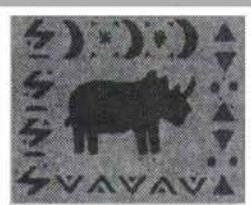


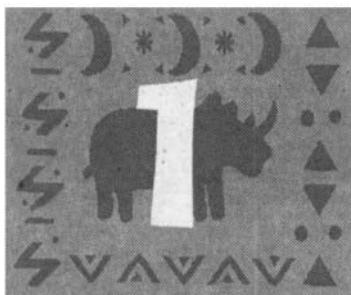
Section 3:



Emergency Preparedness and Risk Reduction

Section 3 is made up of twelve participatory learning activities that further improve participants' ability to incorporate risk reduction into emergency response plans. The activities are a mixture of analytical thinking and strategic planning exercises; participants practice how to identify appropriate strategies for reducing vulnerability, and how to examine proposed action plans in terms of gender considerations. This section aims at developing participants' planning skills by asking them to consider the impact of various hazards on elements at risk.

1.	Do you have what it takes, in risk reduction?	187
2.	How do we plan for emergency preparedness and response?	191
3.	Why should emergency preparedness and response be integrated with development?	221
4.	How do we integrate risk reduction with emergency response actions?	233
5.	How is gender analysis a tool for risk reduction planning?	237
6.	Why are gender considerations essential to emergency preparedness and response planning?	243
7.	How do we incorporate gender into risk reduction planning?	251
8.	How do we identify risk reduction measures?	259
9.	How can we learn from past experience when planning risk reduction projects?	265
10.	What is the role of different players in drought interventions?	279
11.	How do we prepare public awareness campaigns?	289
12.	What is the role of development workers in risk reduction?	293

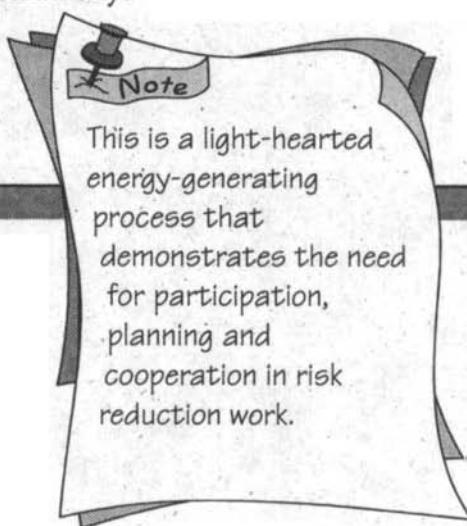


Do you have what it takes to work in risk reduction?



Purpose

Working as a group, participants attempt to juggle a great number of shoes, for as long as possible. In terms of risk reduction: participants practise working collectively and cooperatively.



Procedure

In this activity participants use their shoes as 'juggling balls'. This is followed by a discussion on risks and risk reduction.

Time

- ◆ ½ hour

Process

Introduction

1. Introduce the activity saying this is a 'Risk Reduction Juggle'. Request participants to take a small risk.
2. Ask participants to stand in a circle. Join in the circle.
3. Explain the following: in this activity we will juggle as many shoes as possible. To be able to do this, we have to plan and establish a definite order of throwing and catching, and then stick to that order all the way through.

Participant Action

1. Ask participants to take off one of their shoes, and you do likewise. Ask them to put the shoes on the ground, by their sides.
(You may want to ask them to check that there is nothing stuck to the soles of their shoes.)
2. Holding your shoe in one hand explain the following:

I will throw my shoe to one of you, across the room from me. To alert her/him, I will say her/his name. S/he will then throw the shoe to another participant across the room from her/him, again saying her/his name, and so on, until we have all had a turn at catching and throwing, and the shoe is back with me.

It is important that you remember who to throw to, and who to catch from, and that you always follow the same order, throughout the juggle.

3. Check for understanding, and throw the shoe across the room, to another participant.
4. Watch carefully to check that participants follow your instructions. Ensure that no-one is left out or receives the shoe twice. When the shoe is back with you discuss what happened.
5. Repeat the process of throwing and catching until participants have established a clear order.
6. Explain that from now on, in each round participants will add another shoe: first the second participant, in the next round the third, and so on. Point out that many shoes juggled at the same time requires alertness.
7. Begin by throwing your shoe; prompt the next player to throw her/his shoe after s/he has passed on your shoe. Continue until many shoes are being thrown, or juggled, at the same time.

8. The process ends when the juggle collapses: this usually happens as soon as the pattern is broken and participants can no longer keep up with catching and throwing.
9. Allow participants to catch their breath, collect and put on their shoes and sit down.

Review and Discussion

1. Encourage participants to describe what happened; the juggle usually generates a lot of laughter and participants enjoy talking about the process.
2. Ask questions such as
 - ? What were the risks involved for each participant?
 - ? What was the risk involved in terms of the purpose of the activity: to juggle as many shoes as possible?
3. Ask participants to identify and list the attitudes and skills that were needed from each participant. Write them up on the flipchart.

The list may include the following:

- planning
- coordination
- listening
- observation
- strategic thinking
- alertness
- dependability
- quick responses
- energy

4. Review the list: which of these attitudes and skills are typical of the qualities needed for community workers engaged in risk reduction? How are the qualities important? Who needs them?
5. Review the process of juggling: What made the juggle work, what made it collapse?
 - Discuss key issues such as participation, collective action, planning, cooperation, consultation etc.
6. Sum up by asking participants to make a brief statement about what they learnt from the 'risk reduction juggle'.

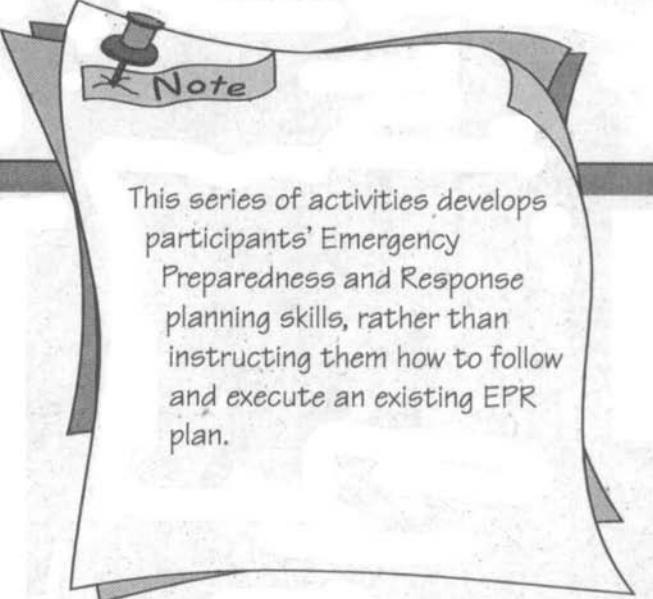


2

How do we plan for emergency preparedness and response?

Purpose

This series of activities strengthens participants' capacity to develop emergency preparedness and response plans specific to the needs of particular communities.



This series of activities develops participants' Emergency Preparedness and Response planning skills, rather than instructing them how to follow and execute an existing EPR plan.

Procedure

The first activity is an information-giving session; this can be done either through a resource person / EPR expert, or by way of reading and discussion. The case study asks participants to apply the information gathered to a specific scenario. The fish-bowl discussion illustrates the need for coordinated planning and demonstrates the difference between preparedness and emergency planning.

Time

- ◆ approximately 5 hours

Materials

- ◆ reading material: (see resources)
 - EPR planning guidelines
 - role play and instructions
 - case story of a flood
 - technical information on floods

Process

Introduction to the session

1. Outline the purpose and procedure of the activity.
2. Point out that there is no one 'master-plan' for emergency preparedness and response and that plans are best developed in consultation and cooperation with the communities concerned.

