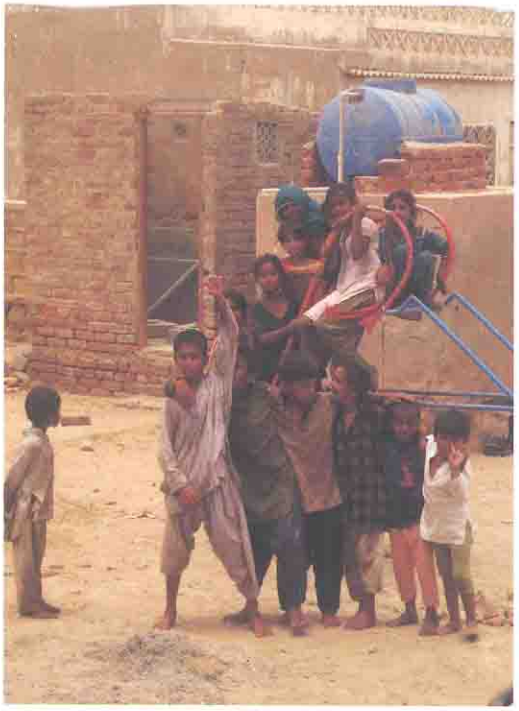
Instructor's Guidelines On Community Based Disaster Risk Management



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Instructor's Guidelines

On Community Based Disaster Risk Management

Published by
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The Project for National Disaster Management Plan
in the Islamic Republic of Pakistan

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Note:

Urdu Translation is provided temporarily to serve as a reference. The English version is the original and JICA Expert Team is not responsible for the quality of the translation.

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2012
Instructor's Guidelines On Community Based Disaster Risk Management

Preface

This Instructor's Guidelines have been prepared for the facilitators to conduct Community Based Disaster Risk Management (CBDRM) activities in selected vulnerable communities of different hazards, namely earthquake, flood, flash flood, tsunami, cyclone, drought, under the JICA project, "The Project for National Disaster Management Plan in the Islamic Republic of Pakistan". The project is jointly conducted by National Disaster Risk Management Authority (NDMA) and Japan International Cooperation Agency (JICA). The CBDRM activities were subcontracted to Focus Humanitarian Assistance (FOCUS) Pakistan, affiliated with Aga Khan Development Network. These guidelines have been developed after incorporation of the feedbacks from the field experiences.

The document has been prepared and compiled by Tomoko Shaw, JICA expert in charge of CBDRM. Module 2 was prepared by Ghazala Naeem, a JICA consultant, and Module 6 was authored by FOCUS. FOCUS also provided professional contribution in Urdu translation, defining key terms and concepts to the guidelines as a whole.

The major differences of these guidelines from the existing CBDRM training manuals are - 1) Scientific knowledge on different disasters and countermeasures for each disaster are included; and 2) Community Based Disaster Risk Management Plan are carefully explained, and map maneuver (known as Disaster Imagination Game - DIG) is highlighted as a tool for CBDRM planning.

These instructor's guidelines aim to serve for the needs of the CBDRM facilitators, and disaster management experts of local governments to ensure maximum outreach of CBDRM activities for local people in their communities.

JICA EXPERT TEAM

The Project for National Disaster Management Plan
in the Islamic Republic of Pakistan

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*Unless otherwise specified, the sources of figures in this report belong to JICA Expert Team.

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List of Abbreviations

AKDN	Aga Khan Development Network
ACCT.	Accountant
AJ & K	Azad Jammu and Kashmir
BHU	Basic Health Unit
CBDRM	Community Based Disaster Risk Management
CBDRMC	Community Based Disaster Risk Management Committee
CBOs	Community Based Organizations
CCB	Citizen Community Boards
CDMC	Community Disaster management Committee
CIDA	Canadian International Development Agency
CO	Community Organization
CRED	Center for Research on Epideminology and Disasters
C.R.I	Control Room in Charge
CSOs	Civil Society Organizations
C.T.W.O	Computer, Telephone, Wireless Operator
DCO	District Coordination Officer
DDMA	District Disaster Management Authority
DDO	Deputy District Officer
D.E.O	District Emergency Officer
DEOC	District Emergency Operation Center
DG	Direction General
D.G. Khan	Dera Ghazi Khan
D.I. Khan	Dera Ismail Khan
DIG	Disaster Imagination Game
DMCs	Disaster Management Committees
DO	District Officer
D.R	Disaster Rescuer
DRAP-P	Drought Recovery Assistance Program Project
DRM	Disaster Risk Management
DRR	Disaster Risk Reduction
EDO	Executive District Officer
EEC	Emergency Coordination Centre
EEFIT	Earthquake Engineering Field Investigation team
EMS	Emergency Medical Service
E.M.T	Emergency Medical Technician
EOC	Emergency Operations Centre
E.T	Electrician
FATA	Federally Administrated Tribal Areas
FFC	Federal Flood Commission
GRAP	Gender Reform Action Plan
INGOs	International Non-governmental Organizations
ISDR	International Strategy for Disaster Reduction
IWMI	International Water Management Institute
JICA	Japan International Cooperation Agency
KP	Khyber Pakhtunkhwa
LPP	Literature Panjab Programme
LGO	Local Government Ordinance
LTST	Literacy through Skill Training
L.T.V	Light Transport Vehicle
MBT	Main Boundary Thrust
NCEG	National Centre of Excellence in Geology
NDMA	National Disaster Management Authority
NDMF	National Disaster Management Framework
NGDC	National Geophysical Date Centre
NGOs	Non-governmental Organizations
NLC	National Logistics Cell
NOAA	National Oceanic and Atomospheric Administration
NPO	Nonprofit Organization
PMD	Pakistan Meteorological Department
PRA	Participatory Rural Appraisal
PVC	Poly Vinyl Chloride
RDA	Rawalpindi Development Authority
RSMC	Regional Specialized Meteorological Centre
SAO	Senior Administrative Officer
S.C	Station Coordinator
S.I	Shift in Charge
SLBAP	Sustainable Livelihood in Barani Areas Project
SOP	Standard Operating Procedure
S.S.K	Senior Stock Keeper
SUPARCO	Space and Upper Atmospheric Research Corporation
TDMC	Town Disaster Management Committee
TMA	Tehsil Municipal Administration
T.M.I	Transport Maintenance Inspector
TMO	Tehsil Municipal Officer
TO	Town Officer
TOT	Training of Trainers
TRDP	Thardeep Rural Development Programme
T.T	Tube well Technician
UC	Union Council
UN	Unaited Nations
UNDP	United Nations Development Programme
UNDRM	United Nations Disaster Risk Management
UNESCO	United Nations Educational, Scientific and Cultural Organization
UNICEF	United Nations Children's Fund
UNHCR	United Nations High Commission for Refugees
UNOCHA	United Nations Office for the Coordination of Humanitarian Affairs
USGS	United States Geological Survey
UTC	Universal Time Coordinated
VCA	Vulnerability and Capacity Assessment
WAPDA	Water and Power Development Authority
WASA	Water and Sanitation Agency
WB	World Bank
WFP	World Food Programme
WHO	World Health Organization
W.T	Wireless Technician

List of Basic Terms

Acceptable risk
The level of loss a society or community considers it can live with and for which it does not need to invest in mitigation

Biological hazard
Biological vectors, micro-organisms, toxins and bioactive substances, which may cause the loss of life or injury, property damage, social and economic disruption or environmental degradation.

Capacity
A combination of all the strengths and resources available within a community, society or organization that can reduce the level of risk, or the effects of a disaster.
Capacity may include physical, institutional, social or economic means as well as skilled personnel or collective attributes such as leadership and management. Capacity may also be described as capability.

Capacity building
Efforts aimed to develop human skills or societal infrastructure within a community or organization needed to reduce the level of risk. In extended understanding, capacity building also includes development of institutional, financial, political and other resources, at different levels of the society.

Climate change
The climate of a place or region is changed if over an extended period (typically decades or longer) there is a statistically significant change in measurements of either the mean temperature or variability of the climate for that region.

Coping capacity
The means by which people or organizations use available resources and abilities to face a disaster. In general, this involves managing resources, both in normal times as well as during crises or adverse conditions.

Disaster
A serious disruption of the functioning of a community or society causing widespread human, material, economic or environmental losses which exceed the ability of the affected community or society to cope using its own resources. It results from the combination of hazards, conditions of vulnerability and insufficient capacity to reduce the potential negative consequences of risk.

Disaster risk management (DRM)
The comprehensive approach to reduce the adverse impacts of a disaster. DRM encompasses all actions taken before, during, and after the disasters. It includes activities on mitigation, preparedness, emergency response, recovery, rehabilitation, and reconstruction.

Disaster risk reduction/disaster reduction
The measures aimed to minimize vulnerabilities and disaster risks throughout a society, to avoid (prevention) or to limit (mitigation and preparedness) the adverse impacts of hazards, within the broad context of sustainable development.

Early warning
The provision of timely and effective information, through identified institutions, to communities and individuals so that they could take action to reduce their risks and prepare for effective response.

Emergency management
The management and deployment of resources for dealing with all aspects of emergencies, in particularly preparedness, response and rehabilitation

Forecast
Estimate of the occurrence of a future event (UNESCO, WMO). The is term is used with different meanings in different disciplines.

Geological hazard
Natural earth processes that may cause the loss of life or injury, property damage, social and economic disruption or environmental degradation. For example earthquakes, tsunamis, volcanic activity and emissions, landslides, rockslides, rock falls or avalanches, surface collapses, expansive soils and debris or mud flows.

Hazard
potentially damaging physical event or phenomenon that may ca use the loss of life or injury, property damage, social and economic disruption or environmental degradation.

Hazards can include natural (geological, hydro meteorological and biological) or induced by human processes (environmental degradation and technological hazards). Hazards can be single, sequential or combined in their origin and effects. Each hazard is characterized by its location, intensity, frequency and probability.

Hazard analysis
Identification, studies and monitoring of any hazard to determine its potential, origin, characteristics and behavior.

Land-Use planning
Branch of physical and socio-economic planning that determines the means and assesses the values or limitations of various options in which land is to be utilized, with the corresponding effects on different segments of the population or interests of a community taken into account in resulting decisions. Land-use planning can help to mitigate disasters and reduce risks by discouraging high-density settlements and construction of key installations in hazard-prone areas, control of population density and expansion

Mitigation
Structural and non-structural measures undertaken to limit the adverse impact of natural hazards, environmental degradation and technological hazards.

Natural hazards
Natural processes or phenomena occurring on the earth that may constitute a damaging event. Natural hazards can be classified by origin namely: geological, hydro meteorological or biological. Hazardous events can vary in magnitude or intensity, frequency, duration, area of extent, speed of onset, spatial dispersion and temporal spacing.

Preparedness
Activities and measures taken in advance to ensure effective response to the impact of hazards, including the issuance of timely and effective early warnings and the temporary evacuation of people and property from threatened locations.

Prevention
Activities to ensure complete avoidance of the adverse impact of hazards.

Public awareness
The processes of informing the general population, increasing levels of consciousness about risks and how people can reduce their exposure to hazards. This is particularly important for public officials in fulfilling their responsibilities to save lives and property in the event of a disaster.

Recovery
Decisions and actions taken after a disaster with a view to restoring or improving the pre-disaster living conditions of the stricken community, while encouraging and facilitating necessary adjustments to reduce disaster risk.

Relief / response
The provision of assistance during or immediately after a disaster to meet the life preservation and basic subsistence needs of those people affected. It can be of an immediate, short-term, or protracted duration.

Resilience / resilient
The capacity of a community, society or organization potentially exposed to hazards to adapt, by resisting or changing in order to maintain an acceptable level of functioning. Resilience can be increased by learning from past disasters for better future protection and to improve risk reduction measures.

Retrofitting (or upgrading)
Reinforcement of existing buildings and structures to become more resistant and resilient to the forces of natural hazards.

Risk
The chances of losses (deaths, injuries, property, livelihoods, economic activity disrupted or environment damaged) resulting from interactions between hazards and vulnerable social conditions. Risk is expressed as Risk = Hazards x Vulnerability. Some experts also include the concept of exposure to refer to the physical aspects of vulnerability.

Risk assessment/analysis
A methodology to determine the nature and extent of risk by analyzing potential hazards and evaluating existing vulnerability that could pose a potential threat to people, property, livelihoods and the environment.

Structural/non-structural measures
Structural measures refer to any physical construction to reduce or avoid possible impacts of hazards, which include engineering measures and construction of hazard-resistant and protective structures and infrastructure.

Non-structural measures refer to policies, awareness, knowledge development, public commitment, and methods and operating practices, including participatory mechanisms and the provision of information, which can reduce risk and related impacts.

Sustainable development
Development that meets the needs of the present without compromising the ability of future generations to meet their own needs. It contains within it two key concepts: the concept of "needs", in particular the essential needs of the world's poor, to which overriding priority should be given; and the idea of limitations imposed by the state of technology and social organization on the environment's ability to meet present and the future needs. (Brundtland Commission, 1987).

Technological hazards
Danger originating from technological or industrial accidents, infrastructure failures or certain human activities, which may cause the loss of life or injury, property damage, social and economic disruption or environmental degradation. Some examples: industrial pollution, nuclear activities and radioactivity, toxic wastes, dam failures; transport, explosions, fires, spills.

Vulnerability
The conditions determined by physical, social, economic and environmental factors or processes, which increase the susceptibility of a community or society to the impact of hazards.

Wildland fire
Any fire occurring in vegetation areas regardless of ignition sources, damages or benefits.

Pilot Activities for Up-scaling

The pilot activities are conducted to upscale the CBDRM activities in other areas. As for upscaling tools, this instructor's guideline and materials for CBDRM activities are developed. To make sure of upscaling, human resources, finance, and institution are important aspects. Through conducting pilot activities in different contexts and settings, lessons learnt are reflected and realistic and sustainable human resources, budgetary sources, institutional arrangements to conduct CBDRM are identified to delineate CBDRM part of National Disaster Management Plan.

How the Guideline is Developed

This guideline is a product of CBDRM activities in 5 pilot communities in Pakistan as one of the components in "The Project for National Disaster Management Plan in the Islamic Republic of Pakistan", funded by the Japan International Cooperation Agency. The pilot sites and their target disasters are summarized in the following table.

The draft instructors' guideline was prepared for the facilitators of the activities and after the completion of the field works, the feedback was reflected and the draft Guideline revised.

Table 0.1 Pilot Community and Target Disasters

#	Province	District	Thesile Township	Union Council	Community	Population	Target Disasters
1	Punjab	Rawalpindi	Rawalpindi	UC 45	Javed Colony	15,000	Flash Flood (Earthquake) (Fire)
2		Bhakkar	Mankera	Hyderabad 42	Dar Boola	5,000	Drought
3		Muzaffargarh	Alipur	Aliabad	Khangarh Doma	(2,000HH)	Flood
4	Sindh	Karachi City Urban Area	Saddar Town	Punjabi Club UC 3	Kharadar	616,151 (Saddar Town)	Earthquake (Tsunami)
5		Thatta	Keti Bandar	Keti Bandar	Keti Bandar	22,000	Cyclone (High Tide) (Tsunami)

Conducted CBDRM Activities

To develop this instructors' guideline, CBDRM activities were conducted from October 2010 to July 2011. The activities and the schedule of each activity are summarized in the following table.

Table 0.2 Schedule of CBDRM Activities

#	Agenda	Theme	2010 Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	June	July	Aug	Sep	Oct	Nov	Dec	2012 Jan	Feb
(1)	Selection	Preliminary Visit																	
(2)		Dicussion with the Concerned																	
(3)	Baseline	Baseline Survey																	
(4)	Preparation	Strategic Meeting															Revising		
(5)		Preparation of CBDRM Guideline for Instructors											Revision		Receiving Comments			Printing	
(6)		Preparation of CBDRM Materials																	
(7)		TOT																	
(8)	CBDRM Activities	Stakeholders' meetings																	
(9)		Disaster Awareness Raising Activities																	
(10)		Town Watching																	
(11)		Hazard Mapping	Basemap				Compiling Data												
(12)		CBDRM Plan																	
(13)		Installing DRR Equippments						1 site											
(14)		Disastetr Scenario, Drill																	
(15)	End	End Survey																	
(16)	Common Activities	Study Visit and Forum										SV Forum							
(17)		Minutes of Agreement																	
(18)	Reports	Progress Reports, Final Report		24 Dec			10 Feb		15 May		30 June								

Lessons Learnt

Key findings on lessons learnt through conducting CBDRM are summarized as below by categories.

Participation

- There should be various efforts from public and private to encourage the participation in urban area. Nowadays, UC Nazim is not functioning fully, and relying only through public channel is not enough.
- Encouraging participation in the rural area is not a problem, while in urban area, it is very difficult to motivate the residents to participate. There was a suggestion to give some fees to the participants, but in our project, we dare not to pay for them in the urban area. Based on the contact information of the individuals who have answered to baseline survey, we contacted to encourage the participation, but it did little help to increase the participation in the urban area.
- Since the community resides in an urban setting and most of the people remain busy in their day to day affairs, advocacy for such a community needs to be more aggressive, and well beforehand. Exhibition and poster presentation on DRM can be organized as a starter of the CBDRM activities in urban area to increase participation.
- Female participants participated very actively and took their share of leadership by joining the leadership of the CDMC. This shows that women could be mobilized to take leadership roles related to their affairs in terms of Disaster Management.

- The female of village Dar Boola of Bhakkar were encouraged to speak in class and they did it. It was one of achievement because they participated in such training for the first time.
- Females were taking more interest to work in female group.

Delivery of Activities

- Practical activities increase and retain the interest and attention of the participants.
- There was little knowledge on scientific knowledge on disasters. Considering low literacy rate, visual materials such as video, visual demonstration of experiments draw attention and interests of the participants.
- For some participants, theory was not so interesting to the participants. Method of delivery need to be interesting and unique which require more interaction.
- Schedule of sessions have to be flexible and as per the ground realities.
- Town Watching and Mapping exercise draw attention, but more facilitators are needed to facilitate the work of each group.
- Since the contents of the session were designed to tailor the needs of the community, it was appreciated by the participants throughout.
- Lecture based session by using white board; writing on board was appreciated by participants.
- Successful mob drill on the last day participated by both male and female in equal numbers stands as towering evidence that the community had gained what was talk to them in workshop.

Mapping Exercise

- Risk and resource mapping increase enthusiasm of participants
- Large number participant were involve in group activity of risk and resource mapping.

Continuation of the DRM Activities

- Evacuation drills, Information Distribution Drills and other DRM activities should be carried out within the community to keep the level of sensitization within the community. Some intervention by public officials is necessary to monitor their activities. To realize this, budget for travel and technical support need to be secured.

Intervention of Public Officials

- Participation of local government officials add to the credits of the program
- Discussion among public officials was effective and also gave local government officials clear image of ground reality.

- The community and the Community Disaster Management Committee (CDMC) wish to have a permanent link with the implementing organizations of this project, so a comprehensive plan of follow up would help retain the cohesion in the newly formed committee and the level of interaction between the government and local stake holders.
- The action plan formulated during this workshop needs serious attention and a full fledge mechanism of follow up to ensure that the activities penned down go smoothly by the concerned organizations identified therein.
- Government departments should come up with such mechanism/strategies that keeps the committee involved in their activities of similar subjects
- The linkage between the government and the CDMC, which till now is on the papers communicated with the responding agencies, should be strengthened through programs/activities of mutual interest. Budget for such activities need to be secured at district level.
- DRM Plan should be considered seriously by the Government officials to ensure structural and non-structural mitigation measures for the community.

Establishing Mechanism of Incorporating Local Needs into Planning

- DRM plans were effectively discussed among community and local government officials to move ahead for implementation. However, to establish mechanism of incorporating village DRM needs into local government development plans needs more time and efforts. As for establishing community DRM needs into DRM plans in the local governments has been somewhat materialized.

Implementing Mitigation Measures

- Participants are willing to implement mitigation methods at micro level.
- Participants in Drought site of Bhakkar are keen to learn about drought and ask a lot of question from the drought expert. They are also interested in changing crop patterns and method of cultivation instructed by the expert, though we were initially worried, if the farmers want to continue conventional way of agriculture.

Model Schedule of Trainings

The CBDRM activities were conducted for 5-7days consecutively. The methodologies of the activities are a combination of presentation, brainstorming, group discussion and works, map preparation, participatory planning, practical exercises, simulations, games etc.

The model training program is summarized in the following table.

Table 0.3 Model Training Schedule

S.#	TASK	CONTENT	SUB CONTENT	TIMING/ MINS	TIMING/ hrs
1	Basic Knowledge on DRM	Introdution		15	
		Sharing Baseline Survey	Facts & Figuers	15	
		Introdution of DRM	Termonoligies, DRM cycle	40	
		Scientific Knowledge on Targe disaster (PPT ,Video	Earthquake,Flood,Cyclone& Heavy rain, Tsunami,Drought	45	
		Formulation of DRM committee	Introduction of Community based Disastre Management Committee (CDMC), Role & Responsibilites, Involvement of stakeholders	45	2 hr40 mins
2	Vulnerability and Capacity Assessment	Introduction of vulnerability	Explaining examples	20	
		Vulnerability	Preparing matrics	40	
		Capacity	Preparing matrics	40	1 hr 40 mins
3	Town watching	Introduction risks and resources in the community	give idea to community regarding resources & risk of area	20	
		Breifing on Town watching and Town Watching	Breifing on task	20	
			Field Group activity	60	1 hr40 mins
4	Mapping	Inputting information in a map	Group Work input information of the iriveng	90	
		Preparation of Map	Community area final map with all given information	30	1 hr 20 mins
5	CBDRM Planning	Disaster Imagination Game	Group Activity with given sceniro using material	120	
		Preparation of Community DRME plans	arly warning,Pre,during, post DRM, Information,Evacuation route, safe heaven, Resources, Land & Infrastructre plan, Stocke management, etc	60	3 hrs
6	Practical Training of CBDRM	Search and Rescue Theory & Practical	Basic Search and Rescue	15	
			Victim Evacuation Techniq ue	45	
			Rope Mangement	120	
		First Aid Theory & Practical	Basic First Aid	10	
			wounds & Bleedin g	10	
			Bandaq es	40	
			Spinal Injury	30	
		Fire Fi ghtinq Theory & Practical	Fire Safet y	15	
			Fire Res ponse	75	
		Camp Management	Camp Safet y	20	
			Camp Data	20	
			Camp Committee	20	6 hrs 20 min
7	Drill (Expect Drought)	Prepartion	Brefinq	30	
			Task Distribution	60	
		Action	Demonstration	90	3 hrs
				1160	19 hrs 40 mins

Module 1 Basic Knowledge on CBDRM

Basic Terminologies of Risk Management

Some of the key basic terminologies on disaster management are listed as a basic knowledge by referring NDMA, IFRC and UNISDR.

Disaster Management is defined as ***A collective term of all disaster related activities***

Disaster Management is a collective term encompassing all aspects of planning for and responding to disasters. It refers to the management of both the risks and consequences of disasters.

Disaster Risk Management is defined as ***A systematic process of using resources to manage the risk of disasters.***

The comprehensive approach to reduce the adverse impacts of a disaster. DRM encompasses all actions taken before, during, and after the disasters. It includes activities on mitigation, preparedness, emergency response, recovery, rehabilitation, and reconstruction.

Disaster Risk Reduction is defined as ***A conceptual framework to reduce vulnerabilities in the context of sustainable development.***

The conceptual framework to: minimize vulnerabilities and disaster risks throughout a society; avoid or to limit the adverse impacts of hazards; done within the broad context of sustainable development.

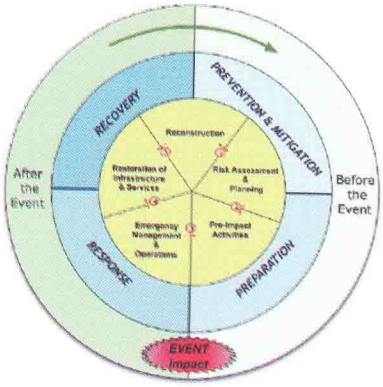
Mitigation is defined as ***The lessening or minimizing of the adverse impacts of hazards and related disasters.***

Preparedness is defined as ***Activities and measures taken in advance to ensure effective response to the impact of hazards, including the issuance of timely and effective early warnings and the temporary evacuation of people and property from threatened locations.***

Disaster Management Cycle is defined as ***A cycle with phases that reduce or prevent disasters***

Disaster management is a cyclical process; the end of one phase is the beginning of another (see figure below), although one phase of the cycle does not necessarily have to be completed in order for the next to take place. Often several phases are taking place concurrently. Timely decision making during each phase results in greater preparedness, better warnings, reduced vulnerability and/or the prevention of future disasters. The complete disaster management cycle includes the shaping of public policies and plans that either addresses the causes of disasters or mitigates their effects on people, property, and infrastructure. The mitigation and preparedness phases occur as improvements are made in anticipation of an event. By

embracing development, a community's ability to mitigate against and prepare for a disaster is improved. As the event unfolds, disaster managers become involved in the immediate response and long-term recovery phases.



Source: Atkinson et al, 2006

Figure 1.1 Disaster Management Cycle

Necessity of CBDRM

Immediately after the Great Hanshin Awaji Earthquake of 1995, many people were rescued from the debris by their neighbours. Statisticsshow that 85% of the people were wither self-evacuated or were rescued by their neighours. This indicates the importance of community immediately after a disaster. The greater that devastation and vastness of the disaster impacts is, the less chance there will be of outreach by public assistance. Secondly, the community participation and involvement has become a universal process. Under such circumstances, the necessity of Community Based Disaster Risk Management (CBDRM) has been stressed and recognized widely. In the JICA project, we have applied the CBDRM approach as we recognize the importance and necessity of CBDRM.

Basic Philosophy of CBDRM

CBDRM Activities need to be conducted by not only public authorities (Public Help), but each individual (Self Help), constituents of the community (Mutual Help) and joint efforts of these three actors. To protect lives and property, awareness raising of each individual, creating appropriate risk perception, promoting preparedness at home and in the community and enhancing resilience as communities are necessary.

Community Unit

In this guideline, community is defined as an unit in which constituents can feel a sense of unity. Thus, it is a much smaller unit than a union council. The members of the community are community leaders, school principals, teachers, Imam of the mosques, leaders of CBOs, and residents of the community.

Actors of CBDRM

Actors of the CBDRM are at first hand, community constituents, the Union Council, Tehsil, Township, and District.

However, CBDRM requires a high level of coordination and cooperation and it is important to develop relationships between the communities and the government national disaster management authorities focusing on disaster risk reduction to instill sustainability measures for continued activity support.

Target Groups

Target groups for CBDRM activities include a diverse group of people: representatives of residents, mosque leaders, and school teachers and representatives of CBOs, NGOs, and volunteer groups in the localities. The workshops should be held jointly for them all.

Process of CBDRM

To develop this instructors' guideline, CBDRM activities were conducted from October 2010 to July 2011. The activities and the schedule of each activity are summarized in the following table.

Step 1 Identifying Participants

Identifying appropriate participants is vital for understanding the social and institutional context. From the beginning, it is important to consider who will be affected, who can influence others, which individuals, groups, and organizations need to be involved, how and whose capacities should be enhanced. At the first meeting, clarifying whose plan it will be and setting the planning goals can be discussed. Stakeholders of the planning exercise include community leaders, health and medical representatives, social workers, health workers, schools, mosque, community based organizations, local private enterprises, officials from the district, tehsil, union council etc. The following questions are useful to draw a preliminary road map for guidance.

- Who can contribute financial and technical resources?
- Whose behavior will be influential for the effort to succeed?
- Who is responsible for overall direction and intent?
- Who can mobilize support or opposition for/against what is intended?

z Who are the voiceless?

Step 2 Establishing Planning Committee

A planning committee consisting of core members is a practical way to begin formulating community plans. This committee will act as secretariat of planning activities and its roles will be identified. Be sure that representatives from the community and key persons from local organizations are involved.

Step 3 Mapping Out Stakeholders' Commitment

Once the participants are identified, it is useful to categorize the degree of participation and roles and responsibilities for the entire planning effort. Each individual and institution needs to be committed to the planning process and if they cannot attend a meeting or workshop, alternative persons should be identified and the process needs to be handed over.

Step 4 Needs Analysis

To know the local stakeholders' needs is an essential factor. To prepare for disasters requires not only disaster risk management but attaining overall development. For sustainable development, local needs and priorities should be researched and analyzed. Development needs, problem identification, constraints and driving forces for each problem need to be identified.

Step 5 Disseminating Damage Estimation (if any)

Identification of the possible local hazards and the possible effects from them on each and every community is essential. This process provides the basis for risk management planning. This enables local people to set planning objectives and identify problems in planning. In this step, this information is disseminated at a meeting or workshop with the participation and explanation ideally given by an expert from a relevant organization.

Step 6 Identifying Vulnerability and Capacity

Vulnerability and Capacity Assessment (VCA) is the starting point of disaster risk management. It is important to know weaknesses and strengths to overcome disasters. VCA aims to identify, analyze and evaluate disaster response capacities, not only physical resources but also social, attitudinal, and organizational aspects. It involves the community's participation to analyze their own capacities, which will encourage the community to build a sense of ownership.

In the participatory risk assessment, various survey methods such as semi-structured interviews, focus group discussions, and tools for Participatory Rural Appraisal such as maps, seasonal calendars, historical profiles, institutional and social network analysis, and problem trees can be employed.

Vulnerability and capacity assessment is a good opportunity to develop local skills and capacity. Involve community people in this survey to understand their own situation, and get community

participants involved in assessing the results. It is important for them to realize their own capacities and vulnerabilities. This self evaluation process is essential to create motivation to reduce local vulnerability.

Step 7 Locating the Vulnerabilities and Capacities

After identifying the vulnerabilities and capacities, locating them on a map will help participants to visualize local situations more clearly. The location of the vulnerability and capacity will make it easier to discuss how to manage the disaster situation and make a plan for it. To accomplish this, "Town Watching" and "Risk and Resource Mapping" are two useful tools.

Step 8 Setting Planning Objectives

After gathering all the necessary information about hazards, vulnerabilities, and capacities, the areas for special attention and support will become clear. Setting planning objectives is recommended in the earlier stage of the planning session. If it is difficult to agree on certain objectives, a practical approach is setting provisional objectives and in the course of the planning process they can be revised and finalized upon the consensus of each stakeholder.

Step 9 Allocation of Responsibilities

Responsibilities for each task will be decided. Functions of control, command and coordination will be cross checked to avoid overlap between teams / task forces and other actors.

Step 10 Documenting the Plan

After the plan has been developed, putting it in the document is the most important process. A common format can be developed within the same district. The statement should be simple and clear. Organizational charts, lists of equipment, and risk and resource maps can be attached. Even though the initial plan is perfect at the time, it can be developed further through the regular drills. Steps 8-10 can be done by utilizing a Disaster Imagination Game as a tool.

Step 11 Testing and Reviewing the Plan

After completion of the plan, exercises are important to ensure that the plans are effective and workable. In this exercise it is essential to involve, not only community people but also planners and members of disaster response organizations. These opportunities will enable the testing of each disaster response agency's abilities and cooperation with each other. Moreover, testing the plan can identify any gray zones where more than two agencies are involved. Exercises can suggest the boundaries of tasks.

One cost effective exercise is a Table Top map maneuver, which can be conducted indoors employing a precisely planned scenario. The other option is an on-site exercise which provides communities first hand practical experience. On-site drills have two types: one is the training exercise and the other is scenario type drill. The training exercise is a basic thematic training on tasks such as search and rescue, first aid,

fire extinguishing, and information management. Teams / Task force teams will be organized and the exercise will be based on a plan.

The scenario type drill is an advanced practice. In this exercise, only the controllers will know the scenario, and the rest of the people (called players) will react to the scenario provided by the controllers. Drawings of fires, road blockages, fallen trees, and dolls will be prepared. This training will be conducted in the community and include simulated fire and road blockage; human casualties will be set in the real community. Players need to search for fire extinguishers and first aid kits to identify the places where they are located. The process can be video taped and a debriefing session should be organized to share suggestions and opinions to improve the plan. Finally the plan should be revised. It is important to make and keep a schedule for reviewing and updating the plan. Regular exercises should be conducted to update the plan and to provide the community members with an opportunity to practice the proper response to the disaster, ensuring that they know how to protect themselves and assist their neighbors.

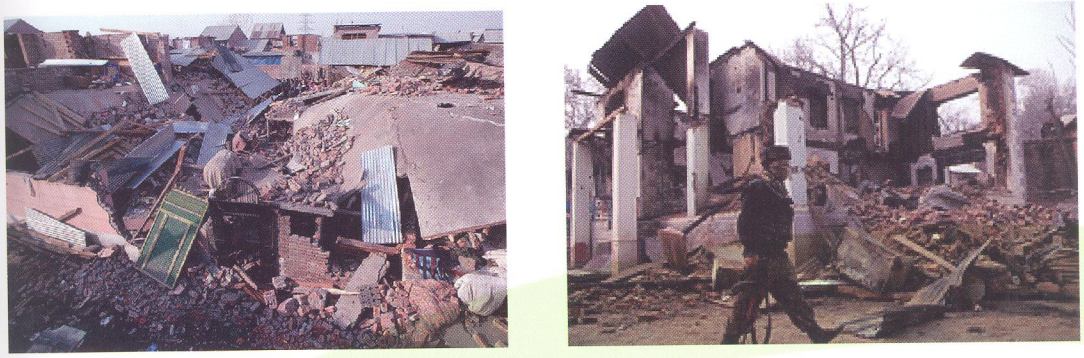
Module 2 Basic Knowledge regarding Disasters

In this module, scientific knowledge such as generating mechanism of the disasters, historical damages, and measures both structural and non-structural are described in this module. The indigenous knowledge of the localities needs to be introduced in the knowledge session, such as symptoms and reaching time of disasters, and cost effective measures.

Earthquake

An earthquake is a sudden movement of the Earth, caused by the abrupt release of strain that has accumulated over a long time.

At the Earth's surface, earthquakes manifest themselves by shaking and sometimes displacing the ground. When the accumulated energy grows strong enough, the plates break free. If the earthquake occurs in a populated area, it may cause many deaths and injuries and extensive property damage.

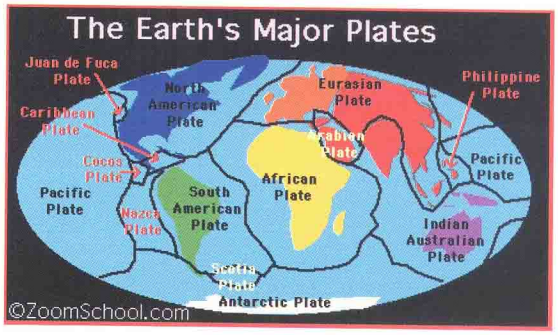


Source: http://www.flickr.com/photos/imran_nissar/

Figure 0.1 Damages of Kashmir Earthquake 2005

Causes

For hundreds of millions of years, the forces of plate tectonics have shaped the Earth as the huge plates that form the Earth's surface slowly and move over, under, and past each other. Sometimes the movement is gradual. At other times, the plates are locked together, unable to release the accumulating energy. The boundaries of plates are called "faults". The sudden slip at the fault causes the earthquake — a violent shaking of the Earth when large elastic strain energy is released and spreads out through seismic waves that travel through the body and along the surface of the Earth.



Source: Tsunami Glossary - EnchantedLearning_com.mht

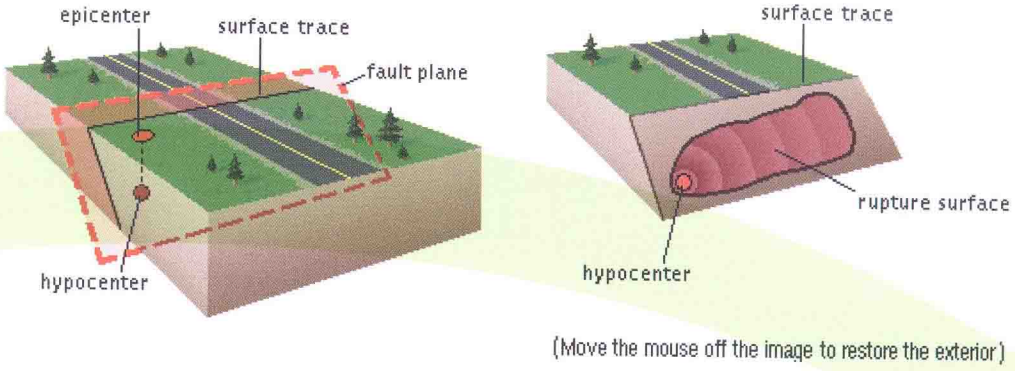
Figure 0.2 Major Plates

After Shocks

Aftershocks are small earthquakes that occur after a large earthquake.

Epicenter

The epicenter is the point on the Earth's surface directly above the place that an earthquake occurred.



Source:http://earthquake.usgs.gov/learn/kids/eqscience.php

Figure 0.3 Epicenter and Hypocenter

Magnitude / Richter Scale

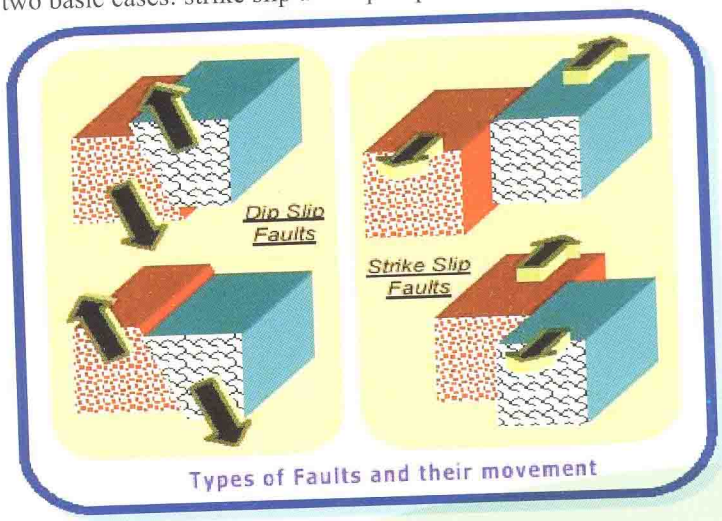
The intensity of an earthquake is described by a number in the Richter scale, called the magnitude. The magnitude of an earthquake is calculated from the logarithm of the amplitude of the waves as recorded by seismographs. A magnitude 2.0 or less earthquake is called a micro-earthquake and is not felt by people. A magnitude 4.5 or more earthquake can be measured by seismographs all over the world. Tsunamis can be caused by undersea earthquakes of magnitude 7.5 or greater. When scientists refer to a "great" earthquake, they do not mean the earthquake was fabulous, they mean it was huge. Informally, earthquakes are classified according to their magnitude size:

- Under 5 small 5 – 6
- Moderate 6 - 7
- Large 7 - 7.8 major 7.8 or above great

What is a Fault?

The crust of the Earth is broken into plates. The plates are enormous chunks of rock that float atop the soft mantle. The plates are moving at a speed that has been estimated at 1 to 10 cm per year. Oceanic plates (those that are under the ocean) are thinner and denser than continental plates.

Earthquakes occur on faults. A fault is a thin zone of crushed rock between two blocks of rock, and can be any length, from centimeters to thousands of kilometers. When an earthquake occurs on one of these faults, the rock on one side of the fault slips with respect to the other. The fault surface can be vertical, horizontal, or at some angle to the surface of the earth. The slip direction can also be at any angle. We classify these into two basic cases: strike slip and dip-slip motion.



Picture Source: http://earthquake.usgs.gov/learn/kids/eqscience.php

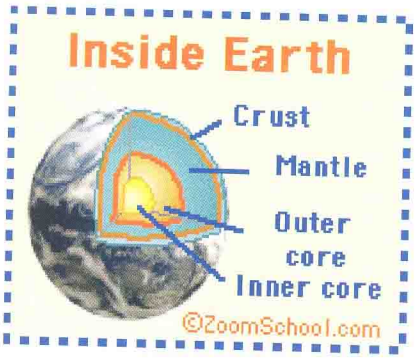
Figure 0.4 Types of Faults

Tectonic Plates

Plate tectonics is the now-established theory that chunks of the Earth's crust (plates) float on the surface and change both position and size over time. The Earth's crust is its outermost, rocky layer.

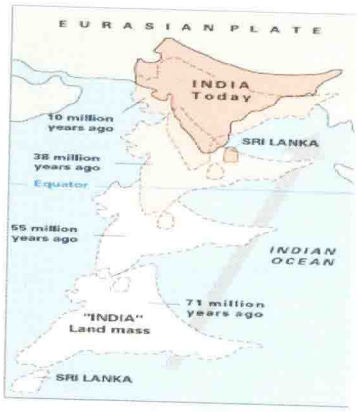
Plate movements

The plates are moving at a speed that has been estimated at 1 to 10 cm per year. Oceanic plates (those that are under the ocean) are thinner, younger, and denser than continental plates. These underwater plates are about 75 kilometers thick and are made of basalt rock. They are relatively young since plate formation (seafloor spreading) occurs at the margins of oceanic plates



Picture Source: Earth's Continental Plates - ZoomSchool_com.mht

Figure 0.5 Innner Structure of the Earth

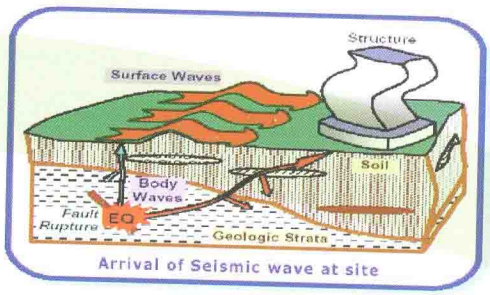


Picture Source: U.S. Geological Survey (USGS) Website

Figure 0.6 Plate Movements

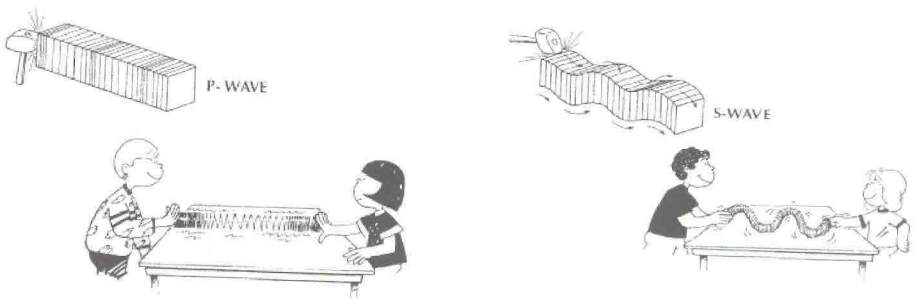
How the Ground Shakes? Seismic Waves

The large strain energy released during an earthquake travels as seismic waves in all directions through the Earth's layers, reflecting and refracting at each interface. These waves are of two types - body waves and surface waves; the latter are restricted to near the Earth's surface. Body waves consist of Primary Waves (P-waves) and Secondary Waves (S-waves), and surface waves consist of Love waves and Rayleigh waves.



Source: http://earthquakw.usgs.gov/learn/glossary/?=fault

Figure 0.7 Seismic Wave



Source:http://www.pdc.org/TAK/Educators/Teacher_Guides/Teacher/HighSchool_teacher.pdf

Figure 0.8 Difference of P Wave and S Wave

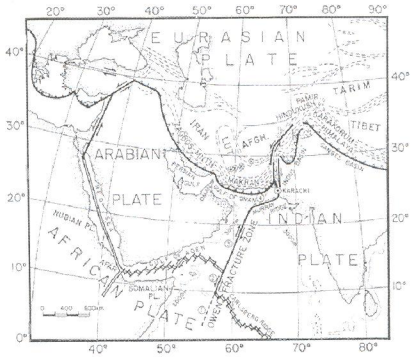
Seismicity in Pakistan

Plates around Pakistan

Earthquakes and active faults in northern Pakistan and adjacent parts of India and Afghanistan are the direct result of the Indian subcontinent moving northward at a rate of about 40 mm/yr (1.6 inches/yr) and colliding with the Eurasian continent. This collision is causing uplift that produces the highest mountain peaks in the world including the Himalayan, the Karakoram, the Pamir and the Hindu Kush ranges.

National Seismic Hazard Map

Figure 2.9 shows the tectonic setting around Pakistan. Plate boundary between the Eurasian plate and Indian plate runs through Pakistan's territory from south-west to north-east, and Arabian plate subducts beneath Eurasian plate in the southern part of Pakistan, with a rate of 19 mm/year.



Source: Quittmeyer & Jacob (1979), BSSA, vol.69, No.3.

Figure 0.9 Location of Plats and Epicenters of Major Earthquakes Along the Arabian Coast

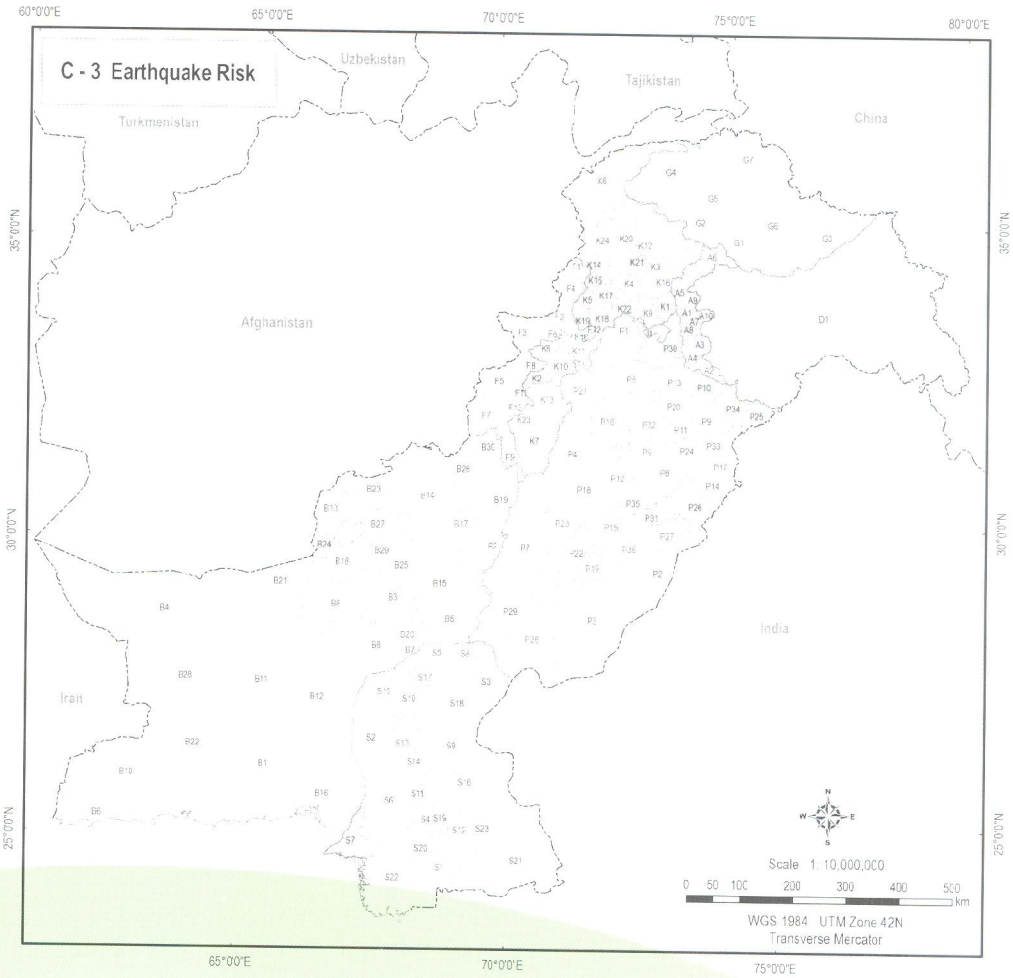
Earthquake Risk Map prepared by JICA Expert Team is shown in Figure 0.10[1] below. Seismic hazard maps on a local scale are also developed. ERRA had developed probabilistic seismic zoning maps in earthquake affected areas, and seismic hazard microzonation map for Balakot and Muzaffarabad.

NDMA develops the seismic hazard assessment map of Muzaffarabad and Mansehra, employing deterministic and probabilistic approaches. Furthermore, NDMA conducted risk analysis and developed an earthquake scenario in Muzaffarabad and Mansehra for the purpose of planning and preparedness for earthquake disaster.

In Karachi, the Karachi Building Control Authority compiled information on seismic risk in Karachi and published a book on seismic zoning and recommendations for seismic design of buildings (Loya et al., 2000[2]).

[1] Earthquake hazard and risk maps, along with other disasters were prepared in the JICA project for "National Disaster Management Plan in the Islamic Republic of Pakistan" in 2010.

[2] A. Razzak Loya, Nayyer Alam Zaigham, and Mushtaq H. Dawood, 2000, Seismic zoning of Karachi and recommendations for seismic design of buildings



No.	District Name	No.	District Name	No.	District Name	No.	District Name	No.	District Name
A1	Bajh	B22	Noshki	C5	Gilgit	P2	Bahawalnagar	P31	Sahiwal
A2	Zhob	C27	Nushki	C6	Skardu	P3	Bahawalpur	P32	Sargodha
A3	Kech	S22	Panjgur	C7	Hunza Nagar	P4	Bhakkar	P33	Sheikhupura
A4	Lasbela	C21	Washuk	I1	Islamabad	P5	Burewala	P34	Sialkot
A5	Muzaffarabad	B24	Quetta	K1	Abbottabad	P6	Chichawatni	P35	Toba Tek Singh
A6	Kohistan	B29	Sibi	K2	Bannu	P7	D. G. Khan	P36	Vehari
A7	Poonch	B26	Zhob	K3	Balakgarh	P8	Faisalabad	S1	Badin
A8	Sudhnoti	B27	Ziarat	K4	Buner	P9	Gujranwala	S2	Dadu
A9	Kotlan	B28	Kharan	K5	Charsadda	P10	Gujrat	S3	Ghotki
A10	Kasur	B29	Harnai	K6	Chitral	P11	Hafizabad	S4	Hyderabad
S1	Abbottabad	B30	Sherani	K7	D. I. Khan	P12	Jhang	S5	Jacobabad
S2	Hangu	D1	Disputed Area	K8	Hangu	P13	Jhelum	S6	Jamshoro
S3	Bannu	F1	Bajaur Agency	K9	Haripur	P14	Kasur	S7	Karachi
S4	Dir(a)	F2	Khyber Agency	K10	Karak	P15	Khanewal	S8	Kashmore
S5	Dera Ismail Khan	F3	Kurram Agency	K11	Kohat	P16	Khushab	S9	Khairpur
S6	Peshawar	F4	Mohmand Agency	K12	Kohistan	P17	Lahore	S10	Larkana
S7	Haripur	F5	North Waziristan Agency	K13	Lakki Marwat	P18	Layyah	S11	Matiari
S8	Jhal Magsi	F6	Orakzai Agency	K14	Lower Dir	P19	Lodhran	S12	Mirpur Khas
S9	Kohat	F7	South Waziristan Agency	K15	Malakand	P20	Mianwali	S13	Naushahro Feroze
B10	Kech	F8	FR Bannu	K16	Mansehra	P21	Multan	S14	Nawabshah
B11	Kharan	F9	FR D. I. Khan	K17	Mardan	P22	Muzaffargarh	S15	Qambar and Shahdadkot
B12	Khuzdar	F10	FR Kurram	K18	Nowshera	P23	Okara	S16	Sanghar
B13	Kila Abdullah	F11	FR Lakki Marwat	K19	Peshawar	P24	Rahimyar Khan	S17	Shikarpur
B14	Kila Saifullah	F12	FR Peshawar	K20	Swabi	P25	Sahiwal	S18	Sukkur
B15	Kohlu	F13	FR Tirah	K21	Swat	P26	Sargodha	S19	Tando Allahyar
B16	Lasbela	B31	Pishin	K22	Tank	P27	Shekhupura	S20	Tando Muhammad Khan
B17	Mastung	B32	Sanjawi	K23	Upper Dir	P28	Sialkot	S21	Tharparkar
B18	Nasirabad	B33	Shirani	K24	Attock	P29	Toba Tek Singh	S22	Thatta
B19	Nushki	C4	Ghizar	P1	Attock	P30	Rawalpindi	S23	Umerkot

Legend
Earthquake Risk
Category
Very High
High
Medium
Low
Very Low
No data

Source: JICA Study Team

The Project for National Disaster Management Plan in the Islamic Republic of Pakistan

Source: JICA Study Team

Figure 0.10 Earthquake Risk Map of Pakistan

Impact

Historical Earthquakes in Pakistan

The historical database comprises of 58 earthquakes from year 25 A.D to 1905. A concentration of earthquakes has been observed in the northern belt from Islamabad/Rawalpindi to Peshawar, around Quetta, four earthquakes in the Karachi-Ahmadabad and regions of low historical activity are Makran, Chagai hills, Toba-kakar range north of Quetta and Punjab. In 1935, Quetta, the great earthquake of Magnitude 7.7 was felt at 3:03 A.M on 31st May 1935, 30,000 peoples died. On 28th December, 1974 at 12:11 Universal Time, Coordinated (UTC) a strong earthquake was felt in Swat, Peshawar, Islamabad and Lahore, its epicenter was in Pattan. This left 5300 persons dead, 17,000 injured and thousands of houses destroyed.

