Learning to live with

FLOODS

Natural Hazards and Disasters

Department of Institutional Development
National Institute of Education

2008

Ministry of Education

Ministry of Education National Institute of Education
Education for Social Cohesion, Disaster Risk Management and Psycho-social Care Programme

National Institute of Education

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Sri Lankan - German Development Cooperation

Supported by

The German Federal Ministry for Economic Cooperation and Development and implemented with assistance of the German Technical Cooperation - GTZ

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Originally developed by
the Asian Disaster Preparedness Centre, Thailand. (2002)

Adapted for Sri Lanka

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FOREWORD

Disaster resilient schools and the well being of school children are significant goals under the overarching commitment towards quality education for all. Adequate disaster preparedness and prevention start with knowledge and skills – thus education is one way to create a safe and disaster resilient society. In the classroom, knowledge, innovation and skills to reduce disaster risks can be created.

The dramatic impacts of the Tsunami 2004 and the floods and landslides 2003/ 2006 on the education situation of children, have shed light on the urgent need for disaster safety education. The Disaster Management Act no 13 of 2005 was enacted providing strong legislative and institutional arrangements for disaster risk reduction. In this context, education and public awareness to meet these challenges are also strongly recommended.

The objective of this educational booklet on flood – to be seen as part of a series of booklets on natural hazards - is to prepare school children, teachers, parents and the community for future natural disasters. The booklet shall enable teachers and school children to learn about floods: In an illustrative way it explains the different types of flooding and what dangers and negative impacts floods can cause on human beings and the environment.

Furthermore, the booklet provides flood survival tips: It advises on how we shall act on flood warnings and how to act correctly before, during and after a flood. The importance of emergency kits, flood evacuation and the returning to normal life after a flood are highlighted. Finally, it is explained how to lessen future flooding and its impacts.

It is hoped that the present publication contributes to help saving children's and teachers' lives and to enable them to spread the key messages of disaster preparedness and risk reduction further to the community. Their active participation is desired for moving the world towards a safer living place and a sustainable developed society.

Prof. Lal Perera
Director General
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CONTENTS

1. FLOODS IN SRI LANKA

Sri Lanka's position across the path of two opposing monsoon systems makes it receive rainfall from monsoons over a large portion of the year. Inter-monsoon rains also bring rains over a part of the balance period shortening the really dry seasons to only a few months.

This weather pattern, combined with frequent cyclones, makes much of the island vulnerable to floods. From the past records it can be seen that floods have occurred over much of the year, except during the driest months.

While a very little area of Sri Lanka is said to be entirely free from flooding, some of the areas are more prone to floods. The rivers falling to sea on the western coast from Deduru Oya to Nilwala Ganga are subject to frequent floods in the lower reaches. In addition, the largest river Mahaweli Ganga and then Walawa in the south are two of the flood prone rivers. Some of the rivers draining to the east, such as Kumbukkan Oya, Gal Oya, Maha Oya, Heda Oya etc. are also flood prone. In addition almost all the rivers originating from the central highlands are subject to flooding in the hilly region.

2. WHAT IS A FLOOD?

By definition, any land which is usually above water level is said to be flooded if it goes under water for a period arbitrarily defined as one or two hours. Flooding can be owing to many reasons. Usually this happens when the river or the stream draining the area is over balanced by a very large volume of water beyond its capacity. A river channel is formed by the forces of nature to be able to convey the flow that is found most of the time. When the volume exceeds this, the water level rises above the banks and spreads in to the adjacent lands. This area is usually called the flood plain of the river.

People resident or working in the flood plains must be mindful of the fact that there is an ever present threat of floods. The probability may be high as in Kalu Ganga or low as in some dry zone rivers. Yet the possibility is there always.

Even those who live above the level of possible flood in a flood plain may find their access or services cut off by floods. Such people must acquire the knowledge that will help them to face floods with confidence and mitigate the attendant the risks and discomforts.

3. TYPES OF FLOODING

Flooding can be classified into several types. Out of those riverine floods and urban floods are the most common. The flood types are explained below.

3.1 Riverine floods:

Some rivers are prone to frequent floods – annually or seasonally, while others may not be affected. Riverine floods can be further classified by the rapidity of flooding or its magnitude.

In the first classification, a flood can either be a flash flood or a normal flood. Flash floods occur in mountainous areas with high slopes and shallow soil depths and are caused by intense rainfall. In such conditions rivers will flood within a very short period of rainfall, not giving much notice of flooding.

In the case of normal flood, the river rises gradually and gives people ample notice of it's arrival. The type of rainfall may also be a high volume spread over a longer period rather than a short one with intense precipitation.

The same river may cause flash floods in one area and normal ones in other areas. In Sri Lanka, this is usually so with hill areas subjected to flash floods and lower reaches to normal ones.

The second classification of riverine floods is based on the magnitude. The depth of inundation is a good indicator of the magnitude. The full range of the classification is given below:

High stage flows

This is technically not a flood as the flow is still confined between the banks. Still the water may be deep and the velocities high so that normal river uses are disrupted. Bathing, boating, fishing etc. can either be impossible or extremely risky.

Minor floods

Such a flood may affect only a small part of the riparian community. It usually inundates the low lying areas such as paddy fields, meadows etc. Economic loss is small and number of evacuations is also limited. Communications are rarely severed.