Remind participants that the information offered should serve as a guideline rather than a blueprint for EPR planning in the field.
3. Give an interactive input on EPR planning: list and explain the key questions that need to be asked when developing an EPR plan. (see resources)
4. Hand out reading materials (see resources)
 - (a) guidelines for EPR planning
 - (b) 'The 1987 Floods' - an eye-witness account of a flood experience
 - (c) technical information on floods

Participant Action 1: reading and discussion

1. Ask participants to read their materials.
Allow approximately 45 minutes for this.

Review and Discussion

1. Facilitate a brief plenary discussion on the reading:
 - Encourage questions of clarification.
 - Ensure understanding and common usage of specific disaster terms, such as hazard, risk, vulnerability.
Allow approximately 15 minutes for this.

Participant Action 2: case study

1. Divide participants into three working groups representing NGOs and agencies working in the following areas:
 - (i) health
 - (ii) relief
 - (iii) development, with a specific focus on income generating projects.



2. Set up the case study activity:
 - Hand each group copies of the case scenario and instructions.
 - Briefly read through the instructions and check for understanding.
 - Remind participants that they have 60 minutes to complete the task.
3. Manage and monitor the process by going from group to group, checking on progress and assisting if necessary.

Review and Discussion

1. Ask groups to reconvene in plenary, and facilitate report-backs. Allow approximately 10 minutes for each group's report.
2. Initiate and facilitate a plenary discussion. Ask questions such as the following:
 - ? What information did you need? What sources of information did you draw on? How did you go about conducting the assessment?
 - ? What were the problems you encountered when planning? How did you go about working together?
 - ? What planning tools did you use? What resources did you draw on?
 - ? Were there any overlaps between the EPR outlines presented? What were the similarities, what were areas that might lead to contestation?
3. Ask participants to apply the case study task to their work in the field: what were the problems and frustrations they encountered in the planning task, and how do they relate to real planning workshops?
4. Suggest an energiser / stretch or break.

Participant Action 3: No pressure fishbowl¹

1. Introduce the next process.

Explain that cooperation and coordination in emergency situations is crucial. Plans from different organisations / agencies should be coordinated in order to avoid duplication of actions or even conflict.

Remind participants of the purpose of this activity:

You will be asked to coordinate the plans developed in the previous activity. This will allow you to practise a number of skills, such as meeting skills, cooperative group work skills and planning skills. It will also serve as a means to demonstrate the different dynamics that arise in preparedness and emergency meetings.

2. Request each of the case study groups to appoint or elect a representative. Ask all other participants to act as observers.
3. Request participants to move into a fishbowl arrangement: The three group representatives will sit in the middle with all others as observers in a circle around them.
4. Give the following instructions:

(a) to group representatives:

You are asked to coordinate your EPR outlines and work towards one consolidated EPR plan.

(b) to observers:

focus on process and content of the task group with two main guiding questions in mind:

- (i) What did the group do to coordinate successfully?*
- (ii) What aspects of EPR planning were overlooked / left out?*



This planning meeting acted out by group representatives is likely to be fairly unpressurised and relaxed (no time limit was given!) and concrete outcomes are unexpected.

5. Allow approx. 15-20 minutes for the planning discussion.
6. Interrupt the process and thank the participants.

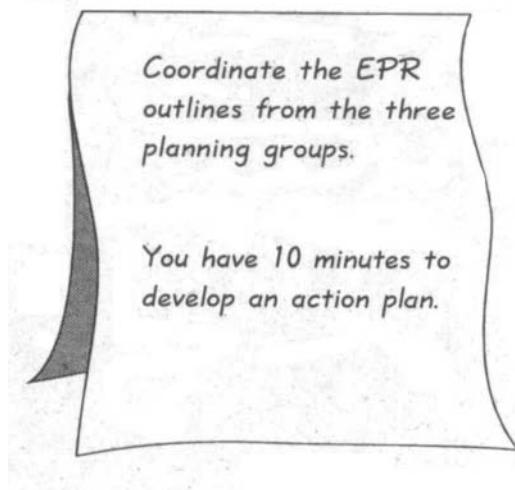
Review and Discussion

1. Facilitate a report from the observers. Point out that group representatives will be given a chance to respond to observations only after observers have completed their reports.
2. Record the key observations on crucial aspects of the coordination of plans on flipchart.
3. Ask participants to discuss what kind of a planning meeting this had been.
4. Point out that emergency preparedness meetings conducted when there is no imminent crisis are likely to be less pressurised and task-oriented than EPR planning meetings in times of an emergency.

Participant Action 4: High pressure fishbowl

Introduction

1. Request three new representatives (one from each group); ask them to sit in the 'fishbowl' and give the following instruction:



Participant Action

1. While the planning meeting happens, put pressure on the group and ensure they take the task seriously and in the spirit of an emergency situation.
The following are some suggestions for creating an atmosphere of pressure:
 - give the instruction as an 'order' by speaking in a clipped way;
 - write up the 10 minutes as figures 1-10 and cross out numbers as the minutes pass;
 - draw a clock and show the passing of time by moving the 'finger'-line;
 - walk around the group, impatiently;
 - terminate the process when the time has elapsed.

Review and Discussion

1. Discuss what happened; record important observations on flipchart.
2. Identify the difference between the two planning meetings.
3. Ask participants to describe what a planning meeting might look like once the emergency has already started?
 - Point out that in times of real emergencies action replaces planning meetings; this is why preparedness plans are so crucial.
4. Ask participants to list some of the questions they would ask after an immediate emergency has passed; Point out that post-emergency meetings would serve as opportunities for evaluating EPR plans.

Questions might include:

What was the emergency response action supposed to be?:

What did we actually do?:

What was the difference?:

Was there duplication?:

What were the gaps in planning?

Session Review

As a way of summing up the series of activities: ask participants to take turns and one by one make brief statements about what they have learnt from these activities.

1. Thank you to Juan Saenz, International Federation of Red Cross and Red Crescent Societies, East Africa, for his ideas and facilitation of a session in 1995.



Emergency preparedness and response planning

1. What do you know about the hazard and community at risk?

Have you (or has someone else) collected information about the past impact of this hazard on the community?

Have you (or has someone else) carried out a community risk assessment (e.g. assessed the hazard and the community's vulnerabilities and capacities)?

2. In which sectors is your agency likely to respond?

(How does your agency's orientation in general relate to this type of threat? What types of services and support could it dependably offer?).

What geographic area does your agency cover?

Which target groups do you assist and how many?

What types of assistance do you generally offer?

How do your agency's goals and action plans fit and match with those of your partner organisations?

3. Who will be in charge, and who will coordinate?

(Where will your focal response points be?).

Who is in charge at local level/intermediate level/head office?

Who is the focal point (give and circulate name and contact information within your agency and to other partners).

Who are the team members (at each operational level)? What are their names and responsibilities?

Is there a lead agency? Who? What are their responsibilities to your agency - and your responsibilities to them?

4. How do you guarantee supplies, support and communication to the worst affected area?

What material supplies will you need?

Where can you find them?

How will you store and transport them?

Can you find other NGOs/private companies to do transport for you?

What types of transport would you need to guarantee access during the worst of the emergency?

Will certain areas be cut off? If so, do you need to preposition supplies in advance? Who will watch over them?

How will you work with the community? (What community structures are there and who are the key people?)

How do you ensure communication between the local and other levels (assume there are no telephones)? What informal communication systems already exist for disseminating information?

Can you guarantee access to electricity? If not, what back-up supplies will you need to work?

5. How and when do you activate a response? Who does it?

How do you track the warning information? Who is responsible?

How do you track the impact information? Who is responsible?

How do you disseminate the information within your agency? Who is responsible?