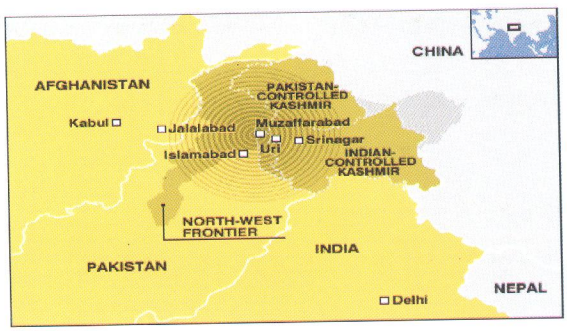
Table 0.1 Past Historical Earthquakes in Pakistan

Date	M	Location	Killed	Affected
31/ 05/ 1935	7.5	Quetta (Balouchistan)	60,000	
27/ 11/ 1945	8	Makran (+ Tsunami)	4,000	
28/ 12/ 1974	6.2	North Indus R. Valley	4,700	50,200
12/ 09/ 1981	6.1	Karakoram, Darel,	250	2,000
31/ 01/ 1991	6.4	Malakand, Chitral,	300	204,794
08/ 10/ 2005	7.7	Bagh, Muzzafarabad,	73,338	5,128,000
29/ 10/ 2008	6.4	Khanozai, Rod Mulazai,	166	75,320

Source: EM-DAT, Center for Research on Epidemiology and Disasters (CRED)

2005 Kashmir Earthquake

The most recent and the deadliest earthquake occurred on 8th October, 2005 in northern parts of Pakistan measuring 7.6 on the Richter scale. The focal depth of the earthquake was 10 km and its epicenter was in the north of Muzaffarabad (Azad Kashmir) about 90km north of Islamabad. The earthquake occurred at 08:50:30 PST.



Source: news.bbc.co.uk

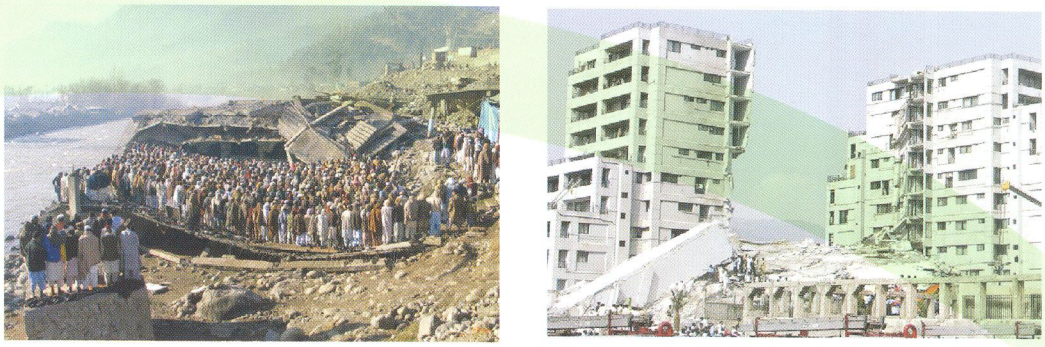
Figure 0.11 Affected Areas of Kashmir Earthquake

- Magnitude: 7.6 on the Richter Scale
- Affected Area: 30,000 sq Km
- Human Loss: 73,338 Dead and 128,304 Severely Injured
- Physical Loss: 3.5 Million Rendered Homeless
  over 600,000 Houses Destroyed
  5,808 Educational Facilities Destroyed
  307 Health Facilities Destroyed
  715 Government Sector Buildings Damaged
  2,393 km Major Roads Damaged

Table 0.2 Damage Statistics from the 2005 Earthquake

		a	b	c	d	e	f			
Province	District	Population in 1998	Houses in 1998	House full damage	Hpuse partial damage	Death	Injuries	MMI	Full damage ratio (%) =c/b	Death ratio (%) =e/a
NWFP	Abbottabad	880,666	153,819	6,961	27,051	515	1,730	8	4.5	0.1
	Batagram	307,278	44,585	28,712	8,656	3,232	3,279	10	64.4	1.1
	Kohistan	472,570	74,087	4,350	18,395	661	639		5.9	0.1
	Mansehra	1,152,839	203,109	31,323	43,282	24,511	30,585	10	15.4	2.1
	Shangla	434,563	67,003	15,661	10,281	423	957	5	23.4	0.1
AJK	Bagh	393,000	59,623	47,619	18,226	8,157	6,644	9	79.9	2.1
	Murpur	334,000		0	0	6	11	7		
	Muzaffarabad	746,000	123,679	108,157	17,120	33,724	21,374	10	87.4	4.5
	Neelum			3,692	7,215	447	1,013	9		
	Rawalakot(Poonch)			15,086	25,405	1,025	1,909	9		
	Sudhnoti	224,000		429	1,719	4	16	9		
	Total			261,990	177,350	72,705	68,157			

MMI: Modified Mercalli Intensity
Source: ADB and WB, 2005 [3], Census data, 1998.



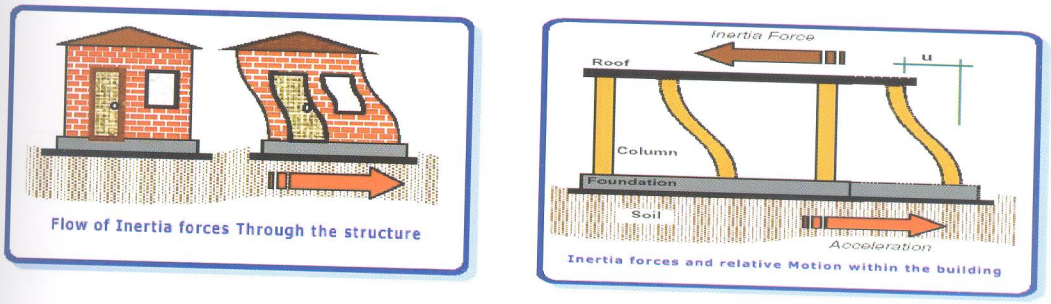
Source: uphaa.com

Figure 0.12 Glimpse of devastation in Kashmi r and Margala Tower, Islamabad collapsed by 2005 Pakistan Earth Quake

Engineering: Seismic Effects on Structures

Following pictures show how buildings behave during an earthquake:

[3] ADB-WB (2005), "Preliminary Damage and Needs Assessment – Pakistan 2005 Earthquake", prepared by Asian Development Bank and World Bank, Islamabad, Pakistan, November 12, 2005.



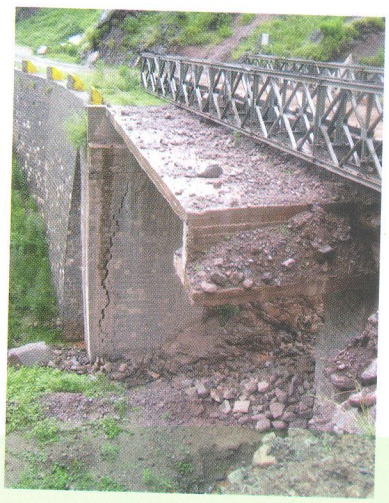
Inertial forces and relative motion within the buildings
Source: http://www.iitk.ac.in/nicee/EQTips/EQTip05.pdf

Figure 0.13 Inertia Forces through the Structure

If the building and infrastructure are not built considering seismic impact there could be huge loss and damage to:

- Houses /civil structures
- Infrastructure i.e. roads, bridges, etc.,
- Utilities i.e. water supply, sewage, etc

According to Government of Pakistan estimates, in the hard-hit areas 80 percent of public buildings, 25 percent of main roads, and 75 percent of local roads were severely damaged in the hardest hit areas of the Pakistan2005 earthquake.



Source: Images of Kashmir earthquake

Figure 0.13 Infrastructural Damage of Earthquake Wealth

Economic: Overall Impact on the Economy

The economy is very much affected by earthquakes and they produce tangible as well as intangible losses:

- Business
- Material
- Jobs
- Skilled Manpower

2005 earthquake caused losses of $5 billion (Asian Development Bank and World Bank, 2005) where as Pakistan's total budget in 2008-09 was $25.125 billion. This means a budget share of $148/person and damage share $29/person i.e. everyone lost 20% of his budget share.

Population

Earthquakes and associated secondary hazards can cause deaths and injuries as well as making people homeless and affecting their livelihoods. For example the 2005 earthquake caused[4]:

- Deaths Æ 73,338

[4] Source: Impacts of Earthquake in Pakistan, Mohammad Riaz, NCEG, University of Peshawar.

- Injuries Æ 128,304
- Homeless Æ 3.5 million

UN estimates 3.5 million people directly were affected.

Geological Impacts (Hazards)

Liquefaction

Earth shaking causes a 'slurry' of water saturated soil that causes the foundations to fail and the buildings to collapse e.g. Nigata, Japan (1964)

Ground Rupture

Ground rupture also causes damage to:

- Land/property
- Agriculture
- Water channels

Avalanches

Localized but swift and thus can be deadly:

- December 2001 Chilas earthquake triggered some avalanches but no damage reported. (Source: Impacts of Earthquake in Pakistan)

Source: Mohammad Riaz, National Center of Excellency in Geology (NCEG), University of Peshawar

Figure 0.14 Image of Avalanche

Landslide

Earthquake shaking can cause land sliding on many scales. An earthquake can cause a slope to become unstable by the inertial loading it imposes or by causing a loss of strength in the slope materials.

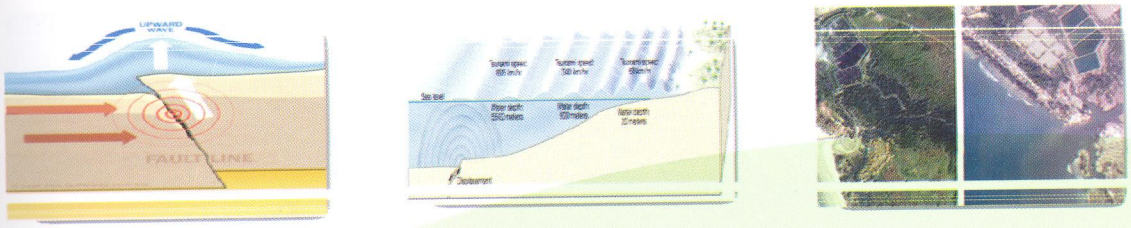
- Loss of life and property
- River channel damming and flooding e.g. Chikar (Hattian Bala), Nisar Camp (2005 E.Q)& Hunza (Jan 2010)
- Forest/Crop loss
- Loss of Soil

Source: Source: Impacts of Earthquake in Pakistan, Mohammad Riaz, NCEG, University of Peshawar

Figure 0.15 Ataabad Landslide on Jan 04, 2010, in Hunza caused flooding in the river and created a lake more than 300 feet deep.

Tsunami

Earthquake causes Tsunamis when it causes the seafloor to rise or fall. This is when two tectonics plates collide into each other at a plate boundary. The denser plate would subduct under the other plate, which leads to a rise or fall of the seafloor. This movement of the seafloor will cause a rapid displacement of water, and a wave would form. As the wave approaches a coastline, it would get higher as the seafloor gets shallower, causing a tsunami.



Source: Impacts of Earthquake in Pakistan, Mohammad Riaz, NCEG, University of Peshawar

Figure 0.16 Tsunami Generation

Mitigation and Preparedness

Structural

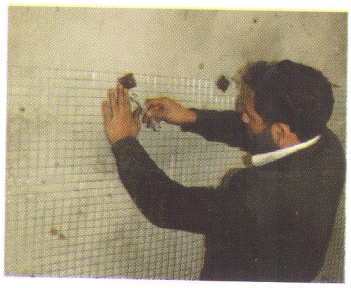
Building codes/designing (critical)

When constructing a new building, seismic provisions need to be catered for. It has been experienced that the cost of construction of a seismically resilient building is only 5-8% more than that of a conventional building. Following are some of the structural elements that need to be incorporated to make the buildings seismically resilient.

Retrofitting

Existing buildings/ structures should be strengthened with retrofitting

- land use restrictions
- hazard mapping and land use zonation
- Geological surveys before development



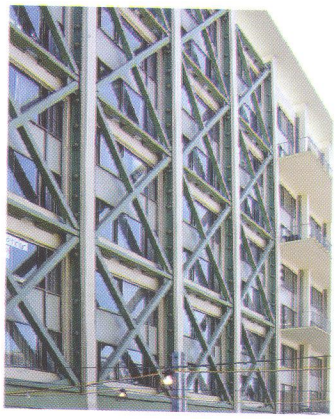


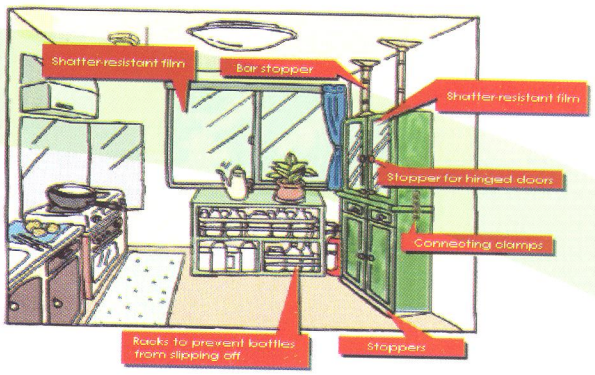
Photo Source: Impacts of Earthquake in Pakistan, Mohammad Riaz, NCEG, University of Peshawar

Figure 0.17 Example of Retrofitting

Non-structural

Safety of Non-Structural Elements of Buildings

Non structural elements of buildings if not properly fixed and attached to structural elements, can cause death or injury during an earthquake. Therefore, the objects susceptible to fall should be properly attached/ fixed/ installed.

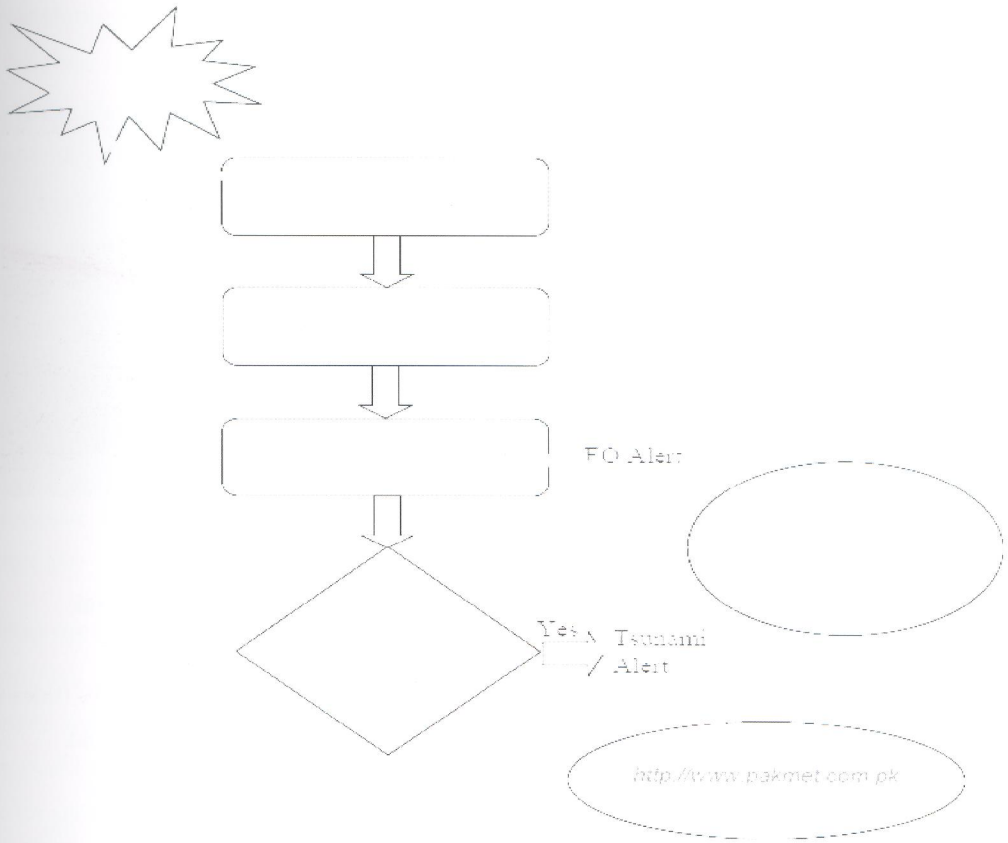


Source: Tokyo Metropolitan Government

Figure 0.18 Non-Structural Measures Preventing from Falling

Warning and Evacuation / Drills

Natural alert by shaking and dissemination of warning using Mosque, Schools or electronic media so that community could have lead time for evacuation.



Source: Pakistan Meteorological Department

Figure 0.19 Outline of PMD's Earthquake Observation / Tsunami Warning System

Public Awareness / CBDRM Programme

Countermeasures include:

- Education
- Mandatory portion of curriculum
- Appropriate training in emergency response
- Hazard & resource maps
- Emergency response plan
- Disaster management plan
- Buying insurance

Tsunami

A tsunami is a series of huge waves that can cause great devastation and loss of life when they strike a coast.

Source: The Tohoku Earthquake March 2011
xn--qckua0a9340dnp3a9ke4lm.biz

Figure 0.20 Image of Tsunami

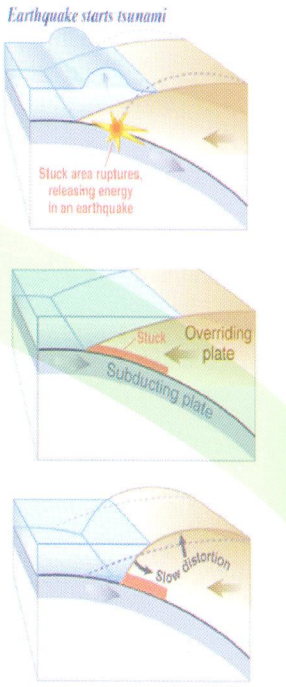
Meanings of Tsunami

"Tsunami" is a Japanese word in which "tsu" means harbor and "nami" means wave. Thus the word means "harbor wave." The waves travel outward in all directions from the disturbance, similar to what you would see if you threw a rock in a pond. The average wave speed is 450 miles per hour. These waves may be as long as 100km and travel across the ocean at speeds of up to 800km/h[5]. Tsunamis are sometimes incorrectly called "tidal waves" -- tsunamis are not caused by the tides (tides are caused by the gravitational force of the moon on the sea). Regular waves are caused by the wind.

Causes of Tsunami

Undersea Earthquake

Tsunamis are caused when an earthquake causes the seafloor to rise or fall. This is when two tectonic plates collide into each other at a plate boundary. The denser plate would subduct under the other plate, which leads to a rise or fall of the seafloor. This movement of the seafloor will cause a rapid displacement of water, and a wave would form. As the wave approaches the coastline, it would get higher as the seafloor gets shallower, causing a tsunami. The shockwaves produced by the earthquake would radiate out and cause waves to form too.



Source: Tsunami Teacher, UNESCO

Figure 0.21 Tsunami Generation Mechanisms

Subduction Zones are Potential Tsunami Locations

Most tsunamis are caused by earthquakes generated in a subduction zone, an area where an oceanic plate is being forced down into the mantle by plate tectonic forces. The friction between the subducting plate and the overriding plate is enormous. This friction prevents a slow and steady rate of subduction and instead the two plates become "stuck".

[5] Source: Tsunami Teacher, UNESCO.

Accumulated Seismic Energy

As the stuck plate continues to descend into the mantle the motion causes a slow distortion of the overriding plate. The result is an accumulation of energy very similar to the energy stored in a compressed spring. Energy can accumulate in the overriding plate over a long period of time - decades or even centuries.[6]

Undersea Landslide

Undersea landslides cause tsunamis due to the forces of gravity and friction. When the force of gravity overpowers the force of friction, landslides occurs.

Undersea Eruption of Volcanoes

Water displacement due to physical land movement can cause an underwater wave in a ripple effect. An underwater wave is different from a regular wind driven surface wave in effect because when the underwater wave reaches shallow waters it is forced up by forward motion causing a tsunami.

Falling meteorites

Meteorites may slam into the ocean and cause tsunami more often than anyone realized. Imprints of tsunami impacts discovered on the coast of Australia suggest these giant waves were so powerful that they could only have been triggered by something as cataclysmic as a meteor impact. And we could be due for another one soon.

Scientific Knowledge

Development of Tsunami

A tsunami starts when a huge volume of water is quickly shifted. This rapid movement can happen as the result of an underwater earthquake (when the sea floor quickly moves up or down), a rock slide, a volcanic eruption, or another high-energy event.

Size of Tsunami

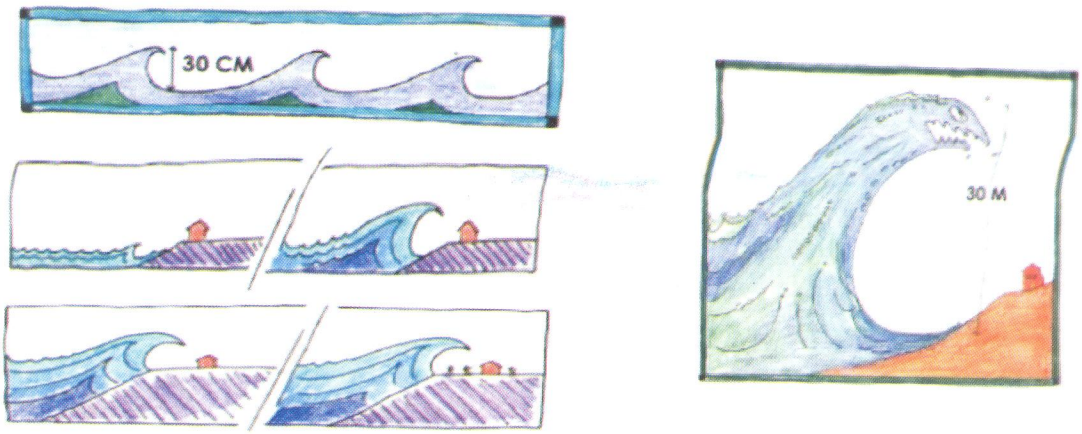
Tsunamis have an extremely long wavelength (wavelength is the distance between the crest (top) of one wave and the crest of the next wave) — up to several hundred miles long. The period (the time between two successive waves) is also very long — about an hour in deep water.

In the deep sea, a tsunami's height can be only about 1 m (3 feet) tall. Tsunamis are often barely visible when they are in the deep sea. This makes tsunami detection in the deep sea very difficult.

A small 30 cm high tsunami wave in the Deep Ocean can become a 30 meter high giant wave when it reaches the coast. Tsunami waves can be small or big, harmless or destructive. People living along coast

[6] Source: Tsunami Teacher, UNESCO

line should understand well the phenomenon and in case of earthquake should move to higher places or inland safe areas.[7]



Source: Tsunami Teacher, UNESCO

Figure 0.22 Amplification of Tsunami at the Coast

Speed of Tsunami

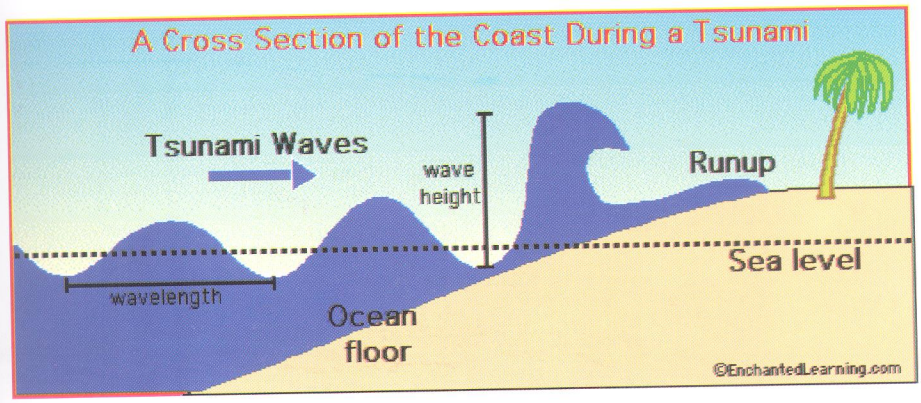
A tsunami can travel at well over 970 kph (600 mph) in the open ocean - as fast as a jet flies. It can take only a few hours for a tsunami to travel across an entire ocean. A regular wave (generated by the wind) travels at up to about 90 km/hr.

Tsunami Hits the Coast

As a tsunami wave approaches the coast (where the sea becomes shallow), the trough (bottom) of the wave hits the beach floor, causing the wave to slow down, to increase in height (the amplitude is magnified many times) and to decrease in wavelength (the distance from crest to crest). At landfall, a tsunami wave can be hundreds of meters tall. Steeper shorelines produce higher tsunami waves.

In addition to the large tsunami waves that crash onto shore, the waves push a large amount of water onto the shore above the regular sea level (this is called run-up). The run-up can cause tremendous damage inland and is much more common than huge, thundering tsunami waves.

[7] Source; Tsunami awareness book, One UNDRM Programme, UNDP/NDMA



Source: EnchantedLearning.com

Figure 0.23 Size of Amplification at the Coast

Tsunami Detection

Scientific detection: Many tsunamis could be detected before they hit land, and the loss of life could be minimized, with the use of modern technology, including seismographs (which detect earthquakes), computerized offshore buoys that can measure changes in wave height, and a system of sirens on the beach to alert people of potential tsunami danger.[8]

Natural Warning

If there is an earthquake, it may have caused a tsunami, so people should run toward higher ground or inland. The first wave in a tsunami is often not the largest; if there is an abnormally-huge wave, it is advised to move inland quickly -- even bigger waves could be coming soon.

If after the earthquake, water recedes quickly and unexpectedly from a beach (this is called drawback), people near the shore should run toward higher ground or inland -- there may be a tsunami coming.

A Tsunami moves with the speed of fast train or a jet plane, so if there is a sound like a train or jet plane coming from sea, it can also be natural sign of Tsunami.

Tsunami Force

The mountain of water comes back down. This pushes the water that was underneath it outwards. The force of the water moves through the ocean causing an underwater force that travels for hundreds of kilometers. The force of the water can reach speeds of up to 800kmh as it surges through the ocean. The energy is underwater and is not noticeable on the surface[9].

As this force travels through the ocean it may eventually reach the shore. At this point, the sea becomes shallower. However, the energy in the water is still the same. The energy is compressed and the water is pushed upwards. This is how the energy is transferred from being underwater into waves on the surface.

---

[8] Source; Tsunami awareness book, One UNDRM Programme, UNDP/NDMA.
[9] Source: Tsunami Teacher, UNESCO.

Source: Tomoko Shaw, JICA Expert Team

Figure 0.24 Damage of Tsunami after Tohoku Earthquake

Tsunami Risk in Pakistan

Being located close to the collision boundary of the Indian and Eurasian plates, Pakistan lies in a seismically active zone. Owing to high population density near seismically active areas, it is imperative that buildings should withstand the seismic hazard to which these may be exposed during their life time. The following coastal districts are prone to tsunami:

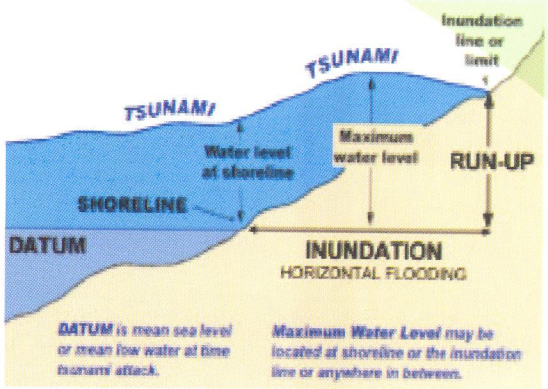
- District Gwadar
- District Lasbela
- District Karachi
- District Badin
- District Thatta

Impact

Means of destruction

Wave Impact- Floating and drag forces rip houses and overturn vehicles including boats and that becomes 8 cars dangerous projectiles 2x12 inch wooden plank in a truck tire caused by Tsunami wave impact –Alaska 1964.

- Inundation- distance inland that a tsunami wave floods
- Erosion- erosion of foundation and collapse of bridges and seawalls.



Source: Tsunami Teacher, UNESCO

Figure 0.25 Reach of Tsunami

HistoricalEvents

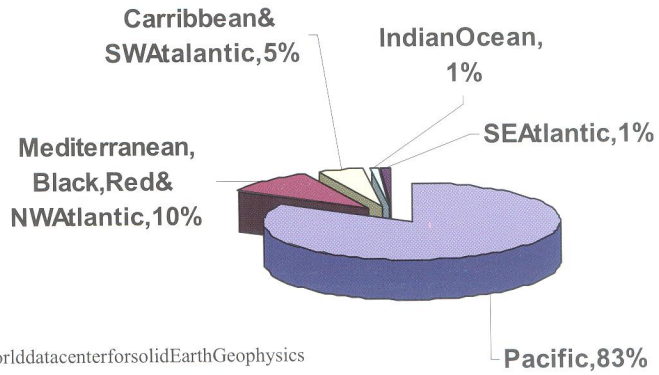
Thedestructivehistoricaltsunamisaresummarizedinthefollowingtable.

Table0.3 HistoricalTsunamiRecords

TsunamiRecordsSince1650		
Date	Source	Estimated death
20Oct1687	Peru	500
07Jun1692	Jamaica	3,000
26Jan1700	Cascadia, Northeastpacific	NA
08Jul1730	Chile	0
25May1751	Chile	30
01Nov1755	Lisbon,Portugal	10,000
24Apr1771	Ryukyuuisland	12,000
02Feb1835	Chile	3
07Nov1837	Chile	62
24Dec1854	Japan	3,000
13Aug1868	Chile	28,000
10May1877	Chile	500
31Dec1881	BayofBengal	NA
27Aug1883	KrakatauIndonesia	33,000
15Jun1899	Japan	22,000
31Jan1900	ColombiaEcuador	500
17Aug1906	Chile	NA
07Sep1918	KurilIsland	47
11Nov1922	Chile	100
03Feb1924	KamchatkaRussia	2
01Sep1923	Kanto,Japan	2,144
02Mar1933	Sanriku,Japan	3,000
07Dec1944	TonankaiJapan	1,038
01Apr1946	AleutianIslands,USA	170
20Dec1946	NankaidoJapan	1,997
04Mar1952	Hokkaido,Japan	33
04Nov1952	Russia	NA
09Mar1957	AleutianIslands,USA	5
22May1960	Chile	2,000
28Mar1964	AlaskaUSA	132
04Feb1965	AleutianIslandsUSA	0
18May1968	HonshuJapan	52
16Oct1994	ShikotanIslandRussia	11
21Feb1996	Peru	15
26Dec2004	NorthernSumatra	250,000
11Mar2011 [10]	JapanTohoku	19,486

Source:TsunamiTeacher,UNESCO

[10] Source:NationalPoliceAgencyofJapan.Thefigureincludesnumberofdeaths(15,811)andlost(4,035),asofSeptember26th,2011.

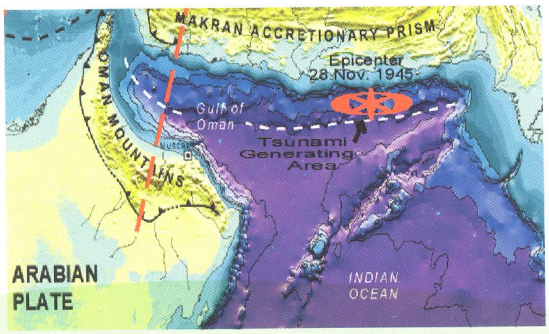


Source:worlddatacenterforsolidEarthGeophysics

Figure0.26LocationofTsunamiOccurrence

1945Tsunami

Aninternationallywell-known,largetsunamithatim pactedthePeninsulawasthe1945Makrantsunami. Thistsunamidevastatedthecoastsof Iran, Pakistan,andpossiblyOman(Berninghausen, 1966).



On28thNovember1945,agreatearthquakeoff Pakistan'sMakrancoast(Balouchistan)generateda destructivetsunamiintheNorthernArabiansea andIndianocean.Morethan4,000peoplewere killedalongtheMakrancoastofPakistanbyboth theearthquakeandtsunami.

Source:PakistanMeteorologicalDepartment(PMD)

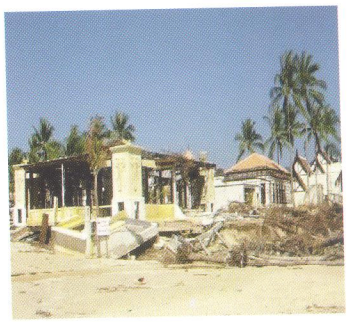
Figure0.27 LocationofTsunamiin1945

IndianOcean2004Tsunami

OnDec26,2004amassiveearthquakeoffSumatrage neratedatsunamithatquicklyandviolentlyhit Indonesia–Andamanisland(30min),Thailand(90min),SriLankaandIndia(2hrs),Maldivesand finallytheeastcoastofAfrica(7hrs)later.TheSu matraearthquaketurnedouttobemorepowerfulthan initiallybelieved.

USseismologistsputitat9.3andnotM8.0asinitiallymeasuredinthefirstfewminutes.Waveheight alongthecoastlineofBandaAcehaveragedover75 feetwithrun-upsoftenreaching90feetandthe tsunami'saveragespeedontheshorewas42feet/sec.





Source:TsunamiTeacher,

Figure0.28 DamagesbyIndianOceanTsunamiin2004

MitigationandPreparedness

Structural

Seawalls

Seawalls,whichprotectthecoastfromtsunamisstriki ngland,arefundamentaltomitigationfortsunami. Theircrestheightshouldbedeterminedbyconstruction standardsoftheparticular areainwhichtheyare built,butplannersshouldbearinmindthatatsunami couldstillbreachthewallsandinthatevent,the effectivenessandsafetyoftheleveewallsmustbetakenintoconsideration [11].

Embankments

Embankmentmayrefertoaprotectionbandin Pakistan ,whichisleveeordike, anartificialbankraised abovetheimmediatelysurroundinglandtoredirectorpreventfloodingbyariver,lakeorsea. Fortransportation,araisedbanktocarryaroad,railway,orcanalacrossalow-lyingorwetarea. Embankmentdam:adammade ofmoundedearthandrock. Landreclamationalongthebanksofariver,usuall ymarkedbyroadsandwalkwaysrunningalongit, paralleltotheriver.

Breakwater

Tsunamibreakwatersalleviaterisesofthewaterlevel withinadesignatedarea.Theyalsoareeffectivein alteringtsunamiwavereverberation.Theyarealreadyinplaceatharborsforlargevesselsandarebeing builtatvariousports.

BioShields(Plantation)

Coastalvegetationisrecognizedas acomprehensivestrategytomitigatethedestructiveforceoftsunami events,althoughitcannotcompletelystopthetsun amiitselfandtheeffectivenessdependsonthe magnitudeofthetsunamiandthevegetationstructure. Danielsenetal.(2005)pointedoutthatmangrovesan dothercoastalvegetationhavebeenclearedor degradedalongmanycoastlines,increasingtheirvulnerabilitytostormandtsunamidamageand

[11] Source:TsunamiTeacher,UNESCO.

suggestedthatestablishingorstrengtheninggreenbel tsofmangrovesandothercoastalforestscouldplay akeyroleinreducingtheeffectoffutureextremeevents [12].

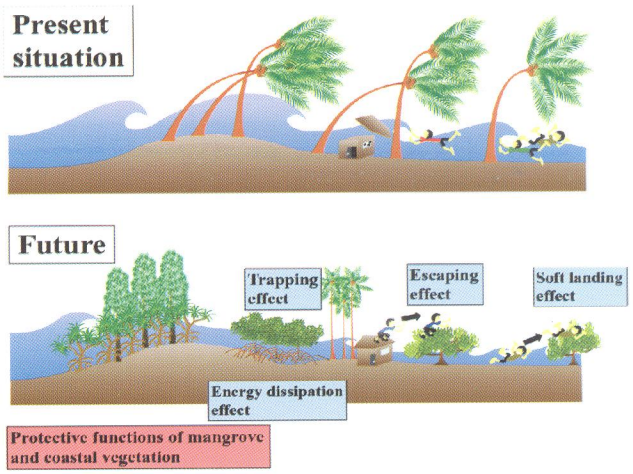


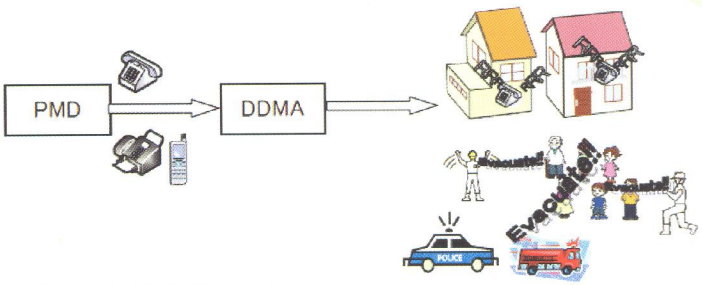
Figure0.29 MangrovePlantationforReducingImpacts

Non-Structural

EarlyWarningSystem

Warning&communicationssystemoftheea rlywarningsystemisdescribedbelow.

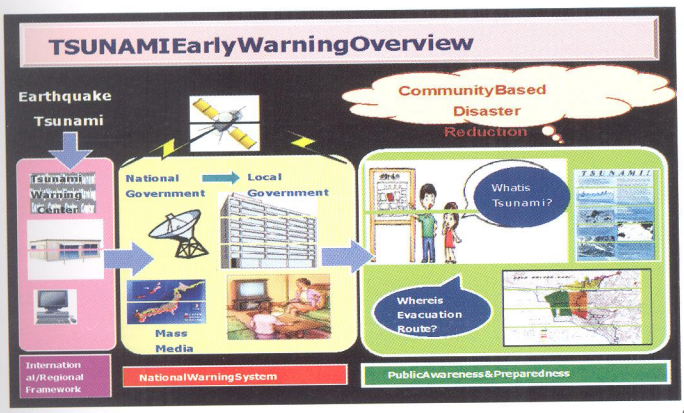
- Estimatingtheoccurrenceofatsunamibyseis micinformation(magnitude,locationanddepth)
- Databaseofthesimulationwithassumptions
- Realtimeanalysiswiththetentativefaultmodel
- Revisionofthetentativefaultmodelbytheobservationdata
- Disseminationofwarningthoughvariouscommunicationsmeans.



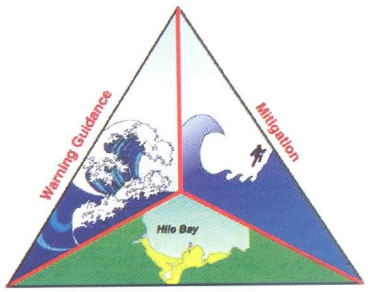
Source;JICAExpertTeamReport

Figure0.30 CurrentDisseminationofEarlyWarning

[12] Source:Environmental&HydrologicalLab,DepartmentofCivilEngineering,SantanaUniversity



Source:Presentationoncommunitypreparedness



Source:EarthquakeandTsunam i,KenjiSatake,Univof Tokyo,OneUNDRMProgramme,UNDP/NDMA

Figure0.31 EarlyWarningSystemandTh reeEssentialComponentsofTsunami

CommunityAwareness/Training/EvacuationDrill

Preparecommunitythoughawarenessraising,training ,schooleducation,emergencyresponsetraining.

Exerciseevacuationdrillandtrainthecommunityto evacuatee.g.

Evacuateimmediatelyiftoldtodoso.Followingis theevacuationtips [13]:

- Listentoyourbattery-poweredradioand followtheinstructionsoflocalemergency officials.
- Wearprotectiveclothingandsturdyshoes.
- Takeyourfamilydisastersupplieskit
- Lockyourhome.
- Usetravelroutesspecifiedbylocalauthorities –don'tuseshortcutsbecausecertainareas maybeimpassableordangerous.

Source:FocusHumanitarianAssistanceinJICAProject

Figure0.32 Evacuation DrillinMuzaffarghar

ThefollowingsarealsoeffectiveasTsunaminon-structuralmeasures.

- IdentificationofSafeEvacuationSitesandRoutes
- Zoning&Landuseplanning

[13] Source:Tsunamiawarenessbook,OneUNDRMProgramme,UNDP/NDMA.

Flood/FlashFlood

Floodsoccurwhenalargeamountofwateroverflow soverdryland.Theymayresultfromprolongedor veryheavyrainfall,severethunderstorms,monsoonra ins,ortropicalcyclones.Peoplewholivenear riversorinlow-lyingcoastalareasliv ewiththegreatestthreatoffloods.

Definition

Thedefinitionoffloodisclassifiedasisshowninthefollowingtable.

Table0.4 ClassificationofFloods

Term	MeaninginGeneral	DefinitionintheProject
(Indus)RiverFlood	Floodisa phenomenonofinundation bywatercoming fromariver,drainageorotherwaterbodies,suchas lakesorseasduetooverflowingfromordinary boundarybetweenlandandwaterorwatersurging.	IntheProject, floodrefersto"RiverFlood" resultinginrisingofthewaterlevelsofthe majorrivers,namely,Indus,Jhelum,Chenab, Ravi,SutlejandKabul.
FlashFlood	One o f flood phenomena.Aflashfloodisarapid flooding(mostlylessthan6hours)ofgeomorphic low-lyingareasduetodownpourorheavyrainscaused bylowdepression,climatefrontline(thunderstorm)or cyclone.	Floodsduetowateroverflowingthenullahor drainagelinescausedbyheavyrainand inundationbyrapidflowfromhilltorrentsin propertyareasareconsideredas"Flash Floods". Cityfloodsduetowater overflowingfromnullahordrainagechannels arealsoincludedinakindof"FlashFlood". FloodsaroundPeshawarandthesuburbsatthe endofJuly2010areconsideredas"Flash Flood"sincemostofthefloodwaters originatedfromSwatRiver.
Hill Torrent (Flood)	Hilltorrentfloods arebasicallyarapidfloodingof geomorphicsteepsurfaceareasatalluvialconesor floodplainareascausedbyoverflowingwaterfrom channelsduetorapidvelocityandanyamountofflow quantity.	
CityFlood UrbanFlood	Floodandinundation phenomenaoccurredinthecity orbuil t-upareas.	
River	Ariverisanaturalwaterway, usuallyfreshwater, flowingtowardlowerlevelof watersurfacesuchasan ocean,alake,asea,oranotherriver. Therefore, nullahsarekindoflikerivers ingeneral.	IntheProject,"River(s)"refer(s)tosix flows/channels,suchasIndus,Jhelum, Chenab,Ravi,SutlejandKabulRiversas majorriversinPakistan.
Nullah (Nallah)	APakistani term.Riversexcludinghugeriversinthe IndusRiverSystem.	Exceptforthesixriversmentionedabove,the flows,channelsandbodyofstreamwaterrefer to"Nullah".

Source:JICAExpertTeam

Typology

Riverine/RiverFlood

Slowkinds: Runofffromsustainedrainfallorrapids nowmeltexceedingthecapacityofariver's channel.Causesincludeheavyrainsfrommonsoons,hurricanesandtropicaldepressions,foreignwinds andwarmrainaffectingsnowpack.Unexpecteddraina geobstructionssuchaslandslides,ice,ordebris cancauseslowfloodingupstreamoftheobstruction.InPakistan,thefloodsalongthemiddleandlower reachesofIndus,Jhelum,Chenab,RabiandSutlejRiversareclassifiedintoRiverFlood.

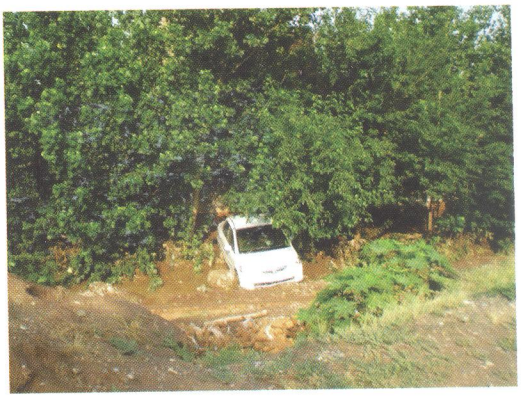
Fastkinds/FlashFlood: includeflashfloodsresultingfromconvectiveprecipitation(intense thunderstorms)orsuddenreleasefromanupstreamimpoundmentcreatedbehindadam,landslide,or glacier[14].

[14] Source:JICAExpertTeam.

Asthenamesuggests,flashfloodsareeventswithlittle timeoccurringbetweenthestartofthefloodandthe peakdischarge.

Thesefloodsnormallyoccurwithinsixhoursofthe beginningofheavyrainfallandareusuallyassociated withintensivelocalizedshowersandsevere thunderstorms.

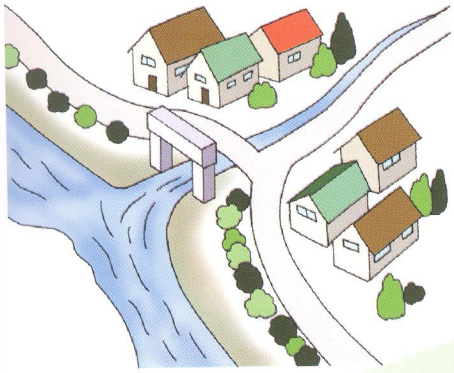
Thesefloodsareparticularlydangerousbecauseofthe suddennessandspeedwithwhichtheyoccur.



Source:Natureandcausesoffloodsandassociatedsecondaryhazards, Prof.AmirNawazKhan ,CDPM ,Universit yofPeshawar

Figure0.33 FlashFlood

Internal Flood



Source:FoundationofRiver&BasinIntegratedCommunications,Japan

Figure0.34 NormalSituationofri ver andtributaries Figur0. 35 Internal loodi Situation

Thereisanotherfloodpattern.Itisaninternalflood.Inthepictureonright,thereisafloodgateandthe floodinthemainstreamcannotflowintotheresidential area.Butthereisnothatgatein Nullahsystemin Pakistan.Therefore,thefloodflowsbackwardintothetributariesanddrainages.Thisworsensthe situation.

Tosolveinternalfloodneedsstructuralmeasuressuchasthemainchannelimprovementfirstandthen installationoffloodgatesandpumpingstatio nsattheconfluenceofthetributaries.

EstuarineCoastalfloods/Stormsurges

StormSurges: Thesearecommonlycausedbyacombinationofseatidalsurges,causedbystorm-force winds.Astormsurge,fromeitheratropicalcyclone oranextratropicalcyclone,fallswithinthis category.

Coastal: Causedbysevereseastorms,orasaresultofanotherhazard(e.g.tsunamiorhurricane).A stormsurge,fromeitheratropicalcycloneoranex tratropicalcyclone,fallswithinthiscategory.

Source:Natureandcausesoffloodsandassociatedsecondary hazards,Prof.AmirNawazKhan,CDPM,UniversityofPeshawar

Figure0.36 StormSurge

ScientificKnowledge

Causes

MeteorologicalCause

Mostfloodsaretheresultofmeteorologicalphenomenasuchas:

- Prolongedandintenserainfall
- Cyclones
- Typhoons,stormsandtidalsurges

SourceFoundationOfRiver&Basin Organizations,

SourceReuters

Figure0.37 SituationofFlood

Hydrological

Floodingcanalsobecausedbyincreasedrunoffdueto:

- Iceandsnowmelt
- Impermeablesurfaces
- Saturatedland
- Poorinfiltrationrates
- Landerosion

Anthropogenic

Mankindplaysaveryimportantroleinthemagnitudeandfrequencyoffloodsinmanydifferentways. Actually,itisthehumanactivitiesinwatercatchmentswhichdrasticallyintensifyfloods.

Source:JICA

Figure0.38 DampedGarbageinaChannel

LevelsandMagnitudeofFlood

Generalclassificationsareshowninthefollowing.

- NormalFlood(e.g.1yearflood):Regularinundationoflowlyingfarmlandiscommoninmany tropicalAsiancountries.Theyoccuralmosteveryyearandfarmingpractices,especiallyrice cultivationarewelladapted.Forecastscanbeissuedtogiveadviceregardingcroppingandsowing timestominimizelosses.
- MediumFlood(e.g.5yearflood):Causessomeecon omiclossbutisnotextensiveorserious.It affectsfarmersandpeoplelivingin lowlyingareasandbyrivers.Lossoflifeisunlikelyaspeople areusuallypreparedfortheseregularevents.
- SevereFlood(e.g.20yearflood):Riverlevelscontinuetoriseandeffectlargegeographicareas andpeoplelessfamiliarwithfloodingincluding thoselivinginurbanareas.Damageandlossesto thephysicalenvironmentandeconomicsectoraregenerallysignificant
- CatastrophicFlood(e.g.100yearflood):Inundatesextensiveareas.Theyareextremely devastatingwithmultifoldimpact stolifeandpropertyandthefloodingdoesnotonlyhavea negativeimpactbutsometimesbringsfertilitiestotheland.

