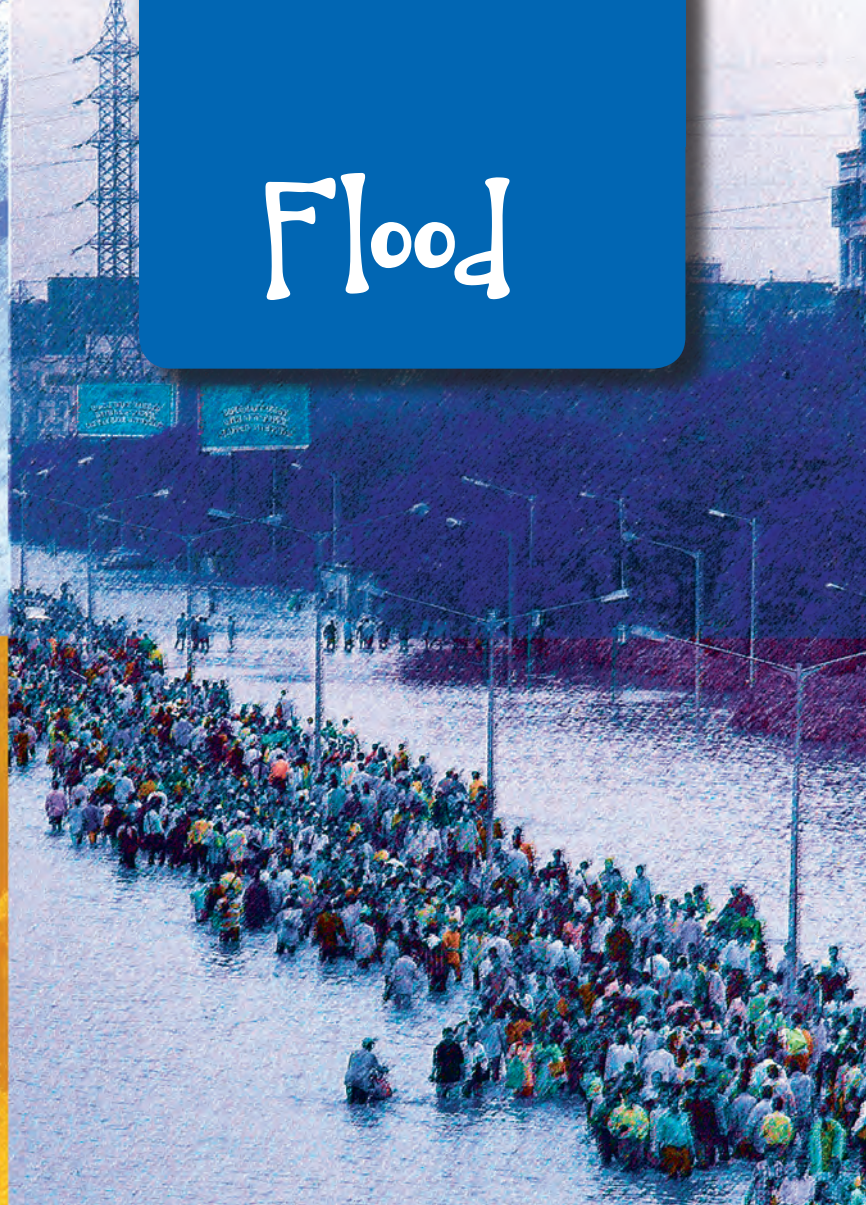
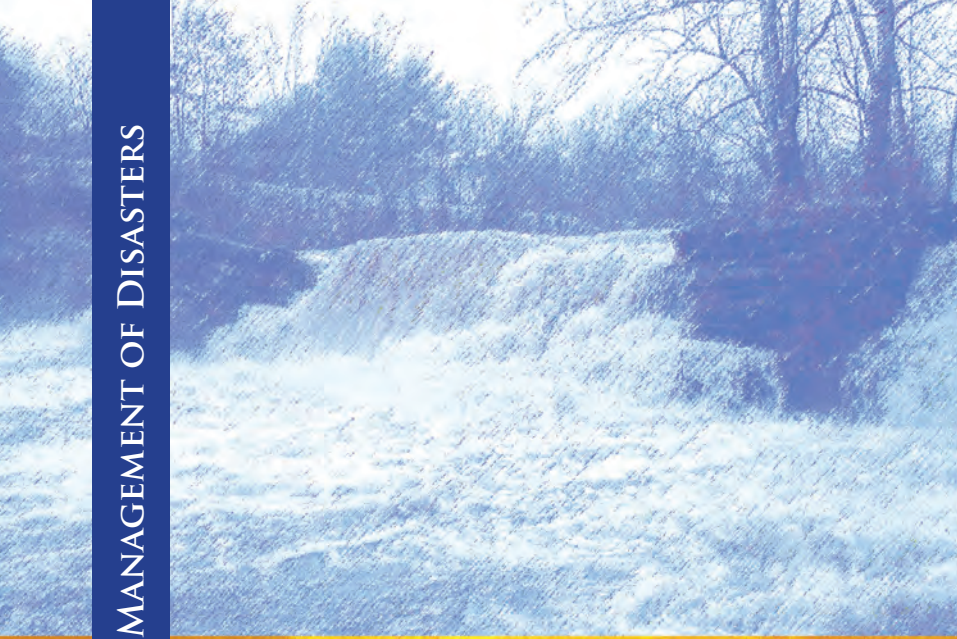




Flood

First Edition

May 2017 Vaishakha 1939

Reprinted

July 2019 Ashadha 1941, June 2020 Jyeshtha 1942

PD 489T RPS

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₹ 30.00

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Cover and Layout

The Banyan Tree

Illustrations

Arup Gupta

Printed on 80 GSM paper

Published at the Publication Division by the Secretary, National Council of Educational Research and Training, Sri Aurobindo Marg, New Delhi 110 016 and printed at Nageen Prakashan Pvt. Ltd., Village Salarpur, Post Rajpura, Mawana Road, Meerut-250 001 (U.P.).

ISBN 978-93-5007-842-6

About the Series

A disaster is an event caused by the sudden disruption of normalcy within society resulting into widespread damage to life and property. Sometimes we also face accidents that are so serious that they have a long term effect on life and property. To avoid such accidents we need to be cautious in our day-to-day activities.

In this series, an attempt has been made to raise awareness in order to handle these disastrous situations effectively so as to minimise losses.

This series comprises of ten booklets covering different areas such as earthquake, landslide, tsunami, flood, draught, fire and accidents, chemical hazards, epidemics like swine flu, malaria and dengue, food poisoning and cholera. You will notice that the topics selected here do not include all the issues related to disaster. These are only illustrative cases. This is because the idea is to impart necessary information to develop skills to enable people to prevent disasters or to reduce their impact by efficient handling of such situations.

Simple and communicative language has been used in the entire series so that children in the age group of 10–16 years can understand it effectively. We hope that the readers will benefit from this material and have confidence to handle such kind of situations proving to be smart and responsible citizens.

It is suggested that the teachers and facilitators use this series as an example to develop related material for school projects. The teachers could also share these projects and hold awareness programmes for the community with an aim to initiate continuous participation when such situations arise.

The Council also welcomes the suggestions from the users of this material.

Flood



Ashwin



Uditā

विद्यया ऽ मृतमश्नुते



एन सी ई आर टी
NCERT

राष्ट्रीय शैक्षिक अनुसंधान और प्रशिक्षण परिषद्
NATIONAL COUNCIL OF EDUCATIONAL RESEARCH AND TRAINING

After a prolonged summer, today, on the start of monsoon, children are happy and dancing.