6. What specific actions are you planning?

Define your actions for:

- evacuation
- emergency shelter
- food and water supplies
- medical care
- public health services
- transport
- etc.

7. What resources do you need to respond?

What do you already have and in what quantities?

Can you shift or reallocate personnel, vehicles, funding supplies from other programmes?

What else might you need?

Can you link with other agencies to get these items and supplies?

Who are other possible agencies and suppliers you can draw on locally?

8. Who will be the key people and what are their responsibilities?

- Make lists of people and their contact addresses and numbers for your agency.
- Make lists of people and their contact addresses and numbers for other agencies. For example:

Emergency Operation Centre:	Indundassion Settlements		
Field Officer in Charge:	Margaret Puddle		
Telephone: 73465	Fax: 73466		
TEAM MEMBERS			
Responsible for	Name	Address	Telephone
Registration	Mary Plamini	11 Phillips Ave Belgravia Harare	76614

Emergency Operation Centre:	Indundassion Settlements		
Field Officer in Charge:	Margaret Puddle		
Telephone: 73465	Fax: 73466		
Other Agencies in		Indundassion	
Name	Officer in Charge	Address	Telephone
Food for the World			
Christian Medical Committee			
Boreholes International			
Health Department			

ROLE PLAY

The Flood of the Manzi River

Briefing for members of HEALTH NGOs

Background

A sprawling informal settlement is growing on the north-east side of a large city. Originally, people migrated to the site as a result of a devastating flood in the North of the country, and due to rising unemployment in the rural areas. Many had fled from political fighting between the country's two main parties. By now there are an estimated 60000 people living on the steep slopes of the Manzi river, which is reduced to a trickle during the dry season.

Large numbers of fragile structures have been erected on the soft soil; the ground is severely eroded. Most of the vegetation has been cut down for fuel. There is no infrastructure apart from communal water taps along the roadside. There is no sanitation. The nearest health clinic is 35 km away. There are no schools in this area. Adjacent to the settlement is a middle-class suburb.

Recently, there have been heavy rains and more rain is forecast. In the previous season the river flooded and 12 people drowned; thousands lost their dwellings. Cases of dysentery have been recorded; in the past months there has been an increase in the reported cases of measles due to poor to non-existent immunisation coverage.

Your task

You are a representative of an NGO that is concerned with issues of health, working in the Manzi settlement.

You attend a workshop of Health NGOs called to draft an Emergency Preparedness and Response (EPR) plan for the Manzi settlement.

PLEASE PREPARE AN OUTLINE OF AN EPR PLAN BASED ON THE SCENARIO GIVEN.

- You have 60 minutes to complete this task.
- Please prepare to do a 10 minutes presentation of your EPR outline to the rest of the group.

The Flood of the Manzi River

Briefing for members of RELIEF AGENCY

Background

A sprawling informal settlement is growing on the north-east side of a large city. Originally, people migrated to the site as a result of a devastating flood in the North of the country, and due to rising unemployment in the rural areas. Many had fled from political fighting between the country's two main parties. By now there are an estimated 60000 people living on the steep slopes of the Manzi river, which is reduced to a trickle during the dry season.

Large numbers of fragile structures have been erected on the soft soil; the ground is severely eroded. Most of the vegetation has been cut down for fuel. There is no infrastructure apart from communal water taps along the roadside. There is no sanitation. The nearest health clinic is 35 km away. There are no schools in this area. Adjacent to the settlement is a middle-class suburb.

Recently, there have been heavy rains and more rain is forecast. In the previous season the river flooded and 12 people drowned; thousands lost their dwellings. Cases of dysentery have been recorded; in the past months there has been an increase in the reported cases of measles due to poor to non-existent immunisation coverage.

Your task

You are a representative of a relief agency concerned with flood emergencies in the Manzi settlement.

You attend a workshop of relief agencies called to draft an Emergency Preparedness and Response (EPR) plan for the Manzi settlement.

PLEASE PREPARE AN OUTLINE OF AN EPR PLAN BASED ON THE SCENARIO GIVEN.

- You have 60 minutes to complete this task.
- Please prepare to do a 10 minutes presentation of your EPR outline to the rest of the group.

The Flood of the Manzi River

Briefing for members of RELIEF AGENCY

Background

A sprawling informal settlement is growing on the north-east side of a large city. Originally, people migrated to the site as a result of a devastating flood in the North of the country, and due to rising unemployment in the rural areas. Many had fled from political fighting between the country's two main parties. By now there are an estimated 60000 people living on the steep slopes of the Manzi river, which is reduced to a trickle during the dry season.

Large numbers of fragile structures have been erected on the soft soil; the ground is severely eroded. Most of the vegetation has been cut down for fuel. There is no infrastructure apart from communal water taps along the roadside. There is no sanitation. The nearest health clinic is 35 km away. There are no schools in this area. Adjacent to the settlement is a middle-class suburb.

Recently, there have been heavy rains and more rain is forecast. In the previous season the river flooded and 12 people drowned; thousands lost their dwellings. Cases of dysentery have been recorded; in the past months there has been an increase in the reported cases of measles due to poor to non-existent immunisation coverage.

Your task

You are a representative of a development NGO working specifically with setting up and organising income generating projects in the Manzi settlement.

You attend a workshop of other development NGOs called to draft an Emergency Preparedness and Response (EPR) plan for the Manzi settlement.

PLEASE PREPARE AN OUTLINE OF AN EPR PLAN BASED ON THE SCENARIO GIVEN.

- You have 60 minutes to complete this task.
- Please prepare to do a 10 minutes presentation of your EPR outline to the rest of the group.

READING

The 1987 Floods¹

In 1984 I lived at Lindelani, the shack area near Ntuzuma township. There were many of us there living in imijondolo. We were waiting for land where we could build proper houses and not be chased away. We were still waiting when the 1987 floods came.

When we woke up on Saturday 23 September 1987 it was raining softly. We did not know that the rain would carry on for four days and wash away our houses and families. At first the rain was soft but as the day went by the rain became very hard. It rained all day and all the time; it did not stop. We stayed inside all day and heard the rain outside. When we went to bed it was still raining and the bed felt damp.

I woke up in the middle of the night. It was raining even harder and I could feel that something terrible was going to happen. I was cold. I lit a candle. The roof was leaking and I looked for more pots to catch the drops. I could hear the water rushing by outside and I was afraid.

The next morning my younger sister, Thandekile, came to visit me. She said, "Hawu! The roads look like rivers. They are full of mud and water. All my clothes are wet!"

We made tea and listened to the rain. It rained all day long without a break. We tried to keep the water out of the house. My next door neighbours had a mud house and it was being worn away by the water which flowed around it the whole day. At about eight o'clock that night their house fell down. We heard their screams but we could not help them. The path between our houses had become a river we could not cross.

In the morning we looked out. We were shocked to see how these neighbours had been washed out. They lay dead in the mud. Some were without clothes, their naked bodies covered with mud. While we stood there in horror we saw something moving in the mud. We ran to that place and started digging. We found a child trapped between the corrugated iron and the wall of the house. We didn't think she would live. We worked for hours in the mud and the rain and finally we got her out alive. Six people were killed in that disaster, the parents and four of their children.

It rained again right through the night and in the morning it had not stopped. This was the third day of staying in the house and we needed some food. I asked Thandekile to go to the nearest shop. She did not want to go alone. "Please come with me, Thembakazi," she begged. "I am so afraid of these roads which are rivers."

I agreed to go with her. I remember we left the house at about 10 o'clock. It was grey outside and still raining.

We had walked only a short way when we heard a loud BANG that it hurt our ears.

We looked towards the graveyard where the noise had come from. Filthy black water burst out of the graves in the cemetery and went roaring down the road. It looked just like boiling water. In no time the road turned into a swollen river. Then I saw coffins being carried by the river, and corpses in the foul smelling water.

