are different types of landslides. Rock falls, Debris slide, and Rotational landslides are examples for them. However, all those types of slides are commonly known as landslides.

1. Rock Fall: Falling of rock down a slope
2. Debris Slide: Sliding down of rocks and soil along with the trees and other material which were on them.
3. Creep: A very slow movement within a slope
4. Rock Slide: Sliding down of rock as sheets
5. Debris Fall: Falling down of rock and soil along with the trees and other material which were on them.
6. Rotational Slide: Sliding of soil layers rotationally down a natural or man made steep slope



Mechanism of Landslides

Basic Explanation

Landslides can occur when natural balance within the slope is lost.

On a hill slope, there are forces such as the weight of the soil mass which act downward as well as the forces such as friction which act upward. On a stable slope, these upward forces balance the downward forces.

Because of the weight and the pressure of the infiltrated rain water, the forces that act downward will be increased. The forces that act upward try to counter balance those increased downward forces. This is similar to pulling a rope by two teams.

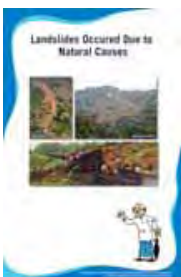
At the moment when the downward forces are higher or stronger than the upward forces, the balance between those forces will be lost and the soil or rock mass will move down the slope.

There are many causes that destroy the balance among forces within a slope. These causes could either be natural or man made.

Events such as heavy rain, earthquakes etc. are the natural causes that destroy the balance among forces within a slope. However, almost all the landslides recorded in Sri Lanka have been triggered by heavy rain.



Landslides Occurred due to Natural Causes



Basic Explanation

1. Mulhalkale Landslide (above, left):

Due to this landslide that occurred on January 08, 1986 in Mulhalkale, a building and the power plant of the Wathumulla hospital was damaged. As a 100 meter stretch of the Walapane Kandy main road was destroyed, road traffic was heavily interrupted.

2. Kalawana, Pothupitiya Landslide (above, right):

Because of this landslide which occurred on May 17, 2003, seven human lives were lost. The debris of this slide dammed the Kalawana oya causing floods in the Kalawana town.

3. Watawala Landslide (below):

Watawala landslide which first occurred on June 03, 1992, was reactivated on June 03, 1993. On both occasions, the railway was heavily damaged and the public and cargo transportation between hill country and low country was stopped for a long time.

Events such as heavy rain, earthquakes etc. are the natural causes that destroy the balance among forces within a slope. However, almost all the landslides recorded in Sri Lanka have been triggered by heavy rain.

Landslides Occurred due to Inappropriate Human Activities

Basic Explanation

Landslides have occurred due to inappropriate human activities as well.

Making steep cuts on hill slopes for construction of houses or roads should be minimized. When slopes are cut, and the soil or rocks at the toe region are removed, the slope loses the natural support it already had at the foot of that hill. This situation leads to destroy the natural force balance within the slope and eventually the slope fails.



Other Human Activities that Cause Landslides

Basic Explanation

Other human activities that cause landslides:

1. Uncontrolled rock quarrying and rock blasting could make the upper slopes unstable.
2. Constructing houses or other structures blocking natural water ways disturbs drainage of rain water away from the slope. This increases the infiltration of water into the slope leading to slope instability.
3. Surface exposures due to removal of forest cover or arson lead to slope instability due to soil erosion and increased infiltration.
4. Retaining water on upper slopes also cause slope instability due to increased infiltration.
5. Illegal construction at inappropriate places and other unplanned land use also increase the possibility of land sliding.



Examples for Landslides that Occurred due to Inappropriate Human Activities



Basic Explanation

Examples of landslides that occurred due to inappropriate human activities:

1. A steep cut made on the slope for road construction had led to the landslide occurred on October 24, 2005 in Baduraliya. A part of the road was damaged and the transportation was interrupted due to this landslide.
2. The landslide which occurred on October 26, 2006 in Kapala kanda, Ja Ela had been created due to a steep cut made on the slope. A house was severely damaged due to this landslide.
3. The landslide which occurred on October 26, 2006 in Kapala kanda, Ja Ela had been created due to construction of houses on a natural water path. 3 houses were damaged due to this landslide.
4. The landslide which occurred on October 19, 2006 in Bandarawela town was caused by illegal construction at an unsuitable place. A number of shops in the Bandarawela town were destroyed due to this landslide.

10 Some Landslides Can Slide Several Times



Basic Explanation

Some landslides could be reactivated several times.