Major Floods

A flood that affects a significant part of the riparian community and causes higher economic damage is considered a major flood. Residential and business areas as well as public buildings may go under water. Normal services are disrupted and a major part of the community may need to be evacuated. Roads, railways and other modes of transport/communication also may be affected.

Dangerous / critical floods

This term denotes flooding that inundates a large area of the basins and requires evacuation of most of the riparian population. The transport gets cut off and normal services are disrupted. A dangerous flood covers an extensive area of the flood plain and may remain stagnant for several days.

A dangerous flood is said to reach a critical flood stage if beyond a certain threshold it causes one or more of the following events:

i. It begins to flood strategically (or nationally) important places such as railway terminus, power stations, base hospitals etc.
ii. It starts entering into entirely fresh areas through saddle points.
iii. Flood waters overtop flood levees and breach them to inundate protected areas.

There are other types of floods. Some of them are described below:

3.2 Urban floods / Drainage congestion

In many cases the so called floods are not caused by rivers overflowing but are caused by the inadequate drainage facilities. In urban areas this phenomenon occurs due to haphazard construction with poor planning which does not allow sufficient retention and percolation areas. In some cases people encroach drainage areas, even obstructing drainage paths and disrupting natural drainage patterns.

3.3 Floods caused by spilling of Reservoirs

When reservoirs spill, it may cause flooding downstream. The spilling may be natural or it may be caused by the reservoir operator opening the gates. In either case the reservoir owner – eg: Irrigation Department – will give advance warning.

3.4 Dam Breach

Most destructive floods are caused by the breaching of the dam of a reservoir. This will release large volumes of water stored in the reservoir. The sudden release of this water will create a rapidly moving flood wave downstream. Depending on the volume of water and the topography, it can be a catastrophic event.

Fortunately, such failures are very rare and signs of failure can be usually visible to the engineers mincing the reservoirs. They will evacuate the vulnerable population to safe areas. However the possibility of sudden failure with little notice cannot be ruled out.

4. FLOOD WARNINGS

Before a flood strikes, there is usually a good warning period. The only exception is when flash flooding occurs because it happens too quickly and unexpectedly for warnings to be issued. Warnings are usually issued by the Irrigation Department or the Disaster Management Center (DMC).

4.1 Terms and their meanings

The following are the most common terms and their meanings.

Minor flooding

This causes inconveniences such as closure of minor roads or low lying land.

Moderate flooding

Low-lying areas are inundated, requiring removal of stock, equipment and evacuation of isolated homes. Main traffic bridges may be covered.

Major flooding

Higher areas are inundated, with towns and properties isolated. Extensive damage is caused.

Local flooding

Intense rainfall could cause a high runoff in some areas, but would not usually lead to significant rises of water level in the main streams.

Significant river rises

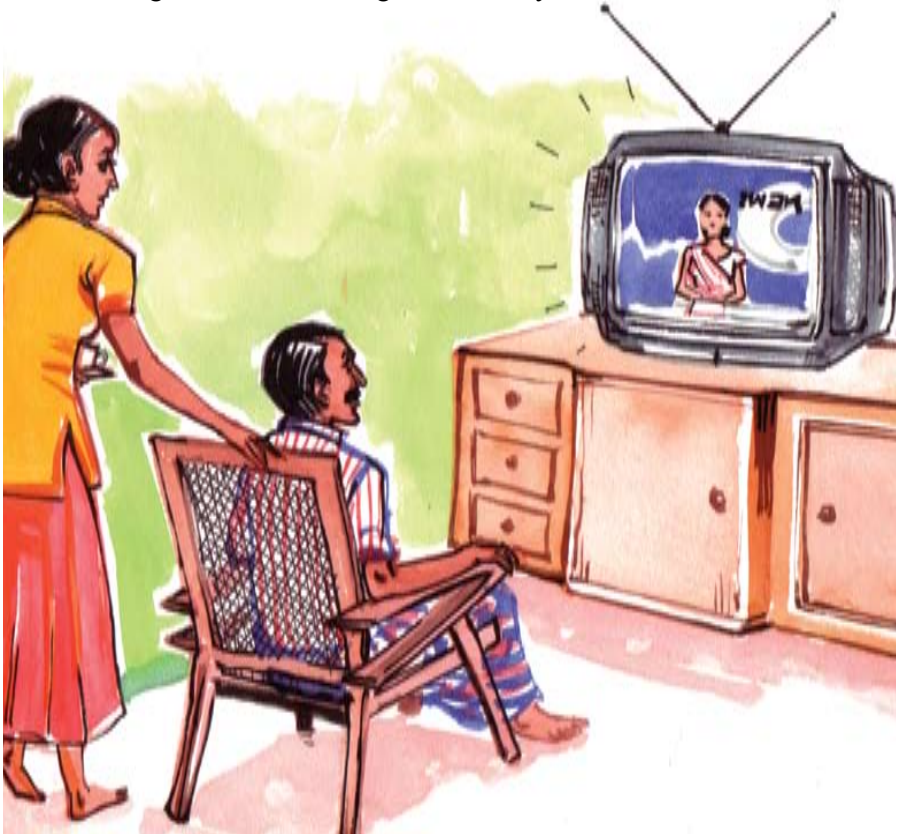
This warning is issued to indicate the uncertainty of the water level and the possibility of existing flood level to increase which may be exceeded in the main stream. It lets people know that possible rises are expected within a short period.