I was shocked. I saw corpses being rolled along in the river. The bodies appeared and disappeared under the water while I watched. It was horrible.

A man who was walking on the other side of the river tried to come across. He was knocked off his feet by the force of the water and washed away by the roaring river. He saved his own life by catching hold of a tree. He grabbed a branch and held on for his life.

We saw that we would not be able to get to the shop. We decided to go back home.

The roads we used to walk on were just rivers. All the houses we saw were damaged. Some people were inside their shacks trying to keep the water out. Some people were outside in the rain trying to keep their shacks from falling down. There were no dry, safe places for shack dwellers that day.

When we got back to our house the place was flooded. Everything was under water or washed away. I saw that I had nothing left in the world. No clothes, no shoes, no underwear, no blankets, no furniture, not even a stove. Everything was under water or carried away in the mud. I had only the clothes I was wearing and a large towel that I had wrapped around my waist. I have never felt so lost.

That night we looked for a place to sleep. We went with other people to a Putco bus. Everyone in the bus was crying. Some were crying for their children, some were crying for their relatives and some were crying for their neighbours. We were cold and wet and hungry. We had nothing. Luckily some strangers came and brought us food. Then we slept.

It rained again the whole of the next day. That night we did not sleep in the bus again. By that time many people had heard about how shack dwellers were suffering. Some people came to try and help me. We were taken to a church hall where we were warmly welcomed. We got fresh food, hot water and clothes. We were warm and dry. We ate and we slept. We stayed there while it went on raining.

On Wednesday 27 September 1987 it began to stop raining. The next day we were taken back to Lindelani. When we got to Lindelani we were confused. There was not so much water now. The river was small. There was not so much noise now. The river was quiet. But we could not see our own houses. We did not know what to do. There were just bits of broken houses everywhere. The mud was full of planks and trees and rubbish. We started to search in the mud. We hoped that we would find some of our belongings.

I found a big plastic bag. When I opened it I saw something I could not believe. It was the pieces of a man. The bag had been buried but it was brought to the surface by the floods. The man's body had been chopped into small pieces. I thought he must be a victim of the violence that was happening at that time. When we walked on we found two more bodies. One was a man and the other was a woman. The woman's head was cut off and she had only one arm. The man's leg and his private parts were cut off. I thought this must be the place of the revenge killings.

The whole place was a mess. There was a bad smell all over Lindelani. This was because there were so many corpses and bones lying in the mud. We saw dogs feeding on a human body. It became part of our daily lives to see parts of bodies lying on the road. It was horrible.

On the third day after the rain stopped a large tent was erected by the Red Cross. Some people went there. At the same time some donations from the Flood Relief Fund were given to us.

After many months some land surveyors arrived at Lindelani. They called us one by one. They allocated plots to families and gave us tents to put up. It took a long time for each family to get a plot and a tent. Even then we were told that the tents and the plots which we had been given were temporary. We waited until 1988 before we allocated permanent plots. We are still waiting for proper houses. Every year when it rains we hope the rain will not bring floods again.

1. Mnisi, T. (1991) *The 1987 Floods*. New Readers Project, Centre for Adult Education, University of Natal: Durban.

Technical information on floods¹

FLOODS

This chapter of the module aims to improve your understanding of:

- *the causes of floods and factors which intensify their effects*
- *impacts of floods on human settlements*
- *flood control, prevention and preparedness measures*
- *flood forecasting and warning systems*

Introduction

Throughout history people have been attracted to the fertile lands of the floodplains where their lives have been made easier by virtue of close proximity to sources of food and water. Ironically, the same river or stream that provides sustenance to the surrounding population, also renders these populations vulnerable to disaster by periodic flooding. Floods can arise from abnormally heavy precipitation, dam failures, rapid snow melts, river blockages or even burst water mains. Flood disasters are second only to droughts in the total number of people affected world wide.



FLOOD HAZARD DATA SHEET

Number killed by declared flood disasters, 1980-89: 16,108

Number affected: 279,330,901 (OFDA, 1990)

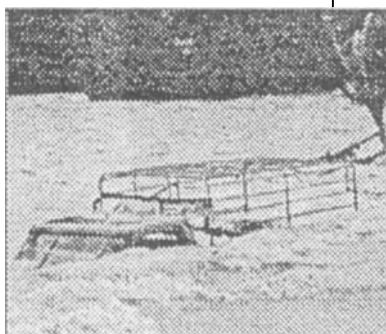
Selected severe flood disasters

Year	Location	Deaths	Losses in US\$ million
1966	Italy	113	1,300
1983	Peru, Ecuador	500	700
1983	Spain	42	1,250
1986	China	260	1,210
1987	USSR	110	550
1987	Switzerland	0	700
1987	Bangladesh	1,600	1,300
1988	Thailand	371	300
1988	Bangladesh	3,000	1,200
1990	Tunisia	25	211
1991	China	2,295	12,500

Source: *Nature and Resources*, Vol. 27, No.1, 1991

Causal phenomena

Types of floods



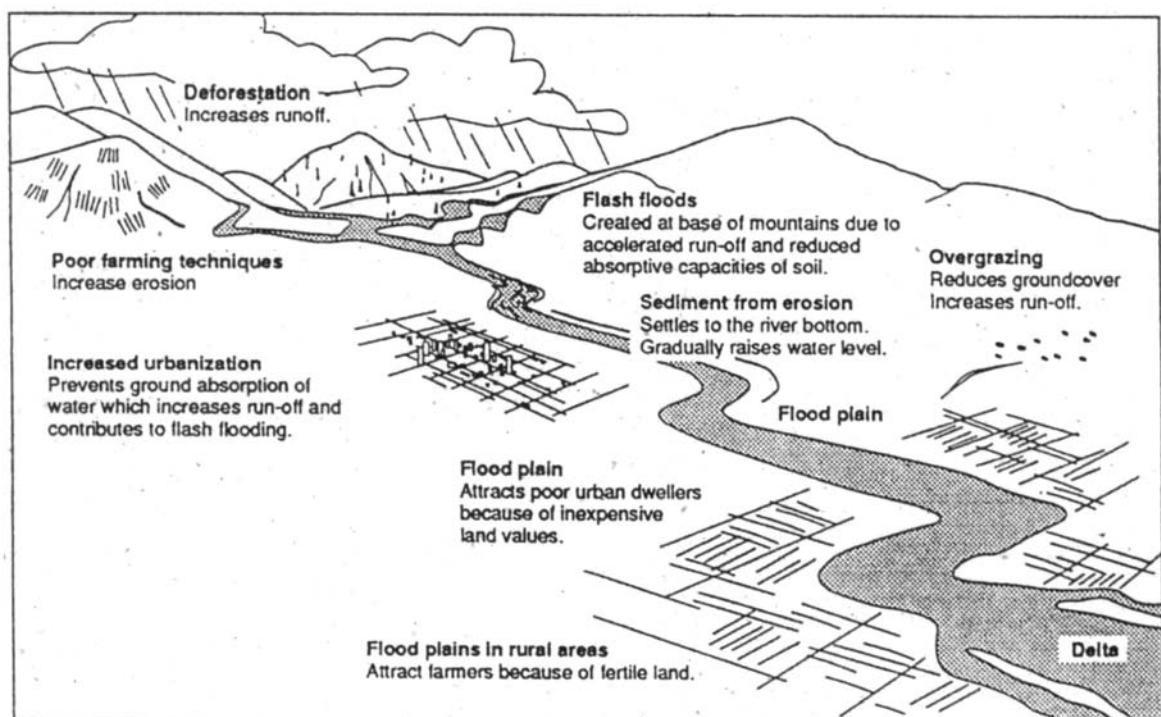
Truck carried away by flooding

Mass Media Production
Centre, Manila, UNDRO
News, Sep/Oct 1984

Flash floods — These are usually defined as floods which occur within six hours of the beginning of heavy rainfall, and are usually associated with towering cumulus clouds, severe thunderstorms, tropical cyclones or during the passage of cold weather fronts. This type of flooding requires rapid localized warnings and immediate response by affected communities if damage is to be mitigated. Flash floods are normally a result of runoff from a torrential downpour, particularly if the catchment slope is unable to absorb and hold a significant part of the water. Other causes of flash floods include dam failure or sudden breakup of ice jams or other river obstructions. Flash floods are potential threats particularly where the terrain is steep, surface runoff is high, water flows through narrow canyons and where severe rainstorms are likely.