Helauda landslide in Ratnapura is a good example. It first occurred in 1993 killing 48 people and destroying 12 houses. It also buried one hectare of paddy, four hectares of coconut and several home gardens with crops such as Jak, Arecanuts etc.. About 350 m stretch of main road was damaged along with a culvert and utility poles. As a result power supply and telecommunication also were interrupted. The same slope was failed again in 2003 and also in 2006.

11 Pre Warning Signals of Landslides

Basic Explanation

Most of the time landslides give pre-warning signals.

1. When a slope is moving, we can see that trees, utility poles etc., tilt. They can fall during the rainy seasons.
2. Another signal we observe on a failing slope is sudden oozing of new springs and/or sudden dry down of existing springs.
3. Most commonly, we see sudden opening and development of cracks on ground, floors and walls.
4. On rocky slopes spurring of rock can also be observed.



12 What Can We Do To Prevent or Minimize the Damage due to Landslides

Basic Explanation

1. Always terrace the slopes when and where slope cuts are necessary to minimize the height of the cut. Always protect the cuts with a suitable retaining wall. There are simple and low cost methods to build retaining structures.
2. Plant trees on slopes and use tall grass or Savandara along the contours of the terraced slope to prevent soil erosion and protect the stability of the slope.
3. Practice good land use. Avoid construction on natural water ways. Select flat land or gentle slopes for construction. Cultivate only the crops that are recommended for hill slopes.
4. Use surface collecting drains and drains that direct the collected water away from the slopes to control the surface drainage on slopes. In certain locations, subsurface drains and wells may also be necessary to reduce the ground water levels.



13 What Can We Do To Prevent or Minimize the Damage due to Landslides



Basic Explanation

1. Avoid selecting land with past landslides for building houses. Ask the elderly people in the area and use database, maps and professional support available in technical organizations deal with landslides to find out whether the land had been subjected to landslides in the past.
2. Avoid making deep cuts on slopes for building houses and roads. It will reduce the natural stability of the slope and will eventually fail making a disaster.
3. When building on slopes, always select a house plan that will need minimum slope modifications. Not only this house looks beautiful, but it has ensured the stability of the ground it is resting on.
4. When you need to cut the slopes always terrace the slope to minimize the height of the cut. Always protect the slope cuts using retaining walls. There are simple and low cost methods to build retaining walls.

14 Establishment of a Community-based Disaster Management Committee



Basic Explanation

Establish a community based disaster management committee in your area.

- This committee can meet frequently and discuss about the areas that can be affected by landslides. Frequent checks can be made to identify any warning signals of landslides.
- The committee can take actions to prevent inappropriate land use, if practiced in your area.
- On rainy days, measure rainfall and make the community aware, if rainfall is high.
- The committee can identify safe places for evacuation during a disaster situation and establish a simple communication system to disseminate warning messages.

15 Follow Construction Methods Suitable for Hill Slopes

Basic Explanation

Use maps and guidelines to know and follow suitable places and methods for construction.

"Construction Guidelines" can be obtained free of charge from:

Divisional Secretaries or District Disaster Management Coordinating Units

Otherwise, write to

**National Building Research Organisation (NBRO)
Landslide Studies and Services Division
99/1 Jawatta Road
Colombo 05**

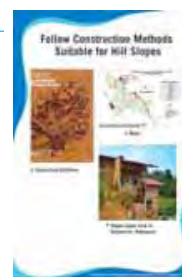
OR

Call 011 258 8946, 011 258 9943

to obtain a copy of the construction guidelines.

A model house suitable for hill slopes has been built in Goluwawala, Ratnapura and

by observing this model house, suitable construction methods can be learnt..



CHAPTER 2.3 Flipitation of Tsunami

1 Let's learn about Tsunami

Basic Explanation

Do you know the 2004 Indian Ocean Tsunami? Tsunami waves washed away people's lives, houses, roads, school buildings and many more. In case of 2004, Tsunami came into 200-300m inland, in some places, it reached almost 1 km inland.

I am going to explain about Tsunami, why Tsunami happens, and how you can survive at the time of Tsunami.

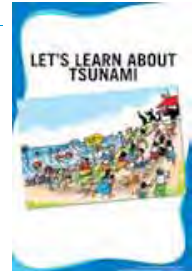
In order to be prepared for Tsunami, it is important to know the mechanism of tsunami and what need to be done.

Points

In the "Flipitation", basic information for Tsunami and Tsunami risk management is introduced. The reference documents for explanation of the "Flipitation" are available in reference DVD.

Reference Documents & Materials.