Rain
has come,
Rain has come! It has
brought us melon;
brought us corn!



Mohan is a farmer staying in the outskirts of a town near the riverbank with his wife, a primary school teacher; his old mother, and two children—Ashwin and Udita studying in class 9 and 5. The river that remains dry throughout the year flows strongly during the rainy season.

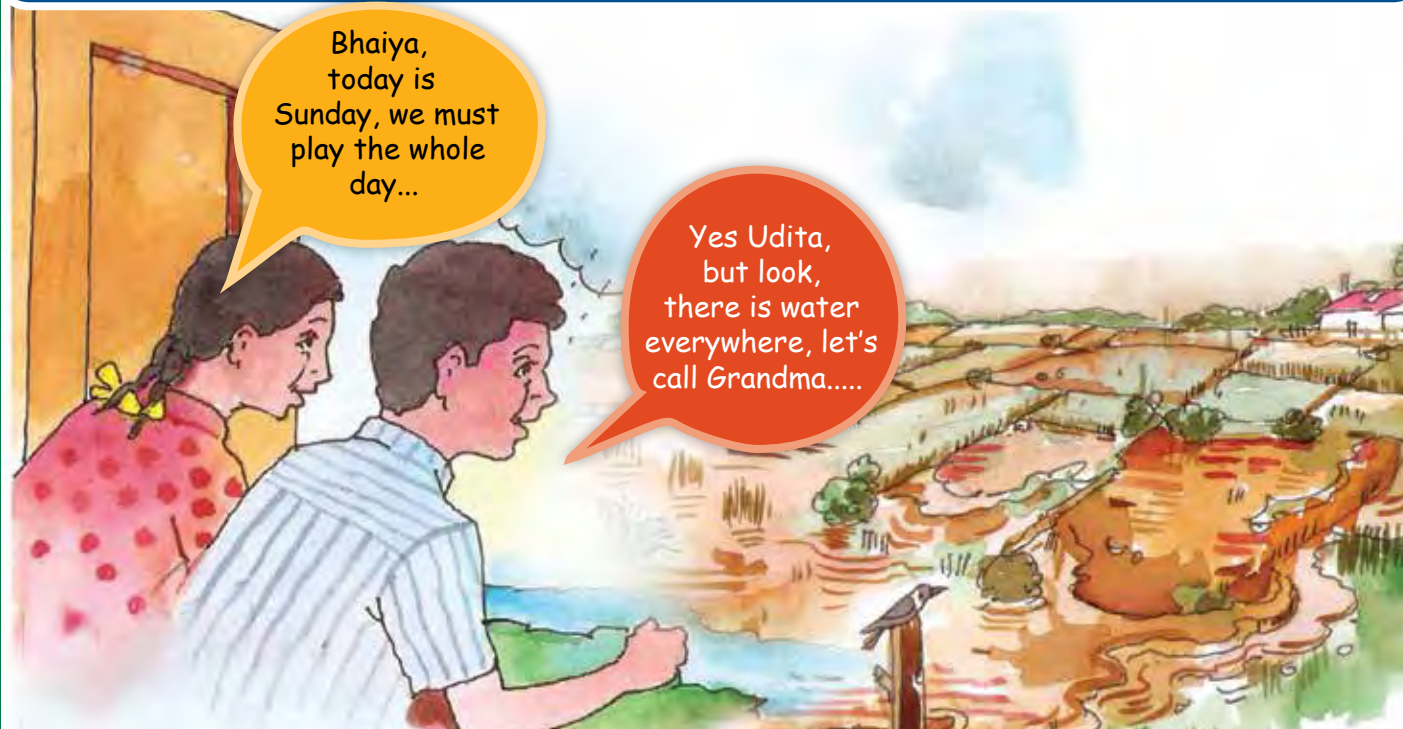
It has been raining heavily for the last three days.



Flood

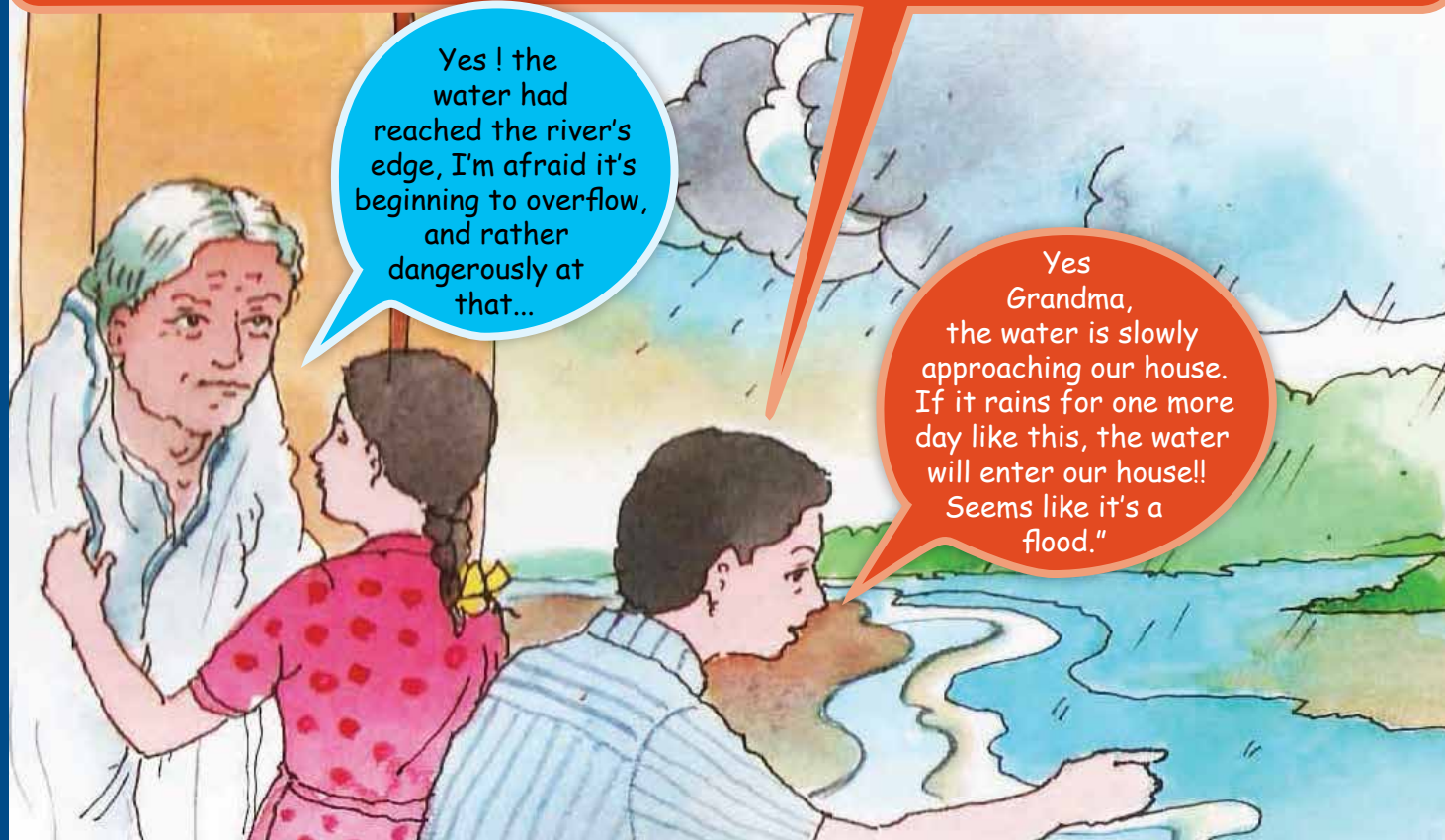
By Sunday, it was five days of continuous rain! Black clouds were still crackling in the sky with thunder*. There was no hope of the rain stopping.