River floods — River floods are usually caused by precipitation over large catchment areas or by melting of the winter's accumulation of snow or sometimes by both. The floods take place in river systems with tributaries that may drain large geographic areas and encompass many independent river basins. In contrast to flash floods, river floods normally build up slowly, are often seasonal and may continue for days or weeks. Factors governing the amount of flooding include ground conditions (the amount of moisture in the soil, vegetation cover, depth of snow, cover by impervious urban surfaces such as concrete) and size of the catchment basin. In some larger semi-arid countries, such as Australia, inland flooding of dry or stagnant rivers may occur many weeks after the onset of heavy coastal monsoon or cyclonic rain has directed river flows many hundreds of km inland, and in the complete absence of any sign of disturbed weather. Historical records of flooding of towns on the main river flood plains prove

Figure 2.2.1
Flooding and its causes
Natural Hazards, Disaster
Management Center, 1989.



unreliable for flood protection purposes due to the varying source of the contributing river tributaries.

Coastal floods — Some flooding is associated with tropical cyclones (also called hurricanes and typhoons). Catastrophic flooding from rainwater is often aggravated by wind-induced storm surges along the coast. Salt water may flood the land by one or a combination of effects from high tides, storm surges or tsunamis. (See the chapters on tsunamis and tropical cyclones for more information.) As in river floods, intense rain falling over a large geographic area will produce extreme flooding in coastal river basins.



Q. *Is your community or country susceptible to flooding?
What types?*

A. _____



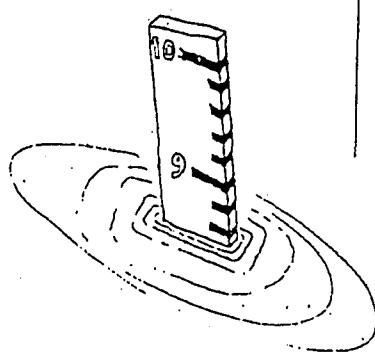
How do humans contribute to flooding?

Floods are naturally occurring hazards. They become disasters when human settlements occupy the floodplain. Population pressure is now so great that the risks associated with floods have been accommodated because of the greater need for a place to live. In the United States, for example, billions of dollars have been spent on flood protection programs since 1936. In spite of this the annual flood hazard has become greater because people have moved to and constructed upon flood plains faster than the engineers can design better flood protection.

Increase in population combined with poor resource management have resulted in new types of flooding. Conversion of forests in the catchment area to pasture and arable land means that less water is held in the upper reaches of the catchment basin, and the increased runoff water flows rapidly to the plains, with the effect of more frequent, unexpected and severe flooding.

Another type of flood becoming more common is *urban* flash flooding. Buildings and roads cover the land preventing infiltration so that rainwater runs over the impervious surfaces forming artificial streams. Inattention to maintenance of drainage systems, especially after long dry spells when dust, debris and overgrown vegetation have blocked natural water flow, can accentuate the degree of flash flooding.

Floods are naturally occurring hazards. They become disasters when human settlements occupy the floodplain.



General characteristics

Floods may be measured and analyzed by the following criteria:

Depth of water — Building foundations and vegetation will have different degrees of tolerance to being inundated with water.

Duration — Damage or degree of damage to structures, infrastructure and vegetation is often related to the length of time of inundation by water.

Velocity — Dangerously high velocities of flow may create erosive forces and hydrodynamic pressure which may destroy or weaken foundation supports. These may occur on the floodplains or in the main river channel.

Rate of rise — Estimation of the rate of rise and discharge of a river is important as a basis for flood warnings, evacuation plans, and zoning regulations.

Frequency of occurrence — The cumulative effects and frequency of occurrence measured over a long period of time will determine what types of construction or agricultural activities should take place on the floodplain.

Seasonality — Flooding during a growing season may completely destroy crops while cold weather floods from snow melts may seriously affect the functioning of a community.

Predictability

Flooding, resulting from precipitation or snow melt in the catchment system, or from upstream flooding, is predictable from about 12 hours to as much as several weeks ahead.

Riverine flood forecasting estimates river level stage, discharge, time of occurrence, and duration of flooding, especially of peak discharge at specific points along river systems. Flooding, resulting from precipitation or snow melt in the catchment system, or from upstream flooding, is predictable from about 12 hours to as much as several weeks ahead. Forecasts issued to the public result from regular monitoring of the river heights and rainfall observations. Flash flood warnings, however, are dependent solely on meteorological forecasts and a knowledge of local geographical conditions. The very short lead time for the development of flash floods does not permit useful monitoring of actual river levels for warning purposes.

For comparison with previous flood events, and conversion to warning information, assessment of the following elements should be included: flood frequency analysis, topographic mapping and height contouring around river systems with estimates of water holding capacity of the catchment area, precipitation and snow melt records, soil filtration capacity, and (if in a coastal area) tidal records, storm frequency, topography, coastal geography, and breakwater characteristics.

An effective means of monitoring floodplains is through remote sensing techniques such as Landsat. The images produced by the satellites can be interpreted and used to map flooded and flood-prone areas. Other efforts to improve forecasting are being implemented by UN organizations such as the World Meteorological Organization using World Weather Watch and Global Data Processing Systems. These systems are strategic when flood conditions exist across international boundaries. The great majority of river and flash floods forecasts, however, depend on observations made by national weather services for activation of flood alert warnings.

Vulnerability

At notable risk in flood plain settlements are buildings made of earth or with soluble mortar, buildings with shallow foundations or non-resistant to water force and inundation. Infrastructural elements at particular risk include utilities such as sewer systems, power and water supplies, machinery and electronics belonging to industry and communications. Of great concern are food stocks and standing crops, confined livestock, irreplaceable cultural artifacts, and fishing boats and other maritime industries.



Other factors affecting vulnerability are lack of adequate refuge sites above flood levels and accessible routes for reaching those sites. Similarly, lack of public information about escape routes and other appropriate response activities renders communities more vulnerable.

Typical adverse effects

Physical damage

Structures are damaged by a) force of impact of flood waters on structures b) floating away on rising waters c) becoming inundated d) collapsing due to undercutting by scouring or erosion and e) damage by water-borne debris.

Damage is likely to be much greater in valleys than in open, low-lying areas. Flash floods often sweep away everything in their paths. In coastal areas, storm surges are destructive both on their inward travel and again on the outward return to the sea. Mud, oil and other pollutants carried by the water are deposited and ruin crops and building contents. Saturation of soils may cause landslides or ground failure.

Casualties and public health

Currents of moving or turbulent water can knock down and drown people and animals in relatively shallow depths. Major floods may result in large numbers of deaths from drowning, particularly among the young and weak but generally inflict few serious but non-fatal injuries requiring hospital treatment. Slow flooding causes relatively few direct deaths or injuries, but often increases occurrences of snake bites.



Endemic disease will continue in flooded areas, but there is little evidence of floods directly causing any large scale additional health problems apart from diarrhea, malaria and other viral outbreaks eight to ten weeks following the flood.