Intermsofintensityofflowdischargeindicated inRoutineDailyFloodForecast(RDFF),IndusRiver floodsareclassifiedintofive(5)levelsasshowninthetablebelow.

Table0.5 ClassificationofFloodsIssuedbyFloodForecastingDivision

S.No.	Classification	Description
1	Low Flood	Afloodsituationwhentheriverisflowingwithindeepchannel(s)butis abouttospreadoverriverislands/ *belas*.
2	Medium Flood	Whentheriverflowispartlyinundatingriverislands/ *belas*butbelowhalf ofitshighestfloodlevel.
3	High Flood	Whenthewaterleveloftheriveris almostfullysubmergingislands/ *belas* andcontinuestoriseuptohighbanks/bundsbutwithoutencroachingon thefreeboard.
4	VeryHighFlood	Whenthewaterleveloftheriverflowsisbetweenhighbanks/bundswith encroachmentonthefreeboard.
5	Exceptionally HighFlood	Whenthereisimminentdangerofovertopping/breachingorabreachhas actuallyoccurredorhighbankareasbecomeinundated.

Source:PMD

FloodintensifyingConditions

Theseconditionsdeterminethekeyfeaturesofafloodevent,suchas:

- Magnitudeoftheflood
- Thespeedofonset
- Theflowvelocity
- Thesedimentloadand
- Thedurationoftheevent

FloodRisksinPakistan

Duringthelast62years,Pakistanhassufferedacumu lativefinanciallossofbillionsofUS$onaccount of16majorfloodevents,about8,000preciousliveshavesofarbeenlost,andadditionally,the dislocationofmillionsofpeoplehasbeenseen.Flood isthemajordisastertoconsider.56%oftheBasin islocatedinPakistancomprisingIndusanditstributaries:Kabul,Jhelum,Chenab,Ravi,BeasandSutlej.

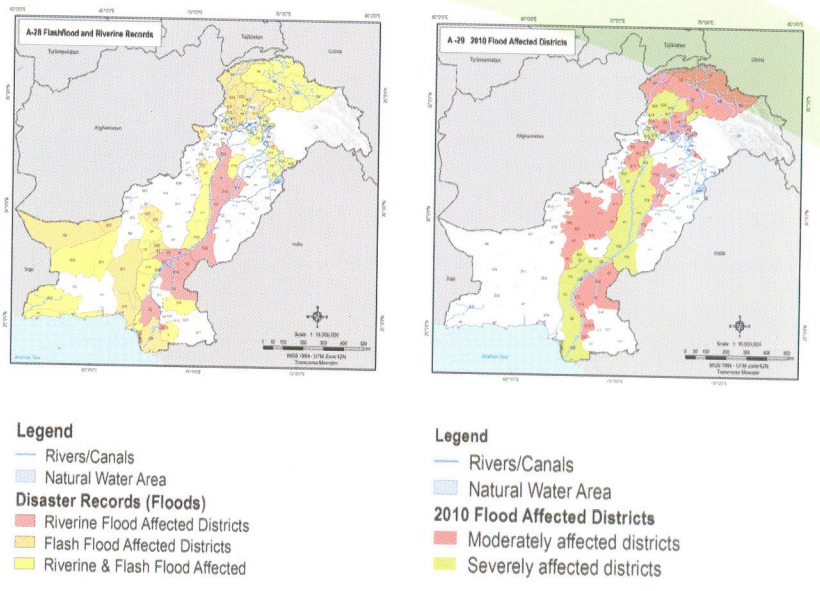


Figure0.39 TheAreasUnderThreatofFloodsinPakistan

FeaturesofthefloodsinPakistanaresummarizedasfollows.

- Thesefloodsoccurasaconsequenceofthemonsoonrains
- NorthernareasofPakistanprovidethemainwatersourcetotheriverInduswithsnowmelt providingan80%contributionandrainfall20%contribution
- InriversChenabandJhelumthemainsource ofwaterissnowmeltfromIndiaandoccupied Jammu&Kashmirbesidesflashfloods
- SimilarlyinriverSutlejandRavi,waterinflows areduetorainfallinth euppercatchmentsin Indianterritory

PerspectivesoffloodrisksituationsinPakistanaredescribedbelow.

- iverfloods
- Torrentialrainsinthehills
- Flashrainsandconsequentflashfloods
- Cyclones
- Drainageissues
- Illconceivedandimplementedprojects
- Lackofforecastingfacilitiesandcoordination
- Haphazardlanddevelopment

Impact

HistoricalEvents

FollowingisthetablewhichsummarizesthehistoricalflooddamagesinPakistan.

Table0.6 HistoricalFloodDamagesinPakistan

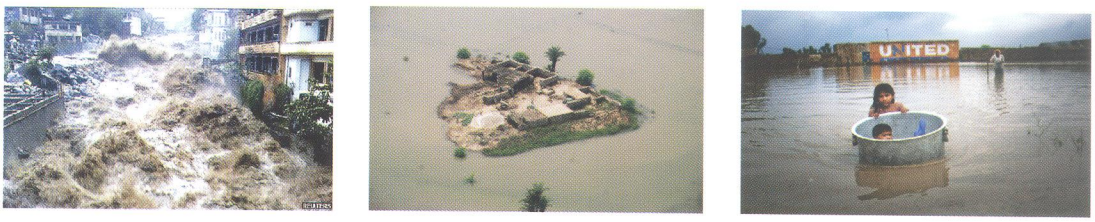
Year	ValueofPropertyDamaged(In MillionRs) Unadjusted	Adjusted	LivesLost (persons)	Villages Affected (number)	RiversMainlyAffected
2010	UnderEstimation		**1,825**	**14,316**	Kabul,Indus,Jhelum
2009	NotReported		99	89	
2008	NotReported		157	800	
2007	7,208.23		586	6,498	
2006	NotReported		541	2,477	
2005	NotReported		59	1,931	Indus
2004	15.00	15.00	85	47	
2003	5,175.00	5,175.00	484	4,376	
2001	450.00	450.00	219	50	LaiNullah
1995	6,125.00	8,698.00	591	6,852	
1992	34,751.00	69,580.00	1,008	13,208	Indus,Jhelum,andChenab
1988	6,879.00	25,630.00	508	1,000	Indus/Jhelum,&Chenab/Ravi/Sutlej
1978	4,478.00	51,489.00	393	9,199	
1976	5,880.00	80,504.00	425	18,390	Indus,Jhelum,ChenabandRavi (TarbelaDamcompletedin1974)
1973	5,137.00	118,684.00	474	9,719	Indus,Jhelum,Chenab,RaviandSutlej (ChashmaReservoircompletedin1971) (ManglaDamcompletedin1967) (WarsakDamcompletedin1960)
1957	152.50	6,958.00	83	4,498	ChenabandRavi
1956	155.50	7,356.00	160	11,609	Indus,Jhelum
1950	199.80	11,282.00	2,190	10,000	Chenab,RaviandSutlej
Total		**385,821.00**	**8,062**	**100,743**	

Source:FederalFloodCommission(FFC)

2010FloodsinIndusBasin

Followingisageneraldescriptionofthe2010flood.

- Duration:26July2010-theendof2011
- Damages:$43billion(estimated)
- Fatalities:1,781
- Areasaffected:KhyberPakhtunkhwa,Punjab,Si ndh,BalouchistanGilgit-BaltistanandAzad JammuandKashimir



Source:http://www.huffingto npost.com/2010/08/04/pakistan-flood-photos

Figure0.40 2010FloodsinIndus

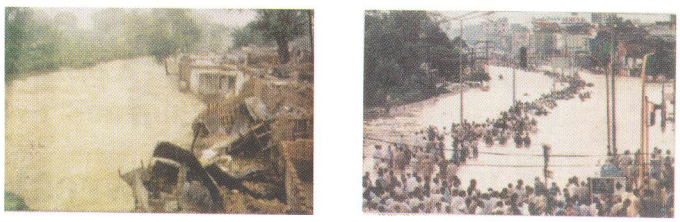
Causesofflooddamages2010

Causesoftheflooddamagesaresummarizedbelow.

- InAugust2010,morethanhalfofthenormalmonsoonrainfellinonlyoneweek.Typicallyitis spreadoverthreemonths.
- Climatechangemaynotbetheonlycauseof Pakistan'swoes.Thereisalsoasensethatthe currentfloodshavebeenexacerbatedbythewaytheIndushasbeenmanaged.
- Thatproblemhasbeenmadeworsebydeforestatio n.Treesprotecttheheadwatersfromerosion. Butoverthepasthalfcentury,moresedimenthasbeenflusheddowntheriversasforestshave beencut.
- TheIndusischokedwithsedimenterodingofftheHimalayas.Buildingleveescausestheriver channeltosiltup.
- Lackofeffectivedisseminationofearlywa rningaswellasthelowawarenesslevelof communitiestorespondtosuchwarnings.
- Unplannedlanduse,especiallyconstructiononriverbanksandfloodplanes

FloodinLaiNullah

Followingsarepicturesofthepeopleevacuatingfromfloodedroadatthetimeofthefloodin LaiNullah.



Source: Presentationonfloodforecasting&warningsystem,PMD,Pakistan

Figure0.41 PicturesofSevereFloodJuly23,2001

EffectsofFlood

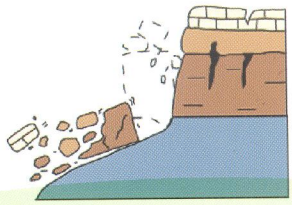
Primaryeffectsoffloodareasfollows.

- PhysicalDamages
  - Property
  - Bridges
  - Buildings
  - Sewersystems
  - Roads
  - Railwaylines
  - Canals
- Casualties-Peopleandlivestockdieduetodr owning.Itcanalsoleadtoepidemicsand waterbornediseases.

Secondaryeffectsoffloodareasfollows.

- Landslides

  Landslidesareamajorthreateachyeartohuman settlementsandinfrastructure,andcausepropertyloss. Landslidesoccurasaresultofchangesinsoilwater content,removaloflateralsu pportbyerosionorrisein groundwaterlevels.



USGS

- SoilerosionandLanddegradation

  Soilerosionremovesvaluabletopsoilwhichisthe mostproductivepartofthesoilprofile.This resultsinloweryieldsandhighercostsofproduction.

- EffectsonHealth

  DirectEffects:

  Directhealtheffectsoccurduringthefloodit selfandarecausedbythefloodwater.Forexample:

  - Injuries
  - Heartattacks
  - Mortalityfromdrowning

  IndirectEffects:

  - Epidemicdiseases
  - Poisoning
  - Post-traumaticstressdisorder
  - Unhygienicconditions

Source:Nature&causesofFloodandassociated secondaryhazards,Dr.NawazKhan,CDPM, UniversityofPeshawar

Figure0.42 SkinDisease

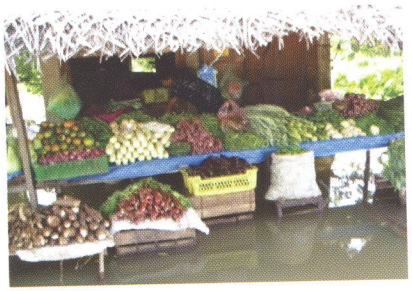
Pollution:

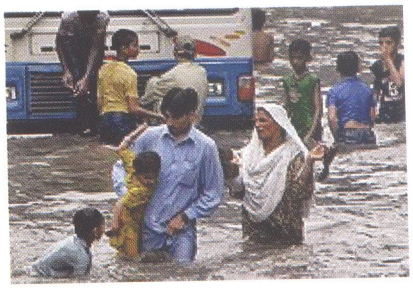
- Waterpollutionisthecontaminationofwaterbodies.
- Cleandrinkingwaterbecomesscarce. (e.g.lakes,rivers,groundwater).

- Waterpollutionaffectsplantsandorganismslivinginthesebodiesofwaterandinalmostall casestheeffectisdamagingtoindividualspeciesandpopulations,andalsotothenatural biologicalcommunities.

Tertiary/long-termeffectsoffloodareasfollows.

- Economichardship:e.g.dueto temporarydeclineintourism.
- Rebuildingcosts.
- Foodshortageleadingtopriceincreaseetc.
- Lossofproductionandprovisionofservices
- Impactoncountry'sdebtposition
- Lossofeconomicgrowth
- Delayindevelopmentprograms





Source:Nature&causesofFloodandassociatedsecondary hazards,Dr.NawazKhan,CDPM,UniversityofPeshawar

Figure0.43 SituationsofFlood

MitigationandPreparedness

StructuralMeasures

Measurestoincreasefloodflowcapacityofwaterwaysare:

- RiverchannelImprovement,
- Drainagechannelimprovement,and
- Constructionofflooddiversionchannels.

Measurestocontrolfloodrunofffromriverbasinsare:

- Constructionofdams/andstoragefacilities,
- Constructionofoff-sitefloodretardingbasins,
- Constructionofon-sitefloodregulationpondsinthenewsubdivisions,and
- Erosioncontrolandsaboworks.

Floodproofingmeasuresofindividualbuildings/unitsare:

- Raisingfloorlevelsofhomesteadsand industrialfacilitiesabovefloodlevels,
- Provisionofrefugeareasorfloodshelters,and
- Ensuringthatwatersuppliesandotherhea lthrelatedfacilitiesoperatethroughoutfloods.

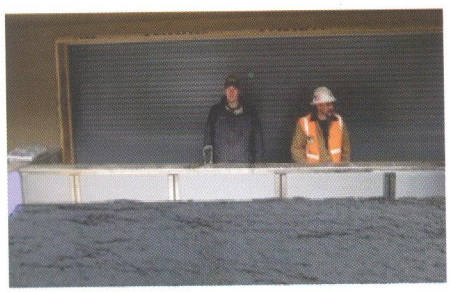
Non-structuralMeasures

Measurestoincreasefloodflowcapacityofwaterwaysare:

- Managementforremovalofgarbageandotherdriftingmaterialsinthewaterway,and
- Preventionofencroachmentintoriverarea.

Measurestocontroloffloodrunofffromriverbasinare:

- Controlofexcessivelanddevelopmentintheriverbasin,
- Legalarrangementforconstructionofon-site floodregulationpondbylanddevelopers,
- Reforestation,
- Floodwarningandevacuationsystem,
- Evacuationawareness,
- Guidancetowaterproofconstruction,
- Developmentanddisseminationoffloodhazardmaps,and
- Unificationofrelatedagenciesforfloodmitigati on(suchasestablishmentofa"FloodMitigation Committee).



Source:5daycourseonfloodmitigation(Feb17,2010),Islamabad,NDMA/UNDP

Figure0.44 Floodproofingofindividualbuildingbyconstructionofprotectionwalland evacuationshelter

FloodRiskManagement

Generaldescriptionsoffloodriskmanagementaresummarizedasfollows.

Purpose

- ReducetheFlooddamageandnumberofvictims

ActivitiesbyCommunities

- ExperienceandKnowledge
- PosterContest,Pamphlet
- DrillsandExercise
- HazardMaps
- InformationandCommunication
- AwarenessProgram,etc.

ResponsibilitiesandMainStakeholdersofFloodRiskManagement

- EmergenceResponse
  - NDMA/PDMA/DDMA(Operation),FFCRescue1122,Police,FireFighting,ArmedForce, CivilDefense,etc.
- Recovery&Reconstruction
  - NDMA/PDMA/DDMA(Rehabilitation&Recons truction),FFC,IrrigationDept.,WASA, RDA,ArmedForce,etc.

- Preparedness
  - NDMA/PDMA/DDMA(Management&Planning),Rescue1122,CivilDefense
  - FFC,PMD,IrrigationDpt.,WASAandotherconcernedagencies

ClassificationofFloodrelateddisasters

- Flood/(IndusRiverFlood): "(Indus)RiverFlood"includesfloodingalongtheINDUS, JHELUM,CHENAB,RAVI,SUTLEJandKABULRive rsinthedownstreamstretchesofMajor Dams(Tarbela,Mangla).
- FlashFlood:FlashFlood"includesnotonlyHillTorrent/NullahFloodbutalsocityflood. ComparedtoRiverFlood,thefloodingperiodisshorterbuttheirflowshavecomparativelyrapid velocities. "FlashFlood"resultsfromshort- timeextremerainfallphenomenawithinnarrow range.
- LandSlide:Strictlyspeakingfromgeological engineeringaspects,"SlopeFailure"and"Land Slide"havedifferencesinthemechanismofcollapse. Thesephenomenaaretreatedas"Land Slide"intheProjectsincemethodologyofpu blicawarenessandpub licevacuationregarding EWSismostlythesameapproach.

  Besides,"LandSlides"resultfromnotonlyfrom thesoilintheslopebeingsaturatedwithwater butalsofromearthquakes. Asforanearlywarningsystem,a"LandSlide"causedbysaturated slopesduetoheavyrainfallmaybeconsidered.
- Cyclone: Acycloneisalow/depressionbeyonda certainintensificationofclosed,circularfluid motionrotatinginthesamedirectionastheEarth. Whiletropicalcyclonescanproduce extremelypowerfulwindsandtorrentialrain,theyarealsoabletoproducehighwavesand damagingstormsurge.
- StormSurge:AStormsurgeisthephenomenaof sealevelriseassociatedwithalowpressure weathersystem,typicallyatropicalcyclone. Ther efore,anearlywarningplanfor"StormSurge" shouldbeincorporatedwiththatof"Cyclone".
- Drought:Adroughtisanextendedperiodofweeks,monthsoryearswhenaregion/provincenotes adeficiencyinitswatersupply. Generally,thisoccurswhenaregionreceivesconsistently belowaverageprecipitation. Inaddition,extrem eclimateconditionsmayoccurinthefuturedue toglobalwarning. Thiscouldhaveasubstantialimpactontheecosystemandagricultureofthe affectedregion.

AdditionalInformation

Safetymeasuresbeforeandduringfloods

Safetymeasuresbeforeandduringfloodsaresummarizedbelow.

BeforeFloods

- Knowyourlocalfloodhistory.

- Findoutfromlocalgovernmentagenciesorexpertsatwhatriverheightyouareunsafe.
- Avoidbuildinginafloodplainunlessyouelevateandreinforceyourhome.
- Findouttheevacuationroute.
- Elevatethefurnace,waterheater,andelectricpanelifsusceptibletoflooding.
- Install"checkvalves"insewertrapstoprevent floodwaterfrombackingupintothedrainsof yourhome.
- Constructbarriers(levees,berms,floodwalls)tostopfloodwaterfromenteringthebuilding.
- Sealwallsinbasementswithwaterproofingcompoundstoavoidseepage.

DuringaFlood

- Listentotheradioortelevisionorlocal/governmentauthorities(ifpresent)forinformation.
- Beawarethatflashfloodingcanoccur.Ifth ereisanypossibilityofaflashflood,move immediatelytohigherground.Donotwaitforinstructionstomove.
- Beawareofstreams,drainagechannels,canyons ,andotherareasknowntofloodsuddenly.Flash floodscanoccurintheseareaswithorwithoutsuch typicalwarningsasraincloudsorheavyrain.

Drought

Definition

Droughthasmanydefinitions.Oneofthemostcommonlyacceptteddefinitionsisthatdroughtoccursin circumstancesarisingdueto"temporaryreductionin wateravailabilitybelow thenormalorexpected levelforaspecifiedperiod".

Source:PresentationondisasterpreparednessbyNaveedShahad

Figure0.45 SituationofDrought

Adrought isanextendedperiodofmonthsoryearswhenaregionnotesadeficiencyinitswatersupply. Generally,thisoccurswhenaregionreceives consistentlybelowaverageprecipitation.

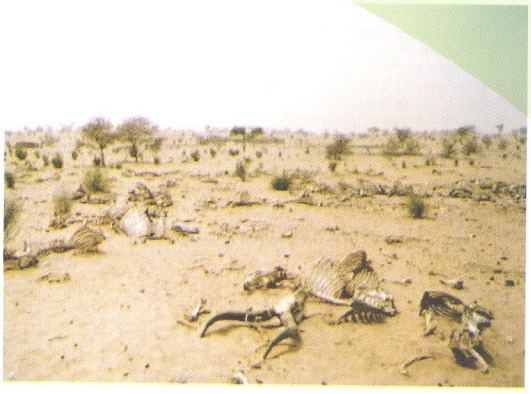
Types

Meteorological

Meteorologicaldroughtisbroughtaboutwhenthereisaprolongedperiodwithlessthanaverage precipitation.Meteorologicaldroughtusuallyprecedes theotherkindsofdrought.Meteorologicaldrought isdefinedasoccurringwhentheseasonalrainfallrece ivedoveranareaislessthan75%ofitslong-term averagevalue.

Agricultural

Agriculturaldroughtsaffectcropproductionorthe ecologyoftherange.Thisconditioncanalsoarise independentlyfromanychangeinprecipitation levelswhensoilconditions anderosiontriggeredby poorlyplannedagriculturalendeavorscausea shortfallinwateravailabletothecrops.However,in atraditionaldrought,itiscausedbyanextended periodofbelowaverageprecipitation. Anagriculturaldroughtoccurswhenthereisnot



Source:Presentationondisasterpreparednessby NaveedShahad

Figure0.46 SituationofDroughtArea

enoughsoilmoistureandtherainfallisn'tadequate tosupportcrops.Agriculturedroughthappensafter meteorologicaldrought.

Hydrological

Hydrologicaldroughtisbroughtaboutwhenthewate rreservesavailableinsourcessuchasaquifers, lakesandreservoirsfallbelowthestatisticalaverage. Hydrologicaldroughttendstoshowupmoreslowly becauseitinvolvesstoredwaterthatisusedbutnot replenished.Thisreferstomarkeddepletionof surfacewaterandfallinwaterta bles.Generally,hydrologicaldroughtfollowsagriculturedrought.

Socio-economic

Socioeconomicdroughtoccurswhenthedemandforaneconomicgoodexceedssupplyasaresultofa weather-relatedshortfallinwaters upply.Thesupplyofmanyeconomicgoods,suchaswater,forage, foodgrains,fish,andhydroelectricpower,dependson theweather.Duetovariabilityofclimate,water supplyissufficientinsomeyearsbutnotsatisfact orytomeethumanandenvironmentalneedsinother years.Thedemandforeconomicgoodsisincreasingas aresultofincreasingpopulation.Supplymayalso increasebecauseofimprovedproductionefficiencyandtechnology.

ScientificKnowledge

Causes

Natural

Generally,rainfallisrelatedtothe amountofwatervaporintheatmosphere,combinedwiththeupward forcingoftheairmasscontainingthatwatervapor.If eitheroftheseisreduced,theresultisdrought.

Factorsinclude:

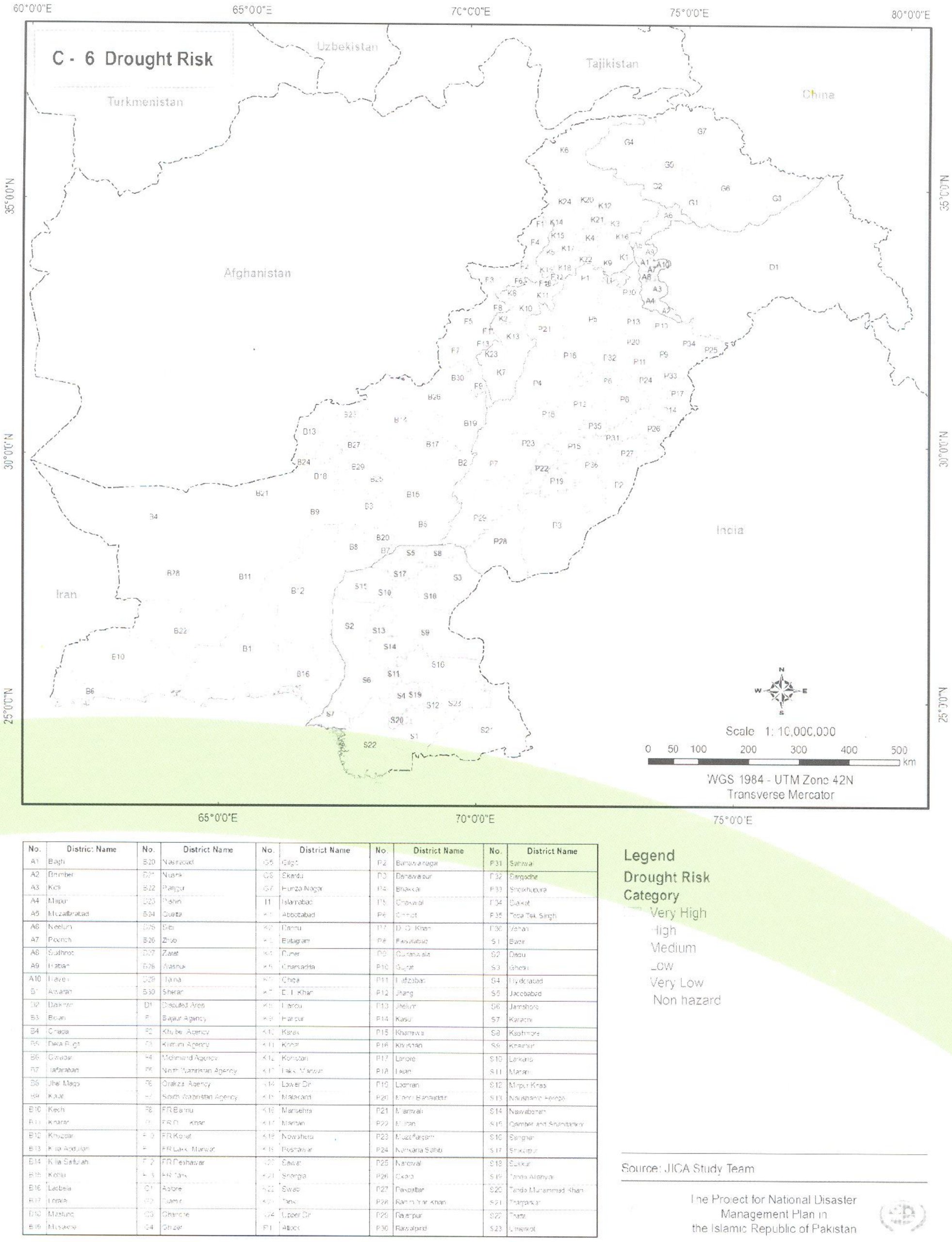
- Above averageprevalenceofhighpressuresystems
- Windscarryingcontinental,ratherthanoceanicairmasses(ie.reducedwatercontent)
- ElNino(andotheroceanictemperaturecycles)
- Deforestation
- Somespeculatethatglobalwarmingwillhavea substantialimpactonagriculturethroughoutthe world,andespeciallyindevelopingnations.

HumanInducedCauses

Environmentaldegradation,especiallythelossofgree ncoverfieldsaffectsrainfallreceivedintheregion, increasingthepossibilityofwaterscarcity.

DroughtrisksituationinPakistan

Figure0.47describesthedroughtrisksituationinPakistanbyareas[15].



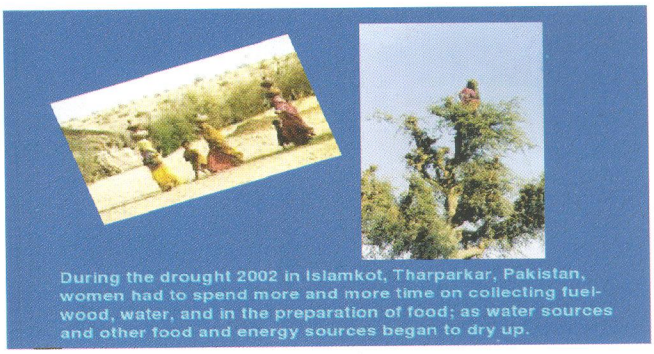
Source:JICAExpertTeam

Figure0.47 DroughtRiskMapofPakistan

[15] Earthquakehazardandriskmaps,alongwithotherdisasterswerepreparedintheJICAprojectfor"NationalDisasterManagementPlaninthe IslamicRepublicofPakistan"in2010.

Impact

Agriculturalgrowthsufferedaseveresetbackduri ng2000-2002asaresultofdrought.Themajomrcrops registeredareductionofalmost10%whiletheoverallagriculturerecordedareductionof2.6%.The droughtpersistedthroughout2001-2002,resultingin awatershortageofasmuchas51%ofnormal suppliesasagainst40%inthepreviousyear.Thetotalflowofwaterinmajorriversdeclined(to109 billionm³againstanaverageof162billionm³)33%fromtheaverage.Rainfallhadalsobeenbelow normal.Thecanalheadwithdrawalshad alsowitnessedsignificantdecline.



Source:Genderissuesindisastermanagement,glimpsefromSouthAsia,Madhavia, IIDGSouthAsia,Colombo

Figure0.48 GenderIssuesonDrought

HistoricalReview

Featuresofdroughtof1997-2001in Pakistanaresummarizedbelow.

- Thisdroughtcausedalossof Pak.Rs.71.50billion intheagriculturalandlivestocksectorinthe year1999-00inPakistan.
- About2.21millionpeopleand23.51millionlive stockwereaffectedduetoseveredrought conditionsduring1999-2000.
- SindhhadtofacePak.Rs.33billionlossesduetodroughtandwatershortage.
- Thelossoflivestocktodroughtwasabout40%inBalouchistanand60%inSindh

Table0.7 Impactof1997-2001Drou ghtonAgricultureinBalouchistan

Crop	%ageoffarmers thatgrowcrops		AverageAreaSown (ha)		AverageArea Damaged(ha)	
	RainfedIrrigated		RainfedI	rrigated	RainfedIrrigated	
Wheat	38.296.7	5.6 2.5 4.8	0.0			
Cotton	1.81.7	0.48.1	0.23.2			
Fodder	2.84.9	2.2	1.0	1.40.6		
Vegetable	25.47.0	1.7 1.6	1.3	0.6		
Orchards	32.00.0	0.0 2.8	0.0	2.1		

Source:Presentationon:DroughtinPakistanbyJICAStudyTeam

Effects

Economiceffectsofdroughtsareasfollows.

- Lossofnationaleconomicgrowth,slowingdownofeconomic development

- Damagetocropquality,lessfoodproduction
- Increaseinfoodprices
- Increasedimportationoffood(highercosts)
- Increasedinfestation
- Plantdisease
- Lossfromdairyandlivestockproduction
- Unavailabilityofwaterandfeedforlivestock whichleadstohighlivestockmortalityrates
- RangefiresandWildlandfires
- Damagetofishhabitat,lossfromfisheryproduction
- Incomelossforfarmersandothersaffected
- Unemploymentfromproductiondeclines
- Losstorecreationalandtourismindustry
- Lossofhydroelectricpower
- Lossofnavigabilityofriversandcanals

Environmentaleffectsofdroughtsareasfollows.

Physical

- Scarcityofwaterfordrinking,domesticandirrigationpurposes
- Depletioningroundwaterlevel
- Reducedflowfromperennialwatersources
- Landdegradation

Bio-physical

- Increaseindeforestation
- Scarcityoffodder
- Damagetocropquality
- Livestockdeathorincapacitation
- Unusualmovementsofflocksandherdsinsearchofpasture
- Impairedproductivityofforestlands
- Directlossoftrees,especiallyyoungones
- Extinctionofendangeredspeciesandlossofbio-diversity
- Dryingupofwatersourcesanddeteriorationinwaterquality
- Damagetofishhabitat
- Declineincropproduction/negativeimpactsonagriculturaleconomy

Socialeffectsofdroughtsareasfollows.

- Foodshortages
- Lossofhumanlifefromfoodshortages,heat,suicides,violence
- Mentalandphysicalstress
- Wateruserconflicts
- Politicalconflicts
- Socialunrest
- Publicdissatisfactionwithgovernmentregardingdroughtresponse
- Inequityinthedistributionofdroughtrelief

- Lossofculturalsites
- Reducedqualityoflifewhichleadstochangesinlifestyle
- Increasedpoverty
- Populationmigrations
- Negativeimpactsonnutritionalstatus

Effectsonincreasedmental&physicalstress(e.g.anxi ety,depression,lossofsecurity,domesticviolence etc.)andmorbidityareasfollows.

- Increaseincrimerate
- Socialcostofmigration,e.gbreakupofcommunitiesandfamilies
- Inabilityofcertaingroupswithinthepopulationtoaf fordincreasedfoodpricesresultsinswitchto cheaperandsometimeslesspr eferredfoods/reductioninoverallfoodintakeetc.
- Lossofeducationduetoreductioninschoolatte ndancebychildrenlackingenergyand/ormoney forfees,andincreaseinchildlabor

MitigationandPreparedness

Droughtisanaturalhazard,ithasaslowonset,anditev olvesovermonthsorevenyears.Itmayaffecta largeregionandcauseslittlestructuraldamage. Theimpactsofdroughtcanbereducedthrough preparednessandmitigation.Someofthepr eparednessandmitigationmeasuresare

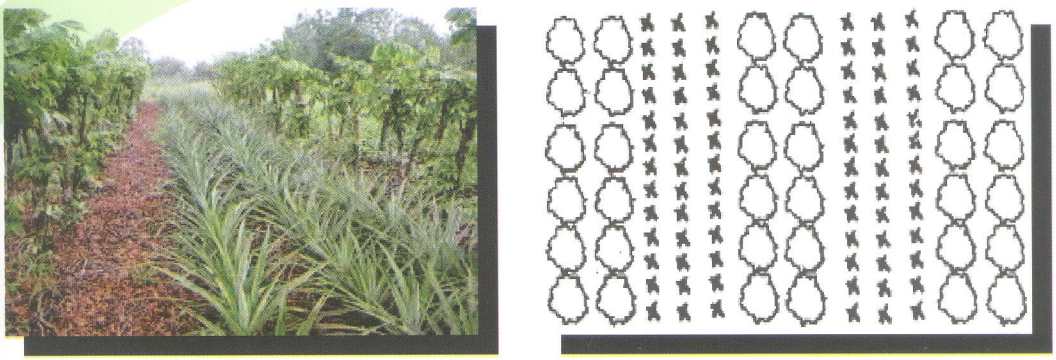
WaterConservation

Meansofwaterconservationareasfollows.

Water-SavingDevices -shouldbeincorporatedintodailylif eforusinglesswater(low-flowtoiletsand showerheads,andsoon).

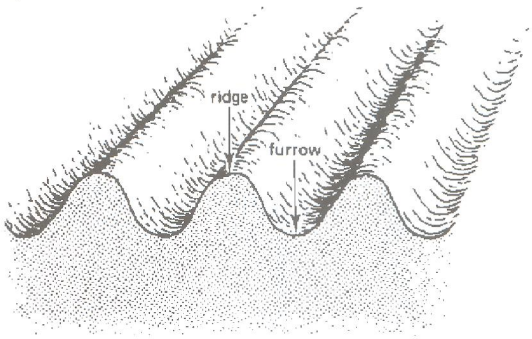
WaterRecycling -Formerwastewater(sewage)thathasbeentreatedandpurifiedforreuse.

Landuse -Carefullyplannedcroprotationcanhelptominimizeerosionandallowfarmerstoplantless water-dependantcropsindrieryears.



Source:WajidAli,TheNationalCentreofExcellenceinGeology,UniversityofPeshawar

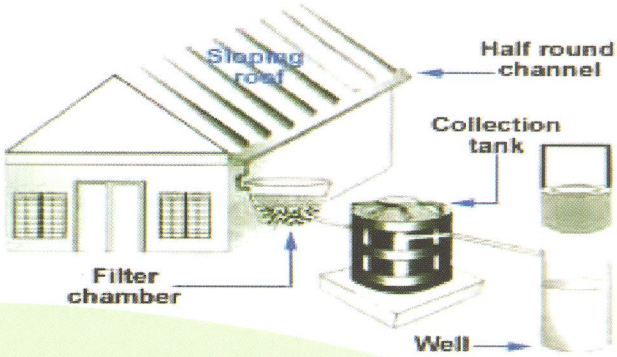
Figure0.49 AlleyCropping



Source:WajidAli,TheNationalCentreofExcellenceinGeology,UniversityofPeshawar

Figure0.50 FurrowSystem

Rainwaterharvesting -Collectionandstorageofrainwaterfromroofsorothersuitablecatchments



Source;Reportonschoolsafe tyinitiatives(Drought),India

Figure0.51 RainHarvestingSystem

Transvasement-Buildingcanalsorredirectingriversasmassi veattemptsatirrigationindrought-prone areas

Outdoorwater -userestriction-Regulatingtheuseofsprinklers,hosesorbucketsonoutdoorplants, fillingpools,andotherwater-intensivehomemaintenancetasks

DroughtMonitoring

Benefitsofdroughtmonitoringanditsmethodsaresummarizedbelow.

- Continuousobservationofrainfalllevelsandco mparisonswithcurrentusagelevelscanhelp preventman-madedrought.Forinstance,analysis ofwaterusageinYemenhasrevealedthattheir watertable(undergroundwaterlevel)isputatgr averiskbyover-usetofertilizetheirKhatcrop. Carefulmonitoringofmoisturelevelscanalsohelp predictincreasedriskofwildfires,usingsuch metricsastheKeetch-ByramDrought IndexorPalmerDroughtIndex.
- Creating,Storing,andDistributingWaterSupplies

- Buildingtheinfrastructureforwatersuppliesin droughtproneareas.(Dams,canals,Pipelines, wells,andsoon.)
- DesalinationofSeawaterfo rirrigationorconsumption

AdditionalInformation

VegetationCover

Environmentalimprovementshelptorestoreecologyin theregion.VegetationCoverhe lpstherainwatertoseep intotheground.Thiswouldincreasethewatertableand overtimeprecipitationisalsoincreasedduetothe vegetationcover.

Alongtermdefenseagainstdroughtisconstructionof damsandreservoirsforartific ialstorageofwater.This wateristhensuppliedtothewatersupplysystemfrom thesestoragereservoirs.Waterisstoredinthereserv oirsduringhighrainfallperiodsandthenisused duringtheleanrainfallperiod.VillagePondsandTanksarealsogoodstrategiestocombattheeffectsof droughts.Thecapacityofthesepondsandreservoirswilldecreaseduetothedepositionofsiltwhichis carriedwiththewaterthatcomesintothereservoirs. Thissettlesatthebottom.ThusPeriodiccleaningof thesereservoirsisnecessaryasthecapacityofthes eponds,reservoirsetcwilldecreasebythedeposition ofsiltwhichiscarriedinthewater.

Source:WajidAli,TheNationalCentreofExcellencein Geology,Universit yofPeshawa r

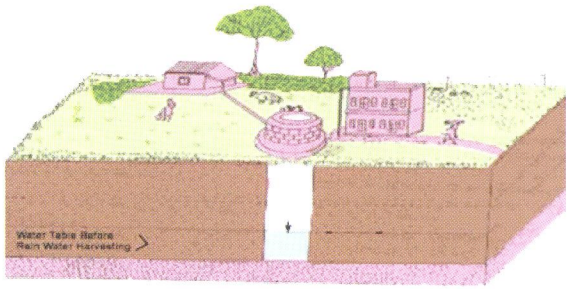
Figure0.52MultingandNoTillageMethod

WaterShedManagement

Thelandareathatshedswaterintoaparticularriveriscalleditswatershed.Thesurfacerunofffromthis areaultimatelyfindsitswaytotheriver.Whenthewa tershedoftheriverisheavilyforested,thesurface runoffisless.Rootsofthetreesandlitteredleaves onthegroundhelpinabsorbingwater.Howeverin deforestedareas,therunofffromthewatershedis considerable.Waterhereisnotretainedinthe watershedandthusflowsintoitsriverandthento thesea.Thisleadstolessgroundwaterreplenishment andthewellsalsogetdryduringleanseasons.Itisthereforeimportanttogrowmoreandmoretrees whereeverpossibleorbuildembankmentswhichwillalsohelptoreducesoilerosion.

RainWaterHarvesting

Rainwaterharvestingisthecollecti onofrainwater.Rainwaterthusco llectedcanbestoredforeither directuseorcanberechargedintotheground.Inotherwordsitimpliescatchingrainwaterforuseatthe placewhereitfalls.

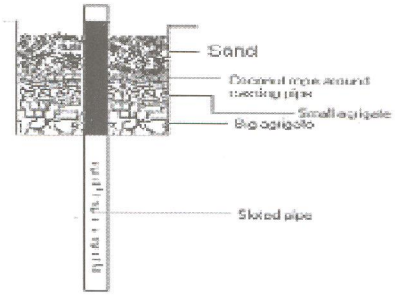


Source;Reportonschoolsafe tyinitiatives(Drought),India

Figure0.53 RainWaterHarvesting

RechargingGroundWaterTubewellrecharging

Usingthissimpletechniqueyoucanrechargeyourtubewellwithrainwaterbydivertingthefarmwater towardsthetubewellthroughafiltersystem.Inthera inyseasonallrainwaterwill gointothetubewell



Tube well recharge

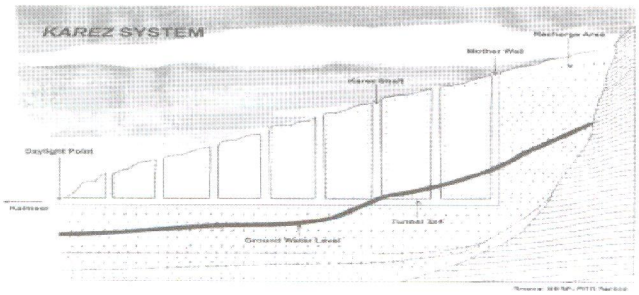
Source;Reportonschoolsafetyinitiatives(Drought),India

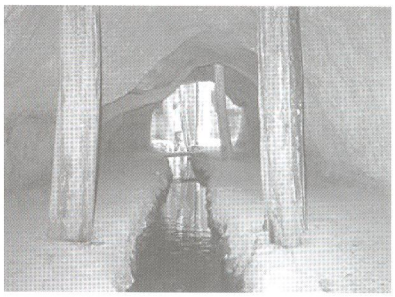
Figure0.54 TubeWellRecharging

DroughtMitigationmeasuresinPakistan

Waterharvestingconservationbytraditionalmethods

WaterharvestingisacommonpracticeinSindhandBalouchistan.Waterharvestingcapturesrainfalls and/orrunoffandutilizesitfordrinkingorfarminge itherdirectlyorstoringinsmallsurfacepondsand sub-surfacereservoirsliketheKrezsystem.





Source:ReportonDroughtmitigationinPakistan,CurrentStatus andoptionsforfuturestrategybyShahidAhmed,Zahid Hussain,RashidaMajeedandMohammadSaleem

Figure0.55 TraditionalKarezSystem

SmallDams

Severalsmallscaledamshavebeenconstructedin hillyandmountainousareasatsomeplacestostore rainwater.ThesearetypicalintheKohistanareaofSindh.

Wells

Inmostoftherangelands,themostdependableandcommonsourceofwaterisawellwhereground waterisofdrinkablequality.Thewellsaredugalongriverbedsandchannelstoharvesttheshallow seepagewater.

Source:ReportonDroughtmitigationinPakistan,CurrentStatusandoptionsforfuture strategybyShahidAhmed,ZahidHussain,RashidaMajeedandMohammadSaleem

Figure0.56 Well

Artificialrechargetogroundwater

Apossiblesolutionisartificialrechargeofgroundw ater. Theartificialrech argetechniquesinclude plantingofappropriateplantspecies

- invertedwells
- rechargedams
- loosestonecheckdams
- deepdugwells
- pondsandrechargebasins
- depressions
- benching
- spreadingofwater

Watersourceimprovement

Considerablewastageofwateroccursinwatercourse s.InSindhProvince,suchlosseswereintherange of44%.AfterliningwithPolyVinylChloride(PVC) Geo-membrane,waterlosseswerereducedto33%. OverallinPakistan,about33%oftota lwatercourseshavebeenimproved.

ImprovedFurrow-ridgeplanting

ThebasinirrigationmethodiscommonlyusedintheSindhandBalouchistanprovinces,withthehighest waterconsumptionandthelowestwaterefficiency.Furr ow-bedirrigationiscons ideredthemostefficient

methodofwaterapplication.Raisingrowcropslikecottononbedswithrow-to-rowspacingof75cmis gainingpopularityamongstthefarmers,mainlybecauseit saveswater;thecostofcropproductionisalso substantiallyreduced.Plantingofcotto ninbedsandfurrowirrigationhaveresultedina30-35%increase inyieldwitharounda40-45%savinginwater (InternationalWaterManagementInstitute:IWMI1999a). Thetechniqueisalsobeingevaluatedforriceproductionandhasthepotentialtogrowricewithless water(Gilletal.2002)

Adjustingcroppingpatterns

Sindh:Cottoninsteadofrice,sugarcaneinsteadofmangoandbananaorchards

Balouchistan:AppleorchardsreplacedwithPomegranate

DroughtMonitoring

Monitoringofdroughtrelatedhydrometeorologicala ndothervariablesinPakistaniscarriedoutby severalagencies,includingthePakistanMeteorologicalDepartment,WaterandPowerDevelopment Authority,ProvincialIrrigationandDrainageAuthoritiesandDistrictGovernments.

Developingregionaldroughtmonitoringsystems

Thesuccessofdroughtpreparednessandmitigationde pends,toalargeextent,upontimelyinformation onthecomponentsofanydroughtmanagementprogram.Droughtmonitoringandearlywarningsystems shouldbethemajornationalinitiativesemphasizethisneed.

Analysisofdroughtrelatedpoliciesandinstitutions

Thesuccessofdroughtmitigationisdeterminedby theeffectivenessofdroughtrelatedpoliciesand institutions.

Anumberofissuesforpolicydevelopmentwillcertainlyalsoemergefromtheresultsofsocio-economic surveysdescribedinthenextsection.

Allstudiesemphasizethatashiftisneededfromth ecurrentemphasisonad-hocreliefmeasuresto droughtpreparednesswithafocusonmeasurestakeninadvanceofadrought.

APakistanstudyrevealedthatnonational-levelinte gratedinstitutionalmechanismisoperationalinthe countryatpresentandthatdroughtrelatedprogramsat federalandprovinciallevelsandtheeffortsofcivilsociety andNGO'sarenotcoordinated.Thesuggestionwasmadeto developaNationalDroughtPolicyCommission,whichwill guidetherelevantpolicyand institutionaldevelopmentfor droughtmitigationandwill coordinatethedifferent ministriesandlineagenciesinvolved.Forimplementationof theNationalDroughtPolicytobe developed,itissuggested toestablishanapexorganization,whichwouldcoordinate andmonitorpolicyinterventionsatthefederalleveland

Source:WajidAli,TheNationalCentreof ExcellenceinGeology,UniversityofPeshawar

Figure0.57 WaterDrippingIrrigation

motivateprovincialgovernmentsto establishsimilarorganizationalset- ups.Adroughtexpert'sinputwill beusefultopreparetheoutlineforthe proposedorganizationatalllevels.

Socio-economicSurveys

Wherelivelihoodsofthelargestrataofpopulationaredirectlydependentonagriculture,physicalwater availabilityandaccesstoreliablewatersourcesareth etwofundamentalfactorsinfluencingthelevelof povertyingeneralandthemagnitudeofdetrimental impactsofdroughtsandresponsestodroughtin particular.Theagriculturalsectoristhemostvuln erabletodrought.Traditionalirrigationsystemsget completelyexhaustedduringprolongeddroughtsand rehabilitationofsuchsystemsshouldbegivena priority.

Consequencesofdroughts

Theconsequencesofdroughtsaresummarizedbelow.

- Diminishedcropgrowthoryieldproductionsandcarryingcapacityforlivestock
- Dustbowls,themselvesasignoferosion,whichfurthererodethelandscape
- Duststorms,whendroughthitsanareasufferingfromdesertificationanderosion
- Famineduetolackofwaterforirrigation
- Habitatdamage,affectingboth terrestrialandaquaticwildlife
- Malnutrition,dehydrationandrelateddiseases
- Massmigration,resultingininternaldisplacementandinternationalrefugees
- Reducedelectricityproductionduetoinsufficient availablecoolantforpowerstations;andreduced waterflowthroughhydroelectricdams
- Shortagesofwaterforindustrialusers
- Snakemigrationsandincreasesinsnakebites
- Socialunrest
- Warovernaturalresources, includingwaterandfood

PresentDroughtSituationinPakistan

PresentdroughtsituationinPakistanareasfollows.

- TheGovernmentofBalouchistanhasdeclaredall 22districtsascalamityhitonaccountofdrought. Theonlyexceptionsaretheurbanpartsof QuettaandPatFeederregions.Theaffecteddistrictsare Quetta,Chagai,Kharan,Khuzdar,Kalat,Mastung, Loralai,KillaSaifullah,Pishin,Zhob,Kohlu, Lasbela,Sibi,DeraBugti,Ziarat,Awaran,Ke ch,Panjgoor,KillaAbdullah,Gwadar,Kachhiand un-irrigatedareasofTehsilsChattarandTambooofNasirabadDistrict.
- TheGovernmentofSindhhaslikewisedeclaredtheentireTharparkarandDadudistrictscalamity hitalongwithpartsof10otherdistrictsaswellas thedefunctMalirdistrict.Thedistrictsdeclared

calamityhitare:Tharparkar,Dadu,Thatta,Mi rpurkhas,Badin,Ghotki,Sanghar,Larkana, Jacobabad,Sukkur,Khairpur,Shikarpurandpartsofthedefunct Malirdistrict.

- AttockDistrictinPunjabhasalsobeendeclaredcalamityhitbytheProvincialGovernmentdueto thedrought.Additionally,therainfedregionsofPu njabprovincenamely:Pothoharbelt,Mianwali, D.G.Khan,Rajanpurandsoutherndistrictsof Punjabprovincecontinuetosufferfromserious droughtaffects.
- TheKhyber-PakhtoonkhwaGovernmenthasdeclared HaripurandMansehradistrictsascalamity hit.Thesoutherndistrictsoftheprovincename ly:Kohat,Karak,BannuandD.I.Khanalsoare impactedbytheilleffectsofdrought.

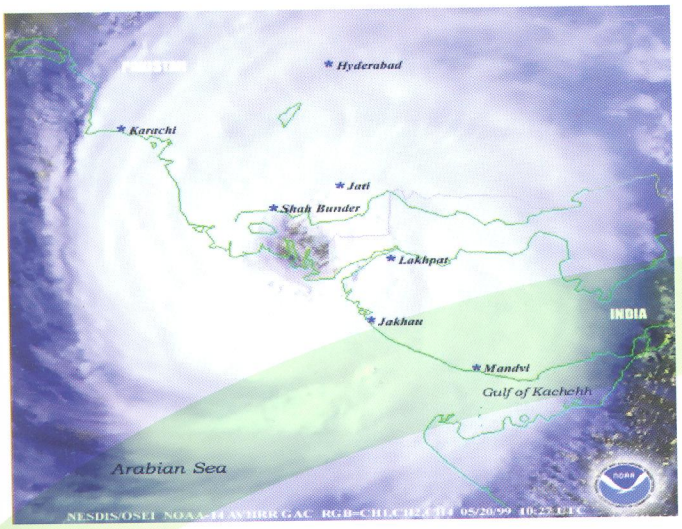
Cyclone

Acycloneisanareaofclosed,circularfluidmotionro tatinginthesamedirectionastheEarth.Thisis usuallycharacterizedbyinwardspiralingwindsthat rotatecounterclockwiseintheNorthernHemisphere andclockwiseintheSouthernHemisphereoftheEarth.