The radio broadcasting the weather forecast said "...the rains are expected to continue in the coming days...."



***Thunder**: a loud crashing noise heard after a lightning flash due to expansion of rapidly heated air.

Oh Grandma! Look at the river!! Water is flooding the crop fields on both sides of the riverbank.



Flood

In response to Udita asking what a flood meant, Ashwin replies, "A Flood is an inundation* of a large land area with water, sometimes, for several days".



* **Inundation**: cover or overspread with water



Oh, Is it because of heavy rains?

The illustration shows a young girl with brown hair in pigtails, wearing a pink dress with red polka dots, asking a question. A young boy with dark hair, wearing a blue and white striped shirt, is responding to her. They are standing outdoors, with a background showing a landscape with a body of water and some trees. The scene is framed by a dark blue border.

What is Flood?
A Flood, normally, a natural phenomenon is usually in response to heavy and continuous rainfall and causes massive loss to human life and property.

Not only heavy rains, but there are several other reasons too.

WHAT CAUSES FLOOD?

Flooding in rivers is mainly due to —

- ❖ intense heavy rainfall resulting in excessive water flow.
- ❖ rapid melting of mountain snow contributing to heavy flow of water into rivers.
- ❖ river bank erosion* and silting of riverbeds.
- ❖ landslides leading to blockage of flow and change in the river course.
- ❖ slower flow due to tidal and back water effects.
- ❖ cyclone*, cloud burst* and heavy rain fall.

Other causes of floods include —

- ❖ Strong tides* which may be due to storms and Tsunami* hitting coastal regions
- ❖ Damage to dams and dam bursts
- ❖ Activities like overgrazing and deforestation which increase surface run-off of water



***Erosion:** is the wearing away of landscape by different agents like wind, water and ice.

Cyclone: formation of a very low-pressure region with very high-speed winds revolving around it.

Cloud burst: A sudden and very heavy rainfall.

Tide: The rhythmic rise and fall of ocean water twice in a day.

Tsunami: A huge tidal wave (more than 15 meters in height) formed due to the blowing of wind at high speed or an earthquake or volcanic eruptions or underwater landslides.

Worried Ashwin, Udita and Grandmother moved to the upper floor to take a better view:



What
will we do
now?

Don't worry
Udita, my teacher
had told us about what
to do in case of flood. Let
us inform Maa and Papa.

Grandma, please
stay upstairs. I will
be back soon.





Maa, Papa
see! There seems
to be a possibility of
flood waters entering our
house!
It has already entered
our fields and the water
level is steadily
rising.

The illustration shows a family of three looking out a window. A young boy in a green striped shirt is pointing towards the outside. A woman in a blue floral sari and a man in a white shirt are looking on with concern. Outside the window, a landscape is shown with rising floodwaters, a small house, and trees under a cloudy sky.

Yeah!
Let me take all
our pets and animals
to a higher platform at
a safer place. You shift all
the valuables to the first
floor. Also store some
eating and cooking
material with
you.



Flood

Ashwin also switches off the electricity from mains and calls the Police Station to make them aware of the situation in the town.



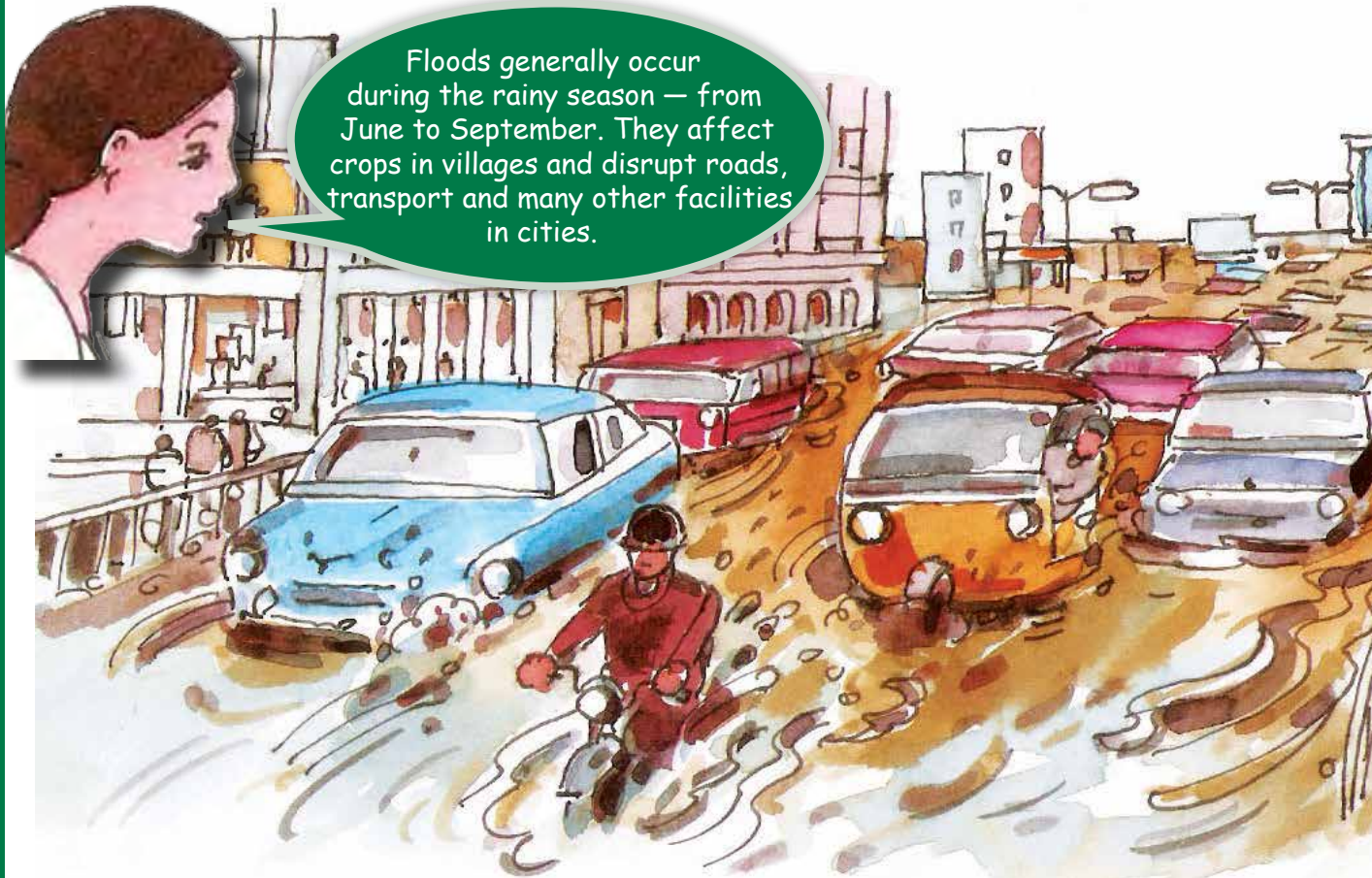
Fortunately, the rain stopped in the evening.
By the next day, the situation was under

control. In school everybody was talking about
the flood.