4.2 How to act on warnings

Once a flood warning is issued, it means that the flood is anticipated. Here are key factors that contribute to flooding and signs to watch.

- Unusually heavy rain over several hours or steady substantial precipitation over several days.
- When a cyclone or other tropical system is affecting your area.
- When water is rising rapidly in streams and rivers.

Any of these signs should prompt you to get an up-to-minute reports on flood conditions. During this time, you should stay tuned to local radio weather channel that provides accurate and timely storm updates for your area and be alert to signs of flash flooding and be ready to evacuate at a short notice.



Once a flash flood warning is issued for your area, or the moment you realize that such an event is imminent, act quickly to save yourself.

5. FLOOD IMPACTS

- Injury or death to people and animals.
- Damage to houses and property and important possessions such as furniture, electrical appliances, etc.,
- Livelihood of people because floods destroy crops, farmlands and livestock.
- Food shortage.
- Long-lasting floods can disturb routine cultivation pattern.
- Soil erosion can occur after floods. Lands are usually covered with debris, sand or boulders which may reduce farming areas and fertility of soil.
- Damage to infrastructure and facilities like hospitals, clinics, schools, roads, railways, telephone lines and electricity supplies.
- Disruption of clean water supplies and contamination of sources of water which can subsequently cause diseases.
- Triggering of epidemics, water borne diseases, help mosquitoes to breed resulting in the spread of malaria and dengue.
- Stream or river bank erosion where land adjacent to the main channel and tributaries is worn away by the strong floods currents. This event can be aggravated by such factors as extensive clearing of deep-rooted, natural vegetation along the banks for agricultural and urban development, weakening the stability of the stream or river banks towards the erosive force of flood flows.
- Any disaster can have a profound impact on people's emotional wellbeing affecting their feelings, thoughts, actions, and relationships. The sudden over whelming disruption and danger to life and property can put tremendous psychological pressure on a person, often even affecting how well he/she is able to function at the time of the crisis. The impact a disaster can have on a person also depends on his/her past experiences of crises, how well he/she has been prepared for such events both physically and mentally and his/her attitude or level of resilience.

6. FLOOD DANGERS

Water depth and currents: The majority of deaths caused by floods results from people attempting to swim, walk or drive through flood waters. Flood water depth and currents are easily misjudged and therefore there is a capability of sweeping away and submerging even large vehicles. In small streams, water level can rise suddenly.

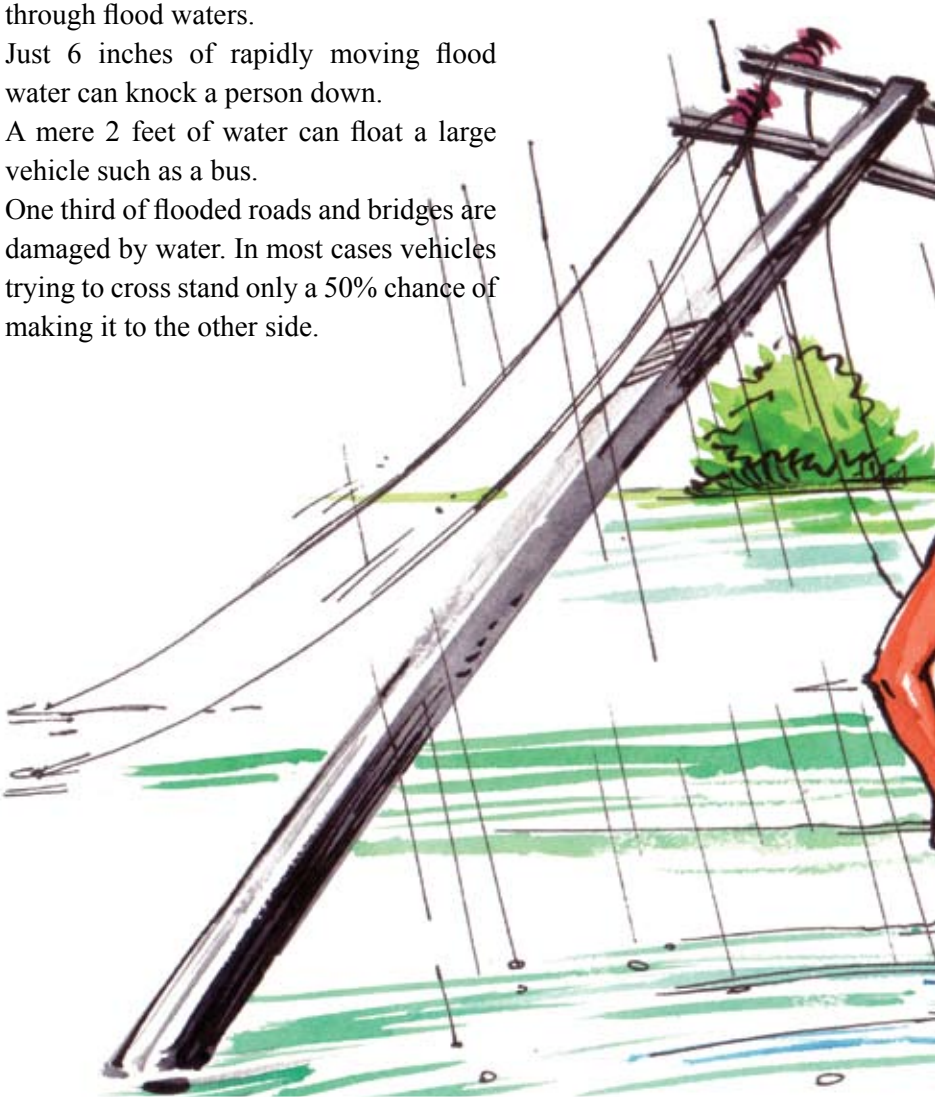
Flash floods: Flash floods cannot be predicted by weather forecasting