ScientificKnowledge

Causes

Cyclones(includingtyphoonsandhurricanes)arecau sedbywarmtropicalmoisturebearingclouds developinginopenoceansorseas.Cyclonescanonly formoverwarmwatersinthetropicalregionsof theoceanswheretheseatemperaturesare26.5degreesCelsiusorhigher.Theyoccurinareasofverylow pressurewhenairthatisheatedbythesunrisesra pidly,andbecomessaturatedwithmoisturewhichthen condensesintohighthunderclouds.



Cyclonescirculate counterclockwiseinthe NorthernHemisphereand clockwiseintheSouthern Hemisphere

Source: NationalOceanicAtmosphericAdministration(NOAA), CyclonicStormonThatta&BadinDistrictson20/05/1999.

Figure0.58 CyclonestormonThattaandBadinon20/05/1999

Whenthehotairrises,coolerairrushesintofillthear ealeftvacantbythehotai r.TheCoriolisEffectof theEarthspinningonitsaxiscausestheairtospiral upwardswithconsiderableforce.Thisinturncauses thewindstorotatefaster,causingthetropicallowto deepeninintensityintoatropicaldepression,and eventuallyacyclonewhichisanywherebetweenhundreds ofkilometerstothousandsofkilometerswide.

Formation

Fouratmosphericandoceanicconditionsarene cessaryfordevelopmentofacyclonicstorm

- Awarmseatemperatureinexcessof26°C,toadepthof60m.

- Highrelativehumidity(degreetowhichtheairis saturatedbywatervapor) oftheatmospheretoa heightofabout7000m.
- Atmosphericinstability(anaboveaveragede creaseoftemperaturewithaltitude)
- Alocationofatleast4-5degreesoflatitudefromth eEquatorallowstheinfl uenceoftheforcesdue totheearth'srotation(Coriolisforce)totake effectininducingcyclonicwindcirculationsaround lowpressurecenters.

TypesofCyclones

Typesofcyclonesarecategorizedasfollows.

- A **tropicalcyclone** isthegenerictermfornon-frontalsynopticscalelow-pressuresystemsover tropicalorsub-tropicalwaters withorganizedconvection(i.e.th understormactivity)anddefinite cyclonicsurfacewindcirculation.
- **TropicalDepressions** isacyclonewithmaximumsustainedsurfacewindsoflessthan17m/s(34 kt,39mph).
- If**TropicalStorm**iswithwindsofatleast17m/s(34 kt,39mph),anameisassigned.Ifwinds reach33m/s(64kt,74mph),thentheyarecalledasfollows.
  - **"hurricane"**:occursintheNorthAtlanticOcean,theNortheastPacificOceaneastofthe dateline,ortheSouthPacificOceaneastof160oE
  - **"typhoon"**: occursintheNorthwestPacificOcean,westofthedateline
  - **"severetropicalcyclone"** :occursintheSouthwestPaci ficOcean,westof160oEor SoutheastIndianOceaneastof90oE
  - **"severecyclonicstorm"** :occursintheNorthIndianOcean
  - **"tropicalcyclone"** :occursintheSouthwestIndianOcean

Tropicalcyclonesareclassifiedaccordingtothemaximumwindswhichaccompanythemasindicatedin thefollowing:

Table0.8MajorTypesofCyclone

Type		Classification
Depression		windsupto33Knots
Cyclone	Storm	windsfrom34to47Knots
	SevereTropicalStorm	winds from48to63Knots
	CategorizedCyclone(Hurricane)	windsof64Knotsormore

Source:PMD

ScalesofIntensity

Intensityofa"tropicalcyclone"isdeterminedaccordingto:

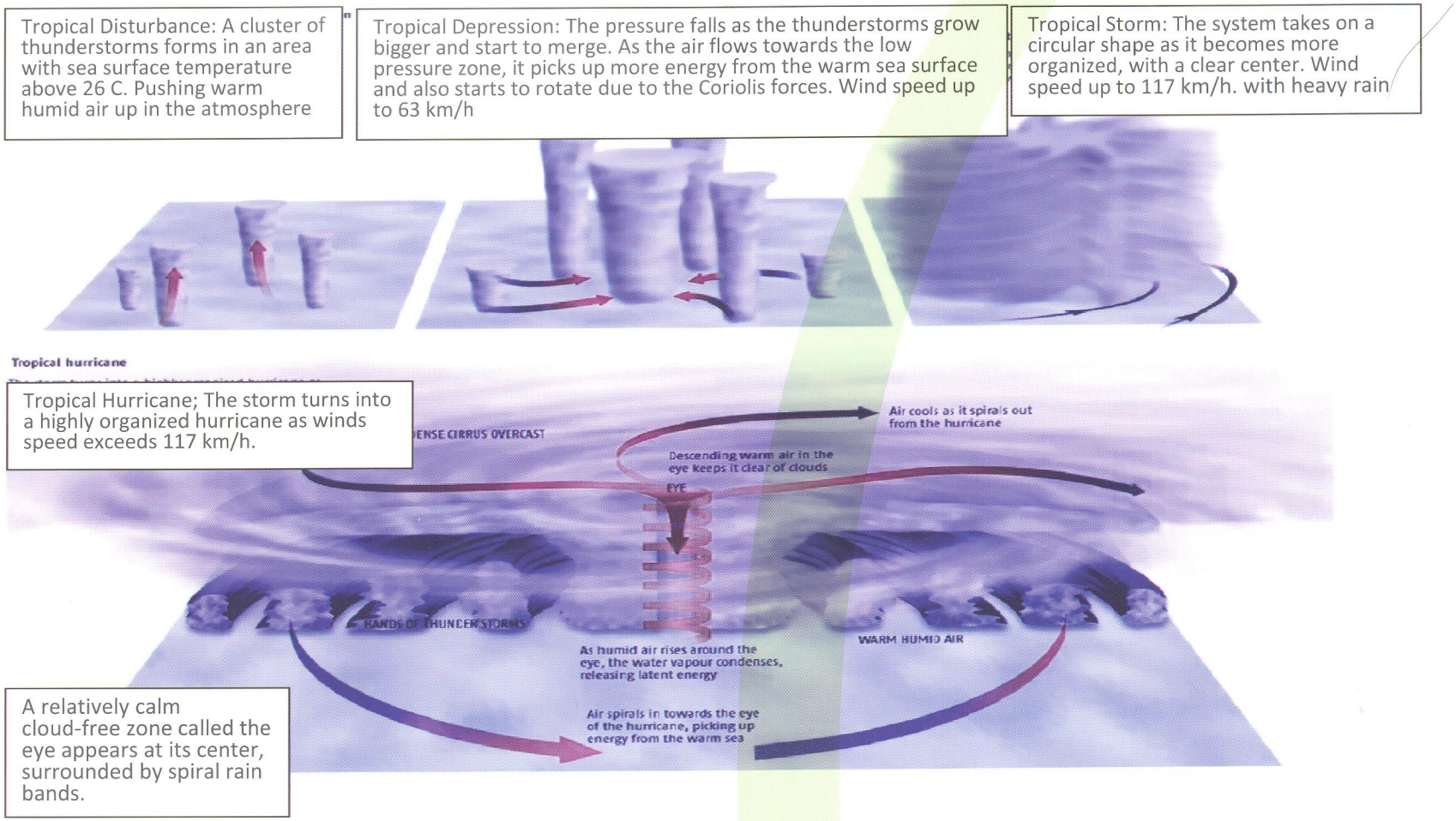
- theSaffir-SimpsonScaleorintheUnitedStates,and
- theBeaufortscale.

Theintensityofcyclonewithwindsof64knotsormorehasbeendividedintothefollowingfive categoriesshowninthetable2.8.

Table0.9 CategoriesofCyclone

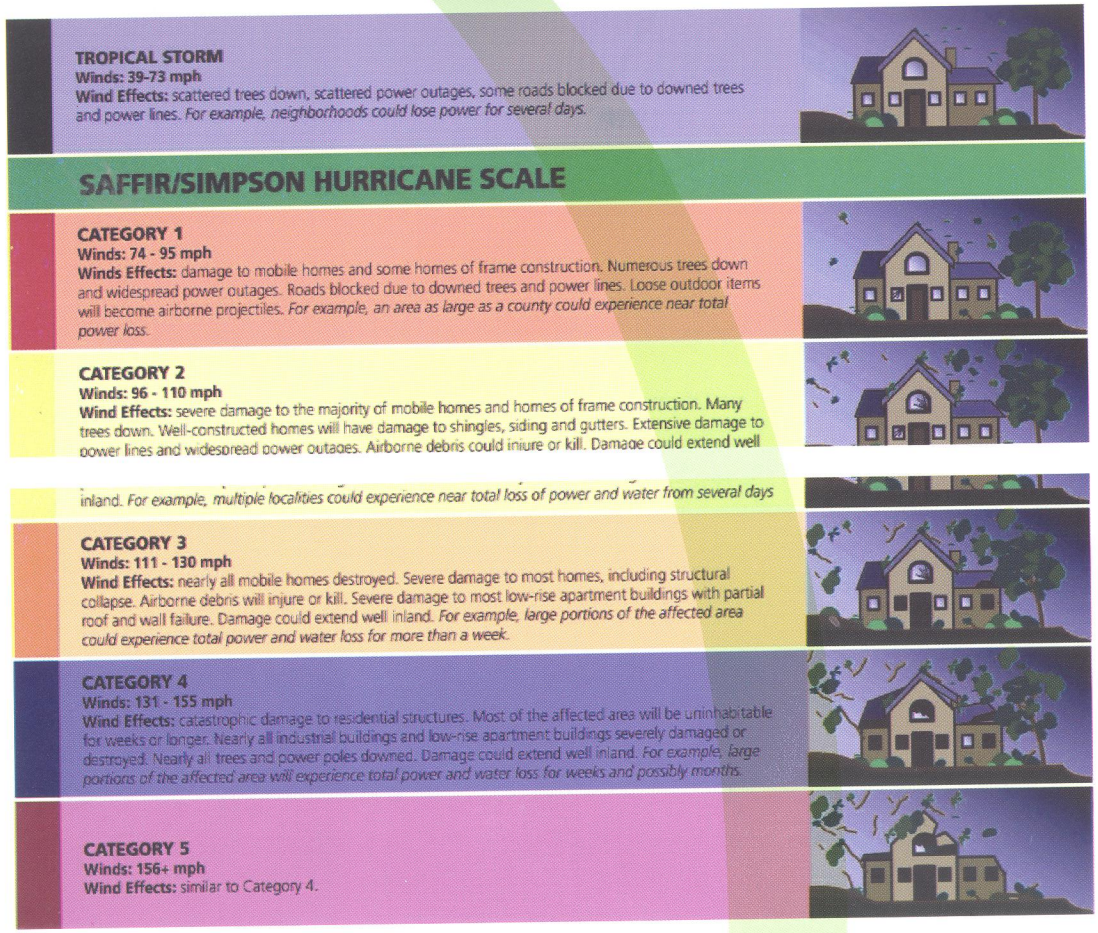
Category	SustainedWinds	StormSurge(feet)	CentralPressure(mbar)
Category-	1 64-82	4-5	980-989
Category-	283-95	6-8	965-979
Category-	3 96-113	9-12	945-964
Category-	4 114-135	13-18	920-944
Category-	5 >136	>19	<920

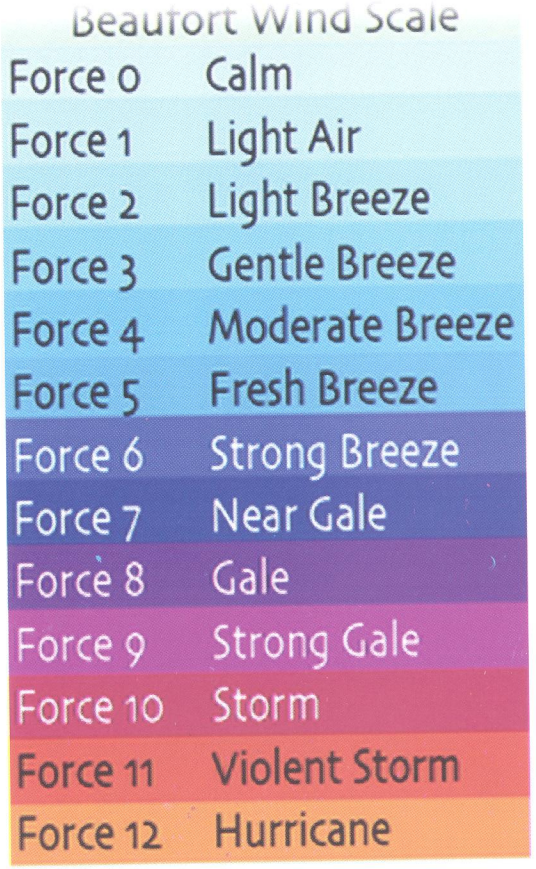
Source:PMD



Source: Causes, impacts and associated secondary hazards of cyclones, presentation by Sajid Mahmood Farooqi , University of Karachi.

Figure 0.59 Generating Mechanism of Cyclone





Source: Causes, impacts and associated secondary hazards of cyclones, presentation by Sajid Mahmood Farooqi , University of Karachi.

Figure 0.60 Situations of Tropical Storm by Categories

Cyclone Warning Centers

There are six Regional Specialized Meteorological Centres (RSMCs) worldwide. These organizations are designated by the World Meteorological Organization and are responsible for tracking and issuing bulletins, warnings, and advisories about tropical cyclones in their designated areas of responsibility. Additionally, there are six Tropical Cyclone Warning Centres (TCWCs) that provide information to smaller regions.

Pakistan Meteorological Department (PMD) is responsible for issuing cyclone warnings and updates at the national, provincial and district levels.

Cyclone Risks in Pakistan

Features of cyclone risks in Pakistan are summarized as below.

- Due to the rarity of the phenomena this hazard has gotten little attention and usually only after the hazard strikes.
- Only three tropical cyclones of different intensities have made land fall on Pakistani Coasts.
- Changing global climatic patterns are showing a change in the trend of occurrences of weather related hazards.
- The Pakistani coast being in a sub tropical location and in close vicinity to warm waters might be hit by tropical cyclones in the future.
- There is an ever increasing need to be prepared in advance to cope with any such disastrous event in the future.

Areas Vulnerable to Cyclones

Areas which are vulnerable to cyclones are as follows.

- Sindh Province (Karachi, Thatta, Badin)
- Balouchistan Province (Gwadar, Kech, Lasbella)

Impacts

Historical review

The history of cyclone occurrences is described as below.

- **The Cyclone of 1999** seriously impacted Thatta and Badin Districts (affected 0.6 million people and caused loss of 202 lives)
- **Cyclone Yemyn in 2007** affected 26 districts of Balouchistan and Sindh (affected 2.5 million people and caused loss of 400 lives).

  Damages in Sindh

  - 110 dead

- Approx 50,000 homeless
- Over two dozen missing at sea
- Severe electric power disruption; especially in karachi
- Damage to crops, orchards, poultry farms, livestock and fishing boats
- Over 3000 kacha houses damaged

Damage in Balouchistan

- 132 dead
- 170 people missing
- Total affected population was one million
- Over 100,000 homeless due to collapsed/ damaged houses
- Severe disruption of electric power, water and communications
- Large scale damage to Makran coastal highway

z **Phet Cyclone 2010**

- On 31 May 2010, a tropical depression in the Central Arabian Sea resulted in formation of tropical cyclone "PHET". "PHET" struck the Northeast tip of Oman coast during the night of June 4, 2010 and moved towards the coastal areas of Balouchistan and Sindh. Cyclone PHET entered Pakistan's coastal areas on June 6, 2010 with a sustained wind speed of 60 to 80 km/hour. PHET had already lost much of its intensity after hitting the Omani coastal areas two days prior to reaching landfall in Pakistan. By the time it hit the coastal area of Pakistan the Cyclone had been downgraded to a tropical storm. Nevertheless, 'Phet' caused heavy rain falls – as much as 370 mm in the coastal town of Gwadar in Balouchistan.
- The cyclone narrowly missed Karachi and made landfall near the fishing town of Keti Bandar and then it hit Thatta, Badin and Hyderabad Districts in Sindh. The storm disrupted life in the coastal areas of Balouchistan and Sindh, where several hundred mud houses collapsed and roads were blocked and damaged. Thousands of coastal communities were evacuated before the cyclone hit the coastal areas and as a result, the loss of lives was greatly reduced.

Means of Destruction

Tropical cyclones are characterized by their destructive winds, storm surges and exceptional level of rainfall which may cause flooding.

Destructive winds

z The strong winds generated by a tropical cyclone circulate counter-clockwise in the Northern Hemisphere, while spiraling inwards and increasing toward the cyclone center. Wind speeds progressively increase toward the core.

z 150 to 300 km from the center of a typical mature cyclone, winds of 63-88 kph

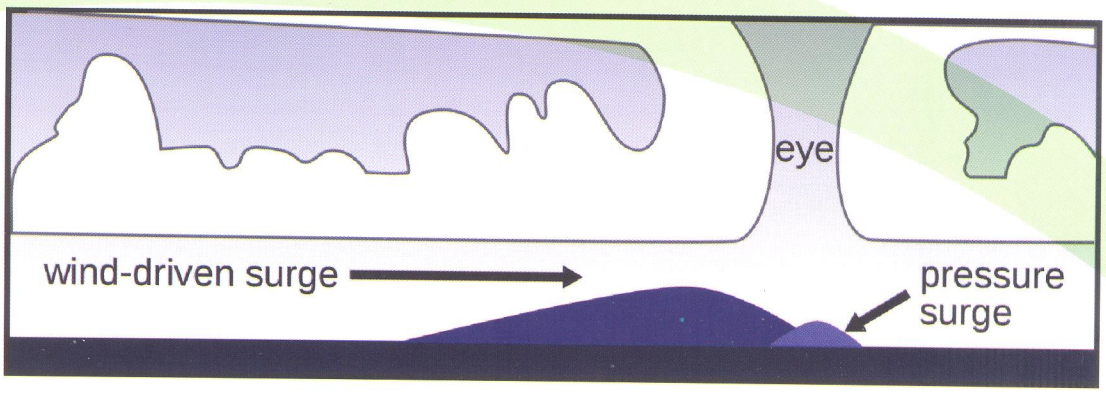
- 100-150 km from the center, storm force winds of 89-117 kph
- 50 to 100 km from the center; winds in excess of hurricane force, 117 kph or greater
- 20 to 50 km from the center, on the edge of the inner core contains winds 250 km/h or higher

Storm Surges

- The storm surge, defined as the rise in sea level above the normally predicted astronomical tide, is frequently a key or overriding factor in a tropical storm disaster
- The friction of strong on-shore winds on the sea surface
- Suction effect" of reduced atmospheric pressure
- Piling up of the sea water along a coastline near a cyclone's landfall
- In cyclones of moderate intensity the surge effect is limited to several meters
- In the case of exceptionally intense cyclones, storm surges of up to eight meters can result

The major factors include the following things.

- A fall in the atmospheric pressure over the sea surface
- The effect of the wind
- The influence of the sea bed
- A funneling effect
- The angle and speed at which the storm approaches the coast
- The tides



Source: Causes, impacts and associated secondary hazards of cyclones, presentation by Sajid Mahmood Farooqi, University of Karachi.

Figure 0.61 Situation of Surge

Associated Secondary Hazards

Exceptional rainfall occurrences

The world's highest rainfall totals over one or two days have occurred during tropical cyclones. The highest 12 and 24 hour totals, 114 cm and 182 cm have both occurred during cyclones at La Reunion

Island in the SW Indian ocean. The very high specific humidity condenses into exceptionally large raindrops and giant cumulus clouds, resulting in high precipitation rates. When a cyclone makes landfall, the rain rapidly saturates even dry catchment areas and rapid runoff may explosively flood the usual water courses and create new ones.

Physical damage

Structures can be damaged or destroyed by wind force, through collapse from pressure differentials, by flooding, storm surge and landslides. Standing crops may be lost to floods, storm surges, and sea water salinity. Salt from storm surges may also be deposited on agricultural lands and increase ground water salinity. Fruit, nut or lumber trees may be damaged or destroyed by winds, flood or storm surges. Plantation type crops such as banana and coconut are extremely vulnerable.

Erosion could occur from flooding and storm surges. Additional items subject to severe damage include overhead power lines, bridges, culverts and drainage systems, jetties and retaining walls, embankments and coastal dikes, general lack of weatherproofing of buildings, huge losses to building work in progress, scaffolding, marinas, and roofs of most structures. Falling trees, wind-driven rain and flying debris cause considerable damage.

Casualties and public health

There are usually relatively few fatalities but there may be numerous casualties requiring hospital treatment due to the high winds associated with cyclonic storms. Storm surges may cause many deaths but usually few injuries among the survivors. Due to flooding and possible contamination of water supplies, malaria and other viruses may be prevalent several weeks after the flooding.

Contamination of Water supplies

Open wells and other ground water supplies may be temporarily contaminated by flood waters and storm surges. They may be contaminated by pathogenic (disease producing) organisms if bodies of people or animals are lying in the sources or sewage is swept in. Normal water sources may be unavailable for several days.

Disruption of Communications and logistics

Communications may be severely disrupted as telephone lines, radio antennas and satellite disks are brought down, usually by wind. Roads and railroad lines may be blocked by fallen trees or debris and aircraft movements will be curtailed for at least 12 to 24 hours after the storm. Modes of transportation such as trucks, carts and small boats may be damaged by wind or flooding. The cumulative effect of all damage will be to impede information gathering and transport networks.

Mitigation and preparedness

Structural

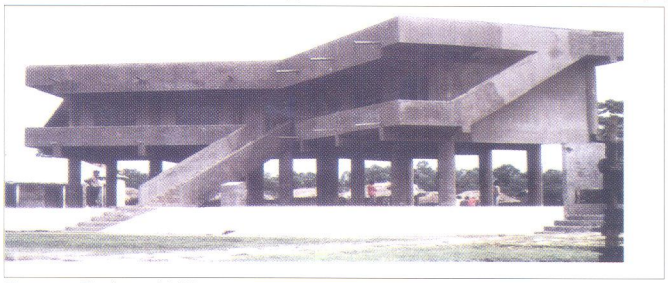
Sea Walls and Embankments

A sea wall is a coastal defense constructed usually of reinforced concrete on the inland part of a coast to prevent the ingress of storm surges arising out of cyclones. The height of the sea wall is determined

according to the maximum observed height of storm surges which may be as high as 10 m (30 ft approximately). Sea walls and embankments are a massive and capital intensive solution, and therefore can only be recommended when valuable assets like a city or harbor is to be protected.

Cyclone Shelters

Community cyclone shelters constructed at appropriate places can provide immediate protection from deaths and injuries to the vulnerable communities. Such shelters are usually built on pillars above the danger level of storm surges/ inundation, are spacious enough to accommodate a few hundred people of neighboring hamlets and provide provisions of dinking water, sanitation, kitchens, etc. During the normal times such shelters can be utilized as schools, dispensaries or for other community purposes.



Source: Caritas, 1992

Figure 0.62 Community Cyclone Shelter

Bio Shields

Bio shields are usually consists of mangroves, palms, bamboos and other tree / shrub species that inhabit lower tidal zones. These can block or buffer wave action with their trunks which can measure up to 30 m (90 feet approximately) and several meters in circumference. They trap sediments in their roots; thereby maintain a shallow slope on the sea bed that absorbs the energy of tidal surges. They also block the high velocity of winds and thus protect the agricultural crops and shelter grazing land for the livestock and farms. Besides they promote sustainable fisheries by releasing nutrients into the water.

Early Warning and Communication

Early warning of cyclones and its dissemination to the local habitants is an important preparatory measure to reduce the loss of life and property during cyclones. With the rapid development of science and technology, it is possible to tack the movement of atmospheric depressions and accurate early warnings can be issued 48-72 hours in advance regarding the probability of a cyclone. Such warnings are broadcast though radio and television networks for the information of the people in the coastal areas. The dissemination system can be made more effective with the active involvement of the communities and households in the preparation of their own cyclone contingency plans.

Cyclone resistant housing and infrastructure

Avoid linear-type development because the wind forces through straight, open and parallel channels increases in speed, the "wind-tunnel effect". Implement and ensure building safety measures i.e. cyclone

resistant construction techniques for new construction and retrofitting of the old structures can reduce the risk of loss of life and property.

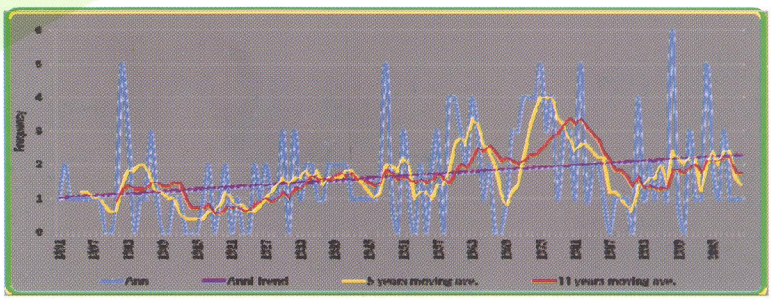
Non-Structural

- Awareness and Educational campaigns that provide advice to the community on cyclone preparedness as well as mitigations measures
- Risk Communication
- Information sharing regarding threats and possible mitigation measures
- Capacity building and Training to all concerned stakeholders (Govt. officials, search and rescue workers, volunteers, women, children, elderly, and the local community as a whole).
- Coastal regulations Zone Act amalgamation & implementation (No development within 500 m of the high tide line with an elevation of less than 10 m above mean sea level)
- Evacuation plans to be developed and shared with all stakeholders.
- Contingency Plans at all levels (community, government and civil society), which include disaster mitigation strategies with emphasis on self reliance for sustenance within the coastal community
- Maintaining Natural Sand dunes

Additional Information

Historical Damages[16]

About 14 cyclones were recorded during the period 1971-2001. The meteorological data about the cyclonic storms in the north Arabian Sea is available for more than a century. During the last 100 years a number of cyclonic storms have struck Pakistan's coastal areas. Including the intensity of the depression, there were approximately 200 cyclones and depressions spawned during the period of 1891-2010 as shown below.



Source: Muhammad Riaz, Chief Meteorologist, PMD

Figure 0.63 Annual Frequency of Tropical Cyclones and Depressions over the Arabian Sea (1891-2010)

[16] Source: JICA Expert Team.

The years when these cyclones and depressions occurred in Pakistan are as follows:

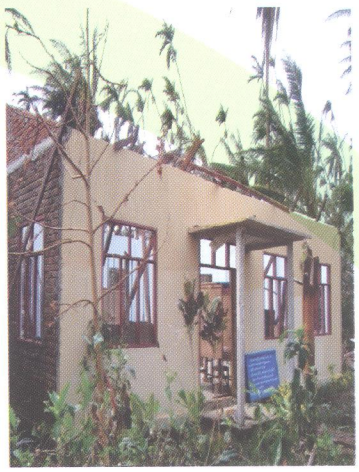
Table 0.10 Years Having Cyclone Occurrence in Pakistan

Item	List of Year
Years Involved	1895, 1902, 1907, 1948, 1964, 1965, 1985, 1993, 1998, 1999, 2007 and 2010

Source: JICA Study Team

The cyclonic storms in 1895 struck the Mehran coast near Pasni and Jiwani. In the early 1900's, three cyclonic storms–two in 1902 (13 May and 16 June) and one in 1907 (6 June) struck the coast in the vicinity of Karachi within a short span of six years. The cyclonic storm in 1964, which actually entered the Indian coast, did cause great loss of life and property in Hyderabad and Tharparkar districts as it moved northeastward into south eastern areas of Sindh. The cyclonic storms in 1984 struck the Mehran coast near Pasni and Jiwani, similar to the cyclone of 1895. In 1998 and 1999, southwest districts in Sindh were affected by the Cyclones Gujarat and 2A in 1998 and 1999, respectively.

The 2007 Cyclone (Cyclone Yemyin) killed at least 213 people in Karachi from rains and winds that might have been associated with an outer band of the cyclone, packing at least 70 mph winds that lashed at the city on 23 June 23 2007. PMD had warned of heavy rains and wind from the system as early as 22 June. The heavy downpour also flooded the Kech Korandi riverine, inundating the city of Turbat and forcing more than 10,000 people to evacuate their houses. At least another 380 people died in Balochistan, with another 250 dead in Sindh and 100 in KP. More rains associated with the remnants of the cyclone hampered rescue efforts. The cyclone affected at least 10 districts of Balochistan and 4 districts of Sindh, affecting the lives of at least 1.5 million people. At least 2 million people were indirectly affected by the cyclone from power outages and water shortages in Balochistan. More than 2 million livestock, worth over Rs.4 billion, were killed by the Cyclone. Property losses from the storm were estimated at Rs.24 billion.



In 2010, Cyclone Phet brought extremely heavy rainfall over the coastal areas of Balochistan (Gwadar 370 mm, Jiwani 208 mm, Pasni 139 mm) accompanied with very strong wind gusting to 120 km/hour. On 6 June, rain started in Karachi (Masroor 133 mm, Faisal 92 mm, Saddar 84 mm up to midday of 6 June) with 35 mph winds under the influence of the cyclone, disrupting the city's railways and electricity transmission systems. At least 15 people were killed, mostly by electrocution, and dozens injured. Cyclone Phet has also left thousands of Pakistanis homeless. In the evening, the storm moved past Karachi about 50 km away and made landfall between coastlines of Thatta and Badin, causing heavy rains in the area. The Hyderabad power supply was also disrupted from the downpour.

References:

1. Sajid Mahmood Farooqi, Research Student University of Karachi, Presentation presented in cyclone training, April 26, 2010, Organized by NIDM
2. Wajid Ali, National Centre of Excellence in Geology, University of Peshawar
3. Power Point Presentation: Scientific Knowledge on Cyclones in Pakistan, JICA Expert team
4. NOAA Technical memorandum

Landslide

The term "landslide" describes a wide variety of processes that result in the downward and outward movement of slope-forming materials including rock, soil, artificial fill, or a combination of these. The materials may move by falling, toppling, sliding, spreading, or flowing.

Definition

Debris and mud flows are rivers of rock, earth, and other debris saturated with water. They develop when water rapidly accumulates in the ground, during heavy rainfall or rapid snowmelt, changing the earth into a flowing river of mud or "slurry." They can flow rapidly, striking with little or no warning at avalanche speeds. They can also travel several miles from their source, growing in size as they pick up trees, boulders, cars, and other materials.

Types

Although landslides are primarily associated with mountainous regions, they can also occur in areas of generally low relief. In low-relief areas, landslides occur as cut-and-fill failures (roadway and building excavations), river bluff failures, lateral spreading landslides, collapse of mine-waste piles (especially coal), and a wide variety of slope failures associated with quarries and open-pit mines. The most common types of landslides are described and illustrated at the right.

The two major types of slides are **rotational slides** and **translational slides**. Slide types, images and descriptions are at the right.

Source: Earthquake Engineering Field Investigation Team (EEFIT) report on Atabad landslide, Hunza Richard Huhges, Consultant, Aga Khan Cultural Services

Figure 0.64 Atabad Landslide Area

Scientific Knowledge

Causes

Landslide problems can be caused by land mismanagement, particularly in mountain, canyon, and coastal regions. Land-use zoning, professional inspections, and proper design can minimize many landslide, mudflow, and debris flow problems.

A Landslide occurs when part of a natural slope is unable to support its own weight. For example, soil material on a slippery surface underneath, can become heavy with rainwater and slide downward due to its increased weight. A landslide is a downward or outward movement of soil, rock or vegetation under the influence of gravity. This movement can occur in many ways. It can be a fall, topple, slide, spread or flow. The speed of the movement may range from very slow to rapid. The mass of moving material can destroy property along its path of movement and cause death to people and livestock.

Impact

Historical Events

Pakistan 2005 Earthquake

The magnitude 7.6 earthquake that shattered Pakistan on October 8, 2005, caused the most damage in the region surrounding the city of Muzaffarabad, about 10 kilometers southwest of the earthquake's epicenter. The quake flattened buildings and triggered landslides throughout Kashmir. The Ikonos satellite captured an image of a landslide (top) in Makhri, a village on the northern outskirts of Muzzaffarabad, on October 9, 2005. The western face of the mountain has collapsed, sending a cascade of white-grey rock into the Neelum River. The landslide is likely only one of many to occur along the river, which was almost unrecognizable after the earthquake.

Source: http://earthquakeobservatory.nasa.gov/images/imagerecords/5000/5952/neelum_iko2005282_irg.jpg

Figure 0.65 Satellite Imge after 2005 Earthquake

Hunza Landslide 2010

On January 4th, 2010 in the remote Hunza River Valley of northern Pakistan, a massive landslide buried the village of Attabad, destroying 26 homes, killing 20 people, and damming up the Hunza River. As the newly-formed lake grew, authorities rushed to evacuate and supply those affected in the landslide area and upstream. The lake is now over 300 feet deep and 16km (10 mile) long, submerging miles of highway, farms and homes.

Source: EEFIT report on Atabad landslide, Hunza Valley, Northern Area of Pakistan, Richard Huhges, Consultant, Aga Khan Cultural Services

Mitigation and Preparedness

Vulnerability to landslide hazards is a function of location, type of human activity, use, and frequency of landslide events. The effects of landslides on people and structures can be lessened by total avoidance of landslide hazard areas or by restricting, prohibiting, or imposing conditions on hazard-zone activity. Local governments can reduce landslide effects through land-use policies and regulations. Individuals can reduce their exposure to hazards by educating themselves on the past hazard history of a site and by making inquiries to planning and engineering departments of local governments. They can also obtain the professional services of an engineering geologist, a geotechnical engineer, or a civil engineer, who can properly evaluate the hazard potential of a site, developed or undeveloped.

The hazard from landslides can be reduced by avoiding construction on steep slopes and existing landslides, or by stabilizing the slopes. Stability increases when ground water is prevented from rising in the landslide mass by:

- Covering the landslide with an impermeable membrane,
- Directing surface water away from the landslide,
- Draining ground water away from the landslide, and
- Minimizing surface irrigation.

Slope stability is also increased when a retaining structure and/ or the weight of soil/rock is placed at the toe of the landslide or when mass is removed from the top of the slope.

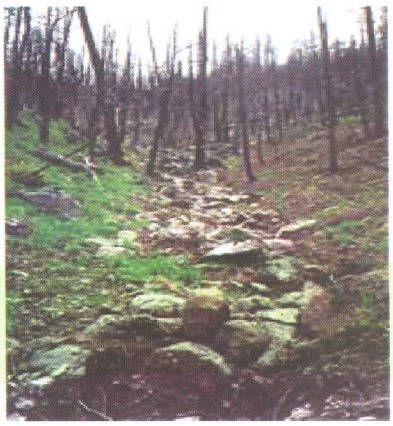
Debris Flow

Scientific Knowledge

Causes

Debris flows can be triggered by many different situations. Here are a few examples:

Addition of Moisture: A sudden flow of water from heavy rain, or rapid snowmelt can be channeled over a steep valley filled with debris that is loose enough to be mobilized. The water soaks down into the debris, lubricates the material, adds weight, and triggers a flow.



Removal of Support: Streams often erode materials along their banks. This erosion can cut into thick deposits of saturated materials stacked high up the valley walls. This erosion removes support from the base of the slope and can trigger a sudden flow of debris.

Failure of Ancient Landslide Deposits: Some debris flows originate from older landslides. These older landslides can be unstable masses perched on a steep slope. A flow of water over the top of the old landslide can lubricate the slide material or erosion at the base can remove support. Either of these can trigger a debris flow.

Emergency and Survival Preparedness
Dehydrated Food / Survival
Gearwww.crisisfoodsource.com

Wildfires or Timbering: Some debris flows occur after wildfires have burned the vegetation from a steep slope or after logging operations have removed vegetation. Before the fire or logging the vegetation's roots anchored the soil on the slope and removed water from the soil. The loss of support and accumulation of moisture can result in a catastrophic failure. Rainfall that was previously absorbed by the vegetation now runs off immediately. A moderate amount of rain on a burn scar can trigger a large debris flow.

Emergency and Survival Preparedness
Dehydrated Food / Survival
Gearwww.crisisfoodsource.com

Volcanic Eruptions: A volcanic eruption can flash melt large amounts of snow and ice on the flanks of a

volcano. This sudden rush of water can pick up ash and pyroclastic debris as it flows down the steep volcano and carry them rapidly downstream for great distances. In the 1877 eruption of Cotopaxi Volcano in Ecuador, debris flows traveled over 300 kilometers down a valley at an average speed of about 27 kilometers per hour. Debris flows are one of the deadly "surprise attacks" of volcanoes.

Impact

141 Houses (1652 individuals) of Village Attabad & Sarat were displaced due to a land slide on 4 January 2010. The following have been displaced due to inundation (starting from 10 January onwards as of November, 2010):

Village Ainabad	32 Houses
Village Shishkat	130 Houses
Part of Village Gulmit	61 Houses
Hussaini	10 Houses
Gulkin	7 Houses
Total	240 Houses
Grand Total: (including Atta Abad & Sarat)	381 Houses

Mitigation and Preparedness

The following are steps you can take to protect yourself from the effects of a land- Debris Flow.

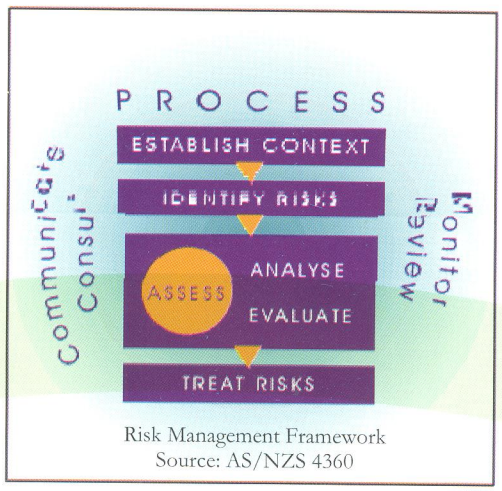
- Do not build near steep slopes, close to mountain edges, near drainage ways, or natural erosion valleys.
- Get a ground assessment of your property.
- Consult an appropriate professional expert for advice on corrective measures.
- Minimize home hazards by having flexible pipe fittings installed to avoid gas or water leaks, as flexible fittings are more resistant to breakage (only the gas company or professionals should install gas fittings).

Module 3 Risk Assessment / Vulnerability and Capacity Assessment

Risk Assessment Process

The risk assessment process is described in the following steps; 1) Establish context, 2) Identify risks, 3) Analyze risks, 4) Evaluate risks, 5) Treat risks. The stakeholders participate in each step. In 2) Identify risks, hazard assessment, risk assessment, and vulnerability and capacity assessment are conducted.

In this module, 2) Identify risks, 3) Analyze risks, and 4) Evaluate risks are described. Regarding stage 5) Treat risk, and 6) Monitor and Review, modules 4, 5, 6, 7 and 8 describe the activities respectively.



Risk Management Framework
Source: AS/NZS 4360

Figure 3.1 Figure Risk Management Framework

Table 3.1 Disaster Management Process and Contents

Process	Contents
Establish Context	Objectives Stakeholders Criteria Define key elements
Identify Risks	What can happen? How can it happen? z Hazard Assessment z Risk Assessment z Vulnerability and Capacity Assessment
Analyze Risks	Review controls Likelihoods Consequences Level of risk
Evaluate Risks	Evaluate risks Rank risks
Treat Risks	Identify options Select best responses Develop risk treatment plans Implement
Monitor and Review	Monitor changing circumstances Monitor operation of other 5 stages
Communicate and Consult	Communicate with all stakeholders Consult so as not to miss high priority issues

Source JICA Expert Team

Hazard Assessment

Hazard assessment is a process of determining the frequency, severity, potential, duration, and impact of hazards. The following table is a sample matrix to summarize the hazard assessment.

Table 3.2 Table Hazard Assessment

Hazard	Warning signs	Speed of onset	Frequency	Duration	Season	Impact
Types of hazard	Scientific and indigenous indicators	Rapidity of arrival	Frequency of occurrence	How long the hazard lasts	When the hazard occurs	Extend of damage, death, injury
Flood	Early warning	3 days	Occasionally in rainy season in July – Sep.	2 weeks	Rainy season in July – Sep.	Some simple houses collapsed, A few deaths and injuries in the severest cases during 10 years
Landslide	…	…	…	…	…	…
…	…	…	…	…	…	…

Recent Emphasis on Vulnerability

In order to understand how people are affected by disasters, it is clearly not enough to understand only the hazards themselves. There are shifts of emphasis in disaster management: from focus on the hazards to focus on vulnerability. Disasters happen when a natural phenomenon affects a population that is inadequately prepared and unable to recover without assistance.

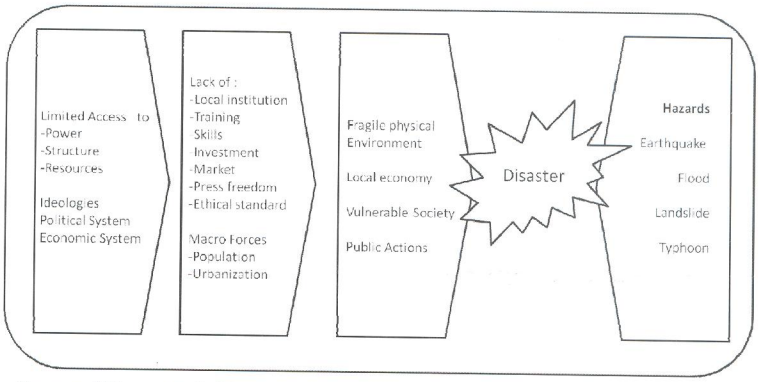
Vulnerability refers to the capacity of an element exposed during the impact of a hazard event.

Pressure and Release Model

The following model shows disaster as the intersection of two forces: those pressures generating vulnerability on the left hand, and physical exposure to a hazard on the right. The left hand side illustrates the progression of vulnerability. A series of levels of social factors generate vulnerabilities. The root causes of the disaster sometimes lie in the distance, like the economic and political sphere. These are normally a function of the economic structure, political system, legal definitions of rights, gender relations, etc.

This model describes the pressure and release function, where disasters are considered as the results of hazard and vulnerability. The vulnerability is a function of physical, social, economic and political factors. The goal of disaster reduction activities is to reduce vulnerability and enhance capacity.

It has been increasingly recognized that while it is important to reduce vulnerability, it is also required to enhance the capacity of the system to cope with the natural disasters. Capacity is often described as the potential in the communities, which should be explored in the appropriate way to maximize its use to reduce the potential losses due to disasters.



Source: Wisner et al. 2004)

Figure 3.2 Pressure and Release Model

VCA Framework

Several VCA frameworks are suggested by different people. Some of the examples are introduced here. It is not necessary to follow everything, but the framework can be modified according to the local situations.

The most classic framework is the simple matrix of Anderson and Woodrow (1998) for viewing vulnerabilities and capacities in three broad, interrelated areas: physical/material, social/ organizational and motivational/attitudinal. Each of these three areas covers a wide range of features:

z **Physical / Material**

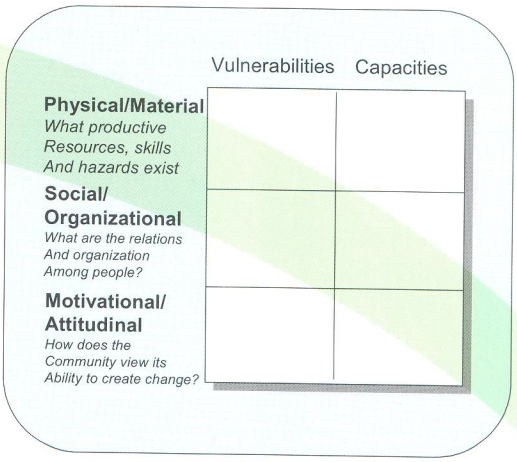
This is the most visible area of vulnerability. It includes land, climate, environment, health, skills and labor, infrastructures, housing, finance and technology.

z **Social / Organizational**

This includes how society is organized, its internal conflicts, and external networks.

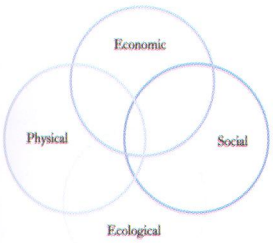
z **Motivational / Attitudinal**

This includes how people in society view themselves and their ability to affect their



Source: Anderson and Woodrow (1998)

Figure 3.3 Figure Vulnerability and Capacity Framework



environment. It includes ideology, belief system, awareness and traditional wisdom.Living with Risk by UN-ISDR (2004), which is a worldwide white paper for disaster management, describes four aspects of vulnerability, namely social, economic, physical, and environmental ones. It also explains that VCA is one of the steps of a disaster risk management framework.

Table 3.3 Vulnerability and Capacity Framework and its Contents

Categories	Contents
Physical	the location considerations and susceptibilities of the built environment density levels, remoteness of a settlement, its sitting, design and materials used for critical infrastructure and for housing
Economic	economic status / levels of individual, community and national economic reserves, levels of debt and the degree of access to credit and loans, insurance, economy lacking in diversity inadequate access to critical and basic socio-economic infrastructure, including communication networks, utilities and supplies, transportation, water, sewage and health care facilities
Social	level of well being of individuals, communities and society, levels of literacy and education, the existence of peace and security, access to basic human rights, systems of good governance, social equity, positive traditional values, knowledge structures, customs, ideological beliefs, overall collective organizational systems, less privileged in class and caste structures, ethnic minorities, the very young and very old, disadvantaged and marginalized segments of the population, gender, public health concerning physical, mental and psychological well being, disabilities, predisposition to infection, exaggerated exposure to communicable diseases, lack of defensive mechanisms, insufficient basic infrastructure, especially water supply, sanitation, inadequate health care facilities and supplies, levels of literacy and training, traditional knowledge, systems, and access to information on disaster risk and measures, cultural aspects, such as indigenous beliefs, traditions and ways of coping, deeply rooted beliefs that are destiny oriented or pose a fatalistic vision of disasters, the state of domination and power relations in the concerned society, social cohesion and regulation, social insecurity, decline of traditional structures, civic groups or communities formerly engaged in the collective well being, protection of the weakest people
Ecological	the extent of natural resource depletion, the state of resource degradation, loss of resilience of the ecological systems, loss of biodiversity, exposure to toxic and hazardous pollutants

Source: after ISDR Living with Risk 2004

Vulnerability Assessment

The vulnerability assessment is a process of estimating the susceptibility of 'elements at risk' (people, households, community, facilities, services, livelihood, economic, social activities, natural environment etc.) to various hazards and analyzing the causes due to which they are at risk.

The following table is a sample matrix to summarize the vulnerability assessment.

Table 3.4Table Vulnerability Assessment

Hazard	Category	Vulnerability	Impact of hazard to the element at risk	Characteristics of elements at risk
Types of hazard	Types of vulnerability	Vulnerable elements	Consequences by the elements at risk	Reasons, root causes, situations of the vulnerabilities
Flood	Physical	Physically challenged	Evacuation difficulties may cause death	Disabilities to evacuate alone
…	…	…	…	…
… …	… … …			

Capacity Assessment

Capacity Assessment is the process to determine how people cope in times of crisis to reduce the damaging effects of hazards. Through capacity assessment, the community's coping strategies and resources that are available for disaster preparedness, mitigation and prevention are identified. The capacity assessment process involves 1) understanding people's previous experiences and actions involving hazards, 2) the coping strategies they have developed, and 3) analyzing available resources used and that can be used by the community to reduce the disaster impact.

VCA tools

Different tools are utilized to assess the vulnerabilities and capacities in a participatory manner as is shown in the following table. Most of the tools have their origin in the Participatory Rural Appraisal (PRA) tools. A number of vulnerability and capacity assessment tools exist, and are practiced by different agencies. Among these, the most prominent one is that of the International Federation of the Red Cross for in-depth study.

Table 3.5 VCA Tools

Tools	Description
Reviewing Secondary Data	Compiling different existing data and information
Community Baseline Survey	Interview / Questionnaire survey to be conducted to learn the situation before starting CBDRM activities
Semi-structured Interview Survey	Guided interview in which most questions are open (not decided before hand). It can be conducted to disseminate knowledge and collect information.
Focus Group Discussions	Resource person in the community discusses given topics. participants can also share views among them. Excellent quality of facilitation Skill is required for the moderator.
Town Watching (Transect Walk)	Observing the situations of the community by walking through to be recorded on a map.
Mapping	Information collected in the town watching is drawn on a map.
Seasonal Calendar	Monthly activities such as harvesting patterns, disasters, economic activities taking place through the year by month are prepared in a chart to analyze the stresses and vulnerabilities.
Historical Profile	The important events and activities are listed and described to understand the community development and social cohesion.
Livelihood Analysis	Livelihood activities, assets, resources and threats to them are described.
Venn Diagram (Institutional and social network analysis)	Local organizations, linkage, and networks are illustrated to learn the institution and social networks.
Problem Trees	Problems are summarized by cause and effect relationship.

Analyzing Risk

After completion of the vulnerability and capacity assessment, potential impact of the different possible disasters on elements at risk is analyzed.

- What kind of impacts will a hazard have on various elements at risk?
- How many people will be injured, killed?
- How much land will be affected?

Evaluating Risk

Evaluating risks is done to decide how to prioritize the actions to treat risks. When risk maps are prepared by union council level, for example, priority union councils can be identified to conduct certain countermeasures. By conducting risk evaluation, decision making can determine whether any countermeasures are required, and which places should be prioritized.

Module 4 Participatory Community Based Disaster Management Planning

Setting Objectives

The CBDRM activities can take effects only when community residents become aware of the disaster risk management activities and continue working on increasing the resilience of the community. Therefore, it is important to set mid term and long term objectives and prepare annual plans to attain the objectives. By setting such objectives, the motivation of the residents is expected to increase and eventually help increase the capacity for disaster management. It is important to prepare continuous and sustainable plans and activities, by considering the level of the community disaster management committee to increase the community resilience gradually.

Before setting objectives, it is advisable to learn the basic knowledge on disaster management and local vulnerabilities and capacities. It is advised to pay special attention to the following points.

Important Points

- Acquire basic DRM knowledge from DRM experts of districts, tehsil, UC
- Understand local vulnerabilities and capacities by preparing VCA reports and risk and resource maps
- Set concrete viable objectives considering institutional capacity

Continuous Cycle of Preparing DRM Plans

First of all, the current capacities are examined. Considering the current situations, once objectives and community disaster management plans are prepared, which include mid and long term plans, annual plan, they will be implemented and put into activities. After that, progress and capacity are going to be monitored and evaluated. Based on the situations, the level of the targets and plans are going to be upgraded.