Water supplies

Open wells and other groundwater supplies may be contaminated temporarily by debris carried by flood waters or salt water brought in by storm surges. They will, however, only be contaminated by pathogenic organisms if bodies of people or animals are caught in the sources or if sewage is swept in. Normal sources of water may not be available for several days.



Crops and food supplies

An entire harvest may be lost together with animal fodder resulting in long-term food shortages. Food stocks may be lost by submersion of crop storage facilities resulting in immediate food shortages. Grains will quickly spoil if saturated with water even for a short time.

Most agricultural losses result from the inundation of crops. Susceptibility to inundation depends on the type of crop and duration of flooding. Some crops, such as taro are quickly killed by relatively small amounts of flood water. Others may be able to resist submersion but may die eventually if large amounts of standing water stagnate as in the 1988 Bangladesh flood.

Large numbers of animals, including draught animals, may be lost if they are not moved to safety. This may reduce the availability of milk and other animal products and services, such as preparation of the land for planting. These losses, in addition to possible loss of farm implements and seed stocks, may hinder future planting efforts.

Floods bring mixed results in terms of their effects on the soil. In some cases, land may be rendered infertile for several years following a flood due to erosion of the topsoil or by salt permeation in the case of coastal floods. Heavy silting may either have adverse effects or may significantly increase the fertility of the soil.

In coastal areas where fish provide a source of protein, boats and fishing equipment may be lost or damaged.

On the positive side, floods may flush out pollutants in the waterways. Other positive effects include preserving of wetlands, recharging groundwater, and maintaining the river ecosystems by providing breeding, nesting, and feeding areas for fish, birds and wildlife.

Possible risk reduction measures

The majority of deaths and much of the destruction created by floods can be prevented by mitigation and preparedness measures. The first step involves identifying vulnerable elements by preparation of a flood hazard map and then integrating that information into a plan for preparedness and development. A strategy might combine regulation of land in the floodplains with flood control measures. Planners may seek contribution from a variety of disciplines to assess risk, the level of acceptable risk, and viability of proposed activities. Information and assistance may be obtained from different sources ranging from international agencies to the community level.

Mapping of the floodplain — Floods are normally described in terms of statistical frequency using the 100 year flood plain event parameters for flood mitigation programs. The 100 year flood plain describes an area subject to a 1% probability of a certain size flood in a given year. Depending on the degree of acceptable risk that is selected for an evaluation, other frequencies may be chosen such as 5, 20, 50, or 500 year floodplains.

The basic map is combined with other maps and data to form a complete picture of the floodplain. Other inputs include frequency analysis, inundation maps, flood frequency and damage reports, slope maps and other related maps such as land use, vegetation, population density and infrastructural maps. In some developing countries, obtaining extensive long

The majority of deaths and much of the destruction created by floods can be prevented by mitigation and preparedness measures.

Application of remote sensing data to flood prone areas:

Honduras coastal plain — In September 1974, the coast of Honduras was flooded by Hurricane Fifi. The government of Honduras requested assistance from OAS/DRDE for mapping of the floodplain for use in an integrated development study to rebuild the coastal areas. Using Landsat data sheets, pre-flood and post-flood imagery was overlapped to show the areas susceptible to flooding and where prevention and mitigation measures and land use zoning would be necessary.

Pilcomayo River Floodplain: Recurrent flooding along the Pilcomayo River in south-western Paraguay, prompted the Paraguayan Government to draw up a hazard map of the floodplain. Several different maps such as those showing desertification and soils were combined with Landsat maps to draft floodplain boundaries and hazard zones, using overlay mapping. The maps showed the changes in the river channel over time and served to demonstrate the highly dynamic nature of the floodplain, indicating continuous need for floodplain monitoring. Further analysis was used to assess flood hazard vulnerability.

term information may be difficult. Remote sensing techniques provide an alternative to traditional techniques of floodplain mapping and can be equally or more cost effective as they allow estimates of data otherwise requiring labor intensive collection methods, as in hydrology studies over extensive areas.

Multiple hazard mapping — Floods often cause, occur in conjunction with, or result from other hazards. A multiple hazard map, known as a composite, synthesized or overlay map, serves to highlight areas vulnerable to more than one hazard. It is an excellent tool for designing a multiple hazard mitigation and emergency plan. It may, however, not be adequate for site-specific, hazard specific engineered activities.

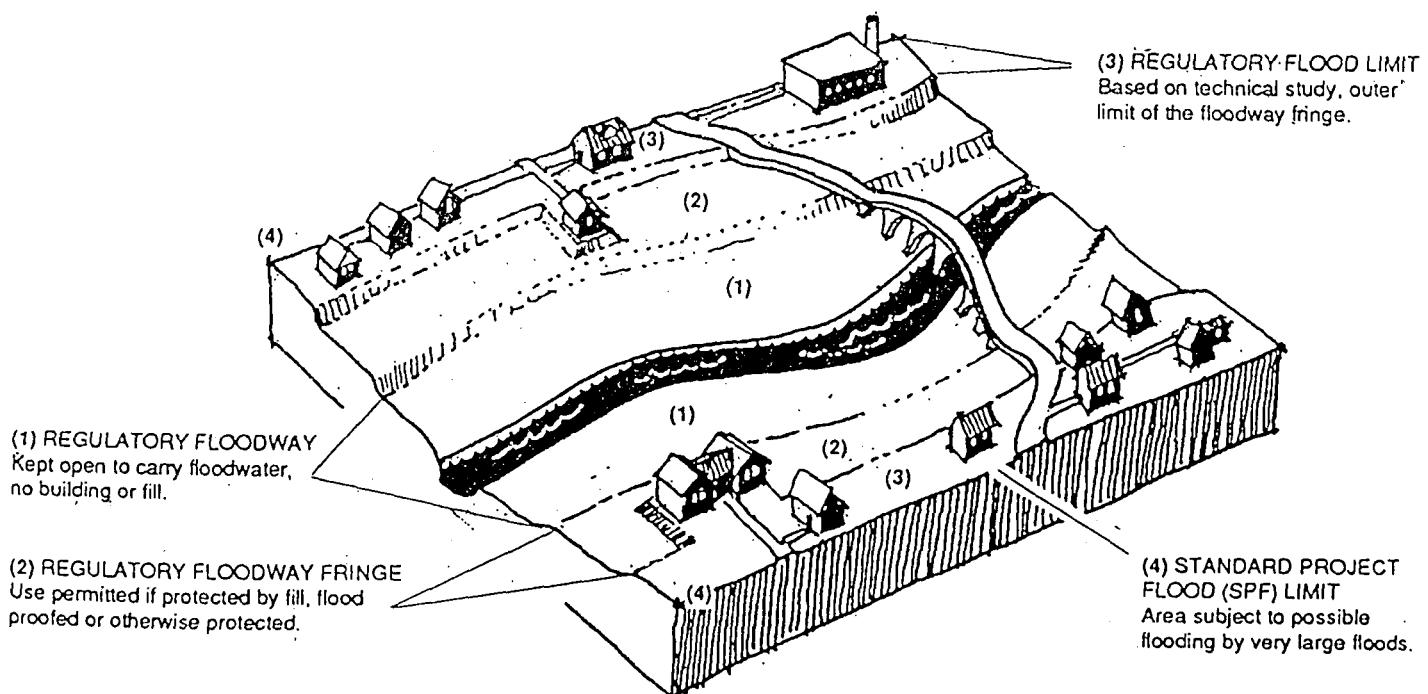
Land use control — The purpose of land use regulations is to reduce danger to life, property and development when high waters inundate the floodplains or the coastal areas. Land use regulations ensure that flood risks are not made worse by ill-conceived new land uses. Of particular concern are regions of urban expansion. The following elements should be addressed.