- JICA Study Presentation "Tsunami Management in Sri Lanka" with some movie pictures
- Tsunami Educational Story – Adaptation version for Sri Lanka - "Inamura no hi" booklet (ADRC, 2005) (see more details in the Column 4)



2 Areas Prone to Tsunami

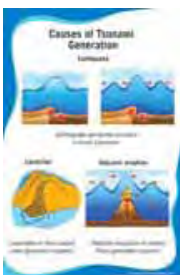


Basic Explanation

This map shows the Tsunami affected divisions in 2004 Tsunami. As you can see, almost all the coastal areas were affected. Therefore, it can be said that coastal area and its community are prone to Tsunami disaster.

There were two Tsunami occurred in recent years. One is 2004 the Indian Ocean Tsunami that caused over 38,000 death and many people affected. In 2007 Tsunami, Tsunami warning was issued and there was small Tsunami of about 50 cm observed in Colombo and Trincomalee even though most people did not recognize the Tsunami. It turned out to be a small Tsunami, but there is possibility of another Tsunami in the coastal area of Sri Lanka.

3 Causes of Tsunami Generation



Basic Explanation

There are several causes for generating the Tsunami.

Major one is due to an earthquake; almost 90% of past Tsunami was generated by earthquakes.

Earthquake occurs when sections of tectonic plates press and slide each other and release energy. This energy pushes up the moving tectonic plate. When an earthquake occurs on the ocean floor, it can displace a large amount of ocean water and create a Tsunami.

Other causes are due to landslide and volcanic eruption in the ocean floor. These cases also generate Tsunami.

4 Speed and Height of Tsunami Wave

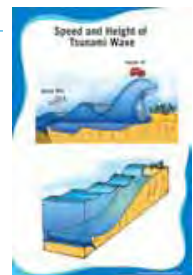
Basic Explanation

I will explain the speed and height of a Tsunami wave.

Tsunami travels the ocean surface very fast. Tsunami can travel about 900km/h like a jet plane when the ocean depth is deep. As the Tsunami wave reaches the seashore, where the ocean depth is shallower, Tsunami travel speed is reduced to about 40 km/h like a car.

On the other hand, the wave height is low in deep ocean, but as it reaches to the seashore, the wave height becomes higher.

That was the reason why at the time of the Indian Ocean Tsunami in 2004, ships in the ocean did not feel much waves, but large Tsunami came to the seashore.



5 Characteristics of Tsunami

Basic Explanation

Tsunami has several characteristics.

- Tsunami waves come several times, but only one time. Usually the second wave is bigger and stronger than the first wave.
- Tsunami is different from normal wave. Normal waves come and go in the coastline. However, Tsunami wave forms into a large wave like a wall and run over very fast to the land.
- Tsunami comes suddenly mostly without any signs. In some cases, there are some signs before the Tsunami comes, but you cannot count on those signs.
- Tsunami has great power. For example in Sri Lanka, tsunami waves destroyed houses and pushed away a train and buses.



6 Warning Signs of Tsunami



Basic Explanation

There is no warning sign that always happens before the Tsunami.

I repeat here, there is a high chance that tsunami comes suddenly without any signs in Sri Lanka.

However, there are some warning signs that you can observe. If you observe some signs, please move away from the seashore and go to a safe place.

One sign is an earthquake. When you feel a strong earthquake or not very strong, but long shake of an earthquake, there is a chance of Tsunami. However, in Sri Lanka, there is a high chance that Tsunami can strike thousands of miles away and you will not feel an earthquake before Tsunami comes.

Another sign is a backrush. In some places, the waves throw back seaward before a Tsunami strikes. This is a sign you need to be aware of. In this case, do not go to see the ocean but be ready to go up to the safe place. There are many cases reported that people and children went to sea to investigate and catch stranded fish and eventually become victims of the Tsunami.

One thing you have to be aware of this will not always happen before a Tsunami.

7 Structural Measures to Reduce Damages of Tsunami



Basic Explanation

I hope you understand why Tsunami occurs. Now, let's think about how you can protect yourself from Tsunami.

In order to protect people and property from the Tsunami, there are several structural measures that could be taken.

One of the measures to protect people and towns from the Tsunami is constructing structures like seawalls and bank protection. These photos are of a seawall in Galle and a bank protection in Hikkaduwa.

Another example is planting bioshield and coastal vegetation. It is said that planting vegetation may reduce the power of Tsunami.

However, construction of these structural measures takes time and cost. Also, it is not possible to construct these structures all along the coastal area.