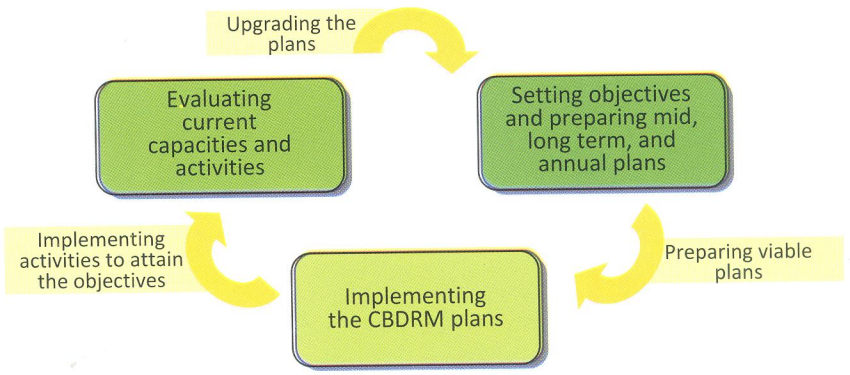


Figure 4.1 Cycle of Preparing DRM Plans

Planning Steps and Planning Components

The planning steps and components of community disaster risk management plans are summarized in the following table. In the participatory planning, all the participants are encouraged to express their opinions and to discuss the measures to be taken as community actions.

Table 4.1 Table Planning Components

Institutionalization	
Community Boundary	• Demarcate the community boundary
Stakeholders	• Identify stakeholders such as schools, enterprises, CBOs, mosque leaders
Key Persons	• Identify key persons for the CBDRM activities
Members of CBDRM	• Call for core members 10-20 people for preparing DRM plan
Institutionalization Leader Sub-leaders Teams / Task Forces leaders	• Decide leaders, sub-leaders, and teams/task force leaders • Allocating responsibilities in ordinary and emergency time • Nominating / deciding members of teams / task forces
Countermeasures	
Listing Measures	**List all the possible measures without thinking of viabilities.** • Mitigation measures (measures which can be conducted before disasters) • Preparedness measures • Emergency response which community can conduct • Recovery works which community can conduct • (after 2 weeks of the disasters)
Categorize Measures	**Categorize the above measures by themes, shown as examples.** • Awareness raising and disaster knowledge development • Infrastructure measures • CBDRM activities, community responses • Evacuation places, public facilities • Publicity work • Early warning • Landuse plan • Budget
Preparing Community Disaster Risk Management Plan	
Objectives	• Set overall objectives of CBDRM
Action Planning	• Discuss community actions to realize the measures • Make a list of actions • Identify each action in detail: timeframe (by when), responsible person (by who), resources available and needed (how it will be conducted), budget (how much)
Prioritization	**Prioritize the actions** • Viable actions within a year • Actions which everyone wants to conduct within 2-3 years • Actions which require 3-5 years • Actions which require longer perspective (more than 5 years)
Documentation	**Document the discussions to cover the following** • Objectives • Types of disasters to tackle • Vulnerability and Capacity Assessment (see module 3) • Countermeasures • Actions • Schedule for implementation

	• Responsible persons, institutions to realize the actions
Implementing the Plan	
Resource Mobilization	**Discuss how to secure human, physical, and monetary resources** • Identify affordable resources • Identify unaffordable resources and think about possible ways of acquiring them (consult with external assistance)
Implementation	**Document activities to improve the future activities** • Documentation of activities, difficulties, lessons learnt
Collaboration and Coordination	**Coordination with public authorities** • Report CBDRM activities • Submit maps, diagnosis information, DRM plans • Request regular, refresher training **Cooperation with local enterprises** • Plan for sharing resources and equipment • Involve enterprises in CBDRM activities and DRM planning • Plan and Conduct joint training **Cooperation with other communities** • Share knowledge, lessons learnt on CBDRM activities • Plan and conduct joint trainings
Annual Activity Plan	**Plan annual activity**
Monitoring and Evaluation	
Evaluate the Activities	**Review the validity of the activities** • Appropriate stakeholders • Appropriate schedule • Are activities completed within the budget? • Achievement of countermeasures? • Achievement of objectives
Evaluate the Plans	**Review the community based disaster management plan annually and revise it according to the following points** • Necessity to change the plan after conducting activities • Necessity to change the plan after lessons learnt • Necessity to change the plan after changing geographical, physical, or environmental conditions

Action Planning

During action planning, the following tables can be developed to clarify the plan in detail for implementation.

Table 4.2 Action Planning Sheet

Measures					
Action	Time frame (when)	Resources (how) available & needed	Budget (how much)	Quantity (how many)	Responsible persons (who)
Action 1	...	...	...	...	...
Action 2	...	...	...	...	...

Preparing Annual Plans

In the actual situation, it is neither realistic to think that community residents immediately have become aware of the disaster management, nor that level of the activities will have been upgraded rapidly. Continuous efforts are especially important. Even though the level of activities is upgraded, if activities are not continuous, the interest of the residents cannot be maintained. To make the DRM activity

sustainable, it is very important that the action plans are developed and implemented to attain the objectives.

In preparing the action plans, review the DRM activities in the past or previous year and think about what kind of actions are needed and select necessary actions. Even though they are simple, annual plans need to be developed. The following are the important points to pay attention to.

Important Points

- Get as many opinions as possible. Get opinions from all the teams / task forces.
- Categorize the opinions by theme and prioritize.
- Select the actions and make an annual activity plan considering time, budget, and responsible persons.
- Make sure to continue the activities.
- Select the main special feature actions yearly to distinguish their importance.

Table 4.3 Format of Annual Plan

Month	Date	Activity	Resource	Budget	Responsible Person
January	12th	Lecture of basic CBDRM	DDMA expert	3000Rs	XXX
February	10th	Conducting DRM games	DDMA expert	3000Rs	YYY
March	3rd	Conducting VCA	DDMA expert	3000Rs	ZZZ
April	20th	Preparing DRM map	DDMA expert Base maps	Printing 500Rs	ZZZ
...	...	...	...	...	...

Participatory Planning Tool: Disaster Imagination Game (DIG)

Disaster Imagination Game (DIG) is a map maneuver, which can be used as a tool for participatory disaster management planning at community workshops (see DIG Manual in Annex).

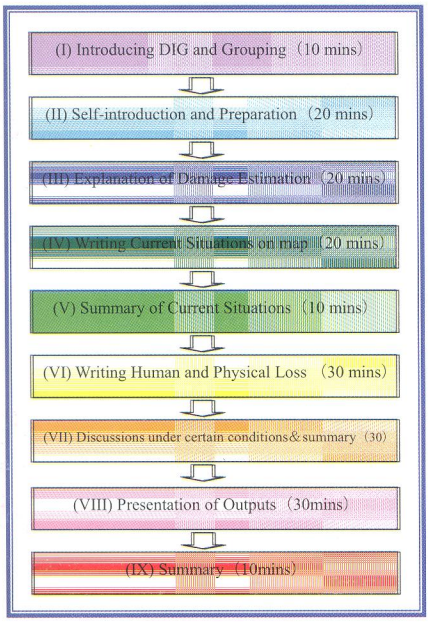
What is DIG?

DIG stands for Disaster Imagination Game, which is a training program for disaster risk management. The English term 'dig' has meanings of "understand", thus it is expected to imply "Understand disaster", "Raising awareness of disaster management", and "Explore the locality".

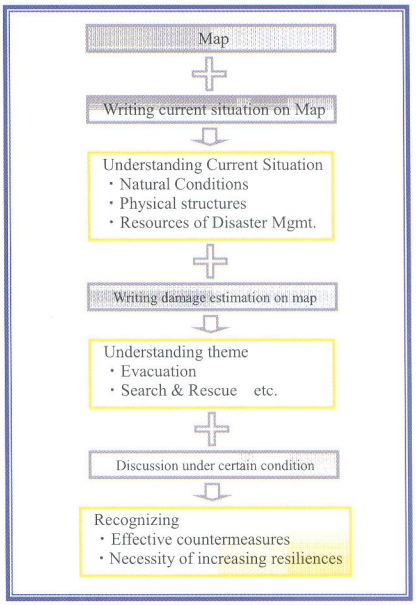
Overall Programme and Target Outputs

The activity of DIG is at first, to understand possible damage situations in the locality and eventually to prepare disaster management plans after discussing how to deal with issues of different themes. Overall programme, work flow, and target outputs are summarized in the following figures.

【Overall Programme】



【Work Flow and Target Outputs】



Key Activities

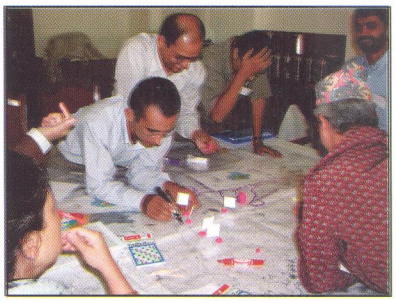
Key activities of DIG are explained briefly with some photos.

Setting a Map on Table

Set a map on the table. A transparent sheet is placed on top and held with scotch tape.

Identifying Natural Conditions

Current natural conditions shown below are identified. If possible, old natural conditions are identified.



Filling in City Structures

The city structures, roads and open spaces are identified and plotted on the transparent sheet (a legend is prepared).

Summarizing Local Characteristics

Local Characteristics, advantages and disadvantages in terms of disaster risk management are summarized on a memo pad and summarized on the flip chart.

Choosing Possible Hazards in the Target Area

As related hazards, possible disaster affected areas are marked and the damages caused by these hazards is considered.

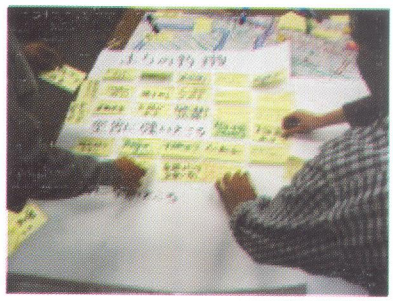
Writing Risk and Resources / Damage Estimation

Damage is estimated by grid. The estimated location, numbers, characteristics of damage to buildings, infrastructure, and possible human losses are colored in red (high risk), orange (medium risk), yellow (low risk).

- Filling in Risks and Resources
- Estimating and recording Possible Human and Physical Losses
- Discussion by Providing Set-conditions
- Providing estimated conditions / situations of post disasters

Discussion and Preparing Disaster Risk Management Plans

Participants are given issues of different themes. The solutions are discussed among the participants over the map. Realistic plans are expected to be prepared by considering distances, existing infrastructures etc. An example of a guiding question is listed as below.



Source: DIG Manual JICA Study Team

Example: Theme: Communication Method

Questions

- District Coordination Officer (DCO) wants to issue an evacuation order to the residents of District Thatta. Both land lines and mobiles are cut off.
- How do you communicate with the necessary persons?
- Think about TO WHOM, TO WHERE, and HOW do you announce the message?

Think about the situation when most of the roads are blocked. Landlines and mobile phones are out of order. How do you inform district, Union Councils, and local community leaders? Think about the information flow such as DCO, District DRM coordinators, UC Secretary, Community Disaster Management Committee leader etc…

Expected Outcome

At the end of the exercise the participants train themselves by imagining the situations of the target area from pre-conditions and plan countermeasures and community actions.

Some Ideas to Minimize the Budget for CBDRM

To make the CBDRM activities sustainable, the budget for the activities needs to be minimized and new ideas created to make use of the budget and conduct the activities effectively. To minimize the costs for conducting activities, consider alternative ways of conducting them economically, and consider

substitutions such as for disaster management equipment. It is advisable to collaborate with other communities and enterprises for certain equipment to borrow and thereby reduce both budgets.

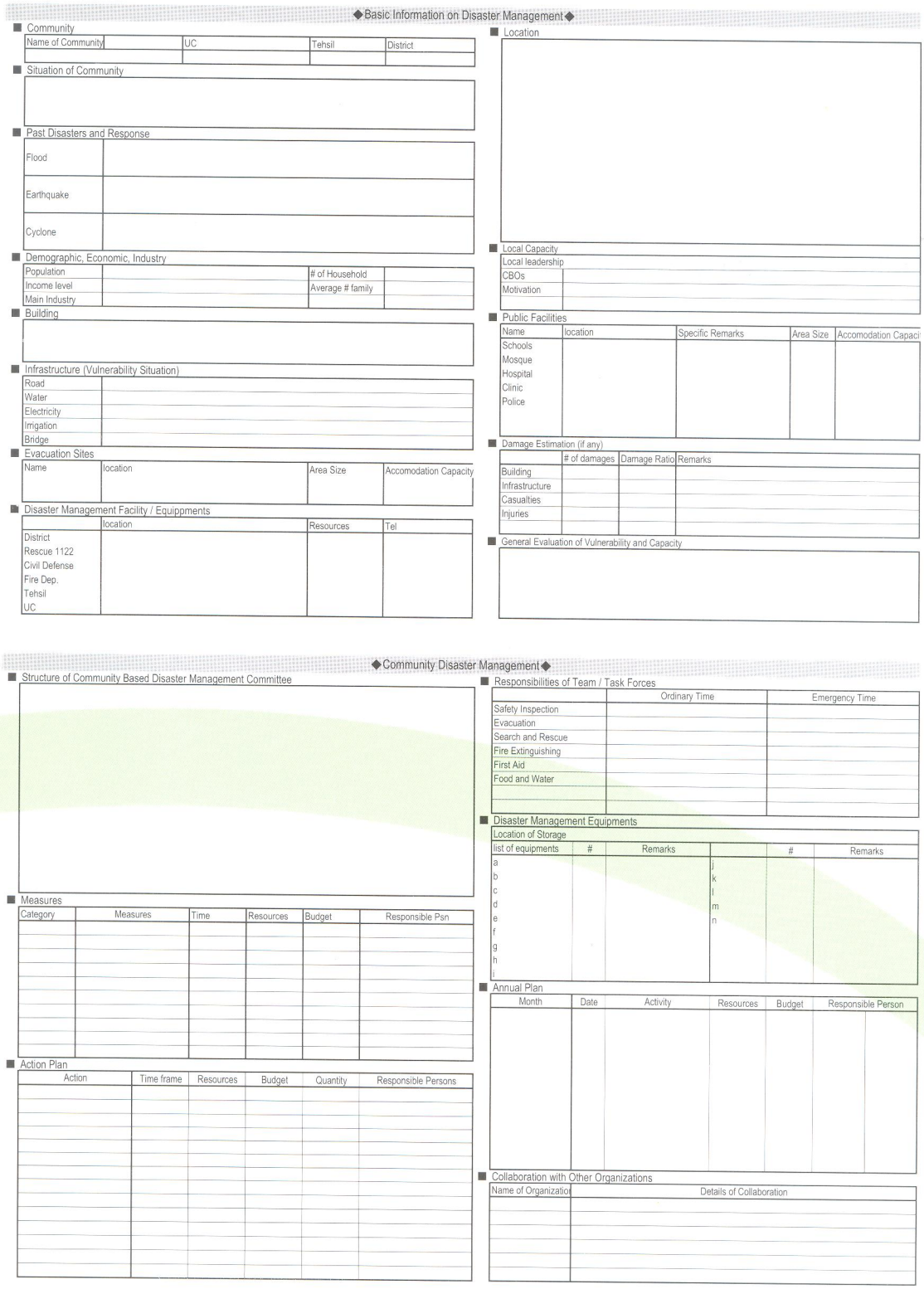
It is important to start some activities that cost little or nothing. The important point is to implement all possible actions. Basically the autonomous DRM activities need to be organized and self supported. However, technical support may be sought from DDMA, Rescue 1122, and civil defense.

Compiling Data Base at District

Compiling Data Base at District

It is advisable to prepare data and information on community based disaster management. This information is not only useful for the community as a summary of the vulnerability and capacity assessment, and participatory DRM planning, but it is also valuable for district relevant organizations to prepare concrete and realistic disaster risk management plans at district level. In some districts, organizations specialized in disaster management such as DDMA, rescue 1122, and civil defense exist. In terms of collaboration and coordination, such locally based information needs to be compiled for sharing. Currently, districts are the key organizations for implementing CBDRM, however, after some years of decentralization they are dispersed; at that point, tehsil can possibly take over handling such basic data. For example, the tehsil could compile such data from the communities and submit it to the district regularly every few years. As for providing base maps and dispatching disaster management experts to guide CBDRM activities, the district can play such roles in the near future, and the tehsil is also a good option to be empowered in the longer term.

The following shows a sample format of data to be compiled as a result of CBDRM activities. The first sheet describes basic information on disaster management, the second one is a simple summary for a community disaster management plan, and the third one is a risk and resource map / disaster management map of the community.



◆Basic Information on Disaster Management◆

■ Community

Name of Community		UC	Tehsil	District

■ Situation of Community

■ Past Disasters and Response

Flood	
Earthquake	
Cyclone	

■ Demographic, Economic, Industry

Population		# of Household	
Income level		Average # family	
Main Industry			

■ Building

■ Infrastructure (Vulnerability Situation)

Road	
Water	
Electricity	
Irrigation	
Bridge	

■ Evacuation Sites

Name	location	Area Size	Accomodation Capacity

■ Disaster Management Facility / Equippments

	location	Resources	Tel
District			
Rescue 1122			
Civil Defense			
Fire Dep.			
Tehsil			
UC			

■ Location

■ Local Capacity

Local leadership	
CBOs	
Motivation	

■ Public Facilities

Name	location	Specific Remarks	Area Size	Accomodation Capaci
Schools				
Mosque				
Hospital				
Clinic				
Police				

■ Damage Estimation (if any)

	# of damages	Damage Ratio	Remarks
Building			
Infrastructure			
Casualties			
Injuries			

■ General Evaluation of Vulnerability and Capacity

◆Community Disaster Management◆

■ Structure of Community Based Disaster Management Committee

■ Measures

Category	Measures	Time	Resources	Budget	Responsible Psn

■ Action Plan

Action	Time frame	Resources	Budget	Quantity	Responsible Persons

■ Responsibilities of Team / Task Forces

	Ordinary Time	Emergency Time
Safety Inspection		
Evacuation		
Search and Rescue		
Fire Extinguishing		
First Aid		
Food and Water		

■ Disaster Management Equipments

Location of Storage

list of equipments	#	Remarks		#	Remarks
a			j		
b			k		
c			l		
d			m		
e			n		
f					
g					
h					
i					

■ Annual Plan

Month	Date	Activity	Resources	Budget	Responsible Person

■ Collaboration with Other Organizations

Name of Organizatio	Details of Collaboration

Figure 4.2 Figure Sample Data Sheet Compiling at District


RISK
Group A
Resource
Risk
Group B
Javed Colony
Resource

MODULE 4 PARTICIPATORY COMMUNITY BASED DISASTER MANAGEMENT PLANNING 93

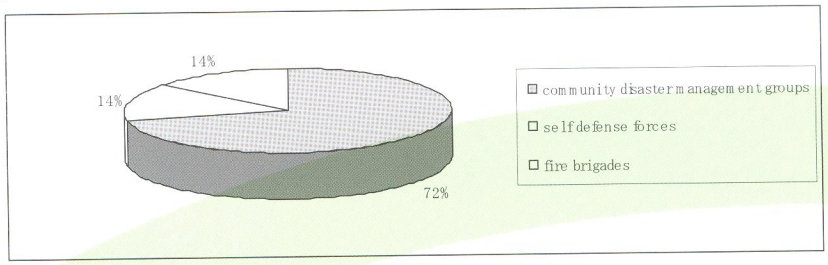
Module 5 Formulating a Community Disaster Risk Management Committee

Necessity of a Community Disaster Risk Management Committee

In the devastating disasters, assistance of public authorities may not arrive in time. Some of the reasons are as follows.

- Due to damage to roads, bridges, and other infrastructures, emergency vehicles such as ambulances, fire engines, and police cars may not be able to pass over the roads.
- Due to telecommunication failures, telephone calls to public authorities become difficult.
- In earthquakes, or landslides, due to the collapse of many buildings, public help cannot respond to all the incidents in different places immediately.
- In earthquakes, short circuits may cause fires. Due to collapse of water pipelines, fire extinguishing work will be hindered.

In the 1995 earthquake in Kobe, 72% of the people who needed rescue assistance were rescued by community people.



Source: Miyano, Osaka City University

Figure 5.1 Community People Are Saved by Community

If someone in your neighborhood is trapped in the debris or some are injured, and public authorities cannot come, community assistance to rescue people and treat the injured can minimize the disaster impacts. Cooperation within the community can have effect. It is necessary to protect your community by your own efforts.

Unit of Community Disaster Risk Management Committee

To protect your own community, an organizational approach is more effective than individual acts. To make this approach more effective, the collaboration during ordinary times is important. If community people have regular interaction with each other, they can have a sense of unity for the common objectives such as "Protecting our community by ourselves" and they can make the disaster management activities sustainable.

It is advised that one Community Disaster Risk Management Committee be formulated for each community. If the community organizes festivals and religious activities during the ordinary times, the existing community unit can be utilized, since community risk management activities need to be based on the regular collaboration networks that exist during ordinary times. Community people need to feel a sense of unity within the community unit.

Structure of Committee

The Community Disaster Risk Management Committee needs to be structured to allocate clear responsibilities to the members and to relate their responsibilities. If there are existing groups within the community such as youth groups, or women's groups, the Community Disaster Risk Management Committee can be structured by utilizing such existing groups.

The committee is designed with necessary teams / task forces by analyzing necessary activities and local situations. The structure consists of a committee leader, sub-leaders, and teams / task forces. It is advised to conduct regular drills in order to improve the suitable compositions for each community. In emergency situations, things may not work as planned. Flexibility to react to different situations is necessary. It is also important to decide responsibilities for both ordinary times and emergency times. The reason for deciding responsibilities during ordinary time is that practicing and conducting responsibilities regularly makes the team / task forces active and well united.

The community needs to be divided into smaller units, considering the size of the population. It is advisable to identify members of all task forces / teams for each small unit. The manageable size of one small unit is about 20 households.

Try to ask participation of professional persons such as medical practitioners in the community. If there are enterprises, factories in the neighborhood, try to collaborate with them for providing heavy machinery, equipment, food, water etc.

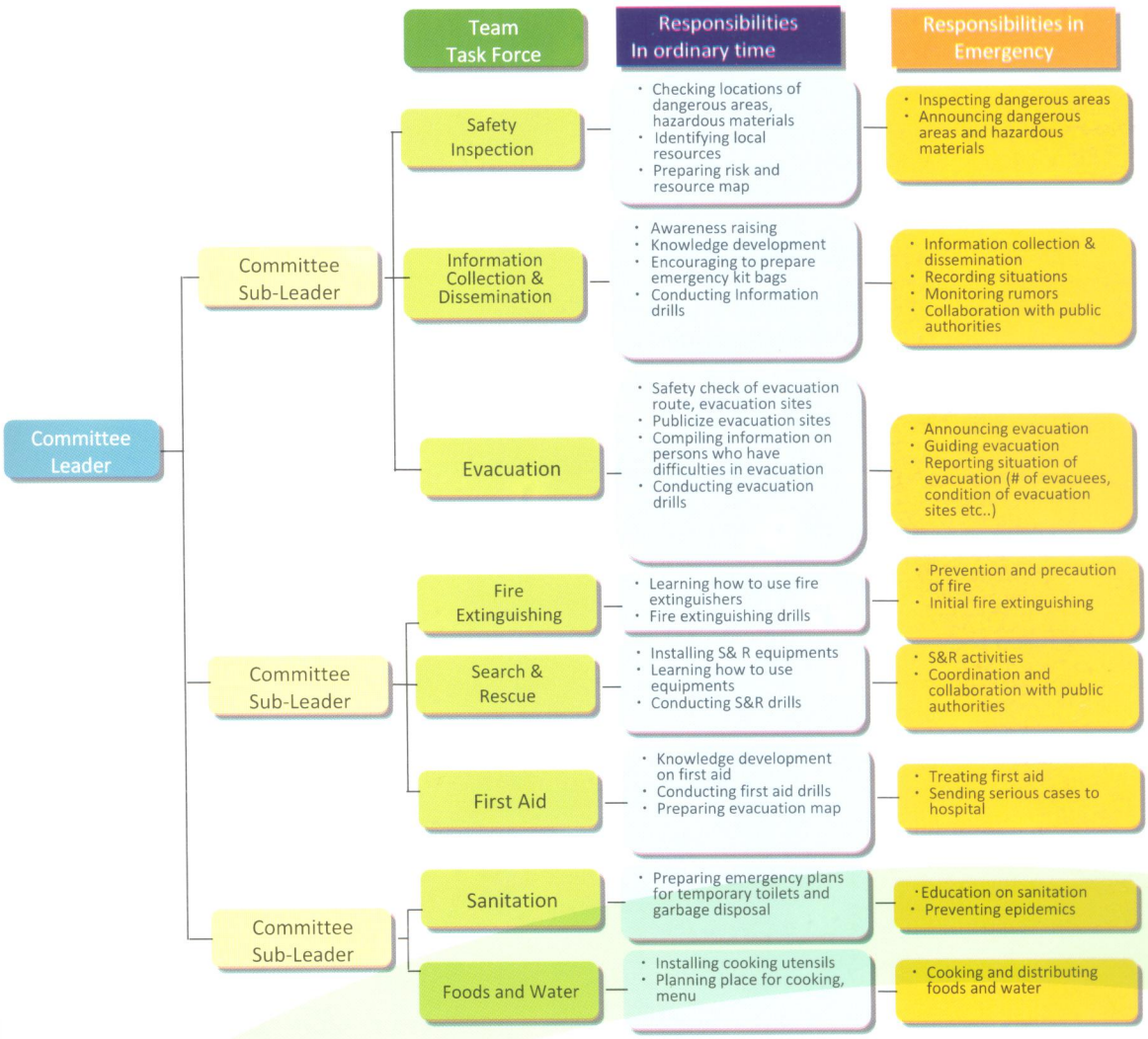


Figure 5.2 Structure of Community Disaster Risk Management Committee (Example)

Roles of Leaders

The leaders are expected to be interested in disaster management activities, gain knowledge of and techniques for disaster management, and cooperate with local residents. In ordinary times, leaders need to take leadership for safety inspections of the community, knowledge dissemination and awareness raising activities for residents, installing and maintenance of disaster management equipment, understanding risks and resources in the community, understanding people who have difficulties in evacuation, and conducting drills. During an emergency, the leaders take initiative for protecting the safety of the residents, minimizing the disaster impacts, and take leadership of task forces / teams for effective disaster risk management activities.

To achieve this, leaders need to cooperate and collaborate with relevant public organizations. It is also important for sub-leaders to link with women, children and challenged persons. Females are also encouraged to assume responsibilities.

Requirements for leaders

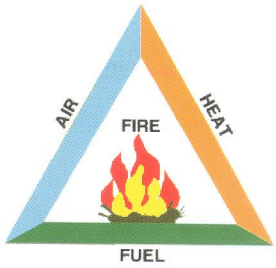
- Interest in disaster risk management
- Experience with disaster risk management activities
- Vitality
- Popularity among community members
- Coordination capacity with different people
- Considerate of others and not an egocentric
- Considerate of minor opinions

Module 6 Emergency Management and Response

Fire Extinguishing

Fire Safety/Prevention

Basic Information



Fire is heat and light from the rapid combination of oxygen and other materials. The flame, which gives the light, is composed of glowing particles of burning material and luminous gases. For fire to exist, a combustible substance must be present, the temperature must be high enough to cause combustion, and enough oxygen must be present to sustain rapid combustion.

Points

The basic strategy of fire prevention is to control or isolate sources of fuel and heat in order to prevent combustion.

Classification of Fires

Not all the fires are the same or have same effects. Fires can be classified according to the type of fuel that burns. These are class A, B and C Fires:

Table 0.1 Classification of Fires

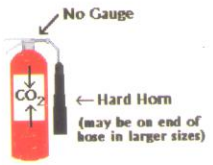
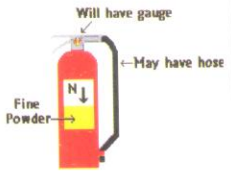
Class "A"	Class "A" fire involves common solid combustible fuels such as wood, cloth, plastic, trash or paper products that are being burned.	
Class "B"	Class "B" fire involves flammable liquid or gas phase fuels that are being burned.	
Class "C"	Class "C" Fire involves energized electrical equipment - As long as it's "plugged in," it would be considered a class C fire.	

Source: Enabling Communities to Live Responsibility with Disasters, FOCUS Humanitarian Assistance

Types of Fire Extinguishers

One way to extinguish a fire is with the help of fire extinguishers. However, these are classified by the type of fire on which they may be used.

Table 0.2 Types of Fire Extinguishers

Air Pressurized Water (APW)	APW Extinguishers are designed for class "A" (wood, paper, plastic, cloths) fires only.	
Carbon Dioxide (CO2)	Carbon Dioxide extinguishers are filled with non-flammable carbon dioxide gas under extreme pressure. You can recognize a CO2 extinguisher by its hard horn and lack of pressure gauge. CO2s are designed for class "B" (flammable liquid and gas) fires.	
Dry Chemical (DC)	Dry Chemical Extinguishers come in a variety. Dry Chemical extinguishers are filled with a fine yellow powder. Nitrogen is used to pressurize the extinguishers. Multipurpose extinguishers are designed to extinguish all types of A, B, and C fires.	

Source: Enabling Communities to Live Responsibility with Disasters, FOCUS Humanitarian Assistance

How to use a Fire Extinguisher: Remember the word "P A S S"

Table 0.3 How to Use a Fire Extinguishers

P	Pull the Pin	This will allow you to discharge the extinguisher	
A	Aim the Nozzle at Fire	Hit the fuel and not the flames	
S	Squeeze the Lever/handle	This depresses a button that releases the pressurized extinguishing agent in the extinguisher	
S	Sweep from side to side until the fire is completely out	Stand at least 5-8 feet back from the fire. Discharge the entire contents of the extinguisher.	

Source: Enabling Communities to Live Responsibility with Disasters, FOCUS Humanitarian Assistance

Table 0.4 Evacuation Tips in Case of Fire

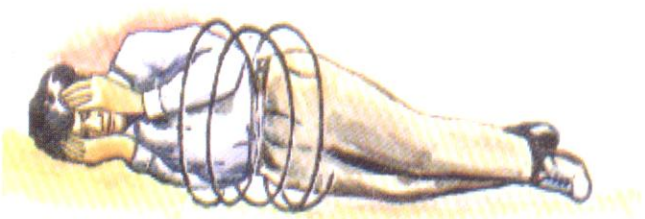
In Case of Fire z Raise the Fire Alarm or Shout fire, fire, fire z Telephone Fire Service on 16 z Use an appropriate fire extinguisher, if it is safe to do so z Immediately exit the house/building, using the stairs & closing the doors – DO NOT USE ELEVATORS z Shut off utility valves – learn how to shutoff gas & electricity	 
If Trapped In A Room z If you do not have a usable exit; close as many doors as possible between you and the fire to slow down its spread. z Seal all doors and vents with duct tape or towels to prevent smoke from entering the room. z Open a window at the top and bottom so fresh air can enter. Be ready to close the window immediately if it draws smoke into the room. z Be prepared to signal to someone outside for help.	
If Forced to advance through Flames z Hold your breath as much as possible. z Breathe shallowly through nose, and use a filter such as a shirt or towel. z Cover your head and hair. z Keep your head down and your eyes closed as much as possible. z Drop to hands and knees and crawl towards a safe exit. z Move quickly.	

Source: Enabling Communities to Live Responsibility with Disasters, FOCUS Humanitarian Assistance

If your clothing catches fire or if you are helping someone whose clothing is on fire, remember these three important words: **STOP, DROP, and ROLL**.

STOP!: Do not run. Running will fan the flames and cause them to burn faster and hotter.

DROP!: Cover your face with your hands, then drop to the ground and keep your head out of the fire. This protects your respiratory system, face, and eyes.



ROLL!: Grab anything available, such as a blanket, coat, or rug, to smother flames and keep rolling in it. If nothing is available, keep rolling on a surface such as dirt, grass, vegetation, etc.

When responding to a Fire Incident!

Use the following guidelines when approaching and suppressing a fire:

- Do not attempt to suppress a fire that is clearly too large for the equipment at hand. Save the equipment for where it will be effective.
- Use safety equipment (helmet, goggles, dust mask, all-leather work gloves, and heavy shoes).
- Work in a buddy system.
- Have a backup team when possible.
- Always have two ways to exit the fire area.
- Approach smoke-filled areas correctly:
- Feel closed doors with the back of the hand, working from the bottom of the door up. If the door is hot, DANGER! - There is fire behind it! DO NOT OPEN THE DOOR or you will risk the door hitting you, being sucked into the fire, the fire flashing out at you, or creating an explosion.
- Confine the fire by keeping doors closed.
- Stay low to the ground.
- Always know a second escape route.
- Use natural ventilation techniques [when there is no risk of a fire flare-up] to clear smoke: Open windows if possible, and create cross-ventilation by channeling natural wind flow.
- Maintain a safe distance, remembering the effective extinguisher range.
- Move around the perimeter of the fire to maximize coverage of the extinguisher agent.
- Prevent rekindling of the fire:
- Locate hidden burning material.
- Extinguish and safely remove it.
- Remove heat by cooling.

FIRE RISK CONTROL

- Always store wood for woodstoves and fireplaces away from your home.
- Store all flammable liquids such as gasoline outside the home.
- Prepare a floor plan of your home showing at least two ways out of each room; primary and alternate escape routes.

- Most fires occur at night when people are sleeping. A smoke detector can alert you in time whenever there is a fire and save your life. Therefore, it is good to install smoke detectors on every level of your home and outside of sleeping areas.
- Store paints, thinners and other flammables in original containers, away from heat, sparks or flame.
- Check all electrical outlets and extension as well as appliance cords. Check for exposed wires, frayed or damaged cords, loose connections, and loose wall receptacles. If any damage is discovered, repair or replace the item.
- Never run electrical cords under a carpet or rug.
- Store matches and lighters out of the reach of small children.
- Extinguish all candles and gas heaters when leaving the room or going to sleep.
- Cooking is the leading cause of home fires; practice fire safety when cooking.
- Keep a Portable Fire Extinguisher in the house, especially in the kitchen.
- Designate a meeting place outside the home where family members can gather for a head count.

Basic First Aid

The First Responder

As a first responder, any individual or community volunteer must understand his/her role. It is most important to understand that the first responder is not medical help. Having basic knowledge and skills as a first responder can save lives in case of a disaster. This section covers the basic first aid for disasters/emergencies. These skills can increase self-sufficiency in a disaster and enable the community to provide emergency assistance to their families and neighbors in the event of a disaster before external help arrives.

Role of Emergency First Responder

As the first person to arrive on the disaster scene, you will need to do a quick assessment and provide support to the people injured in the disaster. You would not only be required to administer first aid but also know the basic search and rescue techniques. This section provides basic information about both these roles.

First Aid

First aid is the immediate medical assistance given to an injured person, within the available resources before getting qualified medical help.

The purpose of First Aid is to:

- Sustain life
- Prevent suffering
- Prevent secondary complications
- Promote speedy recovery

Role of First Aid Provider

If you are the first to arrive on the scene of an accident that results in an injury or serious illness, you may be the only link between a victim and emergency medical care.

Your role is to take action, whether by providing first aid, seeking medical help or calling 15 or 1122 (where this is available)

Your actions may improve the victim's chance of recovery.

Responsibilities of a First Aid Provider

- To assess the situation quickly and safely, and call for appropriate help.
- To identify the level of injury or the nature of the illness affecting the casualty/victim.

- To give early and appropriate treatment in a sensible order of priority.
- To arrange for the safe removal of the casualty.
- To remain with the casualty and reassess his condition from time to time until handing it over to the care of a medical person.
- To make and file a report and give further help if required.

Assessment Procedures

All victims must undergo an assessment, even those that are awake.

- Verbal assessments. This is for those who are able to speak and consists of asking the person about any injuries, pain, bleeding, or other symptoms he/she is aware of and can express.
- Hands-on assessments consist of asking the person for permission to assess them if they are awake and coherent and paying close attention: Look, listen, and feel for anything unusual.
  - What to check: Perform the assessment always in the same order so that you will complete each assessment quickly and accurately, checking body parts from top to bottom. Treat victims as if they have a spinal injury until you are certain they do not. Examine the:
    Head, Neck & Shoulders
    Chest, Arms & Abdomen
    Pelvis, Legs & Back
  - What to look for: Look for anything indicating an injury. Most common injuries include lacerations, fractures, and bruises, but anything out of the ordinary may be an indicator, such as changes in color, temperature and pulse.

DO's & DON'Ts

- DO'S
  - Before handling the casualty use
    Mask
    Gloves
    Head cover
    Apron
- DONTs :A First Aid Provider should never
  - Prescribe medicine
  - Declare death

Principles of FIRST AID (Four Cs)

- Call for help

- Calmly take charge
- Check the scene & the causality
- Carefully apply First Aid
- Courage

ACTION PLAN

- Assess the situation
- Safety of yourself & the casualty
- Help- ask the by-standers to telephone
- Assess the casualty
- Treat the casualty

REMINDER: Remember to emphasize safety and the role of first aid provider.

Wounds & Bleeding

Basic Information - WOUNDS

A wound is any break in soft tissue of the body that results in bleeding.

Types of Wounds

- Open Wound

  A break in the outer layer or skin that results in bleeding & allows Microorganisms (germs) to enter the body.

- Closed Wound

  No break in the outer layer of skin.

Wound Care

Objectives of wound care are to control bleeding and prevent secondary infection. The following steps are necessary:

- Clean the wound by irrigating with water, flushing with a mild concentration of soap and water, then irrigating with water again. Do not scrub.

- Apply a dressing and bandage, after thoroughly cleaning the wound, to help keep the wound clean. (A dressing is applied directly to the wound. A bandage is used to hold the dressing in place.) Use the following rules for dressings and bandages:
- If the wound is still bleeding, apply the bandage with enough pressure to help control bleeding without interfering with circulation. Check for color, warmth, and sensation to determine if the bandage is too tight.
- If active bleeding continues (the dressing is soaked with blood) redress over the existing dressing and maintain pressure and elevation.

Basic Information - Bleeding

Bleeding is the escape of blood from injured vessels. Severe bleeding is called Hemorrhage.

First Aid for Bleeding

The treatment for severe bleeding is:

- Put on disposable gloves.
- Apply direct pressure to the wound with a pad (e.g. a clean cloth) or fingers until a sterile dressing is available.
- Raise and support the injured limb. Take particular care if you suspect a bone has been broken.
- Lay the casualty down to treat for shock.
- Bandage the pad or dressing firmly to control bleeding, but not so tightly that it stops the circulation to fingers or toes. If bleeding seeps through the first bandage, cover with a second bandage. If bleeding continues to seep through the bandage, remove it and reapply.
- Treat for shock.

Fractures

Basic Information

A fracture is a broken or cracked bone. There are a number of signs and symptoms which can indicate that a person has a fracture:

- The injured part cannot be moved normally.
- The injured part may have an unnatural shape or position.
- There is swelling and sometimes bruising.
- There is loss of strength.

- There may be an irregularity or shortening of the affected limb.

First Aid for Fractures

- Treat severe bleeding and difficulty in breathing first.
- Treat on the spot. Avoid unnecessary movement.
- Immobilize the injured part; splint the joint above and the joint below the injury.

Amputation

Basic Information

Amputation is the loss of a finger, hand, arm, or leg and can be extremely dangerous. If you act quickly, you may be able to save the victim's life.

First Aid for Amputation

Control bleeding, watch for signs of shock, and treat for shock as necessary.

- Protect Body Parts:
  - Try to find the severed part of the body.
  - If found, save the tissue parts, wrap it in a plastic bag.
  - Put the bag on ice, but don't freeze.
  - Take the part with the victim to the Hospital.
  - Write the name of the victim and time of the incident on the plastic bag.

Burns & Scalds

Basic Information

Burns: are injuries to the skin & other tissue caused by Heat, Radiation or Chemicals.

Scalds: Burns caused by Moist Heat, such as hot liquids & steam.

Types of Burns

- Heat/Thermal Burns
- Corrosive/Chemical Burns
- Electrical Burns
- Radiation Burns

Degree of Burns

- 1st Degree

Signs: Skin is red or bright pink but not broken and there are no blisters seen.

- 2nd Degree

  Signs: Skin is red, tender, swollen, and blistered.

- 3rd Degree

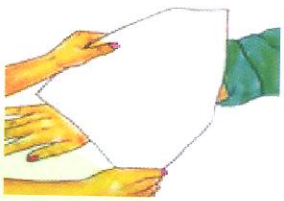
  Signs: Skin will look white and leathery or charred.

First Aid for Burns and Scalds

First-aid treatment for burns involves removing the source of the burn, cooling the burn, and covering it. To treat a burn victim, the following procedure may be applied :

- Remove the victim from the burn source. Put out any flames and remove smoldering clothing.
- Cool skin or clothing that is still hot by immersing in cool water for no longer than one minute or covering with clean compresses that have been wrung out in cool water. Water may be obtained from the bathroom, kitchen or garden hose.

- Use soaked towels, sheets, or other cloths. Use clean water. Do not apply water to third-degree burns except to put out flames. Treat all victims of third-degree burns for shock. WATCH FOR SIGNS OF HYPOTHERMIA. Cover loosely with dry, sterile dressings that keep air out, reduce pain, and prevent infection.
- Elevate burned extremities high above the victim's heart.
- Cool the burnt area with running water
- If clothing sticks to the skin, leave it there and cut away the remaining fabric



- Do not break blusters
- Do not apply lotions, ointments or fat to the injured area.
- Cover the burnt area with a plastic bag
- Cover the burn with a sterile bandage
- Remove the chemical from the skin or eyes by flushing the area with large amounts of cool running water

- CALL a Doctor or emergency medical services (EMS)

BANDAGING

A bandage is a strip of material used mainly to support and immobilize a part of the body. It has several uses such as to:

- Support - fractured bone
- Immobilize – Dislocated shoulder/Jaw
- Apply pressure – Stop bleeding & Improve venous blood flow
- Secure a dressing in place
- Retain splints in place

Principles & Procedures for Applying Bandages

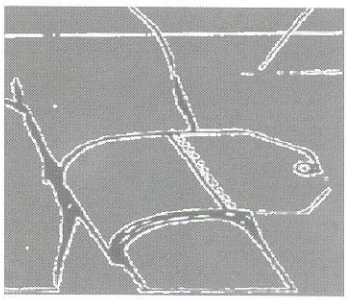
- Wash your hands and wherever necessary, wear gloves.
- Assist victim to assume a comfortable position on a bed or chair and support the body part to be bandaged.
- Always stand in front of the part/victim to be bandaged except when applying a bandage to the head, eye or ear.
- Be sure the bandage is rolled firmly.
- Make sure the body part to be bandaged is clean and dry.
- Assess the skin before applying the bandage for any breakdown.
- Observe circulation by noting the pulse, surface temperature, skin color and sense of touch of the body part to be wrapped.
- Always start bandaging from the inner to the outer aspect and from the far to the near end.
- When bandaging a joint, ensure flexibility of the joint (unless immobilization of the joint is required).
- Always start and end with two circular turns.
- Cover the area 2 inches above and 2 inches below the affected area (wound).
- Overlap turns and slightly stretch the bandage.
- Cover two thirds of the previous turn.
- Where possible, leave fingertips or toe tips exposed for observation (adequacy of blood circulation).
- End the bandage on the outer side of the body. Do not end a bandage on a wound or at the back of the body.

Methods of Applying Bandages

Bandages can be applied in the following methods.

- Circular

- Spiral
- Reverse Spiral
- Figure of Eight



Circular Turn

Circular turns are used mainly to anchor bandages and to terminate bandages. You can apply circular turns by

- Applying the end of the bandage to the part of the body to be bandaged
- Encircle the body part a few times or as needed with each turn directly over the pervious turn.
- Secure the end of the bandage with tape, metal clips or a safety pin over an uninjured area.

Spiral Turn

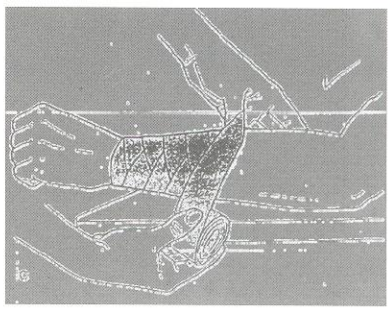
Spiral turns are used to bandage cylindrical parts of the body that are fairly uniform in circumference, such as the upper arm and upper leg.

- Make two circular turns to begin the bandage.
- Continue spiral turns at about a 30-degree angle, each turn overlapping the preceding one by two-thirds the width of the bandage.
- Terminate the bandage with two circular turns, and secure the end as described for circular turns.

Spiral Reverse Turn

Spiral reverse turns are used to bandage cylindrical parts of the body that are not uniform in circumference, such as the lower leg or lower fore arm:

- Begin the bandage with two circular turns, and bring the bandage upward at about a 30-degree angle.
- Place the thumb of the free hand on the upper edge of the bandage.
- The thumb will hold the bandage while it is folded on it self.
- Unroll the bandage about 4-6" then turn the hand so that the bandage is folded down.
- Continue the bandage around the limb, overlapping each

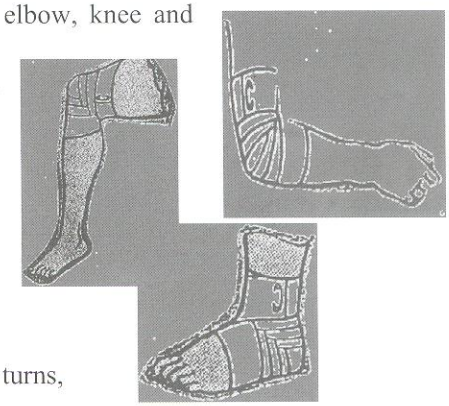


previous turn by two-thirds the width of the bandage.

- Make each bandage turn at the same position on the limb so that the turns of the bandage are aligned.
- Terminate the bandage with two circular turns, and secure the end as described for circular turns.

Figure of Eight Turn

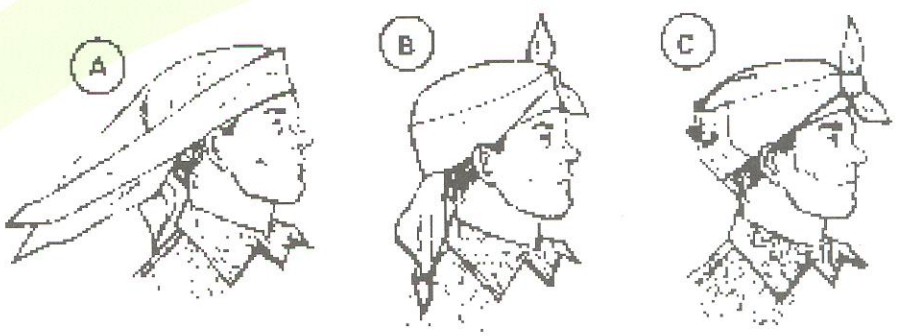
The figure-of-eight method of bandage permits flexibility of elbow, knee and ankle without disturbing the dressing.



- Begin the bandage with two circular turns.
- Carry the bandage above the joint, around it, and then below it, making a figure eight-continue above and below the joint, overlapping the previous turn by two-thirds of the width of the bandage.
- Terminate the bandage above the joint with two circular turns, and secure the ends appropriately.

Triangular Bandage to the Head

- Turn the base (longest side) of the bandage up and center its base on the center of the forehead, letting the point (apex) fall on the back of the neck.
- Take the ends behind the head and cross the ends over the apex.
- Take them over the forehead and tie them.
- Tuck the apex behind the crossed part of the bandage and/or secure it with a safety pin, if available.



Basic Search and Rescue

Basic Information

Natural and human-made disasters are increasing rapidly and likewise their intensity has also increased over the last century resulting in an increase in the risk to lives and properties.

The first 12 hours of any disaster are regarded as the golden hours. This means that the sooner the search and rescue operations starts the better are the chances for survival. While specialized search and rescue teams may take some time to arrive at the scene of a disaster, some basic techniques of search and rescue can help the communities to start the search and rescue operations as soon as the disaster strikes. Understanding of these basic techniques and of how to handle a casualty can save lives.

Generally, search and rescue terms are used interchangeably. However and in reality, these are two separate functions as described below:

Search: This means to carefully look in order to find someone missing or lost. In a disaster scenario, it involves locating victims and documenting their locations.

Rescue: To free a trapped victim from confinement or from under the rubble during a disaster is called rescue. Search and rescue operations require and consist of three significant components:

- **Rescuers:** These include trained personnel and volunteers.
- **Tools:** These depend on availability and as per the needs of a particular situation. For example, storm or earthquake damage may require tools for lifting debris whereas flood damage may require boats, ropes, and life preservers.
- **Time** may be very limited for some victims. The first 24 hours after a disaster is called the "Golden Day" - the period during which injured or trapped victims have an 80 percent chance of survival if rescued appropriately and in time.

Survival rates for persons trapped in a collapsed structure

- 30 Minutes: 91.0% Survival
- 1 Day: 81.0% Survival
- 2 Days: 36.7% Survival

- 3 Days: 33.7% Survival
- 4 Days: 19.0% Survival
- 5 Days: 7.4% Survival

Before undertaking search and rescue, it is important to set certain objectives. The foremost objectives of search and rescue are to:

- Safeguard the life of the rescuer – The most important person in a rescue attempt is the rescuer!
- Rescue and save the greatest number of people in the shortest amount of time.

Basic Principles of Search & Rescue

As mentioned above, the safety of the rescuer is the first priority. These basic principals will help the rescuer to carry out search and rescue in a safe way:

- Damaged buildings and facilities should only be approached from the least dangerous side
- While surveying indoor space in buildings, DO NOT use open fire (Matches, kerosene lamps) for lighting
- When searching for casualties DO NOT walk or stay near badly damaged and collapse-prone buildings
- DO NOT allow people to gather in one spot, in shafts, or floors.
- DO NOT go near collapse-prone walls or other constructions.
- Move very carefully over building ruins (only if it is absolutely necessary) as they are unstable heaps of fragments.
- When removing rubble from ruins DO NOT permit abrupt jerks, shaking, or strong blows at the site.
- When clearing ruins, first drag away and extinguish any smoldering or burning objects.
- Open doors to burning rooms very cautiously. Beware of possible flames or hot gas ejection.
- In burning spaces move by bending low or on your knees. Try to stay near windows, making it possible to get quickly out of the danger zone if need be.
- If an electrical cable is discovered, suspend the operation in order to avoid further damage; DO NOT step on wires.

Search and rescue in a rural setting may be simpler as it usually does not involve multiple storey buildings. Some of the following steps may be less relevant to the rural, but more and significantly relevant for the urban areas

Planning Search and Rescue

Search & Rescue Assessment

Assessment is a continuous analysis of facts that form the basis for decision making and planning. It includes the following steps:

- Gathering of facts.
- Assessment of damage to the building.
- Identification of resources.
- Establishment of the rescue priorities.
- Development of a rescue plan.
- Conducting the rescue.
- Evaluating your progress.

Each of the assessment steps will provide information that may be critical to search and rescue efforts.

Gather Information:

External Inspection of the affected Building:

- Has anyone been reported missing?
- Is the building structure damaged?
- Identify the more difficult tasks.
- Identify the Exit and Entry Routes and Points.
- Locate the Main Utilities Switches.
- Does the building have a Special importance/status?
- Number of people resident in the building.