Flood

Floods generally occur during the rainy season — from June to September. They affect crops in villages and disrupt roads, transport and many other facilities in cities.



However, floods also occur due to damage to dams and canals...



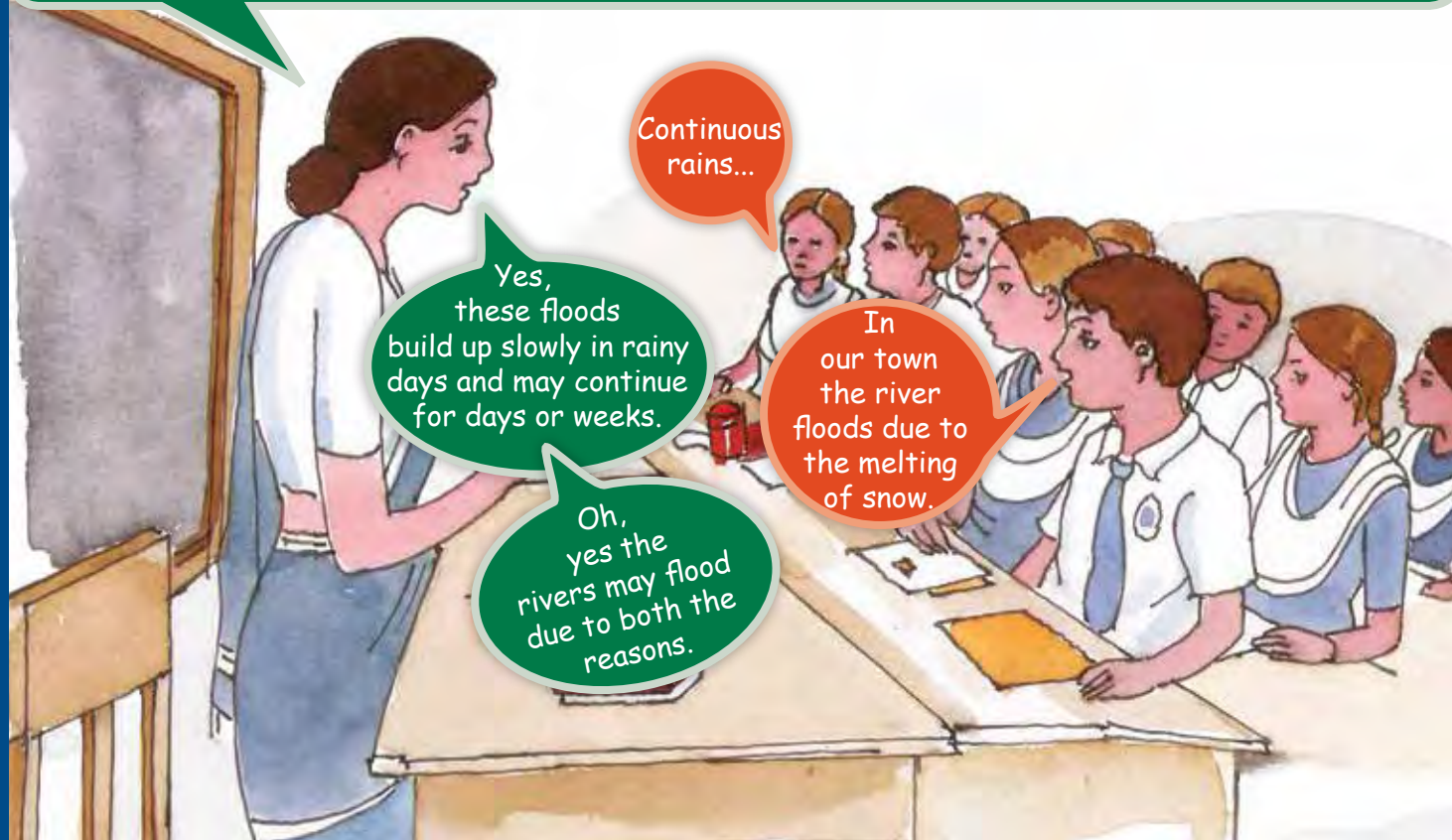
Flood

... or due to blockage in rivers by landslides.
Speedily melting of ice and snow on the

mountains may also cause floods and this may
happen anytime during a year.

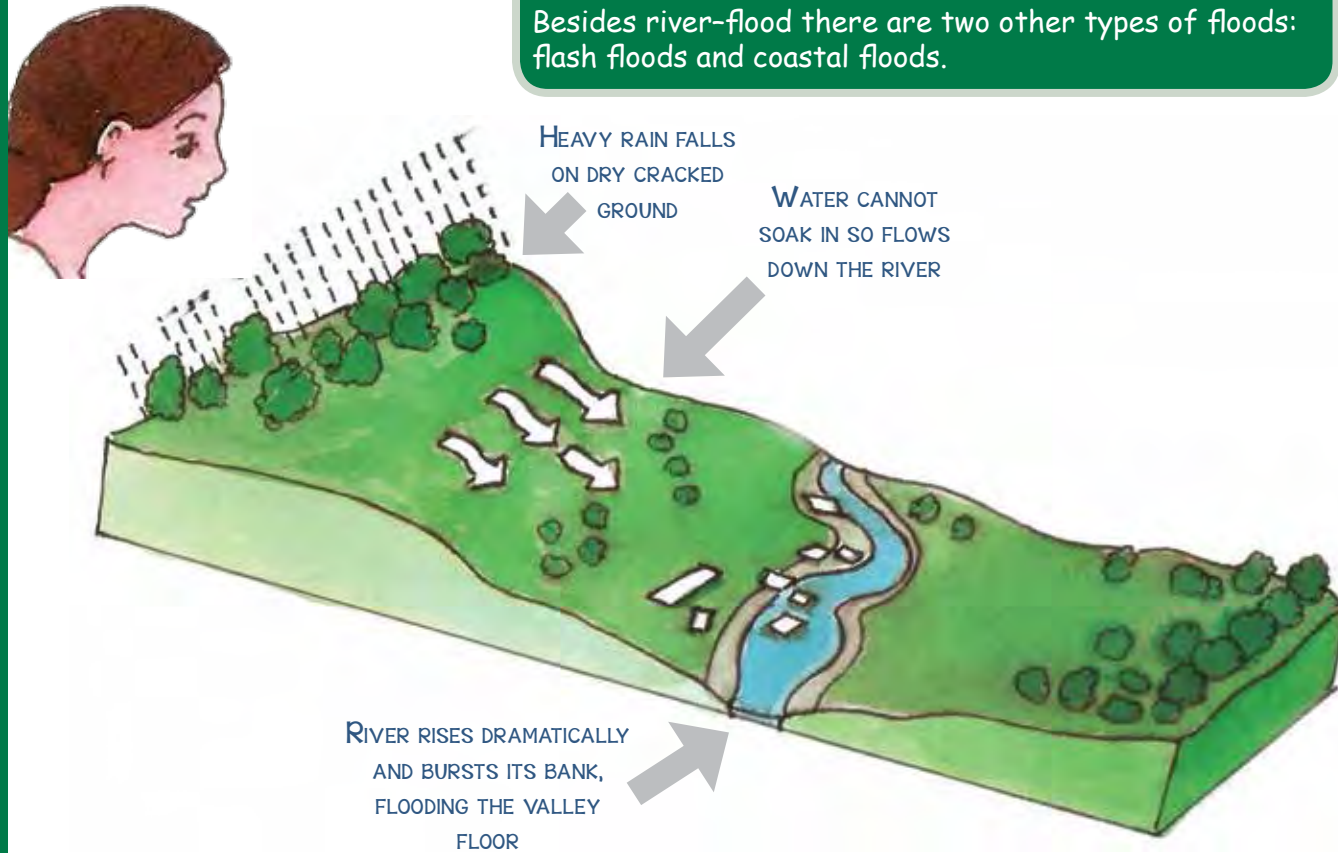


Can anybody tell me the reasons for the flood that we have experienced over the past few days?