1. **Reduction of densities:** In flood prone areas, the number of casualties is directly related to the population densities of the neighborhood at risk. If an area is still in the planning stages, regulation of densities may be built into the plan. For areas already settled, especially squatter settlements, regulation of density can be a sensitive issue and would have to address the socioeconomic implications of resettlement. Unfortunately, many situations exist where dense unplanned settlements are located on floodplains. Planners must incorporate measures to improve sites and reduce vulnerability.
2. **Prohibiting specific functions:** No major development should be permitted in areas found to be subject to flooding once every 10 years on average. Areas of high risk can be used for functions with a lower risk potential such as nature reserves, sports facilities and parks. Functions with high damage potential such as a hospital are permitted in safe areas only



Land use regulations ensure that flood risks are not made worse by ill-conceived new land uses.

Figure 2.2.2
Schematic flood plain regulation map



For developing countries with intensively utilized floodplains, considerable political influence in conjunction with the cooperation of the communities may have to be employed.

Figure 2.2.3
Schematic flood plain regulation map

Natural Hazards, Disaster Management Center, 1989.

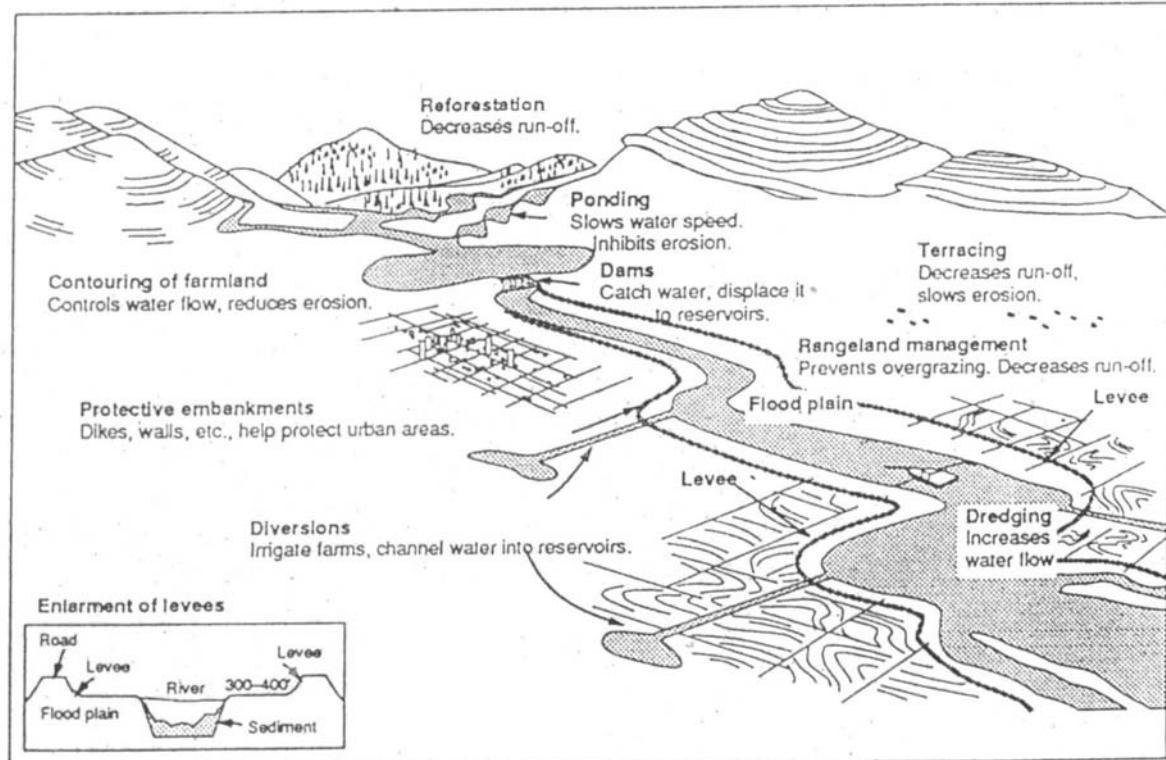
3. **Relocation of elements that block the floodway:** In addition to the obvious danger of being washed away, buildings blocking the floodway may cause damage by trapping floodwaters which then overflow into formerly flood free zones.

4. **Regulation of building materials:** In certain zones wooden buildings and other light structures should be avoided. In some cases, mud houses are permitted only if flood protection measures have been taken.

5. **Provision of escape route:** Neighborhoods should have clear escape routes and provision of refuge areas on higher ground.

Other preventative strategies include:

- the acquisition of floodplain land by developmental agencies, perhaps by swaps that provide alternatives for building sites
- establishment of incentives (loans or subsidies, tax breaks) to encourage future development on safer sites using safer methods of construction
- diversification of agricultural production such as planting flood resistant crops or adjusting the planting season; establishing cash and food reserves
- reforestation, range management and animal grazing controls to increase absorption (see chapters on deforestation, desertification)
- construction of raised areas or buildings for use as refuge if evacuation is not possible.



Flood control

As mentioned above, land use controls will be of limited use in already developed floodplains. Yet, changes must be implemented to reduce a community's vulnerability to flood damage. For developing countries with intensively utilized floodplains, considerable political influence in conjunction with the cooperation of the communities may have to be employed. The most commonly used options are:



Existing channel improvements — Deepening and widening the river bed are methods to increase capacity and thus reduce the area of the floodplain.

Diversion and relief channel construction — New channel construction may be a feasible alternative relative to the cost of moving a settlement. Several options exist for channel construction such as open grass-lined channels, concrete or rock lined channels. Great care must be exercised in the design and construction of diversion channels because of the possible environmental impacts and necessary safety features. Costs may be prohibitive for such highly engineered works.

Dikes and dams — These facilities are capable of storing flood water and releasing them at manageable rates. Again, careful engineering is required to anticipate maximum flood levels. If exceeded, the damage caused may be much higher than if the facility had not been built. Dams and other retention facilities may give the public a false sense of security if not properly engineered and constructed.

Flood-proofing — Individual property owners may reduce the risk of damage by strengthening buildings to a) resist the water's force and b) retain integrity when inundated with water. Newly constructed buildings should have foundations which are not susceptible to scouring.

Protection against erosion — An important element of flood defense is protection against erosion. Streambeds should be stabilized with stone masonry or vegetation especially near bridges.

Site improvement — The elevation of sites can be an effective option for individual or group dwellings.

Q. *What are some possible risk reduction measures which may be used in regard to flood hazards?*

A. _____



1. 'Technical information on floods' taken from: *Introduction to Hazards*, UNDP Disaster Management Training Programme.



Why should emergency preparedness and response be integrated with development?

Purpose

This activity allows participants to develop their understanding of how different pressures obstruct attempts to integrate relief and development action. It also builds participants' abilities to argue for integration.

 Practical considerations, long-established practices and organisational dynamics often stand in the way of integrating everyday preparedness and response with development.

In a process of developing arguments, players have to focus clearly on the implications of integration or non-integration. They need to think of clear strategies, and practise their skills in presenting convincing arguments. This also involves exploring ATTITUDES that hinder or promote a process of integration.

Procedure

The activity takes the form of a role play in which different role players representing various interests argue for or against the integration of specific development actions into drought relief.

Time

- ◆ 2½ hours

Materials

- ◆ briefing sheets for different roles (see resources)
- ◆ pens / paper for observers

Process

Introduction

1. Explain the purpose of the activity and outline the process.
2. Ask participants to have a brief buzz, with the person sitting next to them, about reasons for /against an integration of relief and development activities.
3. Initiate and facilitate a brainstorm. Remind participants of the rules and purpose of a brainstorm. Record all key words.



4. Display the keywords and suggest that participants might want to refer to them in the following activity.

Participant Action

1. Introduce the role play

Ask for volunteers to take on the roles of finance officer, health programme officer, disaster reduction officer, head of programmes and agency director.