floods are fatal and they kill many people because of the sudden release of large guantities water from water sources, such as rivers or dams. Therefore, during a monsoon period, bathing or swimming in irrigation channels, storm water drains or inland rivers in mountain regions should be avoided.

Hidden dangers: Many of those who drown in floods, especially flash floods, may have actually been killed by the violent current of water or being hit by objects in the waters or in the river bed.

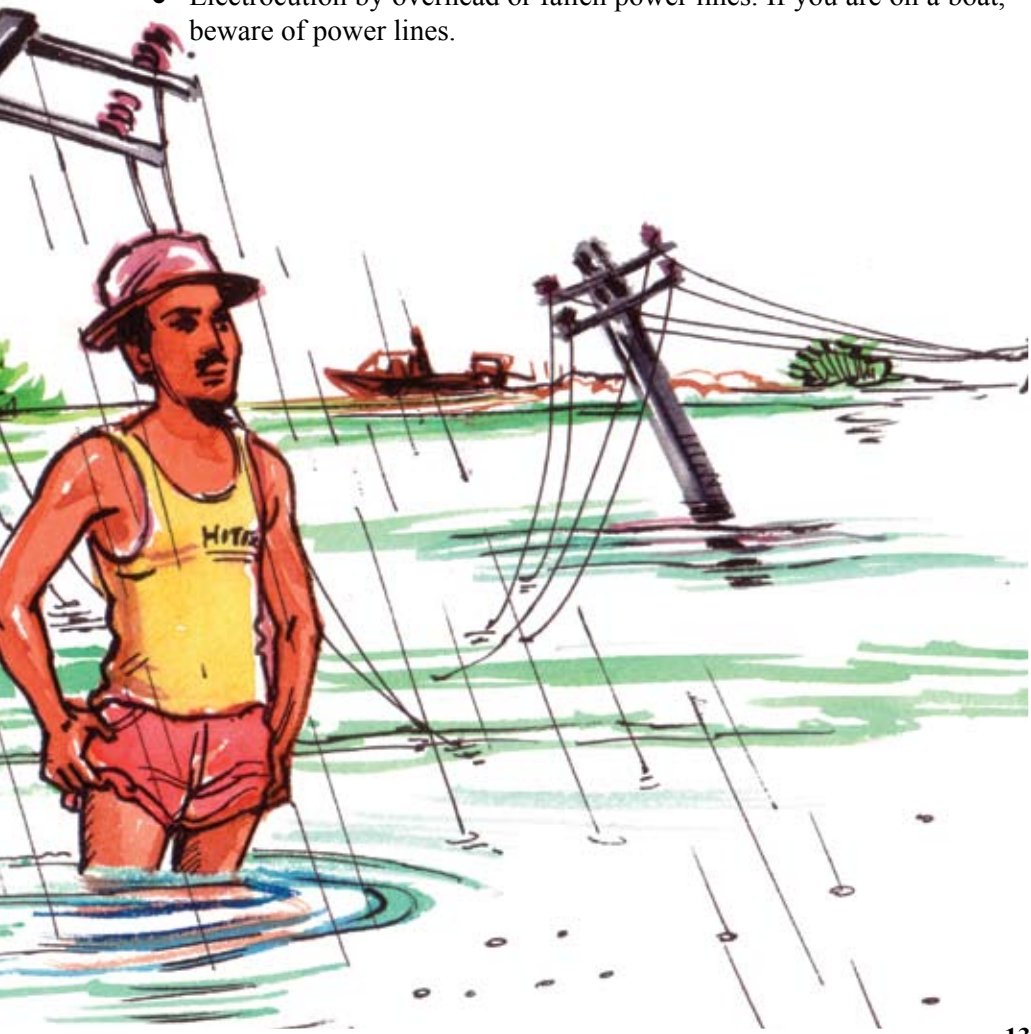
Simply being a good swimmer may not be enough to survive. So it is advisable not to enter or drive into flood waters when an obvious current exists. Most people are unaware that:

- Most flood deaths happen when drivers make a single, fatal mistake trying to get through flood waters.
- Just 6 inches of rapidly moving flood water can knock a person down.
- A mere 2 feet of water can float a large vehicle such as a bus.
- One third of flooded roads and bridges are damaged by water. In most cases vehicles trying to cross stand only a 50% chance of making it to the other side.



Other potential injuries:

- Possibility of hypothermia, a serious medical condition in which the body temperature falls below the usual level, after staying soaked for a long time.
- Risk of illness after drinking flood water or water contaminated with sewage or other hazardous waste (especially in urban areas)
- Injuries due to driving into flood waters, road washouts, soft edges, damaged bridges.
- Electrocution by overhead or fallen power lines. If you are on a boat, beware of power lines.