Table 0.5 Gather Facts – Guideline

Planning Factor	*Questions*
Time of Day/Week	• Does the time of day/week affect the number of people possibly trapped in the area? • Victims likely to be at home, work, in bed, on the road? • Is day light available for search and rescue efforts or not? • How long would it be until sunrise? • Artificial lighting available and practical?
Occupancy Type	• Where are potential victims likely to be in the structure? • How many potential victims are likely to be trapped?
Construction Type	• Types of construction that have been affected? • What are the implications for search and rescue? • Is the age of construction significant?
Weather	• What is the current and forecast weather? • How would the weather affect rescue efforts? • How would it affect the victims? • How will it affect the rescuers?
Hazards	• What are the other or secondary hazards prevalent in the area, e.g. utilities, fire or hazardous materials? • What steps are necessary to mitigate these hazards? • How long would mitigation efforts take? • What effect might the delay have on the victims?

Assessing damage to the Building

There are no established rules for assessing damage. However, the damage categories would serve as a reference point for defining the primary search and rescue mission.

Light Damage:

- Superficial or cosmetic damage.
- Broken windows.
- Fallen or cracked plaster.
- Minor damage to the contents of the structure.

Moderate Damage:

- Visible signs of damage.
- Decorative work damage.
- Many visible cracks in plaster.
- Major damage to the contents of the structure.

Heavy Damage:

- Obvious structural instability.
- Partial or total collapse.
- Titling.
- Building off foundation.

Assessing Resources

The very first step in search and rescue operations is to identify local resources available to assist in rescuing victims, which include personnel, equipment and tools.

Table 0.6 Planning Questions

Resource	*Planning Questions*
Personnel	• Who lives and/or works in the area? • During which hours are those people most likely to be available? • What skills or hobbies do they have that might be useful in search and rescue operations? • What might be the most effective means of mobilizing their efforts?
Equipment	• What equipment is available locally that might be useful for search and rescue? • Where is it located? • How can it be accessed? • On which structures (or types of structures) might it be most effective?
Tools	• What tools are available that might be useful for lifting, moving, or cutting disaster debris?

Rescue Operation

Once the decision is made to initiate search operations within a specific structure or area, Search and Rescue members must systematically inspect the place for searching and rescuing the victims, they must take care of the following:

- The safety of the Search & Rescue Team members.
- The safety of the lives of the victims and others.

- Use of search & Rescue techniques appropriate to the operation.
- Protection of the environment.
- Formation of Teams
  - Make at-least two teams each with two or more members.
  - Be equipped with complete safety and rescue equipment.
  - Ensure proper distribution of responsibilities for collecting and carrying the equipment to the disaster site.
  - Distribution of responsibilities at the affected area.
  - Communication signals to be decided beforehand.

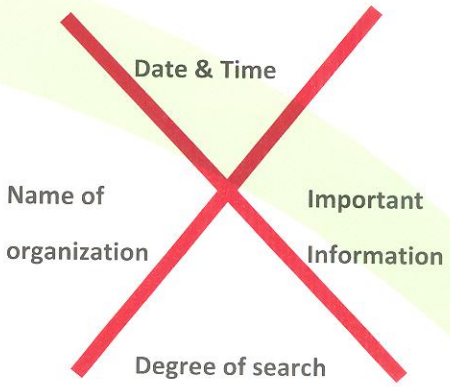
Search Methodology

- Gather at a safe location to assess the building.
- Shut off all the utilities going to the building.
- Mark the building with an "X" before entering it (see below).
- Use force if necessary to get to a victim.
- If you suspect a leakage of Gas in the building, exit immediately & leave all doors open.
- Walk slowly and carefully at every step.
- Mark every primary unit you visited separately.
- Complete the search and try to get back to the X sign.

Marking of Search Area?

BEFORE you enter MARK search areas with an "X".

- Write date & time of the search (in the top quadrant)
- Write the name of the responding agency (in left quadrant)
- Write number of victims rescued & those still inside (right quadrant)
- Write degree of search, full or partial (bottom quadrant).
- Use a zero "0" if no victim is found.
- Put a box around the "X" if it is not safe to conduct search and rescue efforts.



Dangerous--DO NOT ENTER

Search Strategy

- **Call Out:** Begin the search by shouting something like, "If anyone can hear my voice" If any victims respond, then give them further directions such as "Stay calm & wait".
- **Listen Carefully:** Stop frequently and just listen carefully for any tapping sounds, movements or voices.
- **Be Systematic:** Use a systematic search pattern to ensure that all areas of the building are covered.
- **Bottom-Up/Top-Down:** Searching from the bottom of the building up and/or from the top down is well suited to a multi-story building.
- **Right Wall/Left Wall:** Moving systematically from one side to the other is well suited to single-floor structures and avoids repetition.
- **The wall is the rescuer's lifeline:** If you or your partner become disoriented, reverse your steps, staying close to the wall until you get back to the doorway.
- **Throughout your search:** Maintain voice contact with your partner so you do not get separated.

Evaluate Progress

- This is the most important step from a safety standpoint.
- The rescuers must continually monitor the situation to prevent any harm to the rescuers.
- Also, they must determine if their plan is working, and if not, how it can be altered to make it work better.

Emergency Evacuation

Evacuation is the process of identifying a threat to public safety, warning people of the danger, instructing them on what action to take to ensure their safety, and moving all or part of the population in the affected area to a place of safety. Some evacuations involve a small number of people and some may involve a very large number. In the event an evacuation becomes necessary, use the following steps:

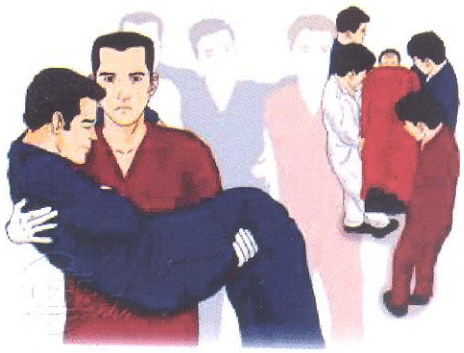
Table 0.7 Steps of Emergency Evacuation

Step	Action
1. Determine the need	Determine whether there is a need for total or partial evacuation.
2. Identify a relocation area	Select an area that is free of hazards and easily accessible.
3. Communicate	Communicate with everyone involved the need to evacuate and inform them of the location of the shelters..
4. Pre-designated routes	Designate the routes from the area to be evacuated to the area of relocation. Consider alternatives.
5. Report the evacuation	Be sure to inform emergency management personnel about the evacuation to avoid unnecessary duplication of effort and risk.

Victim Evacuation/Casualties Handling - Manual Techniques

Manual techniques for victim evacuation are required for the following purposes:

- It is necessary to evacuate an injured person from an emergency scene to a location of safety.
- Manual carrying could be tiring for the rescuer and involve the risk of increasing the severity of casualty's injury.
- Choose the evacuation techniques that would be least harmful, both to the rescuer and the victim.
- Causalities must be carried carefully and correctly handled, otherwise their injuries may become more serious or possibly fatal.
- The situation for evacuation of a causality should be organized and un-hurried.
- Each movement should be performed as deliberately and gently as possible.



Types of Drag and Carry Techniques

Tied-Hands Crawl

The tied-hands crawl may be used to drag an unconscious casualty for a short distance.

- It is particularly useful when you must crawl underneath a low structure, but it is the least desirable because the casualty's head is not supported.
- Use a triangular bandage, a torn shirt, etc to tie the casualty's hands together and place them around your neck. This way you can even move a person much heavier than yourself.

One Person Arm Carry

This involves a single rescuer lifting a victim safely in his arms. During this process, the rescuer holds the victim around the victim's back and under the knees.

One Person Pack-Strap Carry

This method is more appropriate to carry a victim safely for longer distances.

- Place both the victim's arms over your shoulders.
- Cross the victim's arms, grasping the victim's opposite wrist.
- Pull the arms close to your chest.

- Squat slightly and drive your hips into the victim while bending slightly at the waist.
- Balance the load on your hips and support the victim with your legs.

Fireman Carry

This technique is used to carrying a victim for longer distances. It is very difficult to get the person up to this position from the ground. Getting the victim into position requires a very strong rescuer or an assistant.

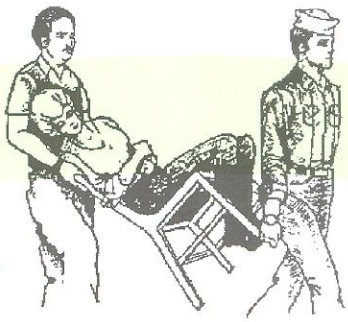
- The victim is carried over one shoulder.
- The rescuer's arm, on the side that the victim is being carried, is wrapped across the victim's legs and grasps the victim's opposite arm.

Two Person Carry (by arms & legs)

- Rescuer 1 squats behind the victim's torso and grasps the victim from behind at the midsection.
- Rescuer 2 squats between the victim's knees, grasping the outside of the knees.
- Both rescuers rise to a standing position.

Chair Carry

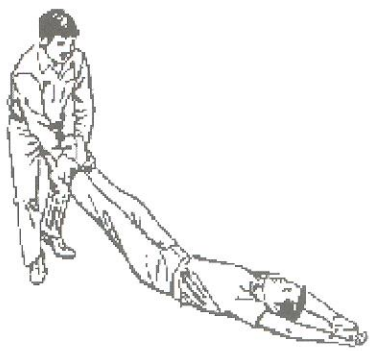
This is a good method for carrying victims up and down stairs or through narrow or uneven areas.



- Pick the victim up and place him or have him sit in a chair.
- The rescuer at the head grasps the chair from the sides of the back, with palms in.
- The rescuer at the head then tilts the chair back onto its rear legs.
- For short distances or stairwells, the second rescuer should face in and grasp the chair legs.
- For longer distances, the second rescuer should separate the victim's legs, back into the chair and on the command of the rescuer at the head, both rescuers stand using their legs.

Ankle Pull

The ankle pull is the fastest method for moving a victim a short distance over a smooth surface. This is not a preferred method of patient movement. The following method is applied here:



- Grasp the victim by either ankles or pant cuffs.
- Pull with your legs, not your back.

- Keep your back as straight as possible.
- Try to keep the pull as straight and in-line as possible.
- Beware that the head is unsupported and may bounce over bumps and surface imperfections.

Shoulder Pull

The shoulder pull is preferred to the ankle pull. It supports the head of the victim. The drawback is that it requires the rescuer to bend over at the waist while pulling.

The following methodology is used here:

- Grasp the victim by the clothing under the shoulders.
- Keep your arms on both sides of the head.
- Support the head.
- Try to keep the pull as straight and in-line as possible.

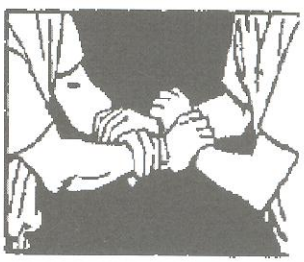
Blanket Drag

This is the preferred method for dragging a victim from the confined area and is applied as follows:

- Place the victim on the blanket by using the "logroll" or the three-person lift.
- The victim is placed with the head approx. 2 ft. from one corner of the blanket.
- Wrap the blanket corners around the victim.
- Keep your back as straight as possible.
- Use your legs, not your back.
- Try to keep the pull as straight and in-line as possible.

Two Handed Seat

This technique is used for carrying a victim longer distances. This technique can also be used to support an unconscious victim and is applied as follows:

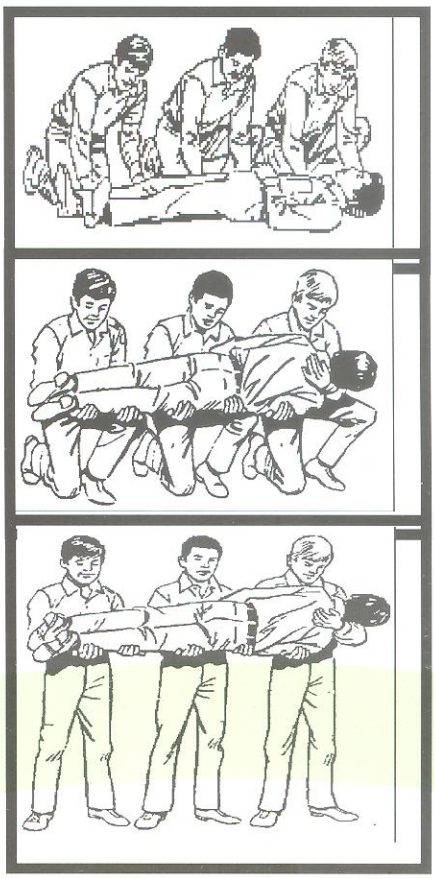


- Pick up the victim by having both rescuers squat down on either side of the victim.
- Reach under the victim's shoulders and under their knees.
- Grasp the other rescuer's wrists.
- From the squat, with good lifting technique, stand.
- Walk in the direction that the victim is facing.

Four Handed Seat

This technique is for carrying conscious and alert victims moderate distances. The victim must be able to stand unsupported and hold themselves upright during transportation. This is done as follows:

- Position the hands to make a seat as indicted in the graphic.
- Lower the seat and allow the victim to sit.
- Lower the seat using your legs, not your back.
- When the victim is in place, stand using your legs, keeping your back straight.



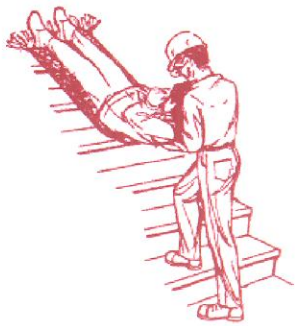
Three Person Carry

This technique is for lifting a patient onto a bed or a stretcher or for transporting him/her short distances. The methodology is as follows:

- Each person kneels on the knee nearest the victim's feet.
- On the command of the person at the head, the rescuers lift the victim up and rest the victim on their knees.
  - If the patient is being placed on a low stretcher or litter basket: **On the command of the person at the head, the patient is placed down on the litter/stretcher.**
  - If the victim is to be placed on a high gurney/bed or to be carried: **At this point, the rescuers will rotate the victim so that the victim is facing the rescuers, resting against the rescuers' chests.**
  - On the command of the person at the head, all the rescuers will stand.
  - To walk, all rescuers will start out on the same foot, walking in a line abreast.

Removal of a Casualty over Stairs

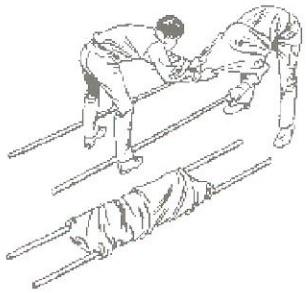
Don't try this if you suspect head or spinal injuries or broken limbs. Use a mattress or rug under the person if one is available.



Improvised Stretcher

This technique requires two poles/pipes strong enough to support the victim's weight and at least two shirts.

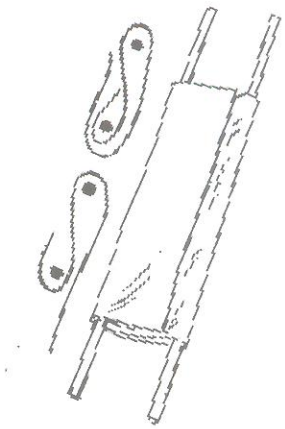
- While the first rescuer is grasping the litter poles, the second rescuer pulls the shirt off the head of rescuer one.
- All buttons should be buttoned up with the possible exception of the collar and cuffs.
- The rescuers then reverse this procedure and switch sides.



Blanket Stretcher

This technique requires two poles and a blanket and is done as follows.

- Place the blanket down on the ground.
- Place one pole approx. 1 foot from the middle of the blanket.
- Fold the short end of the blanket over the first pole.
- Place the second pole approx. 18 to 24 inches from the first (this distance may vary with victim or blanket size).
- Fold both halves of the blanket over the second pole.



Basic Search and Rescue

Flood Rescue

Flood may lead to drowning of people. If you see anyone drowning and if you make an attempt to rescue:

- Think of your own safety first and never put yourself in danger.
- Consider the potential hazards to both the rescuer and the victim.
- If the rescue is too dangerous, wait until the emergency services arrive.

Follow the following safety measures to rescue:

- Never place yourself close enough to be grabbed by a panicky victim.
- Always place distance and device between the rescuer and the victim.
- You may extend your reach with long objects such as a tree branch, pole or rope. Rescue tactics, in order from low risk to high risk are "Reach-Wade-Throw-Row".

Reach

With a long stick, a scarf, clothes or anything else. Crouch or lie down to avoid being pulled in.

Wade

Test the depth with a long stick before wading in and then use the stick to reach out. Hold on to someone else or the bank.

Throw

A rope is best - you can then pull in the person. Otherwise throw something that will float - a ball, a plastic bottle, a lifebuoy...this will keep the person afloat until help arrives.

Row

Use a boat if there is one nearby and if you can use it safely. Do not try to pull the person on board in case they panic and capsize the boat.

Information Collection and Dissemination

During devastating disasters, communication systems may break down, thus it will be difficult to gather necessary information. Local governments also need local information.

When citizens act according to uncertain information and rumors, it may cause panic. Therefore, it is important for the community based disaster risk management committees (CBDRMC) to understand the situations of the localities immediately and report the accurate information to the residents of the communities and relevant public authorities.

Regarding emergency information, there are two components; Information Collection and Information Dissemination. The leaders, sub-leaders and the group members need to be identified.

Information Collection

CBDRMC collect information on 1) number of evacuees and evacuation sites, 2) damage and losses (human, buildings, infrastructure such as roads, water, irrigation systems, dikes etc.) 3) fire incidents, 4) any information useful for survival and report to person in charge of Disaster Management at Union Council

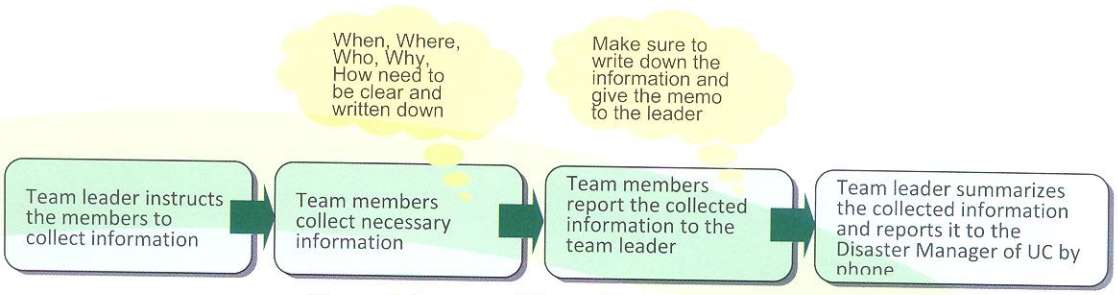


Figure 0.1 Flow of Information Collection

Types of Information to Be Collected

- Number of evacuees, evacuation places residents evacuated
- Damage (casualties, buildings, infrastructures such as roads, water, irrigation systems, dikes)
- Fire incidents, if any
- Information useful for survival

Tips

- Timely / Periodical Reporting

  The first information can only be an outline, but the reporting itself is important. Confirmed information can be reported in the second or further reporting occasions. No remarkable progresses/changes is also important information.

- Confirming the Information

Information needs to be confirmed, since groundless rumors tend to spread.

- Unifying Information

  The leader of the Information Collection and Dissemination needs to contact the person in charge of Disaster Management at UC.

- Familiarize yourself with the Use of the Communication System

  If communication systems such as wireless are introduced, practicing and familiarizing yourself with their use during ordinary times is necessary. Collaboration with amateur radio operators is useful.

- Report as briefly as possible

  In an emergency situation, reporting should be concise. Periodic drills are necessary.

Information Dissemination

Information from public authorities such as UC, Tehsil, District, Provinces, radio and television is disseminated to the residents.

- The local areas in which the information is to be disseminated need to be subdivided and assigned to persons who report the team / task force
- Communication methods such as sirens and mosque speakers need to be decided in advance
- Urgent messages such as evacuation orders or things related to local residents need to be prioritized

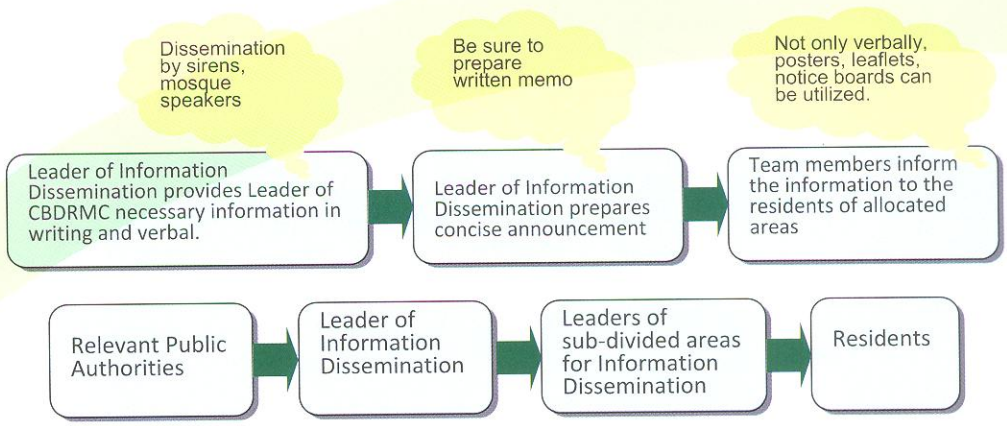


Figure 0.2 Flow of Information Dissemination

Tips

- Disseminate in simple words
- Not only verbally, written memos should be prepared
- To disseminate accurate information, information receivers are advised to repeat the information

- Take special care in disseminating numerical information
- To disseminate the information efficiently, dissemination routes need to be identified beforehand
- Take special care of those who have hearing difficulties, foreigners, etc.
- Regularly inspect the communication system

References:

Enabling Communities to Live Responsibility with Disasters, FOCUS Humanitarian Assistance

Evacuation

During an emergency, if residents know the evacuation routes and evacuation sites, they can evacuate smoothly and safely. It is very important to learn how to assist those who have difficulties in evacuating by themselves. Especially for Tsunami, the speed is extremely fast, thus periodic practice will prevent people from being late for the evacuation. Simulation exercises in the night time are also recommended.

Confirming the Evacuation Sites

- Confirming the evacuation routes and evacuation sites by all the family members is recommended
- Decide where to meet finally, in case all your family members are separated

Timing of Evacuation

When you are facing pressing dangers such as earthquakes and tsunami, the earliest possible evacuation is needed. Evacuate immediately in the following cases.

- When you think it is dangerous
- When there are instructions from public authorities such as police, rescue 1122, civil defense, UC, Tehsil, district, etc.
- When there are instructions from a leader or members of CBDRMC

Procedures

Procedures for evacuation are as follows.

- The Information Team gives evacuation guidance to the residents.
- The Evacuation Team asks residents to evacuate.
- Determine the rough number of evacuees and the situation of those who have difficulties.
- Make pre-defined smaller groups for evacuation, and identify persons who will guide the evacuees.
- The leader of the Evacuation Team announces the appropriate evacuation routes and evacuation sites.
- Members of the Evacuation Team provide ropes for those who have difficulty in evacuation to hold, so that they can easily follow the group.
- Gather information from the radio during evacuation
- On reaching the evacuation sites, members of the Evacuation Team count the number of evacuees and make sure that all the evacuees have reached the evacuation site.

Points of Evacuation

Points of evacuation are described below.

- Set several evacuation routes in advance and decide the safest routes based on the situation, such as road blockages, wind etc.
- If there are injured, patients, or physically challenged who cannot walk by themselves, the residents must cooperate and carry them using instant stretchers, chairs etc.
- During evacuation in groups, keep the pace of the slowest one. The first person in the queue pays attention to the last person in the queue.
- During evacuation, be careful about the wind, sudden change of weather, fire etc.
- Try to wear walking shoes with thick soles.
- Keep both your hands free by carrying back packs with emergency kit bags.

Supplying Food and Water

During devastating disasters, power failure, loss of water or gas supply, a shortage of food, water, and commodities is to be expected. If the affected areas are across a wide area, relief supply may not be adequate and slow in coming. It is advisable to keep stocks at home. It is advisable to train community kitchen and food distribution within the community.

Tips

- Confirm the number of evacuees to equally distribute the supplies.
- Keep the access way and service space for water supply trucks open.
- At the very initial stage, items that do not require cooking can be distributed.
- Keep water for cooking.
- To prevent disease, make sure to wash and disinfect hands.
- While setting up an outside kitchen, try to eliminate obstacles on the ground which cause slipping, and stumbling. Keep infants and small children away.
- Avoid keeping the relief goods in areas with moisture or bad drainage.

Procedures

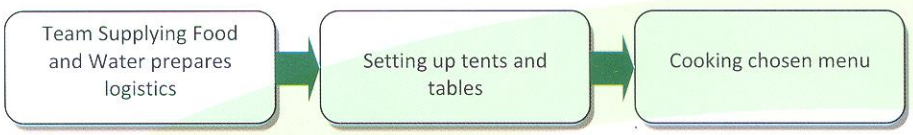


Figure 0.3 Procedures of Supplying Foods

Preparation

Cooking pans, gas cooking stoves, water, towels, rice, flour, vegetables, meat etc. are prepared.

Module 7 Conducting Simulation Drills

Necessity

To minimize the impact of disasters, calm and appropriate actions are important. To be able to take calm and appropriate actions, knowing how to react and practicing how to react is very important. Since most of the time, people cannot do something that they have never done before. By practicing practical training, capacity for emergency action is enhanced and the hazardous impact can be minimized.

Objectives

To be able to act appropriately, practical drills need to be conducted periodically among the different age groups of the residents, by coordinating with disaster management organizations, and enterprises in the locality. The objectives of conducting drills are summarized below.

- Familiar with the systematic emergency responses and disaster management procedures, responsibilities of different team members of CBDRMC among committee members and community members.
- Test the operability and efficiency of the disaster management plan in place.
- Enhance coordination of all stakeholders to implement existing disaster management plans.
- Generate preparedness and enhance confidence among residents and public officials concerned.

Things to Review in the Drills

Many participants can be expected in a drill, thus it is a great opportunity to provide basic information and knowledge for the participants during drills. Following are the points of information / knowledge that can be reviewed and practiced. Such reviews and training need to be conducted repeatedly.

- Basic and practical knowledge on different types of disasters
- Understanding vulnerabilities of the localities
- Conducting countermeasures for each stage of disasters
- Knowledge dissemination on disaster management equipment
- Understanding and practicing the responsibilities of each person
- Understanding evacuation sites

Planning the Drills

Be sure to make a plan for the drills. Plan the menu of the drills carefully so that many people can participate in different types of activities. Plan also the composition of the participants for the types of

activities. The activities need to be structured from easy activities to difficult activities. Conducting the activities repeatedly is recommended.

Drills can be combined with some amusement events such as movies, or festivals. The drill can be organized as a sports festival.

- Plan what types of trainings are to be conducted
- The target groups and target number of participants
- Suitable date and time
- Venue
- Method of announcing the drill
- Preparing disaster management equipment

Instruction by Civil Defense, Rescue 1122, DDMA

It is advisable to coordinate with disaster management organizations, and if it is possible, the instructors can be sent from such professional organizations.

Conducting Reviewing Session

At the end of the drill, it is important to have a reviewing session among all the participants of the drill and feedback to the next drill.

Types of Drills

There are different types of drills, such as information collection and distribution, fire extinguishing, basic search and rescue, first aid, evacuation, supplying food and water, and a combination of these. Map maneuvers are also one of the drills but in this section, only practical on-site trainings are introduced.

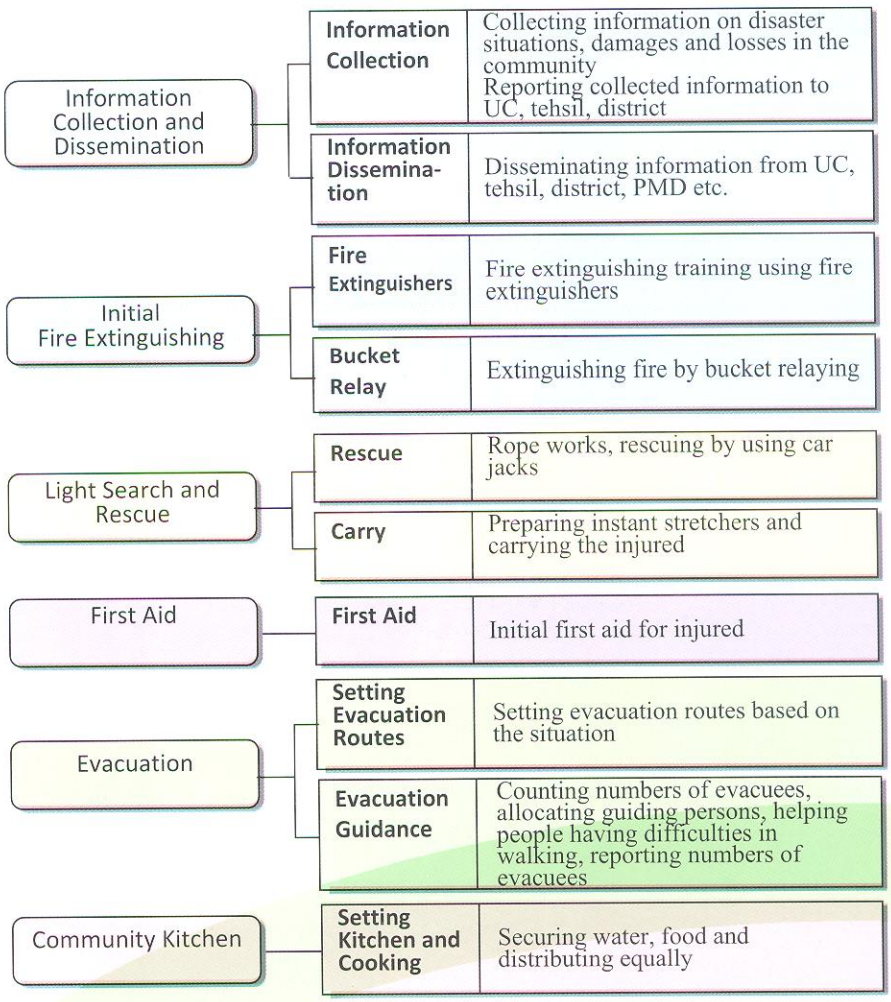


Figure 7.1 Types of Drills

Different Types of Drills considering Local Characteristics

Types of disasters in Pakistan are flood, flash flood, cyclone, landslide, debris flow, earthquake, tsunami, avalanches etc. Types of drills to be conducted are planned effectively by considering local characteristics and situations. Following table shows some examples.

Table 7.1 Table Contents of Drills

Characteristics of the Areas	Contents of Drills
Coastal Areas	**For Tsunami and High Tide** ・ Information dissemination regarding dangers and evacuation orders ・ Evacuation in shortest time ・ Evacuation announcement and guidance for tourists
Area adjacent to Steep Slopes	**For landslide, debris flow** ・ Information dissemination of dangers and evacuation order ・ Evacuation in shortest time
Congested Area	**For Earthquake** ・ Initial fire extinguishing ・ Evacuation ・ Light Search and Rescue in a collapsed structure
Tourist Places	**For Evacuation of tourists** ・ Information dissemination training (announcing dangers, evacuation order) ・ Emergency evacuation
Neighborhood of special facilities	**For collaborating kindergartens / schools** ・ Information dissemination training ・ Emergency evacuation of infants
Business cum Residential Area	**For collaborating residents and enterprises** ・ Evacuation training ・ Light search and rescue ・ Setting community kitchen and cooking

Response Type Drill

The drills can be conducted by setting different incidents such as flooding, fire, falling objects, road blockage, drowning persons, and injured in the different parts of the community. Each scenario is prepared by only a small number of organizers and participants are given instructions to react according to the given situations. To react to the given situations is a good opportunity to enhance the capacity of decision making under an emergency situation.

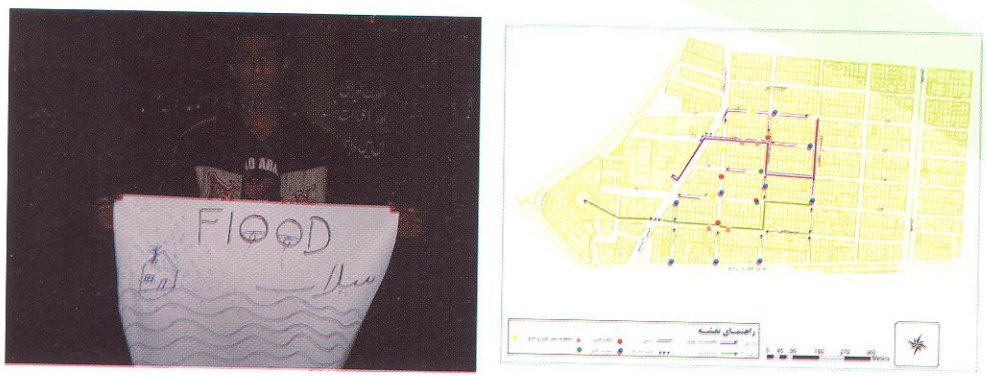


Figure 7.2 Incident Settings

Scenario of the Drill

Drill scenario is developed considering a timeline, responsible persons, and necessary equipment. Example of drill scenario is shown as example.

Table 7.2 Example of Simple Drill Scenario

Activities	Necessary Equipments	Person in charge Organization / Name	Time	Action by PARTICIPANTS
Instruction regarding Drill for a flood	Documents of explanation	UC / tehsil / district 1.Suleiman 2.Shanaaz	**09:00-09:15**	z Gather at one place and listen to the instruction
Flood Warning Siren	2 Hand Sirens 3 Mosque Speakers 1).XXX 2).YYY 3).ZZZ	School principal and Community leaders 1.School Principal 2.CBDRMC leader Mosque Speakers 1).XXX 2).YYY 3).ZZZ	**09:30**	z Self Safety Check
Second Siren for Evacuation	2 Hand Sirens 3 Mosque Speakers 1).XXX 2).YYY 3).ZZZ	School principal and Community leaders 1.School Principal 2.CBDRMC leader 3.CBDRMC Evacuation leader Mosque Speakers 1).XXX 2).YYY 3).ZZZ	**09:40**	z Shut down electric breakers, gas and fire sources. z Take emergency kit, bags, helmets, if any z Start evacuation to designated evacuation site nearby z Bring keys to the houses. z Be careful of heavy rain and strong wind. z Check your own safety, others missing, or injured, utilizing the name lists of the community z Respond to treatment of the injured.
Report to UC about the damage and evacuation	Mobile phones	1 CBDRMC leader	**09:50**	z Report to UC office about situation of the community by mobile phone; (report situation, ask assistance) NOTE: Need to mention that this is a DRILL at first loudly, then report.
Following **Incidents** are set 10 incident sign boards 1 signboard per site	<Production of Signboards for Incidents in advance> (Road Blockage(3), Bridge Impassable (3), Injured (4))	1. Road Blockage: 2. Road Blockage: 3. Road Blockage: 4. Bridge Impassable: 5. Bridge Impassable: 6. Bridge Impassable: 7. Injured: 8. Injured: 9. Injured: 10. Injured:	**09:00 - 09:30**	**NB:** Participants do not know the damage or injuries on the way to evacuation sites Residents / Students will respond to the incidents on the way to evacuation sites.
· **Road Blockages** Setting signboard at 3	3 Signboards	Resident Volunteers 1.XXX	**09:00 - 09:30**	Confronting a ***Road Blockage***

Activities	Necessary Equipments	Person in charge Organization / Name	Time	Action by PARTICIPANTS
places Volunteers hold the signboards		2.YYY 3.ZZZZ		Find alternative route and Detour
· **Bridge Impassable** Setting signboard at 3 places	3 Signboards	Resident Volunteers 1.XXX 2.YYY 3.ZZZZ	**09:00 - 09:30**	Confronting a ***Bridge Impassable*** Find alternative route and Detour
· **Injured** Placing 4 Fake Injured Persons Place types of injuries on cards on fake injured persons (1) Fainted and unconscious:1 (2) Leg is broken:1 (3) Severe cuts on legs: 1 (4) Arm is broken:1 3 blankets are provided for 3 instant stretchers for injuries (1) (2) and (3)	4 Injured Volunteers (1 person x 4 types) 4 Small cards to write about the types of injuries Health Center Staff Supervisors at 4 sites 3 Blankets and 6 bars for 3 instant stretchers	Residents/Volunteers 1. 2. 3. 4. Health Workers 1. 2. 3. 4.	**09:00 - 09:30**	Caring for the ***Injured:*** Apply first aid to the injured Evacuate with the Injured or Carry them to evacuation sites
Registration at Evacuation Sites 1.Setting up a registration desk 2.Assisting Registration of evacuees	Registration sheets Pens (name, address, tel#, time of entry, remarks on food habit, physical difficulties) desks, chairs, tents	Members of Evacuation Team 1. XXX 2. YYY 3. ZZZ	**09:50 Onwa rd**	Evacuees at evacuation site to register, using registration desks Evacuees are divided into **3 Groups (1, 2 3)** for different trainings and receive training tickets
3. Distribution of Biscuits, fruit juice, and bottles of water (200?)	Snacks, drinks 2 desks	Members Supplying food and water 1. XXX 2. YYY 3. ZZZ		
Training A: **Community Kitchen** 10 resident volunteers and 3 team members for supplying food and water and cook emergency meals for 200 people. Open tent is set.	Food Materials for 200 people (including 50 students, 25 observers) Cooking Utensils Meal Ingredients Tent	Team members for Supplying food and water 1. Saida 2. Ayesha 3. Amir Resident Volunteers 1. 2. 3. 4. 5. 6. 7.	**10:00 - 10:40**	**Group A** 3 team members 10 volunteer residents

Activities	Necessary Equipments	Person in charge Organization / Name	Time	Action by PARTICIPANTS
		8. 9. 10.		
Distribution of food/water After cooking is done, distribute the food.		3 team members 10 residents	**13:00 - onward**	**Group A** 3 team members 10 volunteer residents
Training B: **Setting Tents** 3 tents are prepared for setting. **(after setting, to be used for)** **Tent 1: Community Kitchen** **Tent 2: Medical Post** **Tent 3: Registration**	3 tents 2 Instructors	Team members for Supplying food and water, first aid, and evacuation 1. 2. 3.	**10:00 - 10:40**	**Group B** (30 residents) Setting 3 tents 10 residents* 3 tents =30residents
Training C: **First-aid training**	First Aid Kits 2 sets 2 Instructors per one set	Team members for first aid 1. 2. 3. 4. Health Workers 1. 2.	**10:00 - 10:40**	**Group C** (30 residents)
Training D: **Notice boarding**	2 boards 20 Pens 40 Note pads	Team members for Information Collection and Dissemination 1. 2. 3.	**10:00 - 10:40**	**Group E** (40 residents)
Reviewing	Microphones Questionnaire sheets for evaluation (150)	UC Tehsil District DRM expert	**10:40- 11:00**	**All Participants**

Module 8 Monitoring and Evaluation

Steps

The steps of the Monitoring and Evaluations are summarised as below.

1. Identifying what kinds of information need to be collected, considering available human and financial resources.
2. Identifying how the information will be collected.
3. Identifying who will collect, analyse, and use the information
4. Setting up the Monitoring and Evaluation system with a participatory approach.
5. Collecting data and information
6. Analysing and evaluating data
7. Documentation, communication and sharing findings

Monitoring

Monitoring is the process of reviewing the activities periodically and assessing how the progress and the planned schedules are progressing, and how many achievements have been realized. There are two types of monitoring; 1) process monitoring, and 2) effect monitoring. In the process monitoring, the implementing process is assessed, thus if it is behind the planned schedule, more inputs / actions are added to catch up with the timeline. For process monitoring, indicators at key stages can be developed. In the case of effect monitoring, the impacts are assessed. If there are negative impacts, stakeholders are to take appropriate actions to stop the negative effects.

Method of Monitoring

- Direct observation by visiting the field
- Interviewing survey with the key persons
- Conducting review meetings among the stakeholders
- Monitoring with indicators, by reviewing the existing activity reports, progress

Evaluation

Evaluation is the assessment of achievements, results, and effects, usually conducted at the end of the project, but sometimes it can be done during the implementation phase. Evaluations are conducted to know; how many of the objectives are achieved, how successfully the project contributed to disaster risk reduction; what were the effects of the project to the community people, and accountabilities. If the set objectives are not achieved, additional inputs need to be considered.

It is also important to set indicators for evaluation at the beginning of the project. The result of the VCA can be baseline data to assess the changes before and after the project. If a baseline survey is conducted at the early stage of the project, an end survey can be conducted to see the differences and know the effectiveness.

In the evaluation, it is also important to discuss among the stakeholders to identify the lessons learned and make documents to share among the concerned.

The process of monitoring and evaluation needs to be participatory, the stakeholders including beneficiaries, community members, disaster management experts at local governments, and project managers, take active roles in designing the process, developing the findings, conclusions, and recommendations. In the process, the stakeholders decide together and come to common understandings and certain consensus which motivates the participants in the process of the project, and they also extract the lessons learnt for further activities to be improved at the end of the project.

Annex

Annex 1

Baseline Survey / Vulnerability and Capacity Assessment

Baseline Survey Report is attached as one of the example.

Annex 2

Participatory Community Disaster Management Planning

Example of Community Disaster Management Plan is attached. This plan was facilitated to be prepared by community facilitators / trainers of FOCUS Humanitarian Assistance.

Annex 3
DIG Manual

DISTRICT PROFILE

Hazard, Risk, Vulnerability, Capacity
And
Development
Situation Analysis

◆Location◆

District Rawalpindi is located between 73° 4' 0 E, N33° 36' 0 N and 70° 47', 72° E with an area of 3,134 square miles (8,120 km2).

District Rawalpindi is bounded on the northeast by Paksitani administered Kashmir, on the northwest by Khyber Pakhtunkhwa. On the north Rawalpindi is bounded by Islamabad, on the south by Districts Jehlum and Chakwal, while on the west by District Attock.

Accessibility

Being the twin of Pakistan's Capital, Islamabad, Rawalpindi is a bustling town strategically located between Punjab and Kashmir and is easiest to get to.

By plane

Islamabad International Airport is located within the city of Rawalpindi. Daily flights to and from various International and Local destinations are available.

By train

Rawalpindi has its own central railway station, with regular services to many destinations within Pakistan.

By Road

Rawalpindi has extensive road networks, linking it directly to various major cities such as Lahore, Peshawar and Taxila to the north. Apart from that the twin city, which Rawalpindi is otherwise called, has a complete structure of traveling around in the city through local buses.

Brief Introduction of the District

Rawalpindi - History

Rawalpindi has a long history spread over several millennia. Archaeologists believe that a distinct culture flourished on this plateau as far back as 3000 years ago. The material remains found at the site prove the existence of a Buddhist establishment contemporary to Taxila, but less celebrated than its neighbor.

It appears that the ancient city went into oblivion as a result of the Hun devastation. The first Muslim invader, Mahmud of Ghazni (979-1030), gifted the ruined city to a Gakhar Chief, Kai Gohar. The town, however, being on an invasion route, could not prosper and remained deserted until Jhanda Khan, another Gakhar Chief, restored it and in 1493 named it Rawalpindi after the village Rawal. Rawalpindi remained under the rule of the Gakkhars till Muqarrab Khan, the last Gakkhar ruler, was defeated by the Sikhs in 1765. The Sikhs invited traders from other places to settle here. This brought the city into prominence.

Following the British conquest of the Sikhs and their occupation of Rawalpindi in 1849, the city became a permanent garrison of the British army in 1851. In the 1880s a railway line to Rawalpindi was laid, and train service was inaugurated on January 1, 1886. The need for having a railway link arose after Lord Dalhousie made Rawalpindi the headquarters of the Northern Command and Rawalpindi became the largest British military garrison in British India.

In 1951, Rawalpindi saw the murder of the first elected Prime Minister of Pakistan, Liaquat Ali Khan, in Liaquat Garden. Today Rawalpindi is the headquarters of the Pakistani Army and Air Force.

The famous Murree Road has been a hot spot for various political and social events. Nala Lai, famous for its floods, runs through the middle of the city, dividing it into a city area and Cantonment area. History describes Nala Lai water as pure enough to do washing of clothes but now it has become polluted with the waste water from all sources including factories and houses

Photos of the areas, local people, past disaster

◆Basic Data◆

Area and Demography

According to the 1998 census the population of the district was 3,363,911 of which 53.03% were urban, making Rawalpindi the second most urbanised district in Punjab. By 1998 the population was estimated to be 4.41 million - a rise of over a million.

The district has an area of 5,286 km2 (2,041 sq mi). It was part of Rawalpindi Division, until the year 2000 when the division was abolished.

■	**Demography**	
	Population (census 1998)	3363911 persons
	Population growth rate (census 1998)	2.75 %
	Ratio of population less than 18 years old (census 1998)	%
	Ratio of population more than 65 years old (1998)	
	Ratio of urban population	1788273 (53.16 %)
	Population density	636.5person/sq. km
■	**Literacy**	
	Literacy rate	Total: 70.4% Male: 81.19% Female: 59.18%
■	**Public Administration**	
	Number and Names of Tehsil	8 Names: 1. Gujar Khan 2. Potohar (Southern Rawalpindi) 3. Taxila Tehsil 4. Rawal (Northern Rawalpindi) 5. Kallar Syedan 6. Kahuta 7. Kotli Sattian 8. Murree
	Number of Union Councils	170
	Areas	5285 Sq. Kms.
■	**Housing**	
	Average size of house hold	6.5
	Structures	**Mixed Katcha/ Pakka**
	Ratio of houses with piped water supply	215313 (41.29 %)
	Ratio of houses with electricity	474471 (90.98 %)
	Ratio of houses with sewerage	**NILL**
■	**Industry**	
	Major industries in the district	Transportation, Food, etc
■	**Hazard**	
	Major hazards	Man Made Flood Earthquake
	Hazard / Risk level (if there is risk analysis)	NA Earthquake: Risk level : 3 out of 5

Population Growth (in 30 years)

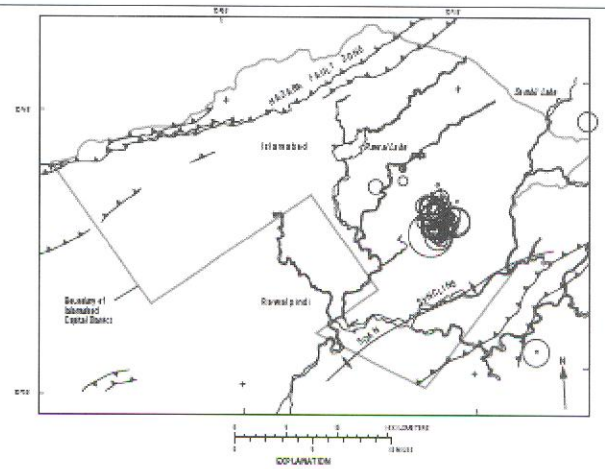
	1978	1981	1998	2008
Total	NA	2121450 persons	3363911 persons	NA
Growth rate	NA	2.75 %	2.75 %	NA
Population density (persons/sq.km)	NA	NA	636.5person/sq. km	NA

◆Development Framework◆

District Development Plan	
Name of the Plan / Prepared by	1.Annual Development Programme 2.Model Villages 3.Punjab Development Social Programme (PDSP) -Education -Special Education -Health 4.Drought Recovery Assistance Programme Project (DRAP-P) -Agriculture -Water Supply 5. Chief Minister's Accelerated Programme -Education -Health 6. Chief Minister's Accelerated Programme (LDP) -Roads 7. Chief Minister's Packages -Tehsil Gujar Khan -Tehsil Kahuta -Tehsil Kallar Syedan -Tehsil Kotli Sattian 8. Education Sector Reform Programme (Phase 1-2) 9. Education Sector Reform Programme (Phase 3) NLC 10. Health Sector Reform Programme (Phase 3) NLC 11. Development Programme -KPP-II (NA-53) -KPP-II (NA-55) 12. National Gender Reform Action Plan (GRAP) 13. Sustainable Livelihood in Barani Areas Project (SLBAP) 14. Federal ESR 15. Special Education 16. National Programme for Improvement of Water Courses 17. Literate Punjab Program (LPP) 18. Literacy through Skill Training (LTST) 19. Miscellaneous
Target Year Current projects	
Vision NA	
Action Plans NA	
Relevant Plans for Disaster Risk Management District Disaster Risk Management Plan Flood Relief Plan	

◆Characteristics of Disasters ◆

Hazard	Description (general vulnerability)
Flood	The Lai basin already receives most (90 percent) of its river flows within a period of one and a half months. The current carrying capacity of the Lai is about 10,000 cusecs [cubic meters per second] while the twenty-five year return period flood carries 35,000 cusecs of water causing inundation in the most densely populated areas of Rawalpindi. Climate change predictions of increased precipitation over approximately the same number of rainy days – in effect, higher intensity storm events -- would exacerbate this situation. Similarly, Islamabad is in an accelerated process of developing new sectors in the upstream watershed, reducing its absorption capacity. The combination of these factors is expected to significantly increase the flood peaks in the Lai. Population and economic growth along with the elitist planning of Islamabad is forcing the poorer population of the conurbation to inhabit the risk prone banks of the Lai, particularly because of its proximity to economic opportunities. Surprisingly, solid waste also emerges as the main hazard identified by the majority of the residents surveyed in the Lai basin. The mortality and disease load from the unhygienic living conditions and contaminated drinking water around the Lai may actually be claiming more lives than the floods. In the Lai flood plain at least 19,000 households lie within the historic 100-year return flood plain with most of them having a tenuous legal status over their habitation. In Rawalpindi City, being on the lower elevation, low-lying areas along Lai Nullah and tributaries suffer from even small floods. Serious flood events occur in particular along: the main stream between Gunj Mandi Bridge and Railway bridge, and the tributaries of Arya Nullha, Dhok Rata Nullah Dhok Charaghdin. Flood inundation starts in these areas once the water level of Lai Nullah reaches 18 feet (491.5 m) at Gawal Mandi Bridge.
Earthquake	The Islamabad-Rawalpindi area lies in a tectonically active zone, where faulting, folding, and earthquakes have been frequent in the recent geologic past. Quaternary deposits are tectonically deformed throughout the Islamabad District, the Rawalpindi District of Punjab and the Abbotabad District of Khyber-Pakhtunkhwa (formerly North Western Frontier Province). In A.D. 25, the Buddhist monasteries at Taxila, 25 km west-northwest of Islamabad, were destroyed by an earthquake estimated at Modified Mercalli intensity IX. An earthquake of Richter magnitude 5.8 on February 14, 1977, centered 7 km northeast of Rawalpindi, caused damage indicating Modified Mercalli intensity VII near the epicenter (Adhami et al, 1980). The focus of the 1977 earthquake was estimated to be at 14- to 18-km depth. Although earthquake shaking is not confined to areas near surface faults, the risk of surface rupture is greater where the surface has been broken previously. Only those faults estimated as most likely to rupture during earthquakes are shown in figure SR, along with the historic epicenters and magnitudes of earthquakes in the Islamabad area between January 26, 1977, and April 30, 1978, from data of Adhami et al. The earthquake of 2005 left behind more than 73,000 deaths and more than a hundred thousand injured.