Depending on the number of participants you may want to allocate two (or more) players to each of the roles and run two (or more) simultaneous role plays. This allows for maximum participation.

2. Ask remaining participants to take on the role of observers.

3. Briefly outline the process:

- (i) Groups will work for 45 minutes.
- (ii) Observers will have 10 minutes to develop their reports.
- (iii) Reports will be presented in plenary.
- (iv) This will be followed by a plenary discussion around key issues as they arise from reports and discussion about the process.
- (v) The process will conclude with a discussion around a number of questions.

4. Distribute briefing sheets, read through them and ask participants to prepare arguments. Allow 5-10 minutes.
5. Begin the role play. Point out that you will move from group to group and be available to answer questions of clarification should the need arise..
6. At the end of 45 minutes ask observers to prepare their reports. Ask role players to move back into plenary.



Review and Discussion

1. Review the role play.

Ask participants questions such as the following:

- ? How did they feel in their roles?
- ? What did they like / dislike about playing the role they were assigned?
- ? What did they find difficult /easy about their roles?
- ? What attitudes were displayed? Are these realistic?

Indicate that this is the end of the role play and they will now assume their own identities. Ask players from each group to address each other by name and shake hands.

2. Ask observers to join the group; point out that in the following you will examine arguments for and against integration and that these arguments should be viewed as independent from the role players. Encourage observers to refer to roles rather than players in their reports. (Talk about 'the health officer' etc, and not the person who took on that role.)

3. Take reports from observers and record main key arguments on flipchart.
4. Facilitate a discussion around those arguments:
 - ? Which of these are based on ‘myths’? Which are real?
 - ? How can arguments against integration be countered?
 - ? What were solid arguments for integration? What made them so convincing? Why were they effective?
 - ? What other arguments could be put forward (these might include some suggested during the brainstorm but not developed further in the role plays)?

Some good arguments for integrating development and relief activities

1. In repeatedly drought-stricken areas, a community-based health programme will have greater credibility with the targeted communities if it addresses recurrent problems caused by drought conditions (e.g. how relevant is it to offer HIV/AIDS education to community members who have no food or water today?)
2. Health programmes that integrate drought considerations during their planning phase are more likely to be “drought proofed” when drought does strike — thus more sustainable, and able to continue offering a service when the community needs it most.
3. The visibility that accompanies a relief programme can bring welcome publicity to ongoing but low-profile development activities.
4. When relief activities are implemented vertically, without careful integration with ongoing village, community or district infrastructures, they are very fragile and non-sustainable after the relief programme ends. If a new relief programme is required 2-3 years later, it is more difficult to resuscitate a mechanism that has been in “hibernation” than one that rests on ongoing community programmes and structures.
5. The time to launch long-term recovery and mitigation activities is right at the start of a relief operation. Although these types of activities are almost all developmentally-orientated, communities are much more receptive towards them when they are dealing with the full impact of a drought — rather than later.



5. Suggest the importance of transferring these insights into participants' work in the field/their organisations: how could they apply what they learnt during the role plays/discussion in their work? What are the obstacles and how could those be overcome?
6. Ask a participant to summarise the main points and key issues. Suggest participants may want to take those forward in their report-backs to their organisations.





ROLE PLAY

Arguments for integrating EPR with development

Scenario (for all participants)

You are participating in a meeting called by the Disaster Reduction Officer in order to discuss a proposed programme of drought action in the region. You are all members of an active NGO - working at Headquarters level. The agency director will chair the meeting. Also present are the health officer, disaster reduction officer, head of programmes & finance officer.

This year, once again, a drought has been declared that affects several districts in your country. Your organisation has been assigned two districts with 80,000 people to assist. The officer in charge of disaster reduction activities in your agency has called for a meeting on how to proceed. S/he has supervised drought relief efforts twice before, and now is deeply committed to using this opportunity to reduce the risks associated with repeated drought in the two districts. As your agency has a limited community-based health care programme in this area, s/he would like to link health and drought related risk reduction activities more closely.

The purpose of the meeting is to reach an agreement on whether this is feasible, and how the operation should be structured. In each district there is a project officer for health, and a number of health volunteers, who have had basic training in primary health care. UNICEF has offered some funding for this effort (that is the drought programme) and so has the World Food Programme. However, in the disaster reduction officer's opinion this support is not enough, and she would like to access some of the health programme's resources for the 12 month risk reduction programme. However, the health officer has already designed her own plan for this year for these districts and is unwilling to divert from the established plan. She is also concerned that the donors might react negatively.

You have 45 minutes to decide on how this issue will be resolved.

Individual briefing sheets for role players

Finance Officer

You have recently joined the NGO, having worked for a borehole drilling company for eight years. Because of your background and familiarity with water resource rehabilitation, you are open to broadening the drought operation to include water and health components.

At the same time, you are a bit worried about how you would account for monies diverted from the health programme to co-fund the drought operation and how this would be safely monitored - especially if the monies were disbursed at district level. You have a great sense of humour.

Finance Officer

You are absolutely devoted to CBHC & PHC and have worked hard to generate funds for your programme. You have worked for this NGO for five years - and have virtually built the health programme from zero. Now - there are trained health field officers in each district - all with motor-bikes, and you feel you have wonderful infrastructure to mobilise. You have designed a careful plan for the next year, and are determined to prove to the director and your donors that you can make it work. Your priorities are HIV/AIDS education for women and sanitation. You have always thought that your organisation's work in drought situations was limited to food relief, and are unwilling to divert your health workers, transport and donor monies away from your designed plan to reduce drought-related risk.

Disaster Reduction Officer

You have worked for this NGO for a number of years. You have wanted to build your organisation's capacity in disaster reduction projects for several years now, but are always getting tied up in drought operation & monitoring food relief in the same districts.

This year you have decided that the only way to reduce the repeated need for food relief in the districts assigned, is to have a broader programme with health and water components. In the last drought, the area suffered badly with diarrhoea and dysentery. You know that the money from UNICEF & WFP will not be enough to cover all costs, and see that one strategy would be to involve the health officer and her programme. But you realise she will not divert resources without good reasons. Moreover, the head of programmes and agency director are likely to have difficult seeing the connection between drought and CBHC without a very clear argument. You are prepared for the meeting with diarrhoea statistics from the last drought in the 2 districts (make these up). You are under pressure to get food relief started but don't want to do this before securing a commitment from your colleagues that the operation will be integrated with health.

How will you convince them?

Head of Programmes

You are the institutional memory for this agency, having worked with it for 10 years. Formerly you worked as a field officer and then for three years in charge of disaster relief. You are well liked by all colleagues and are very fair.

However, you have not been able to keep up to date with recent developments in thinking related to disasters and development. You can understand why the government has asked your NGO to do the disaster relief in this drought - but can't quite understand what this has got to do with health. You are worried that involving both health and disaster reduction officer in the same project will present a real headache for supervision and monitoring. However, as you like the disaster reduction officer, you are open to listen to new arguments.

Agency Director

You are the agency director - and have been for 2½ years. You are eager to build your organisation's profile, and view the drought operation as a perfect opportunity. You are preoccupied with sustaining funding for core expenses - don't wish to antagonise donors.

You respect your health and disaster reduction officers very highly. You have a basic understanding of PHC as your brother works in the Ministry of Health. However, your understanding of the spectrum of activities in disasters is quite conventional and limited to more traditional response.

Observer 1

List all good arguments for integrating health and the drought operation to achieve long-term risk reduction.

Observe and list the positive attitudes that support these arguments.

What strategies are used to convince other members of the group?

Observer 2

List all the arguments against integration.

Observe and record the barriers against a change in work policy and the attitude that displays this negative stance.

What strategies are used to maintain the status quo?