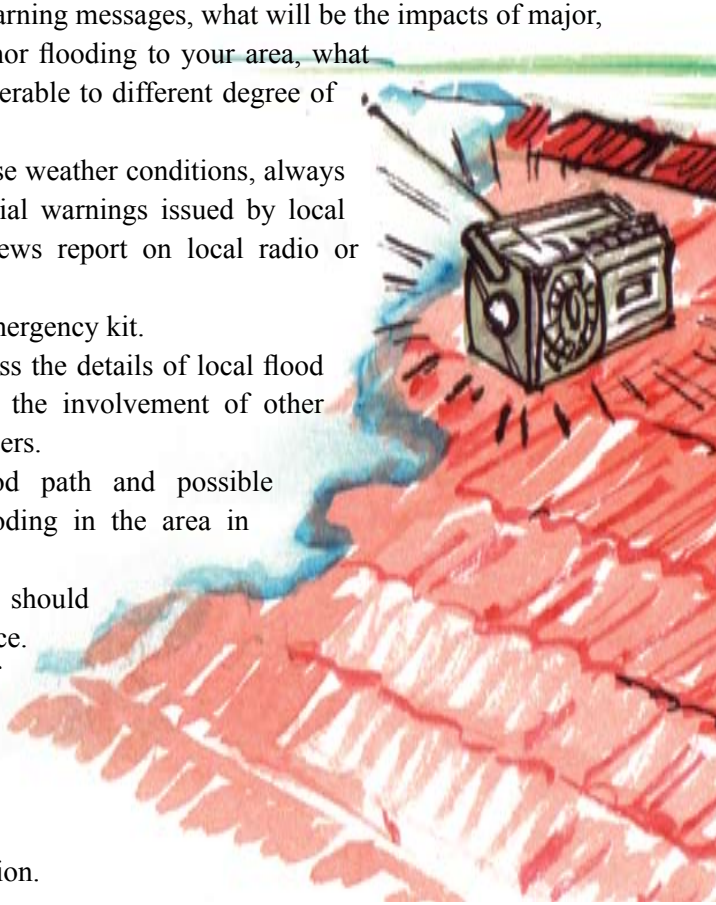
7. FLOOD SURVIVAL TIPS

If you are living in an area prone to floods, follow the instructions below to save your life and property.

7.1 Before the flood

Flood preparedness

- Ensure all communities living in flood prone areas as well as your family members, understand the danger properly.
- Know the flood history of your area.
- Make a mental note of high ground.
- Understand the warning messages, what will be the impacts of major, moderate and minor flooding to your area, what are the areas vulnerable to different degree of flooding.
- At times of adverse weather conditions, always listen to the official warnings issued by local authorities and news report on local radio or television.
- Prepare a flood emergency kit.
- Prepare and discuss the details of local flood hazard map with the involvement of other community members.
- Indicate the flood path and possible sequences of flooding in the area in advance.
- Evacuation plans should be made in advance. Each member of the family must be given specific instructions and responsibilities in case of evacuation.



- If your community has boats, make sure that they are well-maintained and properly tied up to a tree or other permanent object.
- Try to protect community water supply sources.
- Inspect escape routs, houses etc. before floods for weaknesses. If you find any, help to protect them building up a wall of sand bags to block the flood waters.
- If communities are subject to flash floods, organize groups and plan for flood level monitoring and have a discussion on how the information can be disseminated.
- Organize a search and a rescue (S&R) team and identify the areas which will be isolated in case of flooding and prepare a plan for the S & R team.
- Organize a first aid team and ensure it has proper first aid equipment and emergency medicine kits.

  Speak clearly to your family about facing difficult situations and how best to respond at a time of crisis. Be free to talk about issues such as:

  - Being prepared in your mind to face any eventuality, being courageous.
  - Staying calm, and not allowing yourself to panic or get this heightened state of fear.
  - Thinking clearly, and acting thoughtfully.
  - Doing imaginary games or exercise that help you and your children to prepare for events by imagining and discussing options can be very helpful, eg: " what will I do if…" or "where shall I go if …".
  - Staying together as far as it is useful and supporting each other.
  - Looking out for those who are especially vulnerable, eg: small children, old people, the sick or disabled people.
  - Keeping in mind that this is a temporary crisis that will pass.

Emergency Kit

To survive during and after a flood, it is wise to prepare a flood emergency kit for each family member. The kit should contain:

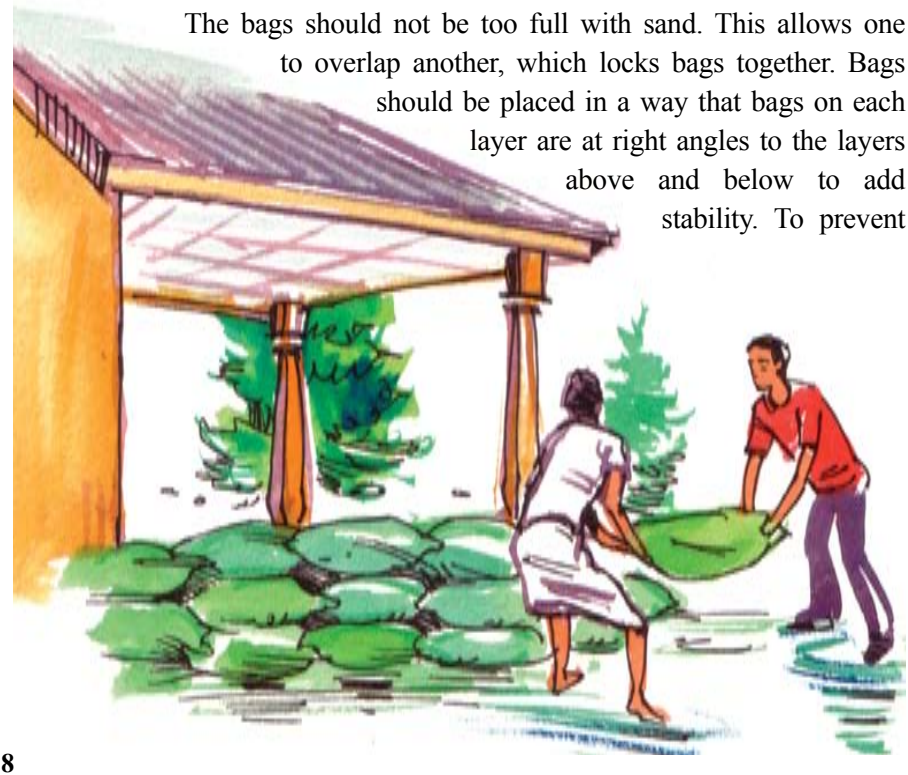
- A portable radio and torch with fresh batteries.
- Fresh batteries.
- Candles and water-proof matches.
- Reasonable stocks of drinking water, canned food and food items such as instant noodles.
- A first aid kit.
- A supply of essential medicine for cold, cough, diarrhea, headache, fever etc.
- Strong shoes and if possible, a pair of rubber gloves.
- A water proof bag for clothing, documents and valuables.
- A plastic bucket to collect fresh water until you get water supplies.
- Your emergency contact numbers and addresses (to be informed in case of emergency).

Emergency flood-proofing

Emergency flood proofing has to be put into effect at a short notice. Methods commonly used involve building temporary embankments, levees or barriers using whatever material easily accessible during the flooding.

Although it is inexpensive, it is hard work and requires a good plan of action to ensure materials, labor and equipment are available within a short notice.

The most readily available material is sand. Sandbags stacked to form a barrier against rising water levels are the most common emergency flood proofing technique. The bags must be strong enough to hold sand or other filling material and withstand the contact with water indefinitely because the water exerts on the sandbags, if possible, a trench may be dug (along the center of the levee or embankment), to prevent the levee from moving.



The bags should not be too full with sand. This allows one to overlap another, which locks bags together. Bags should be placed in a way that bags on each layer are at right angles to the layers above and below to add stability. To prevent

the seepage, a durable plastic sheet can be placed to cover the side exposed to flood water (waterfront). An alternative way could be to construct a stacking of small wooden planks, empty oil barrels, etc. And sandbags can then be placed in front of them to add stability. A plastic sheet can be placed to cover the side exposed to flood water in order to prevent passage of water through sandbags.

River Bank Erosion Management

River and stream bank erosion involves loss of vegetation, valuable agricultural and recreational land along the waterways. As the banks collapse or erode into the flowing water, the sediment and nutrient loads increase and water quality (particular for human consumptive purposes) is reduced, adversely affecting the aquatic life forms. In addition the debris carried by the water can be a threat to roads, bridges and buildings in the downstream areas, resulting in accelerated erosion along the way.

Management options for such hazard includes:

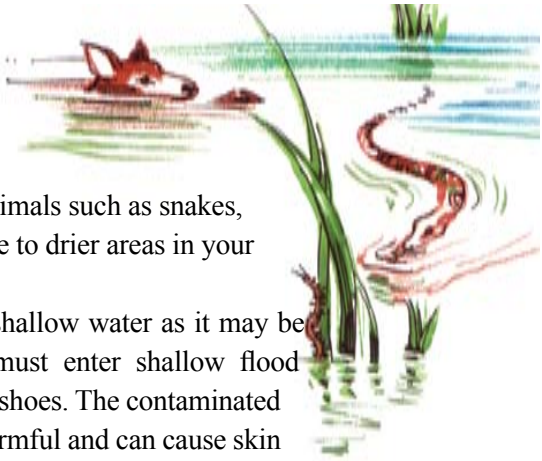
- Maintaining the riparian vegetation (trees, shrubs, grasses, seeds, etc.) along the river and stream banks, especially the kind of vegetation with fine, deep roots. The key advantages of such practice include:
  - The intricate network of vegetation roots form a tight mesh that holds the soil in place and helps resist the erosion process.
  - It makes use of the rising flood water, preventing the bank soil from becoming oversaturated, a condition where easy collapse can occur.
  - It reduces the extremes of temperature and moisture variation that can loosen sediment from the banks through swelling and shrinking of the soil.
  - It can help maintain the water quality and provide aquatic habitat and physical setting.
- Installing fence along the river to prevent livestock from trampling on the vegetation and eating them, which result in leaving only short grass to hold the bank together. The shorter the roots of vegetation along the banks are, the weaker the network that binds the river/stream bank together and therefore, more susceptible to the erosive power of flowing water.

- Conduct a thorough survey (by a mandated and capable national agency) of the river/stream process to understand more about the flow regime in a particular water way before any heavy structural measures are undertaken, to avoid increasing the flood risks in the downstream area. Sometimes, large scale dykes construction in the upstream regions to prevent erosion, can cause increased flooding in the downstream areas.
- Encouraging and restricting proper land use planning practices on the river bank.