	 *(Regional Studies of the Potwar Plateau Area, Northern Pakistan Ed. by USGS Peter D. Warwick and Bruce R. Wardlaw)*
Fire	Due to congested settlement and populated area any fire would quickly spread and cause heavy damage and casualties.
Heavy Rain	Heavy rain is one of the major causes of Flooding it has an enormous effect on the lives of the Rawalpindi people.
Man Made	The law and order situation in the city always remains very precarious and this causes many incidents.

◆Disaster History◆

Hazard	Description	Disaster History		
		Month / Year	Human Damage (Casualties, Injuries)	Loss (PKR)
Earthquake	x Centered 7 km northeast of Rawalpindi, caused damage. The focus of the 1977 earthquake was estimated to be at 14- to 18-km depth.	Feb 14, 1977	Modified Mercalli intensity VII near the Epicenter	N/A
	x The 2005 Kashmir earthquake didn't affect Rawalpindi district directly but indirectly	Oct 8, 2005	More than 73,000 deaths and over 100,000 injured	> 400 Billion
Flood	100 year flood of 2001 in Nullah Lai, District Rawalpindi, 74 Deaths, 400,000 people affected, 742 cattle head totally perished, 1,087 houses destroyed in Rawalpindi besides some 2,448 partially damaged. Estimates indicate a damage/loss of	July 31, 2001 (Referred to as a flood with a recurrence period of 100 years) Aug 13, 2002 Aug 27, 1997 July 29, 1996 July 24, 1995 July 3, 1994 1990 1988 1985 Aug 10, 1982 1981 1978 1977 1976 1972 1970 July 31, 1966 1957 Aug 13, 1944	74 Deaths, 400,000 people affected	more than 15 billion rupees
Fire	Gakhar Plaza Collapse due to fire	2009	NA	

◆Risk Map◆

No risk maps are available.

◆Disaster Risk Management ◆

Disaster Risk Management
Plan
Name of the Plan / prepared by 1. District Disaster Management Plan / Government of the Punjab District Coordination Office Rawalpindi 2. Flood Relief Plan /District Govt
Target Year 2009-10
Vision The aim of this plan is to provide a check list and assign tasks/responsibilities to respective Departments in order to: 1. To secure the life and properties of the citizens 2. Secure National assets etc. 3. To make necessary arrangements for an uninterrupted supply of utility services and daily households items to the general public Since Floods and Earthquakes are the major natural hazards with potential damage to humans, livestock, businesses and infrastructures, they have been addressed with due concern in the District Disaster Management Plan and **Flood Relief Plan** incorporating all available resources and stakeholders (government officials only in this case).
Action Plans NA The District Disaster Management Plan of Rawalpindi basically describes the aims and actions regarding emergency responses by different organizations and departments.
Past Activities
Mitigation Activities x Flood Forecasting & Warning System, City District Government Rawalpindi (JICA) x Establishment of Flood Control Center at TMA x Organization, Control and Relief Measures
Preparedness Activities x Awareness Activity x Training by Civil Defense x Formulation of a Task Force x Formulation of a Volunteer Body (40 people) x Response during floods x Establishment of flood relief camps at Public School Buildings x Production of a detailed Flood Hazard Map for the District Establishment of an Early warning system for flood. x Flood Hazard Maps x Information Drill 2008 x Public Education through media
Photos NA

Capacity of Staffs
Number of Staffs
Training Received
Training Needs CBDRM, DRM planning, VCA, Drills, mapping
Experience of conducting CBDRM activities Rescue 1122, Civil Defense jointly conducted awareness programs in the previous project of JICA for schools, institutions, communities. Later on, Rescue 1122, Civil Defense have continued the CBDRM activities mainly at schools. 2 training officers joined CBDRM trainings in Javed Colony from Feb 10-18, 2011, organized by JICA and FOCUS and learned how to conduct CBDRM activities without using special equipments.
Current Activities and Plans on Capacity Development No capacity development activities are planned for the staff. Workshops on CBDRM for Community/stakeholders delivered by Rescue 1122, and civil defense are planned annually. The workshops are mainly for schools because of difficulties of mobilizing community people.
Strengths and Constraints Not Available
Lessons Learned from Recent Disasters x Government agencies respond but the communities are reluctant to leave behind their houses to seek shelter in the evacuation centers. x The communities need to realize the importance of being prepared to respond since they are the first responders to any disaster
Equipment ***(Lists provided in the District Disaster Management Plan)***
Communication System PMD –DCO Flood Control Centre (District, Central, Local)-Different Departments(Rescue1122, Revenue, Civil Defense, WASA, Army-Community Telephone, Fax, Mobile Mega Phone, Speakers etc
Equipment Civil Defense Boat 1,OBM engine 1,Fuel tank 2, Life Ring 2 , Life Jackets 4, Life Line 120 ft 1,Emergency light 1, Mega Phone 6, stretcher 1, first Aid Box 1 , hand siren 6, Motor Boats with ORS 6, Motor Boat 2, Life jacket 6 Cantonment Board Four dewatering pumps, 2 shovels, 4 dumper, 4 jack trolleys,4 mobile Suzukis, 2 tractors
Photos NA

COMMUNITY PROFILE

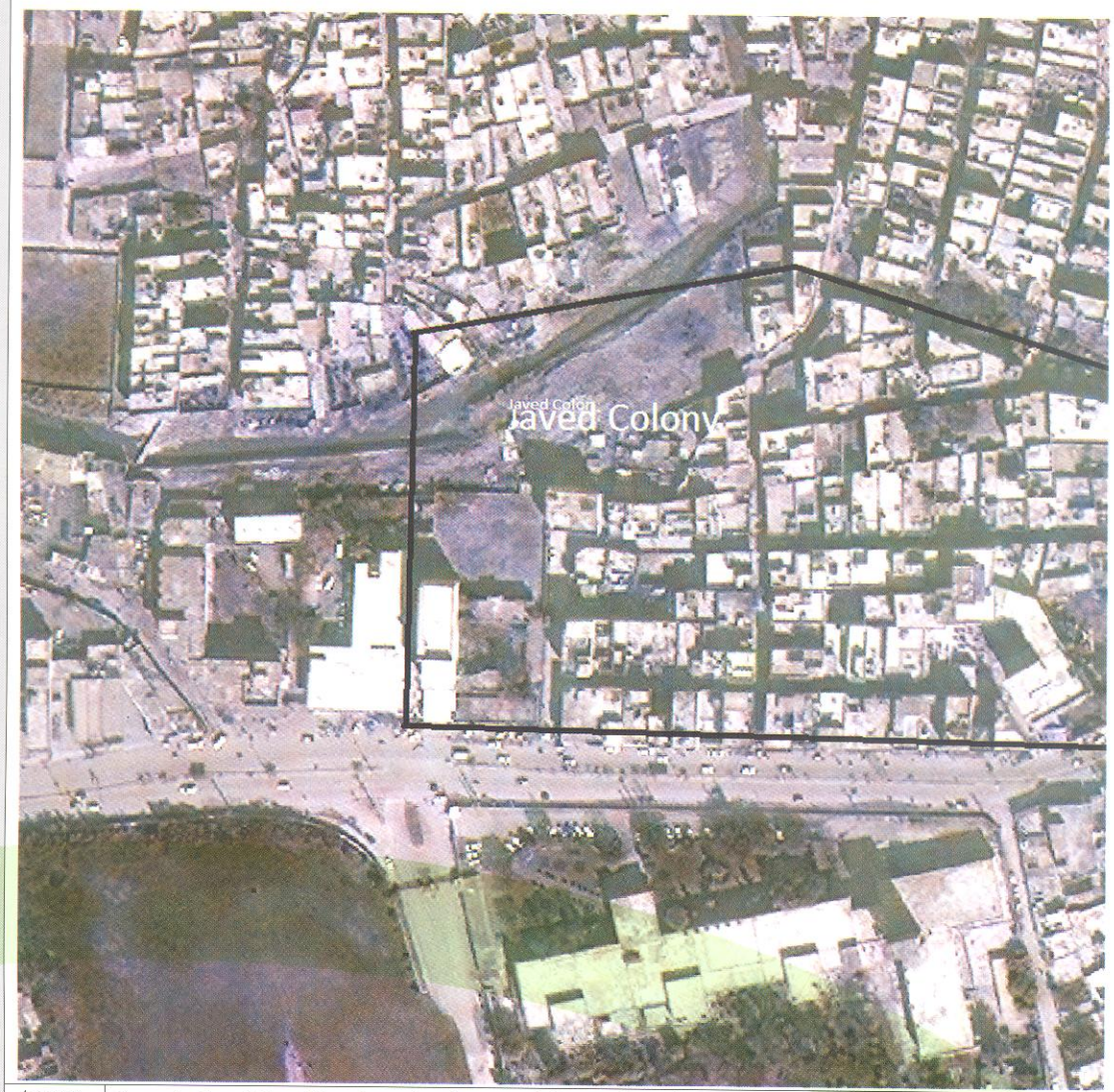
Hazard, Risk, Vulnerability, Capacity
And
Development
Situation Analysis

◆Community Profile◆

■Javed Colony, Rawalpindi Town, Union Council 45, Ra			
Representatives	Community Leader	**Name:** Mr. Tahir Mehmood	**Tel:** () -xxxx
	Community Leader	**Name:** Mr. Adnan Butt	**Tel:** 03015513180
	Religious Leader	**Name:** Imam Masjid Mr.	**Tel:** (374) -xxxx
	School/ Academy Principle/Teachers	**Name:** Col (Retd) Saeed Ms.	**Tel:** +92-
History	Establishment	1980s	
	History	The small colony popularly referred to as Javed Colony has a Muslim colony attached to it which runs contiguous. The population of the colony comes from varied backgrounds/cultures. Pathans, Punjabis, Kashmiris and the Hazaras are more prominent residents of these two colonies with Punjabis in the majority. The people follow diverse professions including medicine, Civil Servants, Live stock dealing, mechanics, vendors and small businesses.	

Location

Map



Access	Located on Tipu Road on the famous Murree Road opposite Rawalpindi Medical College The colony is over-crowed with narrow streets and poor housing that depicts a slum quarter kind of a living condition. The two colonies, affected badly every year by the recurring monsoon flash floods, lie in a depression surrounded by elevated roads on three sides while on one side to the north, the colonies are bordered by a narrow tributary channel of Nala Lai that brings sewerage and rain waters from the I-9 elevated areas of Islamabad

Demography

Population		**Persons** 16000-18000	
Population structure	**School children 7-16**	NA	
	under 20 yrs	NA	
	20-60 yrs	NA	
	Over 60 yrs	NA	
Birth rate	NA	**Aging rate**	NA
Household number	NA	**Family member / HH**	6.5
Type of Family	**Nuclear** **Joint Extended** (nearly all)		

	Male : Female Ratio	49:51			**Literacy rate**	60%		
	Population trend	**NA % increase in 10 years**						
Econo	**Income (Rp/year month)**	**Highest**	NA	**Average**	NA	**Lowest**	NA	
	Savings (Rp/year month)	**Highest**	NA	**Average**	NA	**Lowest**	NA	
	Main Industry	Jobs, Labour, Govt Servant, Micro-business						

Infrastructure	**Total Land Area**	**NA sq. km**		
	Type	**Availability**	**Coverage**	**Remarks**
	Electricity line	Yes	Total	The whole area has access to electricity and gas except settlements along Lai Nulla
	Gas pipeline	Yes		
	Water pipeline	Yes		
	Irrigation Water	NA		Because of urban settings, no irrigation system is needed
	Artesian Well	**1**		
	Nearest Water Source	**km**		
	Drainage pipelines	**- km**		
	Sewerage pipelines	**- km**		

Type	**Availability**	**Remarks**
Telephone	Landline **NA** % Mobile nearly 100% (house hold unit) Satellite NA%	
Internet / Email	Yes	
TV	Yes	
Local Newspaper	Yes	
Bridge	1 bridge	End of the colony in the north, there is one bridge crossing Lai Nulla
Main Road	Tipu Road	boundary of the Colony in south

Type	**Name**	**Capacity**	**Location**
Educational Facilities	Noor Forces Academy 3 Madarasa	500 More than 150 each	Within the colony Within the colony
Cultural Facilities	None	persons	
Religious Facilities	3 Mosques	More 200 Persons each one with a capacity 1000 persons offering prayers at a time	
Medical Facilities	2 Clinic	00	

Housing	**Structure of House**	Mud Brick Tent Houses	**0%** **98%** **1%**
	Comments	*Congested, overpopulated and none are quake proof. Some residents have built their houses higher than the ground level of the colony to obtain flood protection but it could only save them from light rains since the physiographic settings of the colony itself make the colony vulnerable to flooding.*	

L	**Name**	**Founded in**	**# of members**	**Activity (goal, service, fee, budget, plan, project)**

	Zakat organization	Around 2000		**During Musharaf's regime, the organization was founded to distribute money for poor families. However after his regime, no activities have been conducted.**

Social Situations

Leadership Structure
In such urban areas in Rawalpindi, it is very difficult to find a community with strong leadership. Most communities have neither CBOs, nor leaders. There is one elected UC councilor in the UC 45, but this person is not from Javed Colony. When there are problems, local people consult with a councilor to solve the problems.

Leadership
NA

Trust, Support by Villagers
NA
Development Vision of Community Leaders

Experience of Mobilizing Villagers
The community is mobilized through their relatives and/or convincing. No single leadership/decision making platform exists that could act as a unifying platform for such activities.

Decision making pattern
Within the community, no collective actions for decision making are taken. Whenever they face problems, people go to consult with a councilor on an individual basis.

Participation
NA
Ethnicity
Punjabis, Pushtoon, Hazara, Kashmiri and Jogis

Conflicts / Discriminations / Any social issues within the community
Distribution of relief/compensation in the past hasn't been transparent and the communities still have their reservations

Solidarity

What kind of actions have villagers taken in the past?
Built their houses (particularly new ones) higher than the ground level. They have evacuated on their own and travelled to their relatives or to elevated roads during floods.

Can villagers contribute to construction work for free of charge?
Not at all
What is the level of social cohesion?
Cooperation exists but is more observed during disasters

Are there Local Festivals?
No particular festival for the community, however, the community celebrates all Muslim festivals with great fervor as the overwhelming majority of the communities are Muslim.

Political / Administrative

Access to Power Structure
Previously, local body elections were held for Union Councilor, Nazim and Nazim-e-A'la (Mayor), but now only Elections for Punjab Assembly members (MPA—Member of Provincial Assembly) and Member of National Assembly (Parliamentarians) are held.

Access to Public Authority (Tehsil, UC, District)
Through their offices. People have access through a councilor.

Governance of Tehsil, UC, District
The Tehsil is governed by a Tehsildar, the UC is administered by the Secretary of the Union Council and the District is currently administered by the DCO—District Coordination Officer

Disaster History and Experience

Disaster History and Actions

Type Disaster	Year	Damage	Action taken by Residents / Public Authorities
Flood	2001, 2002, 2010	Property, lives, Livestock, Micro-businesses	Felt reluctant to leave behind their belongings but finally evacuated for a few hours to elevated areas, stayed with relatives at other localities or as the last option sought shelter in evacuation centers set up by the government.
Earthquake	2005		Locals came out of their houses. They weren't affected.

Evacuation experience (Did villagers have experience with evacuations? Who directed the evacuations?)
In the 2001 floods the locals were evacuated by the use of Volunteers, Police, Armed forces and other security agencies. It was led by the DCO office and led in the field by the Civil Defense.

Monitoring experience (What kind of monitoring has the village done?)
The locals aren't trained in monitoring floods, however, on their own they keep an eye on the weather patterns and the rising water level of the tributaries passing through their areas.

Disaster Information Distribution System (how was disaster information distributed?)
Through announcements through Mosques and Flood Warning Siren.

Any Collective DRM Actions taken in the past
YES but details not available. Mostly cooperation during emergency but not during ordinary times.

Any Collective DRM Actions that should be taken in the future?
Yes, the Disaster Management Plan and Flood Relief Plan foresee a collaborative mechanism in responding to the disasters but the community is left out. No roles have been identified for the community members.

Availability of Utilization of Loudspeakers on Minarets/Minarahs in Mosques for Communication for DRM (such as evacuation guidance)
YES

Disaster Experience Index	**2.3**

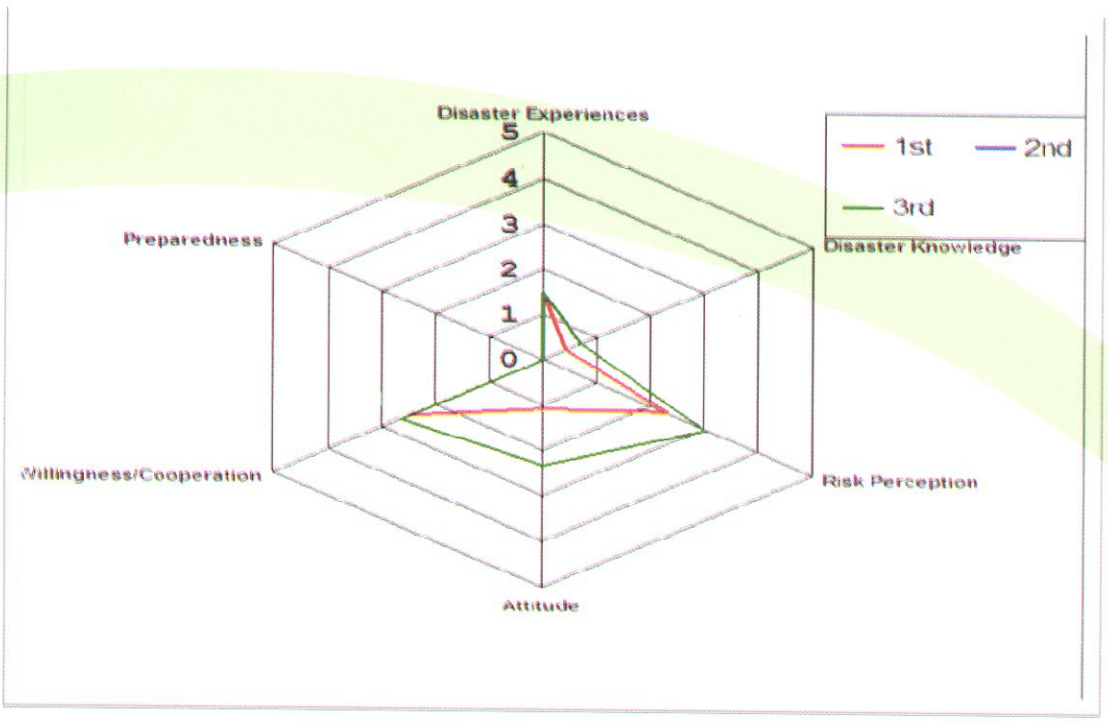
Disaster

Leaders
Like the common folk, the leaders lack a scientific understanding of the hazards threatening the communities but they also are well aware of the problems arising from such disastrous situations.

Community People
The level of understanding of the community members is not at all appreciable.

Knowledge Index	**1.8**

Risk Perception	**Comments** The floods of 2001 and 2010 have left adverse memories and the community understands that their colony is not safe nor are their houses built to be safe from floods and/or earthquakes. Solid waste emerges as the main hazard identified by the majority of the residents surveyed in the Lai basin. The mortality and disease load from the unhygienic living conditions and contaminated drinking water around the Lai may actually be claiming more lives than the floods.	
	Risk Perception Index	**2.8**
Attitude	In the urban environment, not many people are willing to participate in the DRM activities, however, those who took time for interviewing had a serious attitude.	
	Knowledge Index	**2.0**
Willingness	**Leaders** They are willing to address the issue and come up with a solution. However, they aren't ready to commit themselves. **Community People** The willingness level of the community members is appreciable. They are willing to learn skills that could help them safeguard their assets and themselves.	
	Willingness Index	**3.5**
Preparedne	No structural measures have been put in place nor has anyone trained the local communities to respond to such disasters. However, the relevant government institutions have built their capacity to respond in a proper manner.	
	Preparedness Index	**0.37**



TEHSIL PROFILE

Hazard, Risk, Vulnerability, Capacity
And
Development
Situation Analysis

◆Basic Data◆

Basic Information	
Contact Person (office tel, mobile, email)	Mr. Muhammad Idress, Assistant Accountant Tel: 0333-5125957 Mr. Qasim Niazi, TO (I&S), 051-5773333
Responsibilities of Tehsil	1. Execute and manage development plans for the functions which are performed by the Town Municipal Administration. 2. Prevent and remove encroachments. 3. Prepare budget and annual and long term Town Municipal development programmes in collaboration with the Union Council, under the direction of the Town Nazim. 4. Propose taxes, cesses, user fees, rates, rents toll charges, levies, fines and penalties. 5. Collect taxes, cesses, user fees, rates, rents, toll charges, fines and penalties. 6. Organize local sports, culture and recreational events, fairs and shows. 7. Regulate markets and services and issues, permits, grants permission and imposes penalties for violations therefore as and where applicable. 8. Manages properties, assets and lands vested in the Town Municipal Administration. 9. Develops and manages schemes, including site development, in
Population within the Tehsil	More than 782,000
Number of UCs within the Tehsil	46 UCs
Number of Staff	684
Organizational Structure (attach organogram)	Department names Number of Staffs 1. Town Council 14 2. Administrator 7 3. Tehsil Municipal Officer: TMO (General, Store, Public Relation Officer, Religious and Computer Section) 68 4. Finance 84 5. Regulation 107 6. Infrastructure and Services (I&S) (Roads & Buildings, Patch work, Street Lights, Gardens) 361 7. Planning and Coordination (P&C) 43
Annual Budget	993.686 million
Sources of Budget	1. From last year's budget 56.30% 2. Provincial government 11.83% 3. Property tax 17.68% 4. car parking and sales of forms and registers 0.34% 5. Income from Investments 2.09% 6. Sales of equipment, vehicle stand fees (fees for setting bus /suzuki stands etc.), fee for approval of buildings / construction plan, fines for building violations, fines for encroachments, fees for slaughtering of animals, rent for play land and playgrounds, receipts from public latrines, registration/ establishment/ renewal of contractors, rent of TMA property and shops, road cutting charges 11.76%
Employment of Staffs	Some from Provincial government. Others hired by local Committee in the TMA Rawal town. There is no ratio for that.

◆Development Framework◆

Development Plan	
Development Plan	Annual Development Plan (as requested by local representative), street lights, building streets and roads, repair and maintenance of shops and buildings of TMA, sports grounds, road cutting rehabilitation, construction of flats, multi story residences)
Components of DRM in Development Plan	DRM is not included in the Development Plan, This is a subject of the district government.
Persons Responsible for Development	Town Officer (I&S) and his staff (Assistant Town Officers and Sub-Engineers.
Mechanism for Preparing Development Plan	The local representative from the different UCs, refer their development plans to TMA. And then TMA T.O (I&S) prepares these development plans, which are approved by the Town Council or Administrator.
How to Improve Community in Planning	The people of the community do not directly approach the TMA but approach their local representative for their development plans, then the local representative gives that to TMA. At the time of discussions, these local representatives also join in.
Rough Budget Amount for Development of each Village/ Community	632.800 million for the year.

◆Disaster Risk Management ◆

DRM Plans and Activities	
Recent responsibilities/ activities on DRM	No, this issue is related to the District Government.
Possible DRM activities Tehsil can take care of	No, this issue is related to the District Government.
Responsible persons on DRM	From District Government.
Mitigation measures on DRM	No, this issue is related to the District Government.
How to link DRM plan with your development plan	No, this issue is related to the District Government.
Capacity of Staffs	
Any training received on DRM	No training given, if JICA gives us training it would be very useful.
Lessons learned from recent disasters	They do not deal with the disasters.
Current activities and plans on capacity development on DRM	No activities planned because that is a subject of the District Government.
Necessity of DRM	1. Must stop dumping material in Lai Nullah. 2. Illegal Settlement along Lai Nullah must be stopped. 3. Wide banks and deep river bed of the Lai Nullah are needed.
Experiences of conducting CBDRM activities	Not conducted because it's the responsibility of the District Government.
Perceptions on CBDRM activities	1. CNDRM activities are very essential because without involving the community we cannot do any work properly. 2. Awareness Programme for community and meetings with community regarding solid waste, illegal settlement are needed. 3. Enforcement of TMA Laws regarding illegal settlement is needed.
Equipments	
Communication system	Wireless system, landline telephones and mobile phones. Flood control room is located in the second floor, operated by Rescue 1122.
Equipment	Flood control room is connected with real time rain gauges installed at catchment areas, water level gauges installed at several places in the Lai Nullah and 10 warning posts in the Rawalpindi. Warning announcement can be delivered from this control room.
Photos	

UNION COUNCIL PROFILE

Hazard, Risk, Vulnerability, Capacity
And
Development
Situation Analysis

◆Basic Data◆

Basic Information		
Contact Person	Muhammad Tanveer Qureshi, Secretary-UC-45 Off: 051-5765199 Cell: 0345-5269460	
Responsibilities of UC	1. Major function is to undertake local level development projects and monitoring citizens' rights, and services and reporting to the tehsil and district level administration 2. Presentation of annual development plans along with local inputs 3. Conciliation of disputes in family matters (birth, death and divorce).	
Population within the UC	25,000 approximately	
Number of Villages within the UC	6 Villages or Mhallas	
Number of Staffs	5 (3 Secretaries and 2 Naib Qasid {Office Boy})	
Organizational Structure	Department names Number of Staffs 1. Finance budget and accounts 2. Municipal standards and coordination 3. Development of plans 4. Family Matters 5. Street light checking	
Annual Budget	Rs. 1,200,000 Annually	
Sources of Budget	Allocation from District Birth & death certificate and divorce case fees	98.75% 1.25%
Employment of Staffs	Some come from the provincial government Some are employed by the district or town organization No ratio of permanent staffs	

◆Development Framework◆

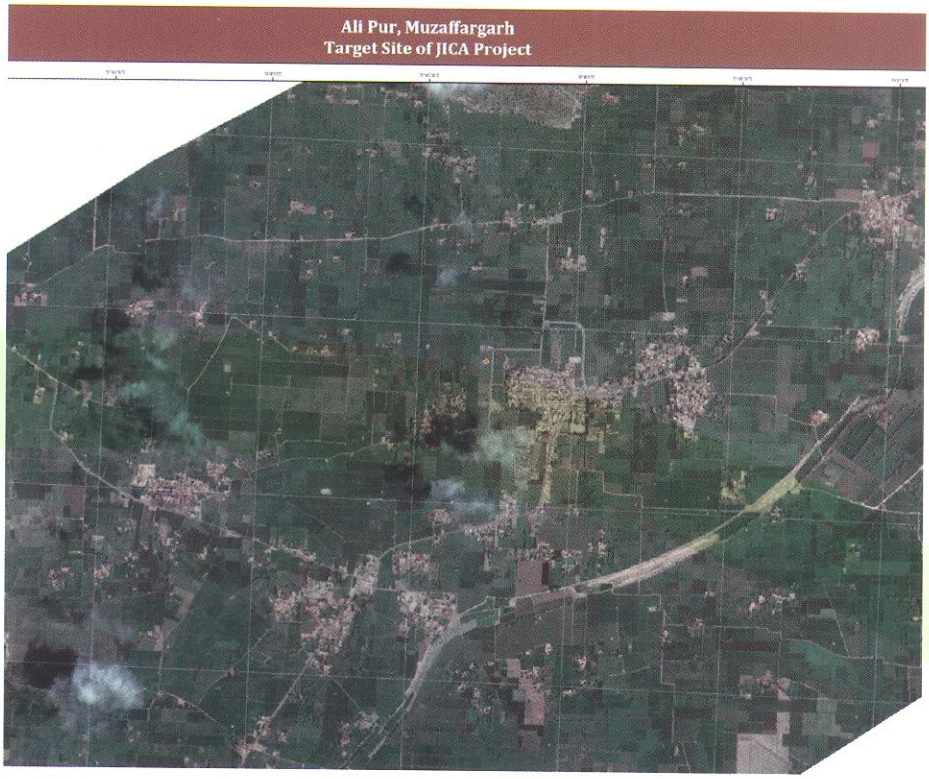
Development Plan	
Development Plan (visions, action plans, priority actions, land use)	Yes, we have a development plan for the UC.
Components of DRM in Development Plan	No DRM in the development plan because DRM is a subject for the district.
Responsible Persons on Development Plan	The secretary of the UC is responsible for development from the Funds of the UC.
Mechanism for Preparing Development Plan	Not done directly by the village inhabitants but elected people (Councilors) submitted their development plan to the UC. When the elected people submitted their plan the Secretary of the UC prepare a plan.
How to Involve the Community in Planning	The community does not directly approach the UC but rather approach the elected people and discuss their problems and these elected people prepare the plans
Rough Budget Amount for Development of Each Village	Up to Rs. 500,000

◆Disaster Risk Management◆

DRM Plans and Activities	
Recent Responsibilities/ Activities on DRM	No
Possible DRM Activities UC Can Take Care of	No
Responsible Person on DRM	From district government
Mitigation Measures on DRM	Subject of district level
How to Link DRM Plan with Your Development Plan	Subject of district level
Capacity of Staffs	
Any Training Received on DRM	No training received
Lessons Learned from Recent Disasters	
Current Activities and Plans on Capacity Development on DRM	
Necessity of DRM	It is very important to have a DRM and to provide some training and important information about the DRM.
Experiences of Conducting CBDRM activities	
Perceptions on CBDRM activities	CBDRM activities are not very useful and therefore need to be improved. Work on sanitation needs to improve and at least 5 feet of cover over the Lai Nullah is needed because most people throw garbage in to Lai Nullah. Currently, there is no specific place to dispose of garbage. In each UC at least 10 points should be provided to drop off garbage and the district government truck should collect it and take it to a sanitary landfill on a daily basis. The street light system should be improved, because it becomes very dangerous at night. Some times people fall into the Lai Nullah in the dark. A government dispensary is currently available, but it needs at least 2 doctors (one male and one female) and it also needs basic gynecological facilities. UC can provide their services only because they have neither sufficient budget nor sufficient staff.
Equipments	
Communication System	Telephone, fax
Equipments	None
Photos	

FOCUS HUMANITARIAN ASSISTANCE

Community Disaster Risk Management (DRM) Plan for Khangarh Doma, Tehsil Alipur, District Muzaffargarh



Focus Humanitarian Assistance Pakistan
Level 9, Serena Business Complex, Opposite Convention Center,
Khayaban-e-Suhrawardy, Islamabad
Tel: 92 51 2072500-30
Fax: 92 51 2072551-2

Table of Contents

List of Abbreviation and Acronyms

JICA	Japan International Cooperation Agency
NDMA	National Disaster Management Authority
DDMA	District Disaster Management Authority
WASA	Water & Sanitation
CDMC	Community Disaster Management Committee
CBDRM	Community Based Disaster Risk Management
UC	Union Council
DCO	District Coordination Officer
DO	District Officer
TMA	Tehsil/Town Municipal Administration
SAO	Senior Administrative Officer
DIG	Disaster Imagination Game
T.L	Team Leader
MBT	Main Boundary Thrust
SOP	Standard Operating Procedures

List of Stakeholders at District Level

Serial #	Name	Designation
1.	Azhar Baloch	DRM Coordinator at DCO Office
2.	Sayed Munawar Bukhari	CEO AWARD Foundation (Local NGO)
3.	Mureed Hussain	UC Secretary
4.	Shakaib Ahmad	DEO Civil Defense
5.	Sami ur Rahman	Executive Member of Society for Human Rights

Executive Summary

"The Project for National Disaster Management Plan in the Islamic Republic of Pakistan is conducted by JICA and Focus Humanitarian Assistance Pakistan is an implementing partner, under this Project there are components of Community Based Disaster Management Activities. Name of this Project is ***"The Project for the National Disaster Management Plan in the Islamic Republic of Pakistan"***.

The objective of this JICA project is to support the formulation of basic plans for disaster risk management at the national level. The goal is the preparation of mitigating measures against possible damage arising from the occurrence of natural calamities by developing the capacity of disaster management administrative agencies in Pakistan, through the formulation of the plans means/mode of supporting the implementation.

Target Areas for this project are the Province of Punjab, and Province of Sindh.

The UC (Union Council) Khangarh Doma derives its name from a village (Moza) named Kangarh Doma that has at least four sub-villages (Basti) namely Basti Shado, Basti Younis Arayein, Basti Ghagri, and Basti Kotla Shah. Within the UC there are at least 24 Mozas, of them, four lie on the eastern banks of the Indus while the remaining lie on its western banks. Moza Khangarh Doma is located on the eastern banks of the Indus along with the Mozas Malik Arayein, Kotla Ghulam Shah and Moza Sarki

Khandgarh Doma UC is one of the 14 UC's of Tehsil Alipur. The UC was formed as a result of the renaming and reconstitution of the former Dhaka UC in 2002.

Vulnerability of this community is very high and therefore, NDMA, JICA & Focus Pakistan decided to conduct a Community Based Disaster Risk Management Workshop for one week. Major components of this project are the following:

1) Formulation of a National Disaster Management Plan
2) This Formulation of a Human Resource Development Plan for Disaster Management and launching of a human resource development training program based on the foregoing plan.
3) Formulation of an Early Warning Plan for responding to major disasters. The Plan will identify high-priority activities to be undertaken during the course of the Project.
4) Implementing model projects for Community-based Disaster Risk Management (CBDRM) in cooperation with the community and local government.
5) Developing the cooperative systems/skills of relevant organizations, and enhancing the capacity of the staff members based on the above process.

The DRM plan envisions a community safe from the adverse impacts of natural disaster through an integrated approach. This can only be achieved through the establishment of an active CDMC strongly linked with and supported by the Government responding agencies such as Civil defense, Rescue 1122 and TMA.

It is very pertinent to mention that the government responding agencies and the community could be linked through a proper mechanism in place on the community level. Hence, to address this issue, this DRM Plan lays out the frame work and terms of reference for a community based disaster management committee composed of responsible members of the community. It is strongly believed that this team of community volunteers through this platform could bridge the gaps that have been part of the practices in the past and ensure a smooth and the effective response to disasters in the futures.

Community Disaster Management Plan

Introduction

The Community Disaster Management Plan under study outlines the overall understanding of the community residing in Moza Kangarh Doma that has at least four sub-villages (Basti) namely Basti Shado, Basti Younis Arayein, Basti Ghagri, and Basti Kotla Shah with regards to the vulnerabilities of their community to Natural and man-made hazards. It includes communal perceptions, the formation of a Community Disaster Management Committee, roles of government responding agencies and represents an integrated approach towards responding to any future disaster.

The plan identifies linkages between all stakeholders from the Government and the community as very critical in reducing the impacts of any disaster.

Available data has been incorporated as well for quick reference purposes. Government agencies have been identified for response and coordination of activities in case of disaster(s). Strong linkages have been built for smooth functioning of the government institutions in the future. Whereas the CDMC has been tasked with acting as first responders and mobilization of the community before a disaster, government agencies have been identified as resource institutions in times of normalcy and as aiding agencies in disasters.

Methodology

The Community Disaster Management Plan under study is being prepared with the consultation of the community leaders (Maliks, Head master, elders of the community), Community Members, Secretary UC and DRM coordinator Muzaffargarh. The process also included meetings with all stakeholders including all District Officials.

Consultations with the community members were carried out through a DIG (Disaster Imagination Game) that addressed four important subjects of concern with regards to disasters. These areas of concern were Problems and Improvements with regard to Information Distribution, Evacuation, and Impacts of Disaster. The data obtained was evaluated and incorporated into the plan. In addition, the formulation of this plan was preceded by a rigorous seven day CBDRM (Community Based Disaster Risk Management) training program for a focus group of individuals in the community. The group was not selected but invited through open invitation from within the community.

VISION

A community safe from natural hazards with the capacity to deal with natural hazards and have a committed, responsible and responsive team of volunteers

MISSION

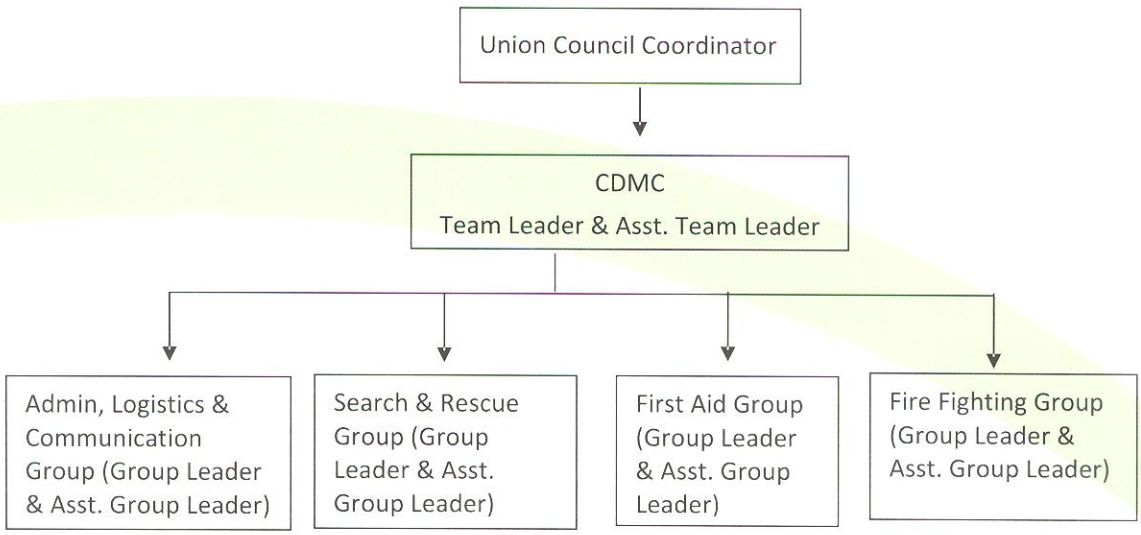
To create awareness and build capacity within the community and establish a permanent link with the government disaster responding departments in order to have a safer community

Objectives

- To raise awareness about the various forms of disasters in the community, especially floods
- To build the capacity of the human resources in the community and update their skills with regards to responding to floods and associated hazards
- To assist the governmental responding departments in the time of disaster.
- To remove the communication gaps by developing a permanent link between the community stakeholders and government institutions

Community Disaster Management Committee

Structure of CDMC



Major Responsibilities of CDMC

- 'First responders' at the local level in a crises situation
- Regularly update the local leadership about activities and plans
- Organize periodic simulations, drills and exercises
- Assess risks and develop plans to mitigate risks and present to the Local leadership for approval and implementation

z Preparation of Disaster Management Plan in the community

Responsibilities of Each Group:

Group	Responsibilities
Union Council	x Supervise activities of the CDMC x Attend meetings of CDMC Leadership/General body meetings. x Deploy CDMC members on emergency duty to perform critical operation in case of any emergency situation. x Ensure the follow up of the Action Plan for the given year (attached in Annexes) x Arrange Equipment and other facilities for CDMC.
Team Leader	x Decision making and planning x Organize Operational Groups x Assign resources x Evaluate progress x Arrangement of Equipment/supplies x Arrangement of Food and/or Water during emergency/disaster x Gather facts x Assess disaster sites x Develop and maintain links with the government responding departments x Co-ordinate and communicate with operational groups x Arrange Transportation to safer places in case of evacuation x Documentation
Assistant Team Leader	x Assist the leader in his duties and lead the team in the absence of the Team Leader
Administration, Logistics & Communication Group	x To collect family profiles of the community. x To identify potential hazards in houses. x To identify potential crises and prepare effective strategic plan to address them on time. x To develop comprehensive information and communication strategy. x Responsible to disseminate information regarding any emergency. x To provide all information and data to Emergency Response Teams and other agencies for timely response. x To make an assessment of the disaster and its impact and also to share with concerned agencies. x On the basis of information and data available, undertake an effective and efficient recovery, with rehabilitation and re-building/reconstruction.
First Aid Group	x Head- to- toe assessment of victims x Opening airways x Controlling bleeding x Immobilization of Spinal victims x Treatment of wounds x Treatment of fractures x Triage procedure x Transportation of victims
Fire Fighting Group	x Fight Small fires x Shut off utilities x Isolate hazardous materials
Search & Rescue Group	x Rescuers safety x Search methodology x Search for victims x Rescue victims x Evacuate victims

Evacuation Points/Places

Type	Name of Place	Remarks
School Building with quarters and almost 18 rooms and open space	Government High School for Boys Seetpur	Outside Community
Double story building Public College Building (50-60 Rooms (ask Bukhari)	Govt Degree College Ali Pur	Outside Community
Govt High School (56 rooms)	Ali Pur	Outside Community
High School	Thaimwala High School	Outside Community
High School	High School Sultanpur	Outside Community (10 km from the community, for minor floods only)
.....	.....	.....
....		

Evacuation Route

Name of Community	Population	# of Households	Building Structure	# of Stories	Difficulties & Characteristics regarding Evacuation, Remarks
Khangarh Doma	6,000	600	Brick and Mad	Single and Double	Over population, and social issues related to females.

Characteristics of Evacuation Place

Name of Evacuation Site	Area	Accommodation Capacity	Remarks
Government High School for Boys Seetpur	2-4 Acres	10 Rooms (587)	Closest to the community but only useable if floods are not high (minor floods)
Govt Degree College Ali Pur	24 Acres	36 Rooms (495 Students)	Located in the Tehsil Headquarters at a distance of more than 30 km.
Govt High School for Boys Ali Pur	7 Acres	26 Rooms (980 Students)	Located in the Tehsil Headquarters at a distance of more than 30 km.
Thaimwala High School Alipur	>1 Acre	16 Rooms (750 Students)	Located in the Tehsil Headquarters at a distance of more than 30 km.
High School Sultanpur	>3 Acres	12 Rooms (584 Students)	Located in the Tehsil Headquarters at a distance of more than 30 km.
High School Khairpur	=>2 Acres	16-18 Rooms (>700 Students)	About 18-20 km from the community
Govt Degree College Marhiya	N/A	N/A	More than 20 km from the Community

Source: Office of the EDO Education

COMMUNITY DISASTER MANGEMENT COMMITTEE UC Khangarh Doma, Tehsil Alipur District Muzaffargarh, ACTION PLAN FOR YEAR 2011

S.#	MONTHS	ACTIVITY	RESPONSIBLE
01	April	In House meeting of CDMC with UC Secretary & Patwari	UC Secretary & CDMC Leader
02	May	2 hrs one day Refresher by AWARD Foundation	Ms. Rashida & UC Secretary & CDMC Leader
03	June	In June Pre flood safety arrangement meeting	DRM Coordinator, UC Secretary, Patwari & CDMC
04	June - Aug	Awareness raising by CDMC & Response agencies	CDMC & UC Secretary
05	September	Post flood safety arrangement meeting	DRM Coordinator, UC Sec and CDMC
06	Oct	2 hr one day Refresher by AWARD Foundation	Ms. Rashida & UC Secretary & Team Leader
07	Nov	Refresher by Hamdard Citizen Community Board, Khangarh Doma	CDMC Leader, UC Secretary
08	Dec	General Body Meeting & Action Plan Formulation	UC Secretary, DRM Coordinator, Patwaris, & CDMC

Introduction to Khangarh Doma

The UC (Union Council) Khangarh Doma derives its name from a village (Moza) named Kangarh Doma that has at least four sub-villages (Basti) namely Basti Shado, Basti Younis Arayein, Basti Ghagri, and Basti Kotla Shah. Within the UC there are at least 24 Mozas, of them, four lie on the eastern banks of the Indus while the remaining lie on its western banks. Moza Khangarh Doma is located on the eastern banks of the Indus along with the Mozas Malik Arayein, Kotla Ghulam Shah and Moza Sarki

Khandgarh Doma UC is one of the 14 UC's of Tehsil Alipur. The UC was formed as a result of the renaming and reconstitution of the former Dhaka UC in 2002.

Demography:

According to the UC office the current population of the UC Khangarh Doma is 35,000-36,000 persons with a male to female ratio of 49:51. The population of the 26 Mozas as per the Census 1998 was 29, 227. The greater part of the population comprises of youth and middle aged. Senior citizens roughly comprise 5% of the population. *(Source: UC Office)*

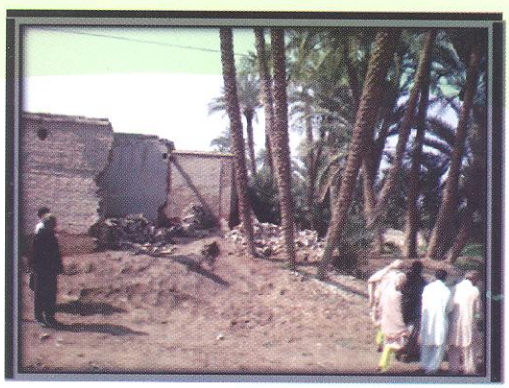
Economy:

The Community of Khangarh Doma heavily depends upon their agricultural products. It has lush fertile and vast fields that are a source of blessings to the community. Hence, an overwhelming majority of the community members adopt agriculture and farming professions by inheritance. In addition, quite a few move towards cities in search of jobs and for employment in the labor force. Women have no direct role in uplifting the economy of the households; however, they take part equally in the works related to agriculture in the field.

Communication & Infrastructure

Located close to the confluence point of the rivers Chenab and Indus, this community is at least 30 km from the nearest city center i.e., Alipur Tehsil Headquarter City. The UC is connected to the city via a link road, the Alipur road that crosses the UC all the way from Sarki to the confluence point. The houses built by the villagers remain substandard due to the use of substandard construction materials. In addition, government buildings have been overwhelmed by floods and collapsed. Quite a few buildings including the schools and the only Basic Health Unit (BHU), now run by a visiting doctor and a dispenser from the International Medical Corp, have been renovated by the Pakistan Army after the floods of 2010. Only a few buildings could be identified as relatively sound in the area.

The communications problem has been overcome to a great extent by the recent influx of the mobile phone industry. Quite a few mobile companies have their towers installed inside the community. No landline exists and previously the community had to rely on the wireless system for communication purposes.



Education:

An estimated 30-32% of the residents of the UC are literate while an estimated 55-60% of the population of the two mozas Khangarh Doma and Malik Arayen are literate / educated. Poverty, lack of resources and inclination towards manual agriculture (at a young age) stand as the harshest hindrances in getting educated or continuing one's education to higher levels.

Administrative System:

The UC Khangarh Doma is one of the 14 UC's of Tehsil Alipur, District Muzaffargarh. It's governed by a Union Council Secretary.

Union Council/Patwari

Union Council Khangarh Doma consists of the following 26 *Mozas*:

1. Moza Malik Arayen
2. Moza Khangarh Doma
3. Moza Kotla Ghulam Shah
4. Moza Tiba Borna
5. Moza Sarki
6. Moza Khwar Peeran
7. Moza Khanpul Nuharka
8. Moza Bait Parara
9. Moza Bait Eisa
10. Moza Dhaka
11. Moza Shah Wali
12. Moza Wahkwar
13. Moza Mohib Shah
14. Moza Bakir Shah Janoobi
15. Moza Kohartira
16. Moza Nusratpur
17. Moza Khanwa
18. Moza Chandia
19. Moza Daulatpur
20. Moza Bait Meer Ahmad Jabail
21. Moza Basti Haji
22. Moza Chak Daud
23. Moza Mahal Mesan
24. Moza Kotri lal
25. Moza Khairpur Para
26. Moza Nahar Wala

The Union Council is currently led by the Secretary Union Council and there's no elected representative from the community.

Picture of Stakeholders Workshop on Disaster Management Plan

Disaster Risks in the Community

The geographic setting of the community makes it vulnerable to serious risks of recurring floods. The community is notorious for being the worst hit area of Muzaffargarh due to its location at the verge of the two major rivers of Punjab. Whenever there's a flood situation in either of the two rivers or in both, this community has to pay the price. The emergence of a mini-river i.e., a canal type of link from Chenab to Indus that emerged as a result of bank erosion/breach from the Chenab has been a constant source of threat for the community of Khangarh Doma Moza.

Natural Hazards:

- A natural hazard is defined as: "A naturally occurring or man-made geologic condition or phenomenon that presents a risk or is a potential danger to life or property" (American geological institute 1984)
- "An interaction of people and nature governed by the co – existent state of adjustment of the humans that use the system and the state of nature in the natural events system" (white 1973)

Flood:

- Flooding is generally defined as any abnormally high stream flow that overtops the natural or artificial banks of a stream. Flooding is a natural characteristic of rivers.
- A flood is too much water in the wrong place, whether it be an inundated city or a single street or a field flooded due to a blocked drain.

Natural hazards damaging properties and communication system

Flash Flood:

- A flash flood is a "Sudden flood of water usually caused by heavy rain or snow melt"

Riverine Flood

Historical profile of different Disasters in the Community

S.#	Name of areas	Events	Years	Impact
1	Khangarh Doma UC	Flood	1973, 1984, 1992, 1995, 2002, 2005, 2008, 2010	Loss of life 36 Properties damaged, Loss of livestock, Major Economic set back

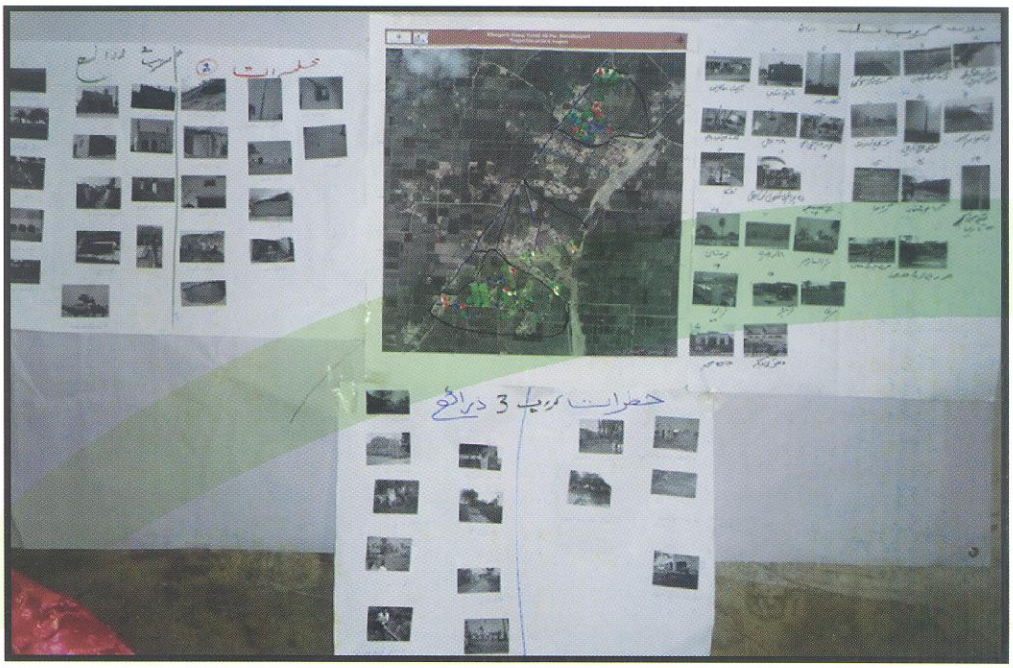
Potential Risks:

The floods of 2010 have washed away the protection bund(s) at several places exposing the community to serious risks of flooding in the succeeding years. Additionally, the use of substandard construction material and ill-planning make the residents of this UC vulnerable to roof and wall collapse. Lack of knowledge of constructing flood proof houses and structures keep the community at the mercy of the two rivers. Since all the buildings follow the same code i.e., defenseless against floods, the question of an available evacuation site within the community stands meaningless and this further adds to the vulnerability of the community.