8 Non-Structural Measures: Tsunami Early Warning System

Basic Explanation

Another important measure to reduce the loss of human lives from Tsunami is an early warning system.

Sri Lanka government has been establishing the early warning system.

This figure shows the flow of Tsunami early warning system.

International society is monitoring the earthquakes and Tsunami. When they observe earthquakes and predict there is a possibility of a Tsunami, they inform the Meteorological Department and GSMB in Sri Lanka.

DOM and DMC give information to local level government organizations as well as media such as TV and Radio. That information is disseminated to residents through local level government organizations, police, Tsunami warning tower and media such as TV and Radio for people's safe evacuation.



9 Let's Evacuate to a Safe Place

Basic Explanation

When you receive information about a Tsunami warning, you have to stay away from the seashore and go up to a safe place.

Don't be in a rush, you have enough time!

Safe place is higher place. Please discuss in the community safe evacuation places and routes in advance.



10 Where Tsunami Generate and How Long it Takes to Reach Sri Lanka



Basic Explanation

As I explained many times, Tsunami comes from a far distant area.

This map shows the locations of large earthquakes occurred before and areas not have high possibility of another large earthquake to occur.

These areas are located at a distance from Sri Lanka. There is high possibility of earthquakes occurs in this zone where 2004 earthquake and Tsunami occurred. It took about 2 to 3 hours to reach from the off coast of Sumatra to Sri Lanka.

Therefore, when earthquake and Tsunami occurs again in this zone, you have enough time to evacuate.

There are other zones that have a possibility of earthquake and Tsunami. These zones are also located at a far distance like Sumatra. Earthquake and Tsunami occurring in these zones also will take some time to reach to the coast of Sri Lanka.

Please understand that you have enough time to prepare and evacuate since Tsunami information comes within 30 minutes to Sri Lanka.

Although there is a low possibility, there are several locations that have a possibility of earthquake and Tsunami near Sri Lanka. When you feel an earthquake, please be aware of Tsunami and evacuate immediately to a higher place.

11 Let's Prepare in the Community

Basic Explanation

1. Discuss what to do at the time of tsunami and select a member of disaster management committee.
2. Draw a hazard map and know where the safe places are and which evacuation routes could be taken.
3. Walk around the village with the community member to confirm the evacuation routes.
4. Conduct evacuation exercises.

Also there are several ways you and your community can prepare for Tsunami such as making sign boards to show the Tsunami evacuation route.

Further, you should avoid new construction of houses near the seashore and find out strong and high buildings in case of evacuation.

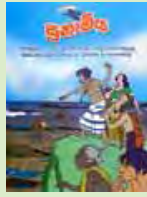


[Column 4]

“Leader’s devoted action mitigated damages of community in emergency”

“Inamura-ho-hi” Story

A big earthquake occurred in the evening. Mr. Gohei, a village chief, became very worried about a Tsunami. From the garden of his house on the top of a hill, Gohei looked down at houses situated along the coast. The villagers did not seem to notice that a Tsunami was coming. “I should warn the villagers at once!” He decided to set fire to “inamura” (rice sheaves,) which were made of just-harvested rice crops.



The villagers saw the fire and shouted, “There is a fire at the house of the village chief!” They made their way up to the hill. They were shocked to see the burning “inamura”. They tried to put out the fire at once. But Gohei exclaimed in a loud voice, “Leave the fire as it is. Tell everyone to hurry up to the hill. A disaster is coming.” They could not understand what was happening.

Just then, Gohei pointed out to the sea, and shouted. “Look. Tsunami is coming.” The sea water stood up like a wall.

The villagers saw the terrible white water destroying their village. They finally understood that it was the fire that saved their lives. They could not find words to thank Gohei.

“Inamura-no-hi” is a story of a man who noticed a precursor of a large scale Tsunami at the earliest stage and led villagers to a high ground by burning harvested rice sheaves. This story was based on a true story at the time of Ansei-Nankai Earthquake & Tsunami occurred in 1854, which claimed around 3,000 lives in the coastal areas of Western Japan. The story was originally written by Lafcadio Hearn, and later adapted for a short tale for education in elementary schools in Japan.

In the real situation, Mr. Goryo Hamaguchi (real name of the man) saved the lives of many villagers by setting ‘fire of life’ when a tsunami hit the village following a major earthquake and guiding the villagers to a safe place. However, the tsunami pretty much destroyed the village. Upon seeing the completely changed site, Goryo turned himself inside out to save the village. He engaged in various recovery efforts including the construction of huts for disaster victims and the provision of farming and fishing equipment. Moreover, he engaged in the construction of a breakwater 600 m long and 5 m high, which minimized damage from tsunamis in later years.