7.2 During the flood

Surviving a flood

- Keep your emergency kit safe and dry.
- Do not eat food which has been in contact with flood water. Do not eat spoiled food supplied by outsiders. Such food can contain bacteria and you could be infected and become ill. Do not eat dead animals. They may have died due to diseases.
- Collect rainwater until you get fresh water supplies. Boil all water before drinking it. This is a better and a safe way to obtain water until other water supplies have been declared safe.
- Do not use water from dug wells during such time until it is declared safe by authorities.
- Do not use gas, electricity or other electrical appliances which have been flood effected, until they are safety checked.



- Watch for your children. Do not allow them to play or swim in flood waters.
- Beware of poisonous animals such as snakes, spiders which may move to drier areas in your premises.
- Avoid wading even in shallow water as it may be contaminated. If you must enter shallow flood water, wear appropriate shoes. The contaminated water and soil can be harmful and can cause skin diseases.
- Check with police or local authorities safe routes before driving anywhere and do not enter flood water without checking depth, current, etc.
- If on foot, do not attempt to walk through flood waters, turn around and go directly to higher ground.
- Keep away from river banks in the flooded area as these may be undermined and may be subjected to collapse.
- If your car stalls in the flood water, immediately abandon it and climb to higher ground.
- Listen to your local radio and TV stations and follow all advice and warnings.
- Discuss the situation with the community members, village leaders and authorities during such time until the flood threat is completely over.
- Stay where there are people around you, give and receive assurance and comfort for each other.
- Children may need more care and comfort than others: answer all their questions as best you can even if they ask the same question more than once. Give assurances that they are safe, and that life will return to normal if we respond well to the present situation.
- You will need all the strength and energy you have to face the crisis, so conserve energy by not engaging in unnecessary and disorganized activity, but do only what is necessary.

- Do things like cooking, eating, chatting, religious observances together that help you successfully adjust to the crisis situation and live through it.

If evacuation is advised

You may be advised to evacuate by village leaders or other local authorities, please follow the earlier plan agreed upon by the community. If you decide to leave the area on your own, please inform the responsible people, neighbors and give all the details of the place you are going to. Before leaving take the following actions.

- Collect all your valuables, papers, certificates, and mementos. etc.
- Stake your furniture and possessions above likely flood level.
- Turn off electricity, gas supply and water and close windows and doors of the house.
- Take care of all electrical appliances.
- Empty the freezers, refrigerators and leave the doors open, unplug them.
- Do not forget your emergency kit.
- Lock the windows and doors of your house before leaving.
- Be sure to follow the recommended evacuation routes.

7.3. After the flood

Your home has been flooded. Although flood waters may be down in some areas, many dangers may still exist. These are things to remember after floods.

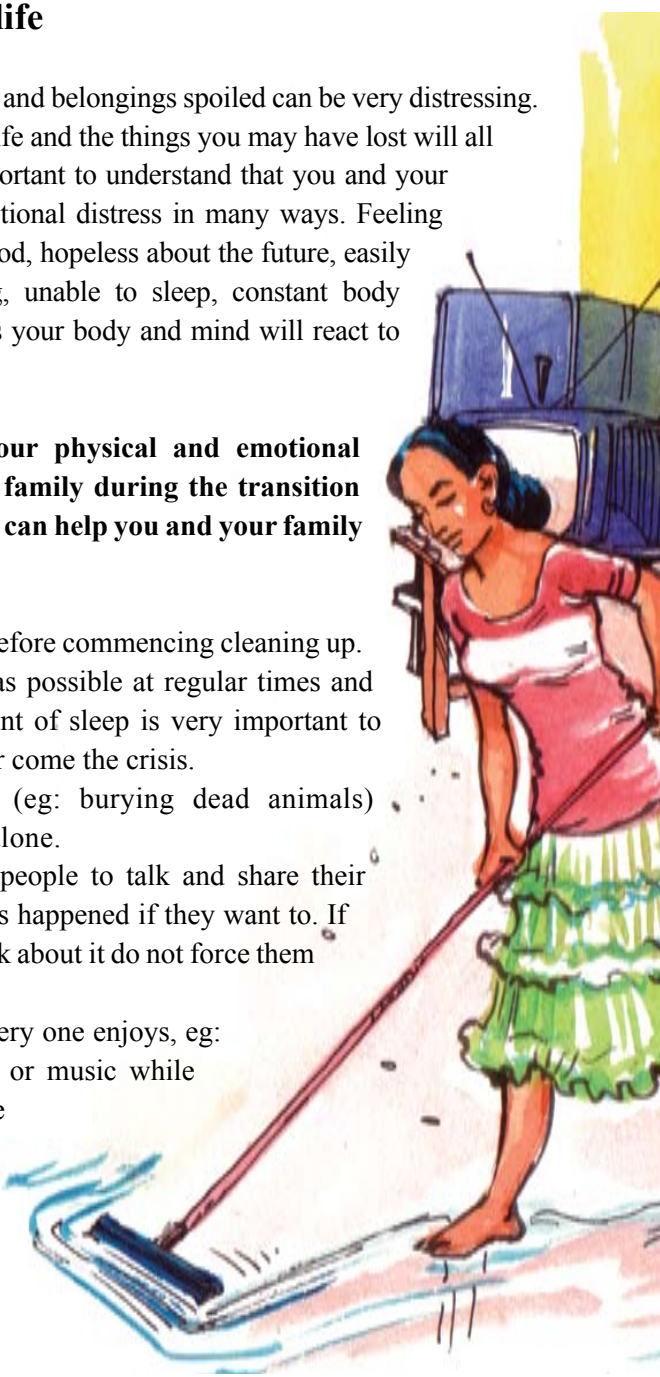
- Inform your village leaders or your neighbors that you are returning home and obtain advice before making a decision.
- Roads may be still closed because they have been damaged or are still covered by water. If you happens to come across such roads with stop signs please avoid that road and find another way.
- Keep listening to radio for news. Additional flooding or flash floods may occur.
- Emergency workers may be assisting people in flooded areas. You may be able to help them.
- Try to avoid walking through the flooded area. Flooding may have caused familiar places to change since flood waters often erode roads and walkways. Flood debris may hide animals and broken bottles and sharp steel ends.
- If you must walk through flooded area, stay on firm ground. Standing water may be electrically charged from underground or downed power lines.
- Use nets when you sleep to prevent mosquito and insect bites.
- Do not go near river banks or where there are signs about landslides or to areas where people have been evacuated.
- Do not allow children to enter the houses / buildings that have been flooded unless they are checked by an adult.
- Do not touch any damp electrical sockets or turn on the electricity if the house was subject to floods until it has been checked and has dried out for some time.