Seasonal Calendar of Natural Hazards for Khangarh Doma, Tehsil Alipur, District Muzaffargarh

Months	J	F	M	A	M	J	J	A	S	O	N	D	Impacts
Hazards													
Earthquake													Loss of life, loss of livestock and properties, public infrastructure
Floods													Loss of crops, and vegetables, damage of houses, and infrastructure, economic losses, epidemics, contamination of drinking water, electricity supply damage.
Wind Storm													Roofs collapse, uprooting of plants, loss of orchards, vegetables, traffic accidents, falling of electric polls, falling of sign boards.
Hail storm													Damage to crops, vegetables,
Torrential rainfall													Loss of crops, epidemics due to stagnant water, road accidents

Risk and Resource Map



Institutional Capacity

Capacity of Union Council

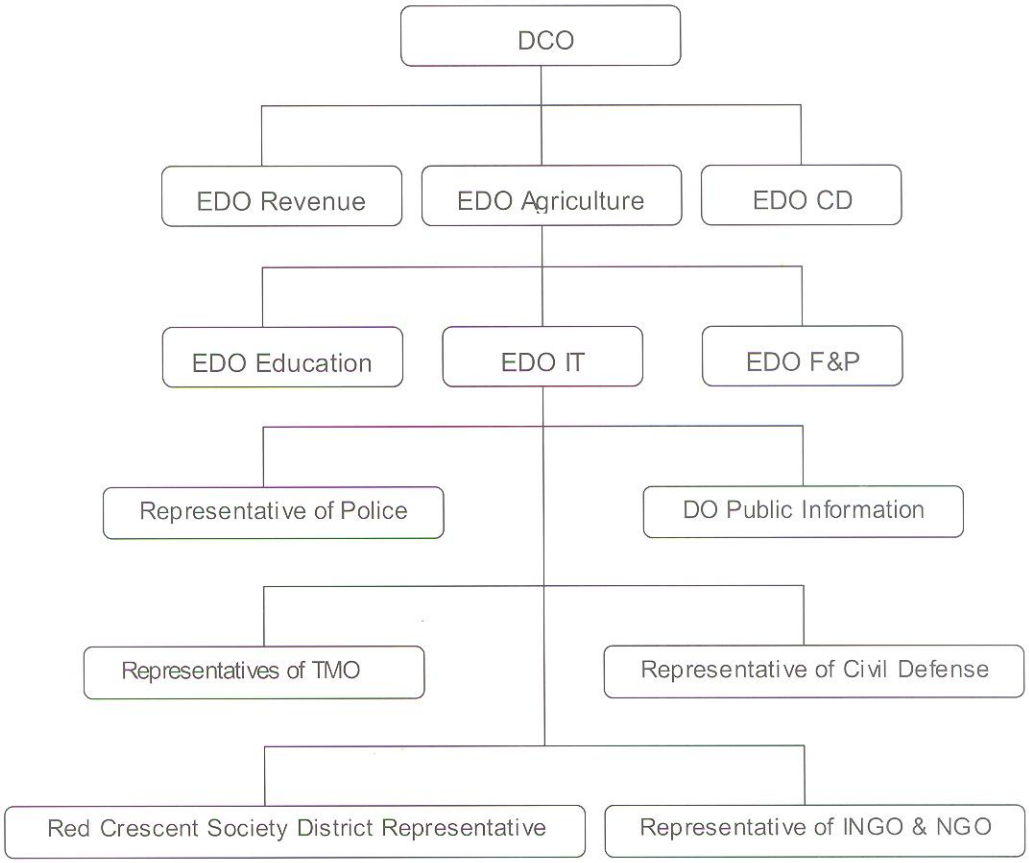
The Union Council Khangarh Doma is currently run by a secretary and a *Naib Qasid* (office boy). By sanction there should be three UC Secretaries and 2 Naib Qasids. However, the remaining posts remain vacant in the UC office Khangarh Doma. The union council has no additional staff nor allocated budget to take care of issues related to Disaster Risk Management. UC Khangarh Doma functions under Tehsil Alipur.

Capacity of District Government

The DDMA is the focal organization and authority in the conduct and implementation of activities and actions on disaster management in Muzaffargarh District. In pre, during and post disaster stages the DDMA holds primary importance. Basically along with its Town / Tehsil and UC tiers, the DDMA is responsible for three main objectives. They are:-

- Pre disaster preparedness
- During the disaster immediate response
- Post disaster rehabilitation activities

The District Disaster Management Authority will comprise the Nazim, District Coordination Officer (DCO), District Police Officer and the EDO Health. Where appropriate, the District Nazim / DCO can appoint other officers as members of the DDMA. They may include EDOs from the education, social welfare, community development, meteorology department, revenue department, environment and agriculture departments, Army, Red Crescent, NGOs, media, private sector, civil Defence services, or any other district stakeholders. After consultations and meetings conducted by the district with various stakeholders, the proposed structure of the DDMA in the District Muzaffargarh is shown below:



Source: District Disaster Risk Management Plan District Muzaffargarh

Town / Tehsil Disaster Management Committee

Institutions at this level are the frontline of disaster risk reduction and response. For many departments this is the lowest level of administration where they interface directly with communities; agriculture, education, health, police, revenue and others. Extension workers of the above departments could play a significant role in promoting disaster risk reduction. For example, agriculture extension workers could promote awareness of drought, flood or cyclone resistant crops. Health workers could raise people's awareness about potential diseases that may occur after flood or drought and how to prepare for them. Education officials could work on school disaster preparedness. Similarly, Town / Tehsil authorities have an important role in organizing emergency response and relief; e.g. damage and loss assessment, and recovery needs assessment. Town / Tehsil and town Nazims will lead in risk reduction and response operations with the help of Town / Tehsil or town municipal officers in consultation with DDMA. Other key players include; extension workers, police, fire services, community organizations (COs), traditional leaders and Doaba Foundation (NGO).

Under Local Government Ordinance (LGO) 2001, the TMAs is to facilitate, provide, manage, operate, maintain and improve the municipal infrastructure and services including: water supply and control and

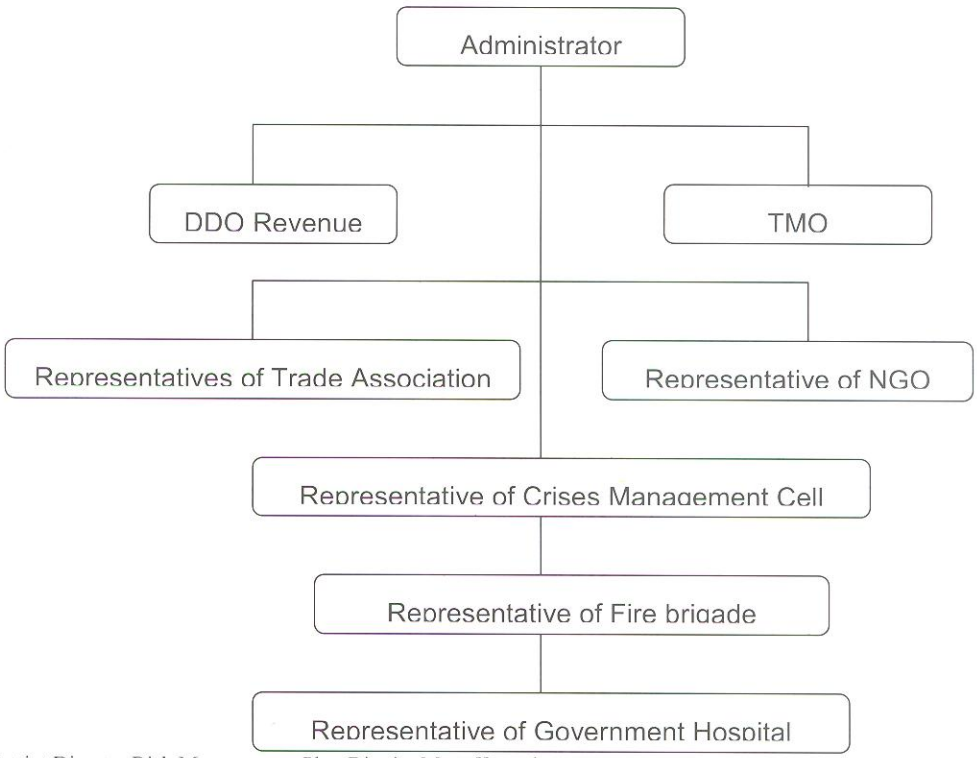
development of water sources other than systems maintained by the union and village council, sewerage, vector control, sewage treatment and disposal, storm water drainage and fire fighting.

There shall be a Town Disaster Management Committee (TDMC) to coordinate and implement disaster risk management activities at the town level. The Town Nazim shall be the chairperson of the TDMC and the Town Municipal Officer shall be the secretary. Members will include all elected Town members, Town Officer (TO) Planning, Deputy District Officer (DDO) Revenue, president of the trade association, DDOs of respective line departments, religious leaders who are to be nominated, and representatives of CCBs and NGOs. Specific roles and responsibilities of the TDMC and members will be further outlined by the District Authority.

TDMC

The National Disaster Management Framework (NDMF) clearly elaborates Town / Tehsil administrations as the frontline of disaster management where disaster activities are actually implemented. As per the NDMF the TMAs are responsible for:

- Formulation of plans and procedures for DRM and DRR keeping view the specific needs of their respective locations.
- Establishment of civic groups for disaster reduction and relief operations.
- Coordinate with DDMA and lead operations regarding DRR and DRM during the different stages of disasters.
- Identification, mobilization and disposal of required financial, technical and logistic resources for disaster management.
- Identification and mapping of all hazards in their respective locations and conduct risk and vulnerability analyses and communicate with DDMA and other relevant groups / institutions.



Source: District Disaster Risk Management Plan District Muzaffargarh

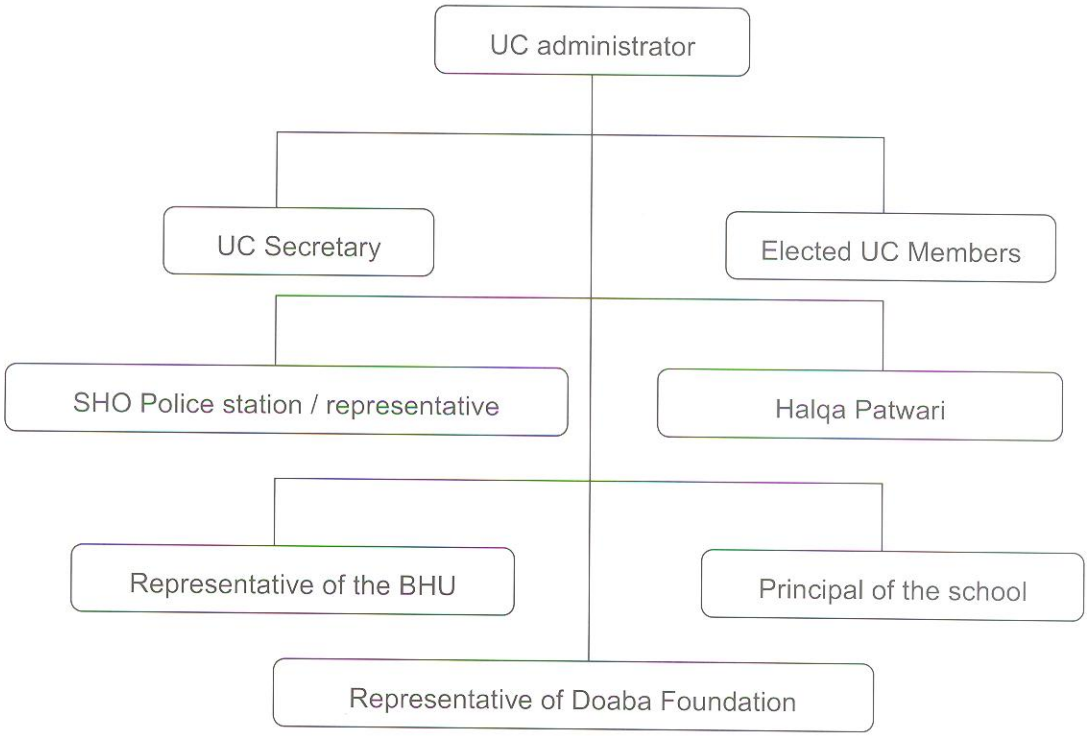
Union Council Disaster Management Committee[1]

Union councils are the lowest tier in the government structure having elected representatives from village and ward levels for these bodies. These are easily accessible by the people and can communicate the government's plan at the most grassroots level. These bodies have an important role in allocation of resources for local development works. Union councils can play an important role in advocating demands of communities to the District Councils and DRM Authorities. Community demands may include requests for allocations of resources from local budgets for hazard mitigation and vulnerability activities; e.g. spurs for flood control, rainwater harvesting structures for drought mitigation, vocational training for livelihoods to reduce vulnerability etc., therefore, it will be important to develop the orientation and knowledge of the local political leadership at this level. The union council may develop local policies and guidelines for vulnerability reduction.

Under the LGO 2001, UC is to assist the relevant authorities during disasters and natural calamities and assist in relief activities. At union council level, a Union Council Disaster Management Committee (UDMC) will be established to coordinate and implement disaster risk management activities at UC level. Following are the suggested members;

[1] Source: District Disaster Risk Management Plan District Muzaffargarh.

Structure of UDMC



Source: District Disaster Risk Management Plan District Muzaffargarh

Town and Union Council level, Activities

During disaster emergencies, the Town and Union Council Administration will be involved in the delivery of the following activities within their jurisdiction:

- Send Initial Damage and Needs Assessment Report to District EOC.
- Search and rescue operations in coordination with the Civil Defense and Police.
- Corpse disposal.
- Assistance to other agencies for mobility/transport of staff including rescue parties, Relief Personnel and Relief Materials.
- Communicate to the Disaster Emergency Operation Center (DEOC) additional resources required by the various control rooms.
- Establish communication links with DEOC, Union Council Disaster Management Committees (DMCs), NGO coordinating committee and Private donors.
- Issue passes and identity cards to relief personnel including the persons from NGOs operating in the affected area.
- Coordinate Doaba Foundation activities through necessary support to ensure community participation by establishing coordination mechanisms among NGOs.
- Mobilizing and coordinating work of volunteers ensuring community participation.

Non-Governmental Organizations (NGOs) and Voluntary Agencies

The Non-Governmental Organizations and voluntary agencies play an important role in disaster management and provide a strong band of committed volunteers with experience in managing the

disasters. Their strength lies in the choice of their manpower, the informality in operations and flexibility in procedures. These organizations enjoy a fair degree of autonomy and hence can respond to changing needs immediately.

However, in order to maintain uniformity in operations and effective co-ordination, it is desirable that they follow the standards of services (*as given in the Guidelines*), information exchange and reporting so as to enable the DEOC to have a total picture of resource availability, disbursements and requirements. NGOs therefore have been assigned specific tasks by the District Administration to undertake relief work within the overall institutional framework. As and where possible, NGOs may also be able to improve the quality of delivery of services. In addition, CBO Committees have been operating at the community level, especially in times of emergencies like house collapses, fires, and floods. Such committees have been identified at the ward level.

Specific activities in which the NGOs/Private Sector can be involved during disaster management operations are:

- Search and rescue operations
- Information dissemination
- First aid
- Disposal of dead
- Damage assessment
- Management of information centers at temporary shelters
- Mobilization and distribution of relief supplies including finances
- Manpower for community mobilization, crowd control, rumor control, traffic management
- Specialized services (psychiatric and mental health assistance)
- Management of transit camps
- Rehabilitation activities

The following agencies will be associated with relief and rehabilitation activities. Most of these agencies have the capacity to mobilize required resources and have assisted the administration in the past in managing relief and rehabilitation activities. These agencies include:[2]

- UN Agencies
- WHO
- District Red Crescent Society
- DOABA Foundation
- CCBs and CBOs at Union Councils and Village level
- Others

[2] Source: District Disaster Risk Management Plan District Muzaffargarh.

Community Based Organizations (CBO's) and activities[3]

In order to promote community level disaster risk management activities, the capacity of existing community based organizations (CBOs) will be developed and enhanced by district and tehsil authorities. In the absence of community organizations, new groups would be established to work in disaster risk reduction and management. CBOs will be trained regarding local early warning systems, evacuation, first aid, search and rescue, fire fighting etc. Linkages would be developed between CBOs and relevant local agencies; e.g. agriculture, banks, health and veterinary services to promote disaster preparedness. Skills and knowledge of CBOs' leadership will also be developed in financial management, human resource management, resource mobilization, interpersonal communication and presentation and negotiations skills. The provision of Citizen Community Boards (CCBs) in Local Government Ordinance (LGO 2001) provides a good ground to organize communities and mobilize resources for issues like local level disaster risk management.

Civil Defense:

The Civil Defense Department will rush to the scene of a disaster and will estimate the damage done and will prepare a rescue plan with other service departments:-

Equipment:

- Bomb Disposal Tool Kit.
- Bomb Blankets.
- Bomb Bin
- Metal detector.
- Remote removal Pole.
- Search rod.
- Helmets
- Civil Defense Volunteers
- Boats
- OBM Engines
- Oars
- Life Jackets
- Life Rings

Rescue 1122

After confirmation of disaster / incident / Bomb Blast the Rescue 1122 will respond to the emergency spot with the following manpower and equipment, which are available round the clock to control & manage any kind of emergency:-

[3] Source: District Disaster Risk Management Plan District Muzaffargarh.

- Three fully equipped Ambulances with trained rescuers are on high alert to meet any kind of Road Traffic Accidents & serious Medical Emergencies;
- Specialized Rescue Vehicle (MGR01) with (T.E.A) tools, equipment & accessories along with highly trained & well skilled Disaster Rescuers will be available round the clock to control any kind of emergency,
- Deputation of rescuers for assistance of Fire Brigade Staff in different shifts at Fire Brigade Station Muzaffargarh as District Emergency Service Rescue. The 1122 Muzaffargarh does not have Fire Vehicles yet.
- Establishment of the key points to provide immediate rescue and medical aid & facilities at the incident site by maintaining the 7 minute Response time.

Available Resources of 1122

- District Emergency Officer (D.E.O): Dr. Irshad-ul-Haq
- Control Room in Charge (C.R.I): Syed Faisal Karim Hamdani
- Station Coordinator (S.C): M. Imran Khan.
- Transport Maintenance Inspector (T.M.I): Ijaz Ahmad
- Accountant (ACCT): Hafeez Ullah Khan
- Shift in Charge (S.I): M.Sajjad
  M. Tahir Abbas
  Safdar Abbas
- Wireless Technician (W.T): Mansoor Ahmaf

Table 0.1

Sr. No.	Designation	Total Strength
1	Computer, Telephone, Wireless, Operator (C.T.W.O)	12
2	Emergency Medical Technician (E.M.T)	21
3	Disaster Rescuer (D.R)	14
4	Accountant Assistant (ACCT. ASST)	01
5	Electrician/ Tube well Technician (E.T/T.T)	01
6	Senior Stock Keeper (S.S.K)	01
7	Light Transport Vehicle (L.T.V)	21

Source: District Disaster Risk Management Plan District Muzaffargarh

Strategies for Disaster Risk Management

Flood:

- Response will be led by CDMC Leader and his assistant and members of CDMC and involved willing youth in a disciplined fashion.
- The team should act practically and have close coordination and cooperation with the Govt., responding institutions, and the community.

Heavy Rain:

- Information Dissemination
- Displaying signs warning of the existence of mud or other impediments to travel
- Fallen electric wires should be covered
- Hazard awareness program for the community
- Establishing linkages with the government agencies both for information and response
- An Emergency Communication System should be established among the team members and associated institutions.

Standard Operating Procedures (SOP's)

Since the major hazard that the community is vulnerable to is Floods, SOP (Standard Operating Procedure) is elaborated for the community hereunder.

As per the routine practices Pakistan Meteorological Department shall monitor and control the flood forecasting and monitoring systems and release information accordingly to all government agencies. Once the information reaches the DCO office it will be communicated to the relevant responding agencies. In this case, Khangarh Doma UC Secretary shall receive information from the Tehsil Office via message and/or fax. He shall then proceed to disseminate this information to the CDMC Leader as explained in the Information Distribution System.

The CDMC leader will take the lead in informing the local notables, his committee members, Imam Masjid, and the community through his Admin, Logistics and Communication Group. Further, the Admin, Logistics and Communication team should lead the identification of the closest and safest site for the possible evacuation of the community. The group should ensure the provision of proper transportation given by the government for the purpose of evacuation. On reaching the camps, this group is responsible to register each community member through a formal process given by the government.

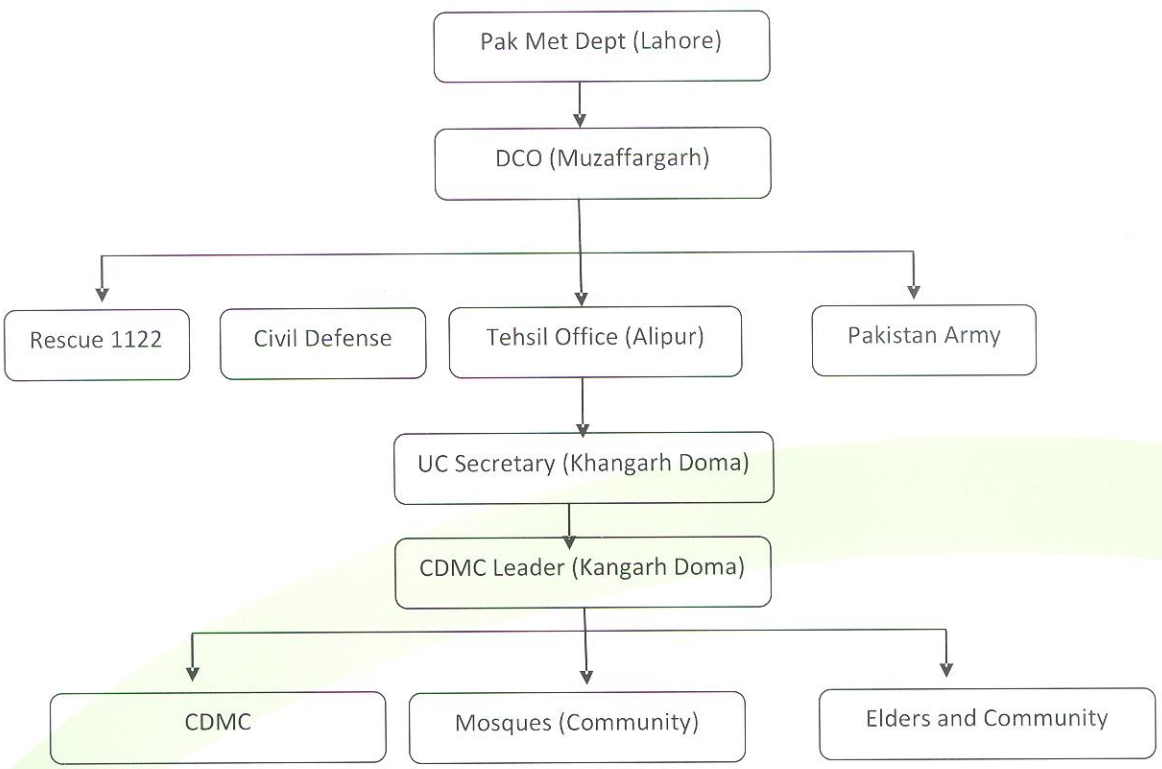
The Search and Rescue Group should be mobilized to function before the arrival of professional teams from the government or Army as per need and assist the incoming teams in their operations. In addition, the group should help in evacuating the community as per the ground realities and needs.

The First Aid Group should lead in assessment of the victims/affectees and give first aid as per need. They are expected to take part actively in the triage process.

The Fire Fighting Group is responsible to shut off the main utilities of the community and take part in other activities in which they have been trained.

The government agencies including the responders like the Civil Defense and Rescue 1122 (if activated during the disaster) are expected to take on board all the responsible members of the CDMC, especially the CDMC leader has to be taken into confidence

Early Warning System



Pakistan Met Department releases information/warning by communicating the message to the DCO office. The DCO office informs the Tehsil Office that in turn informs the US Secretary who will connect with the local CDMC leader. The CDMC leader will inform the community by making announcements in the mosques and keeping the local elders and the team on board.

Land use planning:

No proper land use planning strategy or instructions are available for the community. They construct buildings manually as per their wishes regardless of the fact that the nature of their soil can't support heavy buildings and thus would suffer sinking. In addition, protection bunds constructed by the locals on their own without due planning have not been useful enough in protecting the community. Therefore, any such interventions, by the community or for the community, need careful examination of the ground reality i.e., land survey/soil survey of the area for better planning.

Rules and Regulations (Policy Making towards a safer community):

The community envisions a "resilient community supported by a team of dedicated volunteers to make the community safe from Natural Disasters". This implies the wishes of the community to see practical measures taken on the ground level. Introduction of a new canal system that still doesn't exist in the Moza is believed to help reduce losses to flooding. In addition, rules and regulations need to be legislated at the community level and UC level to leverage the pre-requisites of a safer community. Building across the channel should be banned unless it's within an acceptable limit. The quality of construction material needs to be monitored. Residential houses need to be reviewed for retrofitting and new buildings be constructed as per the building codes applicable within the country taking into consideration, with due seriousness, the concept of Flood Proof Buildings.

Establishment of Emergency Coordination Center (ECC)

The establishment of a Community Disaster Management Committee requires the establishment of an Emergency Coordination Center in the community where the committee members could gather and plan for their activities and where they can coordinate their activities with government responding agencies.

Structural Mitigation Strategies

Diversion Channels and Retention Ponds in the Upstream

The two major rivers confluence at a point downstream at least 12 km from the community in the adjoining Sarki Moza of the same UC; however, there exists enough space between the two in the upper part (relative to the community) where retention ponds could be dug to be opened up to store water when the river is in flood. Similarly, diversion channels could be constructed to safeguard the community and provide an alternate nearby source of water in times of normalcy. Since the community has a past practice of erecting small protection bunds for their safety, motivating them for such a purpose shouldn't pose a big challenge.

Re-construction of broken/breached bunds

What worries the community is the non-reconstruction of the breaches that brought in waters in the floods of 2010. In addition, a mini-river (called so by the locals) that derives from the Chenab and drops water into the Indus when Chenab is in flood but remains dry during non-flood periods and becomes a field of cultivation for the community, adds to the worry of the community. Therefore, it's urged that these breaches be addressed seriously and the broken parts be renovated/reconstructed.

Appendix

Contacts of CDMC

Community Disaster Management Committee (CDMC) for Khangarh Doma, Tehsil Ali Pur, District Muzaffargarh

S. No	Name	Designation	Contact Number
1	A	CDMC Coordinator Secretary Union Council Khangarh Doma	
2	B	Team Leader	
3	C	Assistant Team Leader	
4	D	First Aid Group Leader	
5	E	Asst. Group Leader	
6	F	Asst. Group Leader	
7	G	Fire Fighting Group Leader	
8	H	Asst. Group Leader	
9	I	Asst. Group Leader	
10	J	Search and Rescue Group Leader	
11	K	Asst. Group Leader	
12	L	Asst. Group Leader	
13	M	Logistics/Administration an & Communication Group Leader	
14	N	Asst. Group Leader	
15	O	Asst. Group Leader	

Details of Educational Institutions:

School (Educational Institution)	Capacity
Primary School Malik Arayen (Center)	255 students
Bhambri Primary School	180
Primary School Ghakri for Boys	300 (154 Reg, 144 Unreg.)
Primary School Ghakri for Girls	204
Primary School for Boys Kotla Bakhsh (2)	235 and 141
Haji Khair Mohammad Madrassa	70
Al-Aziz Madrassa Malik Arayein	60
Eid Gah Madrassa Malik Arayein	204

Details of Veterinary, Health Institutions

S. No	Type	Capacity	Status
1.	BHU (Ghagri)	10 bed (6 rooms)	Renovated after floods of 2010 but only partially functional
2.	Veterinary Clinic	Unknown	Non-Functional

Lists of NGO's and CBO's Active in the Area

Name	Founded in
Awaz Foundation	2005
Dawat-e-Islami	2000
Agaz Foundation	
Hamdard Citizen Community Board, Khangarh Doma Moza	Feb 17, 2011
AWARD Foundation	

Production Plan

Crops	Kharif							Rabi				
Months	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	July	Aug	Sep
Wheat	C						H					
Cotton			H					C				
Cereals (Moong)							C		H			
Pea		C				H						
Mustard				C		H						
Onion			C				H					
Gram	C					H						
Green Chili			C			H						
Millet	C											H
Maize							H				C	
Barsim	C						H					
Tobacco	C							H				
Garlic	C						H					

Cultivation = C
Harvest = H

DIG Manual

Earthquake Disaster Risk Management for Almaty City in the Republic of Kazakhstan
Japan International Cooperation Agency (JICA)

1. Outline

(1) What is DIG？

DIG stands for Disaster Imagination Game, which is the training program for disaster risk management.

The English term 'dig' has meanings of "understand", thus it expects to imply "raising awareness of disaster management", "Explore the locality", and "Understand disaster".

(2) Procedure for DIG

1. 5-10 people form one group and plot damage estimations and resources on a map. （Understanding Current Situation）
2. Participants list advantages and disadvantages of communities selected by the participants （Evaluation of Current Situation）
3. Participants list necessary countermeasures to reduce disaster damages.
4. Each group will present results, then all groups discuss and choose effective disaster countermeasures.

2. Effects

(1) Direct Effects

- Players can easily understand advantages and disadvantages of the local communities.
- Players can exercise "Image Training" of the disaster countermeasures.

(2) Indirect Effects

- Raising Disaster Awareness
- Networking among people who are involved in disaster risk management

3. Implementing DIG

(1) Preparation

z **Staffing**

【Planner and Operator of DIG】

1. Moderator
2. Expert who explains Damage Estimation
3. Advisor

【Participants】

1. Players

z **Materials and Tools**

【Map】

1. Topographic Map （Scale will be differentiated by purposes. Size should be about the size which can cover tables to be used）
   - Scale：1/200,000 and above （Ex. For nation-wide plan of allocating human and physical resources）
   - Scale：1/50,000～1:25,000（Ex. For managerial and operational plan of cooperation from cities surrounding affected areas）
   - Scale：1/10,000 and less （Ex. For relief operation plan for affected areas）
   - Scale：1/5,000（Ex. For managerial and operational plan for evacuation centers）

【Stationery】

2. Transparent plastic sheet （approx. 2m×1.5m）
3. Permanent markers （thick, thin、 5-8 colors）： for writing on map
4. Benzene & Tissue paper： for erasing markers
5. Color labels （with glue、 several colors）, colored clay （several colors）, toothpicks： for identifying the locations
6. Post-it notes （Big, small, different sizes）： for writing comments
7. Scotch tape, thicker tapes for writing comments

・Setting Theme of DIG （disaster type, area, level etc.）

⇩

・Estimation of Participants

⇩

・Preparation of Venue・Invitation of Participants

⇩

・Preparation of Maps・Stationeries, Materials and Tools

⇩

・Preparation of Documents for Distribution

⇩

・Confirmation of Task Allocation of Staffs

⇩

・DIG Implementation

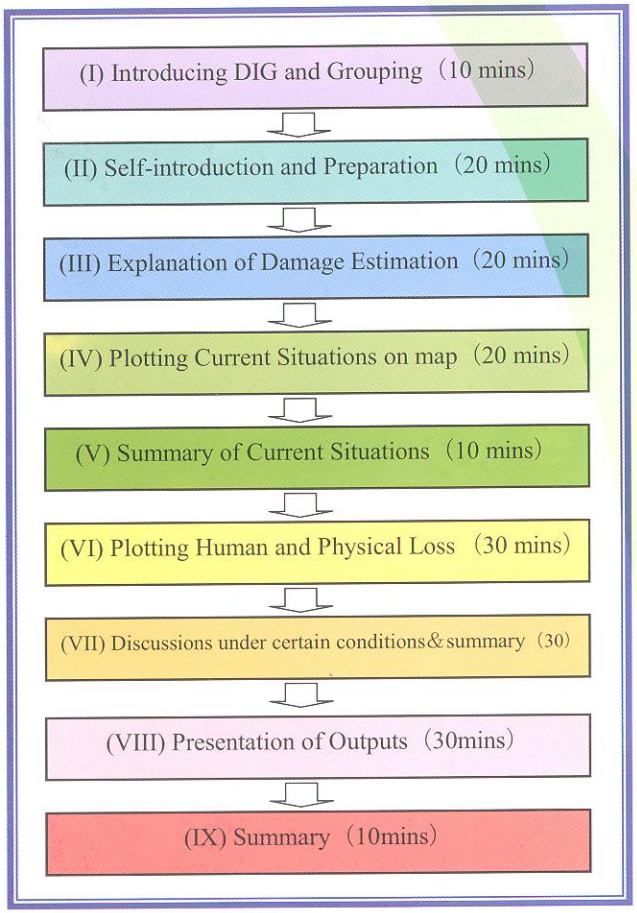
8. White boards, Big papers for writing comments
9. Hazard Map/ Damage Map : for reference
10. OHP / sets of presentation materials : for presentations by groups
11. table, chair, microphone : for presentation

【Others】

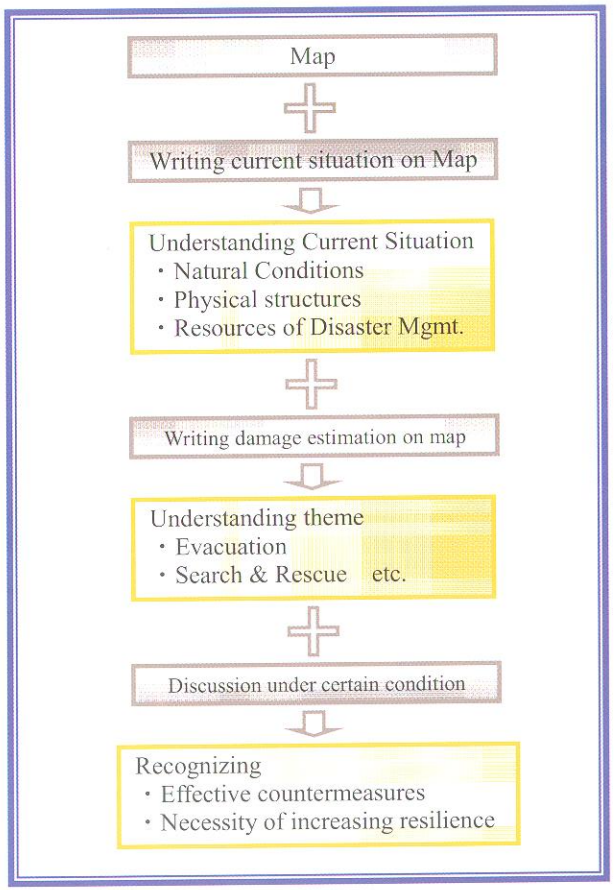
1. Name tags : for introducing participants
2. Writing tools （notebooks, pencils, white board） : for recording discussions
3. Camera, video, voice-recorder : for recording

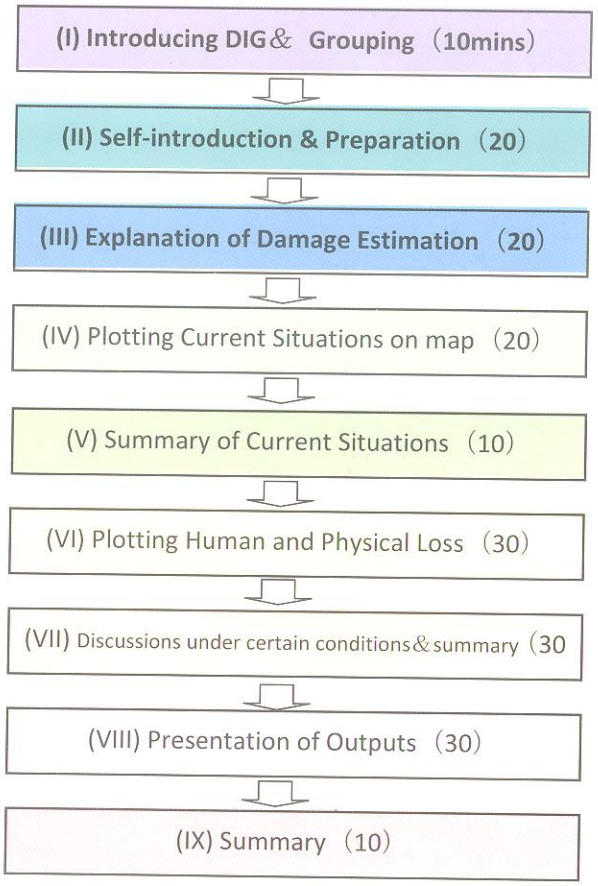
(2) Implementation

【Overall program】



【Work Flow and Target Outputs】





【Contents of Each Session】

(I) Introducing DIG & Grouping

(I-1) Introducing DIG outline

(I-2) Explanation of rules of DIG

For the active participation and discussion, listen to the other persons comments; do not criticize nor deny, but provide alternative ideas. Never tell information you gain during DIG to others.

(I-3) One group consists of 5-15 people.

(I-4) Decide one leader, presenter, and note taker in each group

(II) Self-introduction and Preparation

(II-1) Self-introduction and Ice-breaking

Everyone introduces oneself to ice-break for smooth discussion.

(II-2) Create image of Disaster

Participants watch visual materials to have an image of disaster in order to work on DIG with reality.

(III) Explanation of Damage Estimation

(III-1) Setting Viewpoints of Participants

Set a viewpoint either "General public" or, "Public administrator", or "Local Leader" etc.

(III-2) Damage Estimation

Hazard Maps, Damage Maps will be provided and explained.

(I) Introducing DIG& Grouping (10mins)

(II) Self-introduction & Preparation (20)

(III) Explanation of Damage Estimation (20)

(IV) Plotting Current Situations on map (20)

(V) Summary of Current Situations (10)

(VI) Plotting Human and Physical Loss (30)

(VII) Discussions under certain conditions&summary (30

(VIII) Presentation of Outputs (30)

(IX) Summary (10)

(IV) Plotting Current Situation on Map

(IV-1) Preparation of Map

In case maps consist of small pieces or parts, they will be attached together into one sheet with scotch tape or glue.

(IV-2) Setting the Map on Table

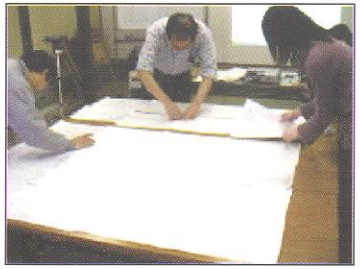
Set the map on the table. Transparent sheet is held on top with scotch tape.

(IV-3) Identifying Natural Condition

Current natural conditions shown below are identified. If possible, old natural conditions are identified.

(IV-4) Plotting City Structures

Identify the city structures, roads and open spaces (a legend is prepared)



- Old City Center
- Old river, wetland
- Old farm land

- Current City Center
- Current mountains, hills, valley, plain
- Current river, channel, sea, lake

• Main roads	Blue thick lines
• Narrow Roads	Red thick lines
• Parks, Open space	Green lines

(I) Introducing DIG& Grouping (10mins)

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(IX) Summary (10)

(IV-5) Plotting Risks and Resources

Legend will be decided (utilizing Colored pens, Post-it notes, Colored clay, Tooth picks)

- Public Buildings, Medical Facilities

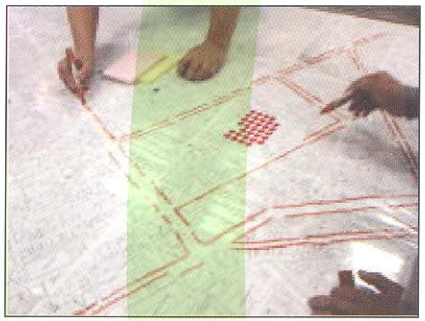
• City Hall, District offices, Nahiye office, Police • Univ., School, Kindergarten	• Hospital and Clinics • Basij office, community meeting place

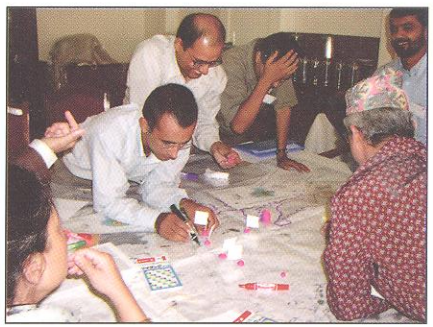
- Other disaster facilities

• Evacuation center, evacuation place • Rescue and Relief operation • Shops (food, commodities, medicines, fuel)	• Fire hydrants, pools, water tanks • Private companies which own heavy machinery

- Hazardous facilities, falling objects, vulnerable facilities and areas

• Storage of hazardous materials • Walls made of blocks and stones, steep slope	• Signboards • Chronic traffic congestion





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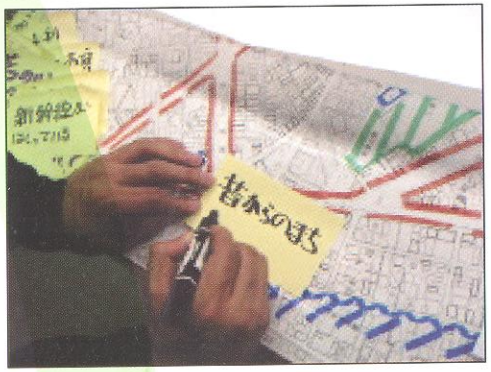
(VIII) Presentation of Outputs (30)

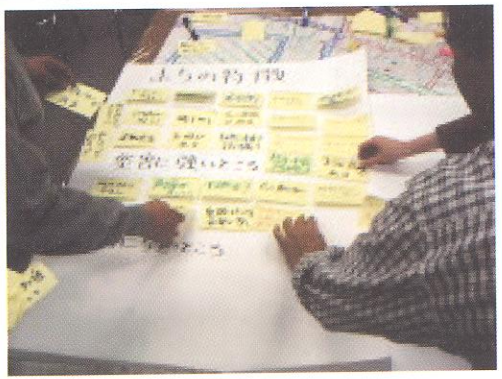
(IX) Summary (10)

(V) Summary of Current Situations

(V-1) Plotting items (list description for each item)

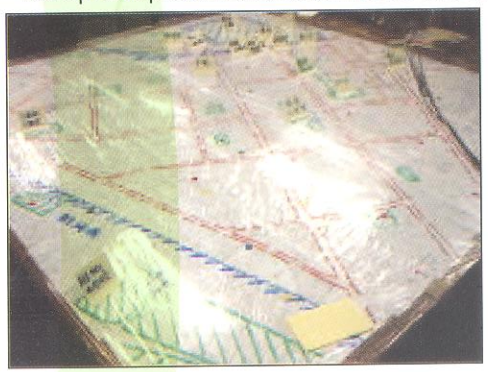
- What are the specific features of the area ?
  (Natural conditions, city structures, resources for disaster management, risks)
- What are the advantages of the area in disaster risk management?
- What are the disadvantages of the area in disaster risk management?





(V-2) Summary of the groups

Compile representative comments and important points from each group



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(IX) Summary (10)

(VI) Plotting Human and Physical Loss

(V-1) Choosing possible hazards in the target area

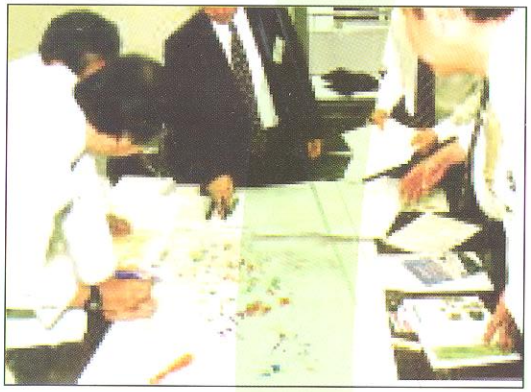
As related hazards, possible landslides, and Tsunami affected areas are plotted and the damages caused by these hazards are considered.

- Damage estimation of Landslides and liquefaction are distributed by grids.
- Steep slopes which are estimated high risk are marked in color.
- Possible damage areas of Tsunami of 10m and above are marked in color.

(V-2) Plotting damage estimation (buildings)

- Building Damages

- Damage estimations of buildings are distributed by grids.
- The number of buildings estimated heavily damaged are colored in red by grids.
(Buildings colors are selected at random)



(I) Introducing DIG& Grouping (10mins)

(II) Self-introduction & Preparation (20)

(III) Explanation of Damage Estimation (20)

(IV) Writing Current Situations on map (20)

(V) Summary of Current Situations (10)

(VI) Plotting Human and Physical Loss (30)

(VII) Discussions under certain conditions&summary (30

(VIII) Presentation of Outputs (30)

(IX) Summary (10)

(V-3) Visualizing Physical Damages

Based on the group discussion, players share the common understandings about the damage situation.

—Discussion Points

・Important facilities regarding disaster risk management, relief and rescue in the affected areas.

(Municipality, District, Nahiye office, Disaster Management Base, basketball courts, Police, evacuation sites, Schools, Mosques, Basij office, Hospitals and Clinics)

・Think about Isolated Areas

(Road blockage due to building damage, landslide, gas explosion etc.)

—Results of the discussion are listed on Post –It notes

(V-4) Plotting Human Losses

・# of Residents, estimated deaths, and casualties are distributed by grids.
・# of residents are plotted in BLUE by grids.
・# of deaths are plotted in RED by grids.
・# of casualties are plotted in PINK by grids.

(I) Introducing DIG& Grouping (10mins)

(II) Self-introduction & Preparation (20)

(III) Explanation of Damage Estimation (20)

(IV) Writing Current Situations on map (20)

(V) Summary of Current Situations (10)

(VI) **Writing Human and Physical Loss (30)**

(VII) Discussions under certain conditions&summary (30

(VIII) Presentation of Outputs (30)

(IX) Summary (10)

(VII) Discussion by Providing Set-conditions

Facilitators set pre-conditions of the disaster and show them to the players. Players train themselves by imagining the situations in the target area based on the pre-conditions and plan countermeasures and community actions.

(VII-1) Procedures

- Facilitator decides and provides preconditions such as date (season), time, weather etc. (Earthquake occurred at 1 pm on Wednesday in the summer time, and it is raining)
- Each group discusses the countermeasures under the set conditions of the set theme (such as evacuation) by groups.
- Discussion results are compiled in the sequence of **problems, reasons, countermeasures** in the post-it notes at each agenda.

(VII-2) Providing Conditions (after Earthquake)

a) **Communication Method**

— Question

TDMMO wants to issue an evacuation order to the residents of District 17. Both land lines and mobiles are cut off. How do you communicate with the necessary persons? Think about **TO WHO, TO WHERE, and HOW** do you transmit the message.

— Points

Think about the situation when most of the roads are blocked. Landlines and mobile phones are out of order. How do you inform district, local community leaders? Think about the information flow such as District disaster manager, community leaders, Red Crescent Volunteers or members etc...

(I) Introducing DIG& Grouping (10mins)

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(III) Explanation of Damage Estimation (20)

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(IX) Summary (10)

(VII-3) Setting Conditions

d) Operation of Evacuation Centers

— Sample Question

Residents who lost houses are gathering on the street looking worried. First of all, estimate the number of evacuees based on the damage estimation. Think about what to do step by step and make a concrete plan.

—Points

Compare the number of estimated evacuees with the accommodation capacity.
Imagine the congested evacuation center and think about operation of the evacuation centers; who will operate, how to operate, how to get necessary items, how to check the stocks. Make a plan for task allocations such as administration, food distribution, medicine etc.

(I) Introducing DIG& Grouping (10mins)

(II) Self-introduction & Preparation (20)

(III) Explanation of Damage Estimation (20)

(IV) Plotting Current Situations on map (20)

(V) Summary of Current Situations (10)

(VI) **Plotting Human and Physical Loss (30)**

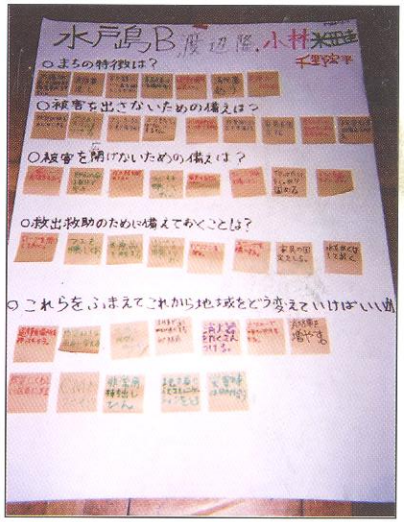
(VII) Discussions under certain conditions&summary (30

(VIII) Presentation of Outputs (30)

(IX) Summary (10)

e) Other issues and countermeasures

- Write on Post- it notes possible damage in limited areas or particular to an area, which are not included in the damage estimation. Compile them based on "Where", "What" and "When".
  - —Points to Consider
    - 9 Possible Evacuation Sites
    - 9 Possible Evacuation Routes
    - 9 Possible Tent Town
    - 9 Possible Logistic Centers
- Plot important damage
- Discuss countermeasures to reduce damage and compile the results on Post-it notes.
  - —Points to Consider
    - 9 Necessary items to solve the problems
    - 9 Things to prepare in advance
    - 9 How to prepare
    - 9 Expectations of public authorities
    - 9 Things to do by individuals
- Select effective and efficient countermeasures



(I) Introducing DIG& Grouping (10mins)

↓

(II) Self-introduction & Preparation (20)

↓

(III) Explanation of Damage Estimation (20)

↓

(IV) Plotting Current Situations on map (20)

↓

(V) Summary of Current Situations (10)

↓

(VI) Plotting Human and Physical Loss (30)

↓

(VII) Discussions under certain conditions& summary (30

↓

(VIII) Presentation of Outputs (30)

↓

(IX) Summary (10)

(VIII) Presentation of Outputs

Presenters and Facilitators give a presentation on what has been discussed and a Summary of what the teams wrote on Post-It notes.

—Comments—

During the emergency operation and disaster risk management, conditions and situations vary, thus there is no best way. Based on each different condition, it is important to start better countermeasures which can be implemented as soon as possible. If other groups planned different actions and countermeasures, it is important to consider why they planned that way.

(IX) Summary

The advisor responds to the presentation and gives comments. Participants share their common understanding that the DIG session is an opportunity for reducing vulnerabilities and planning how to increase resilience. After the session, each organization and individual starts concrete actions.

References : Working Group for DIG Training Manual Publishing
: Homepage of Shizuoka Prefecture Disaster Prevention Center
: DIG Presentation material for Caribbean Disaster Management Project, JICA