Flood

Besides river-flood there are two other types of floods: flash floods and coastal floods.



Flash floods occur within a few hours of heavy rainfall. These are usually associated with:



cumulonimbus
clouds*



severe
thunderstorms



tropical
cyclones

***Cumulonimbus clouds:** An extremely dense, vertically developed cloud with a low, dark base and fluffy masses that tower to great heights.

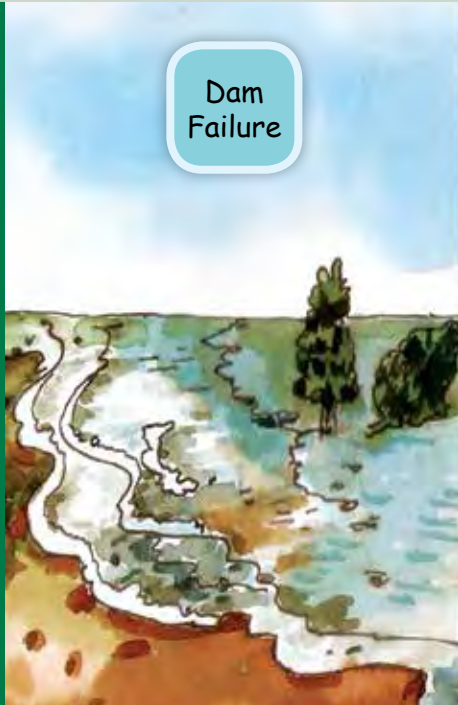
***Thunderstorm:** An event of the swift movement of falling water droplets along with the rising air create lightening and sound

***Tropical cyclones:** Tropical cyclones are violent storms that originate over oceans in tropical areas and move over to the coastal areas bringing about large scale destruction caused by violent winds, very heavy rainfall and storm surges.

Flood

Other causes of flash floods include dam failure, river obstructions or damage to embankment* of rivers and canals. This type of flood requires rapid

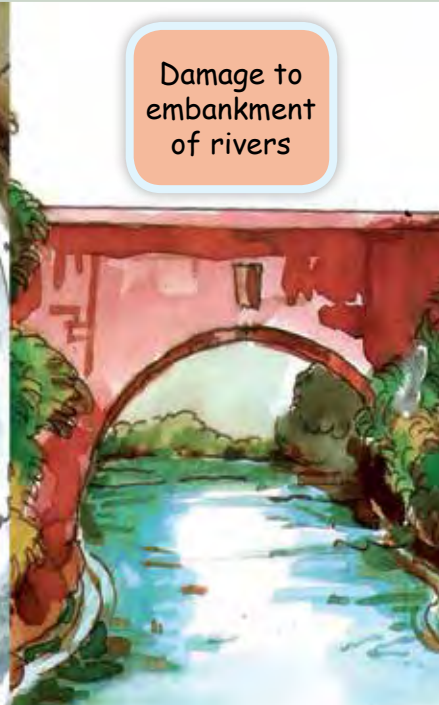
localised warning systems and immediate response in favour of affected communities.



Dam Failure



River Obstructions



Damage to embankment of rivers

***Embankment**: a wall of bank of earth or stone built to prevent a river flooding an area

Coastal floods are associated with the cyclonic storm activities near the sea coast or high

magnitude earthquakes followed by the tsunami hitting the coastal areas causing floods.



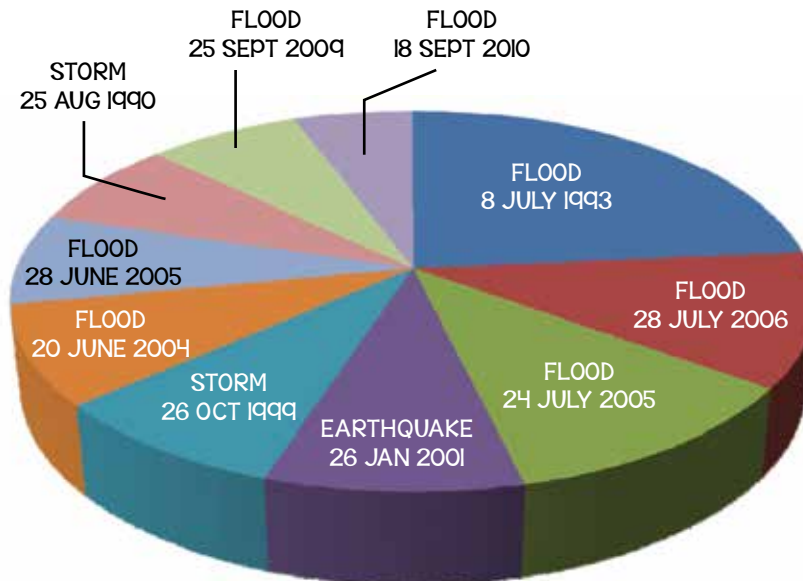
ACTIVITY- THINK AND REFLECT: IS MY STATE/CITY PRONE TO FLOODS?

- ❏ Locate areas vulnerable to flood in the map and check whether your state or city is prone to floods or not.
- ❏ If the answer is YES, list the precautions you need to take to safeguard yourself during a flood.

The most flood prone states in India are Uttar Pradesh, Bihar, Assam, West Bengal, Gujarat, Odisha, Andhra Pradesh, Jammu and Kashmir, Madhya Pradesh, and Punjab. However, sometimes floods do occur in other areas due to man-made activities. Even places like Barmer and Jaisalmer of Rajasthan in the Thar Desert had faced floods.