(A booklet of “Inamura-no-hi” is available in DVD.)

ANNEX

Outline of major ministries in charge of disaster risk management

(1) DMC - (extract from DMC website: http://www.dmc.gov.lk/about_dmc.htm)

Beginning

The Disaster Management Centre has been established under the National Council for Disaster Management in accordance with the Sri Lanka Disaster Management Act No. 13 of 2005 passed by the Parliament of Sri Lanka on 13th May 2005.

Vision

Safer communities and sustainable development in Sri Lanka.

Mission

To create a culture of safety among communities and the nation at large through systematic management of natural, technological and man-made disaster risks.

Objectives

Through countrywide ministries, departments and public corporations, Provincial Councils and local authority administration; and district, division and Grama Niladhari administration; to enforce, coordinate and monitor activities related to,

- Hazard Mapping and Risk Assessment.
- Information Management.
- Long-term disaster mitigation.
- Forecasting, early warning and information dissemination.
- Preparedness to respond to disasters when they occur.
- Emergency Operations Management.
- Management of the post-disaster activities after a disaster.

(2) DOM (extract from DOM Website: <http://www.meteo.slt.lk/index.html>)

History and the Overview of Functions

History of meteorological observations in the form of rainfall measurements dates back to year 1850. Systematic recording of observations started during 1866-1883 under the Survey General of Ceylon. Present Department of Meteorology was enacted in the parliament in October 1948, with the objectives of:

- Providing all meteorological and climatological information nationally, in accordance with WMO and ICAO regulations,
- Supplying of limited seismological and astronomical information to general public and
- Maintenance of time service nationally.

The observation network consists of 22 meteorological stations managed by the Department of Meteorology and 42 Agrometeorological stations

managed by various Government and Statutory Institutions. In addition, over 350 rain gauge stations supplement this network.

(3) DOI (Extract from DOI Website: <http://www.irrigation.gov.lk/>)

History

Having realized the great potential in the ancient irrigation works, a separate department distinct from the former Public works Department was formed on 15th May 1900.

Vision

“Not let a single drop of rain water flow to the sea without first being used for the welfare of mankind” (King Maha Parakramabahu the Great, 1153-1186AD)

Mission

The Irrigation Department is responsible for planning, design, construction, operation and management of all major and medium Irrigation schemes and works related to flood control, drainage and salinity extrusion.

Objectives

- Increasing the productivity under major irrigation systems.
- Raising the income and the living standard of the farmers.
- Assessment of water in major river basins.
- Integrated natural resource management in major irrigation systems.
- Protection of land from flooding, water logging & salt water intrusion.

Functions

- Planning, Design, Construction and Management of infrastructure facilities required to harness the surface water for land development.
- Integrated natural and human resource management in major irrigation systems in order to increase productivity.
- Promoting participatory management in inter provincial irrigation schemes.
- Assessment of water resources in river basins for river basin planning and development, inclusive of stream flow forecasting and flood warning.
- Providing drainage facilities to low-lying coastal areas and preventing of flooding and salt water intrusion.

(4) NBRO- Landslide Studies and Services Division (Extract from NBRO Website: <http://www.nbro.gov.lk/lssd.htm>)

Introduction

The Landslide Studies & Services Division of National Building Research Organization (NBRO) was established in 1992 incorporating landslide studies, consultancy services and Landslide Hazard Mapping Project (LHMP).

Objectives

- Execute landslide hazard mapping work in landslide prone districts of Sri Lanka.
- Introduction of standard guidelines and codes of practices for human settlement planning and site selection in hilly areas vulnerable to landslides.
- Provide consultancy services in respect of landslide investigations (instrumentation and monitoring), slope stability analysis, geotechnical testing and design of preventive and corrective measures.
- Foster community participation in creating public awareness about causative factors of landslides and provide training in the aspect of landslide disaster management.
- Computer workshops and GIS projects.

Services Offered

- Mapping of problematic slopes in landslide prone areas of Sri Lanka. Preparation of landslide hazard zonation maps which can be used as a planning tool for sustainable development in the hilly areas of Sri Lanka.
- Geophysical investigations which can be used as a cheap source for acquiring subsurface data.
- Consultancy services on constructions in hilly areas and development of appropriate early warning systems.
- Design of cost effective, preventive and corrective measures with respect to landslides.
- Conducting of awareness programmes for natural disaster mitigation.
- Development of practical indicators for slope instability in landslide prone areas.

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