Returning to normal life

Seeing one's home devastated and belongings spoiled can be very distressing. The disruption and threat to life and the things you may have lost will all add to your distress. It is important to understand that you and your family may react to this emotional distress in many ways. Feeling exhausted, sad and low in mood, hopeless about the future, easily angered, constant quarrelling, unable to sleep, constant body aches may be just some ways your body and mind will react to what has happened.

You need to look after your physical and emotional wellbeing and that of your family during the transition period. These are ways that can help you and your family return to normal life:

- Get good rest and eat before commencing cleaning up. Having meals as far as possible at regular times and getting the right amount of sleep is very important to staying strong and over come the crisis.
- Do unpleasant tasks (eg: burying dead animals) together rather than alone.
- Encourage and allow people to talk and share their feelings about what has happened if they want to. If some do not wish to talk about it do not force them to do so.
- Do little things that every one enjoys, eg: Listening to the radio or music while cleaning up the house will help make an unpleasant task easier.
- Understand how the stressful event has made you and your family feel and be



patient with each other. Maintain good relationships. Good family support will make the return to normal life faster and better.

It may take some time to get a house back into its original condition. These are ways that can help you and family.

- When going back to your home go with family or friends who can help and support you.
- Some family members or children may not want to go back, may want to avoid the place or may develop strong fear reactions. Give them time, be patient with them and allow them to return and adjust when they are ready.
- Before entering the house, get advice from a skilled person about the supply of electricity, water, gas, etc. Get their advice on necessary repairs and do not enter the house if you can not get any advice.
- Make sure that there is no more threat of occurrence of floods in the near future.
- Have the kitchen cleared and functioning as soon as possible so you can cook and serve food to your family and yourself. This will make you feel happier while it is also safer to cook your own food than wait to get it from an outside source.
- Get the assistance of skilled persons to repair leaks.
- Clear up, drain and start drying out the house when flood water has recedes.
- Take out everything that is wet and that can be moved out.
- On dry days keep all doors and windows open. On wet days keep windows slightly open. Drain away water in the house and try to increase the airflow into the house to assist drying process.
- Repair latrines and disinfect the water supply sources of the household.
- Check for trapped water and mud in wall cavities. Check the condition of walls and all fittings. If there are any signs of leaking walls, foundation damage, buckled floors new cracks on walls, out of shape door frames, etc. consult a qualified skilled person. Get a skilled person to inspect the condition of house and take on further action if it is not safe for living.

8. HOW TO LESSEN FUTURE FLOODING AND ITS IMPACTS

- Have a meeting with the village community and leaders to review the proceedings during and after flooding. Draw lessons that can be learned and discuss where it went wrong, difficulties, encountered setbacks as well as successes. Try to accommodate all recommendations in the list of preparedness actions of the next floods.
- Encourage community members to participate in the cleanup of the environment and common areas.
- Plant bamboo or appropriate trees around the houses and in the common areas to prevent erosion.
- Stop cutting trees. Instead plant trees. They provide a strong natural protection against floods.
- Do not throw rubbish in rivers or canals.

- Do not throw things like cigarette butts, wrappers especially those made of plastic or non-biodegradable objects, etc, anywhere which may clog or block the drainage system thereby impending the flow of water.
- Support community activities intended to lessen effects of floods.
- Make sure children and family are mentally prepared for flood crises if this is common in the area: a positive mind set needs to be inculcated which will help them cope: examples of positive mind set regarding the danger of floods:

    - Floods are a constant occurrence in my area.
    - If one happens, I know what to do, where to go and I am able to cope- I don't have to be afraid.
    - My family and community have been prepared for this, we have faced it before so we can do it again.
    - I can talk to my parent/ friend/teacher/ favorite person if I have unpleasant memories or dreams or fears that won't go away. They will get help for me.

Contact us

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