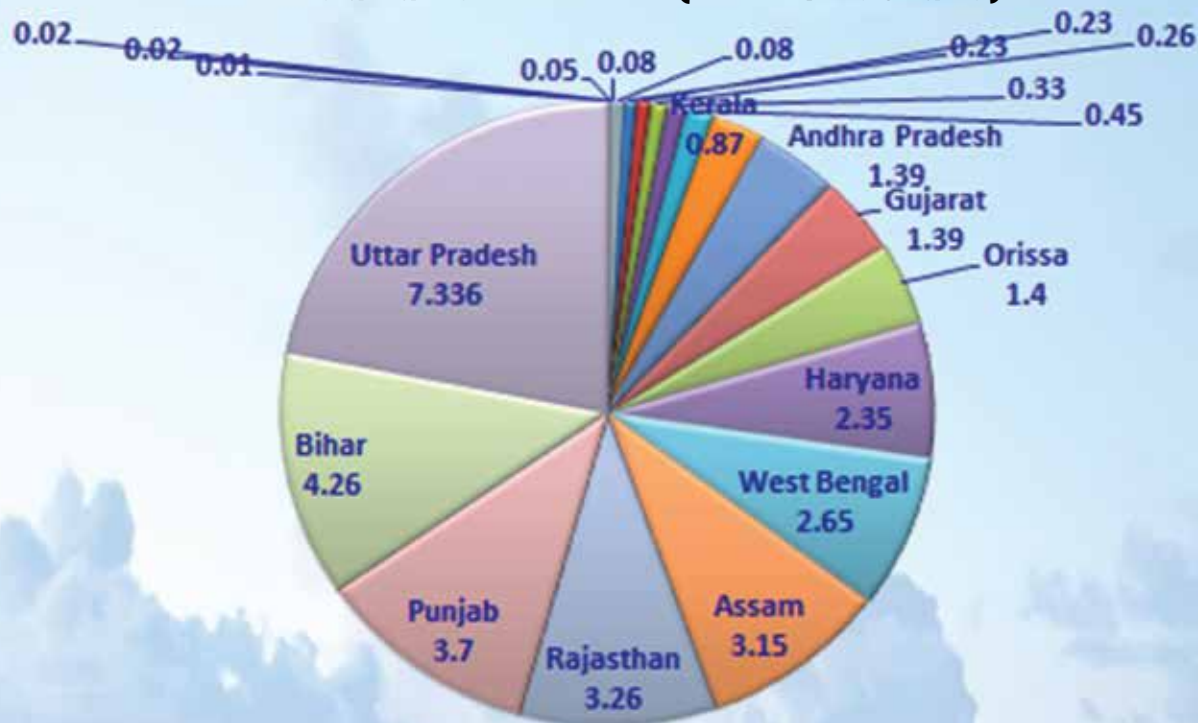


Top 10 Natural Disasters in India for the Period 1990 to 2012 sorted by Economic Damage Costs



DISASTER	DATE	DAMAGE (000 US\$)
FLOOD	8 JULY 1993	7000000
FLOOD	28 JULY 2006	3390000
FLOOD	24 JULY 2005	3330000
EARTHQUAKE	26 JAN 2001	2623000
STORM	28 OCT 1999	2500000
FLOOD	20 JUNE 2004	2500000
FLOOD	28 JUNE 2005	2300000
STORM	25 AUG 1990	2200000
FLOOD	25 SEPT 2009	2150000
FLOOD	18 SEPT 2010	1680000

Area liable to Floods (million Hectare)



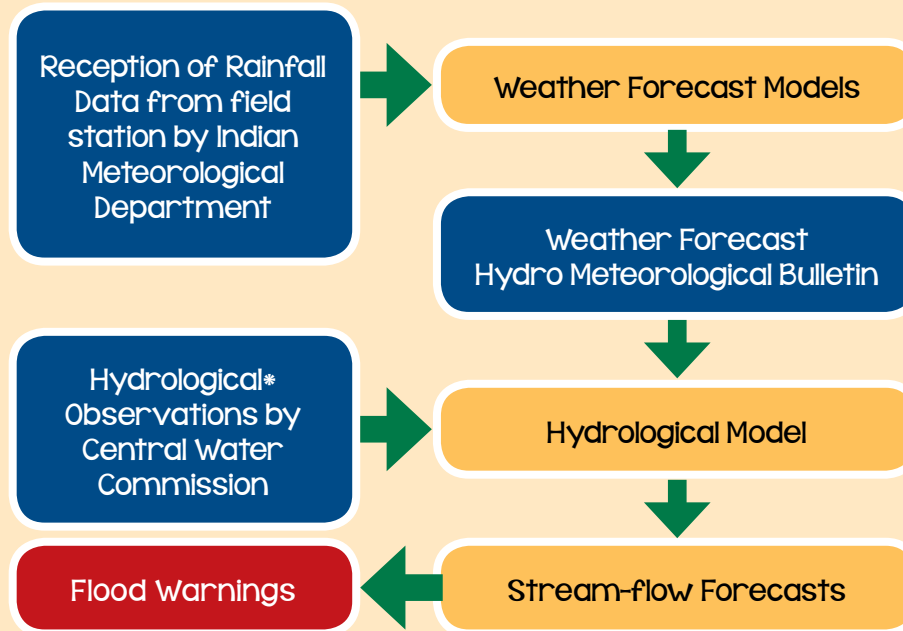
Source: www.mowr.gov.in



भारत मौसम विज्ञान विभाग
INDIA METEOROLOGICAL DEPARTMENT



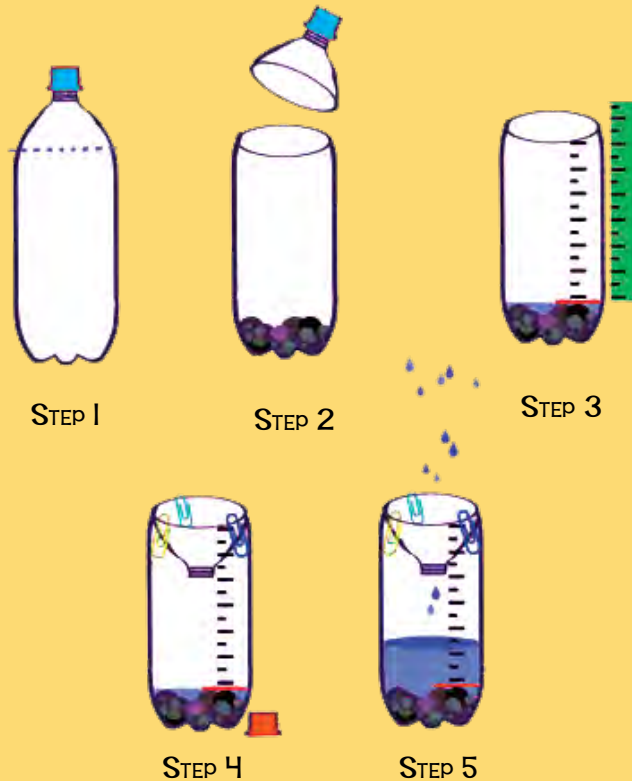
BASIC STRUCTURE OF FLOOD FORECASTING



Who issues flood warnings?

India Meteorological Department collects rainfall and other meteorological parameters for the whole country and passes this information with their forecast to the Flood Forecasting Division of the Central Water Commission (CWC). The CWC collects hydrological data (river flow etc.) and translates this information to river stage and flow. When the river stage is likely to cross 'warning levels', flood warnings are issued to concerned authorities and broadcast to public through the media. Flood warnings are available on the website: www.cwc.nic.in

LET'S MAKE A RAIN GAUGE FOR MEASUREMENT OF RAINFALL



Now your rain gauge is ready, keep it in the open space at the time of rain. Keep a record of daily rainfall.



Mumbai Floods of 2005

A major flood hit many parts of Maharashtra in July-August 2005 including large areas of the metropolis of Mumbai, in which at least 1,000 people died. In some localities houses were submerged to 1 to 2 meters and in some places water rose to even 5 meters. All schools in the affected areas were closed for two days. Mumbai Police requested all residents to stay indoors as far as possible. The reason given was the heavy rains. However, the man-made factors were more responsible. This included the age old drainage system of water that was clogged at several places. The haphazard unplanned construction of building was another factor causing floods.

What were the effects?

- The unprecedented flooding stopped all normal activities in Mumbai.
- The city was practically cut-off from other parts of India. Telecommunication were adversely affected, airports were closed, public transport like motor vehicles, local trains came to a standstill; thousands of people were stranded at different points in the city.

Flood

- Thousands of school children were stuck due to flooding and could not reach home for almost up to 18 hours.
- The rain water caused the sewage system to overflow.
- Thousands of animal carcasses floated in the flood, raising concerns about the spread of water-borne diseases.
- An aeroplane with 330 passengers on-board skidded off the Mumbai airport runway while landing. The runway was blocked for about six hours. However, no loss to life or property was reported.
- The financial cost of floods was unprecedented and caused a stoppage of entire commercial, trading, and industrial activities for many days. A direct loss of about Rs 450 crores was estimated.



HOW DO WE REDUCE THE IMPACT OF FLOOD: MITIGATION

The concept of mitigation includes both disaster (flood) prevention and preparedness:

Structural Measures

- ❖ Prevention of flood water from reaching vulnerable points.
- ❖ Pre and post monsoon checks necessary prior to the flood period, such as, dams, levee armoring, channels etc.

Non-structural Measures

Improving the susceptibility to flood damage through emergency plan, Risk mapping

Flood plain management

- ❖ Land-use planning, zoning building requirements

Modifying flood loss through

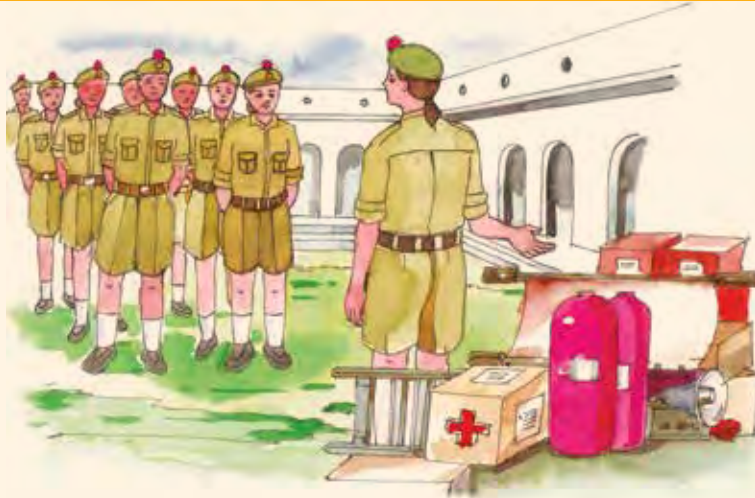
- ❖ Flood proofing including disaster preparedness, and response planning
- ❖ Flood forecasting and warning
- ❖ Education and Media
- ❖ Disaster relief
- ❖ Flood fighting including Public Health Measures
- ❖ Education and Media

DO FLOODS BENEFIT US IN ANY WAY?

There are many disruptive impacts of floods on human settlements and economic activities. However, floods which are more frequent and of smaller magnitude can also bring many benefits such as

- ❖ Recharging of ground water
- ❖ Providing nutrients to the soil and making it more fertile.
- ❖ Providing a much needed water resource to arid and semi-arid regions where rains are very unevenly distributed.
- ❖ Freshwater floods particularly play an important role in maintaining ecosystems in river corridors and are key factors in maintaining biodiversity.
- ❖ Flooding adds a lot of nutrients to lakes and rivers. This leads to improved availability of fish.
- ❖ Fishes make use of floods to reach new habitats.

HOW CAN SCHOOLS PREPARE TO COPE WITH FLOOD CONDITIONS?



Student forums such as National Cadet Corp (N.C.C.), National Service Scheme (NSS), Scouts and Guides, may be trained to serve the community during disasters. A special group of volunteers may be formed and an emergency kit made available to aid them at the time of disaster.

Apart from this, the following points may be considered:

- ❖ If the school falls in the flood prone area, classrooms must be constructed on raised platforms.
- ❖ If the school building is multi-storied, students may take shelter in the upper floors during flash floods.
- ❖ Students in the flood prone areas must learn swimming. For this purpose swimming classes may be made available in most areas for students.

Students can perform a number of activities to understand floods better. Some such activities are listed here. Schools may facilitate these and include some other activities as well.



List of activities:

- ✧ Painting competition
- ✧ Group discussion
- ✧ Visit a flood prone area

- ✧ Schools may arrange a film show on flood and have discussions on various aspects of floods.



- ✧ Schools may organise an interview where students interact with a doctor or person in their area to discuss various water-borne diseases, that tend to spread after a flood. Let them prepare a chart showing symptoms and preventive measures for these diseases.

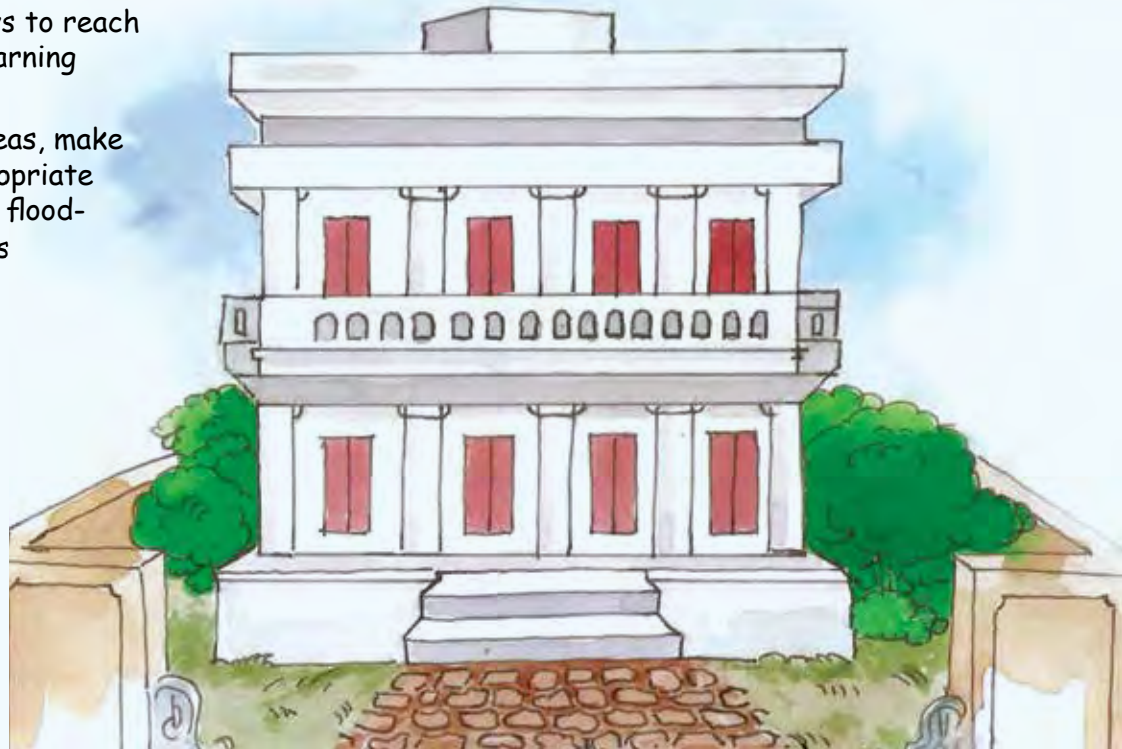
DOS AND DONT'S: BEFORE AND DURING FLOOD

- ✧ Turn on local radio or FM in your mobile or the TV for 'flood alerts and warnings'.



DOS AND DONT'S: BEFORE AND DURING FLOOD

- ✧ Find the safe shelter in your area and ways to reach there following warning signals.
- ✧ In flood-prone areas, make sure you use appropriate materials to build flood-restraint buildings



DOS AND DONT'S: BEFORE AND DURING FLOOD

- ❖ Keep stocks of dry food items (like biscuits, *chana*, *gur*, etc.), candles, matchboxes, drinking water and other essential materials such as; radio, torch and batteries.
- ❖ Collect water-proof bags for storing and carrying valuables.
- ❖ In case of obvious flood risk, switch off heating appliances, gas and electricity.
- ❖ Move furniture, electric equipment etc. to upper floors
- ❖ Prepare a list of contact numbers of various emergency services.
- ❖ Get communication systems like, microphone, loudspeaker, cell phone, drum etc., ready for informing people about the likelihood of flood.
- ❖ Put toxic substances, such as pesticides and insecticides, in a safe place so as to avoid pollution.
- ❖ Keep first aid kit ready to use with medicines for diarrhea and snakebites.

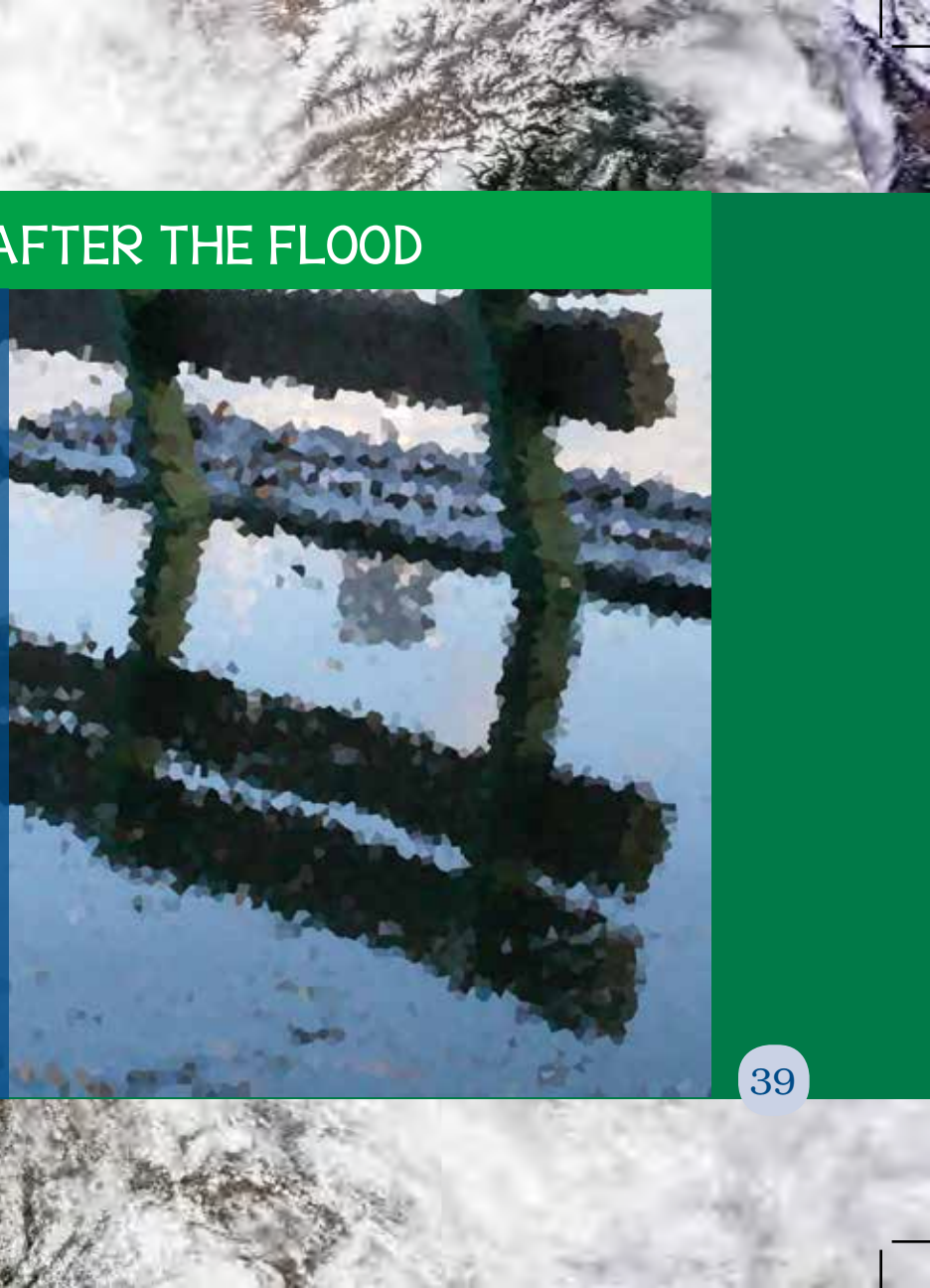


DOS AND DONT'S: DURING THE FLOOD

- ❖ Keep calm
 - ❖ Keep informing your neighbours and help particularly the differently abled, children and the elderly.
 - ❖ Remain alert of the danger and its evolution.
 - ❖ Listen to the radio etc.
 - ❖ Do not use the telephone, don't overload the network
 - ❖ Leave your house following the instructions of the volunteers of the emergency operations.
 - ❖ Use the route indicated by emergency operation services.
 - ❖ Do not take short cuts otherwise there will be a risk of being trapped in narrow and dangerous places.
 - ❖ Make the necessary arrangements for domestic animals.
 - ❖ When leaving for shelter, carry important things, such as first aid kit, identity and personal papers, dry food, drinking water, clothes and medicines etc.
- 
- ❖ Preferably drink boiling water.
 - ❖ Be careful of snakes, as snake bites are common during the flood.
 - ❖ Make sure that the children and pregnant women do not remain empty stomach.
 - ❖ Avoid driving on a flooded road as you risk being swept away by the water current.
 - ❖ If you are trapped in a flooded area and your car breaks down, leave it and get help for you and your passengers.

DOS AND DONT'S: AFTER THE FLOOD

- ❖ Help the injured. Bring your first aid kit
- ❖ Listen to the radio and follow the instructions of those in charge of the rescue operations
- ❖ Be careful before entering your home. Check that it is structurally sound (strength of walls, floors, broken window panes and other dangerous debris)
- ❖ Immediately pour about 2 liters of bleach into stagnant waters
- ❖ Do not drain all the water in one go (this may damage the foundations)
- ❖ Clear only about a third of the volume of water per day
- ❖ Avoid living in a house in which there is stagnant water



AN EMERGENCY KIT FOR FLOOD

Keep the items listed in your home so they can become your emergency kit for use in all types of emergencies:

- ❖ Battery-operated radio (with spare batteries)
- ❖ Torch (with spare batteries), candles and waterproof match boxes
- ❖ First aid kit and manual, including personal protective equipment such as disposable gloves, face masks and goggles, etc.
- ❖ Medications (and repeat prescriptions), tissues, toiletry and sanitary supplies
- ❖ Special needs for infants, aged and people with disabilities
- ❖ Spare clothes including strong shoes, broad brimmed hat, leather gloves and sunscreen for each household member
- ❖ A mobile phone and charger
- ❖ Strong plastic bags (for clothing, valuables, documents and photographs)
- ❖ Contact details for your agreed out-of-town contact



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ACKNOWLEDGEMENT

The National Council of Educational Research and Training (NCERT) acknowledges the valuable contribution of the individuals and organisations involved in the development of “Resource Material on Management of Disasters”. The Council also acknowledges the valuable contribution of the following academics:

Special thanks are due to Jai Shree Sharma, *Professor and former Head* DESM and A.K. Wazalwar, *Professor and former Head*, DESM, National Council of Educational Research and Training for providing guidance.

The contribution of Assistant Programme Coordinator (APC) office, administration of DESM, Publication Division, and Secretariat of NCERT is also acknowledged.

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HAZARDS
AND
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NATIONAL COUNCIL OF EDUCATIONAL RESEARCH AND TRAINING

ISBN 978-93-5007-842-6