Together, Towards a Safer India...

An Introduction to Disaster Management for Class 8

Central Board of Secondary Education

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TOGETHER, TOWARDS, A SAFER INDIA

An Introduction to Disaster Management for Class 8

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CBSE Syllabus on Disaster Management

Instructional Objectives for Class 8

1. Acquaint students about various disasters that India is vulnerable to, and the hazard maps that enable them to visualise their vulnerabilities. (Emphasis would be on effects rather than causes, since the geographical reasons for the occurrence of natural hazards are dealt with in geography)
2. Introduce a few key concepts in disaster management, in simple terms, to orient them to these words that are used in media, discussions, analysis, etc, when a disaster strikes. The questions at the end of each lesson would provide a guide to teachers on what the learning expectations are from students, and in setting examination papers)
3. Introduce the concept of being prepared for disasters through simple do-s and don't-s that school children can imbibe and spread to families and community. The concept of preparedness leading to reduced vulnerability and possible reduction in impact of the disaster on lives, livelihoods and property.
4. Develop an interest in the subject through interactive activities in the classroom, so that students seek more information on disasters.

Course Content

1. Introduction:
   - ◆ Concepts in disaster management, with emphasis on disaster preparedness.
   - ◆ Natural and manmade disasters.
   - ◆ Importance of disaster management and introduction to mitigation methods
   - ◆ Concept of Community Contingency Plan
2. Earthquakes:
   - ◆ Causes and effects.
   - ◆ Relative disaster vulnerabilities among people.
   - ◆ Earthquakes in India, introduction to seismic zones and related damage, scales for measurement
   - ◆ Preparing for earthquakes
3. Cyclones:
   - ◆ Causes and effects
   - ◆ Cyclone-prone areas in India
   - ◆ Preparing for cyclones

4. Floods:
   - Causes and effects
   - Flood-prone areas in India
   - Preparing for floods
5. Drought:
   - Concept of slow-onset disaster
   - Causes and effects
   - Drought-prone areas in India and relative vulnerabilities of people
   - Mitigating drought and preparedness
6. Manmade Disasters
   - Types of manmade disasters (accidents, nuclear, chemical, biological), Concept of WMD (Weapons of Mass Destruction)
   - Simple Do-s and Don't-s

CONTENTS

FOREWORD

Dear Principal,

Civilisations have advanced, and the quality of life has improved with the differences that science and technology have brought into our lives. In countries like India, development has been a tedious and difficult process. Hard earned development gains are often lost when a disaster strikes, bringing losses to lives, property and livelihoods.

India is one of the most disaster-prone countries in the world. Its unique geo-physical characteristics make different areas vulnerable to various disasters. Over 55% of the land area is vulnerable to earthquakes. 70% of the land under cultivation is prone to drought, 12% to floods and 8% to cyclones. The socio-economic backwardness of the majority of our population, coupled with the lack of skills in preparing for responding to disasters increases their vulnerability, negatively affecting their ability to respond and recover from periodic and intense disasters.

Prevention is better than cure, is an old saying which is very apt in the context of disaster management. Every year, colossal amounts of resources are used by our Government as well as aid agencies in relief and rehabilitation measures. It has now become increasingly evident that an investment in disaster preparedness can save thousands of lives, vital economic assets, livelihoods and reduce the cost of overall relief assistance. Further, disaster mitigation is a step forward in attempting to conserve development gains before a disaster strikes.

Awareness and education is an important tool in creating this culture of prevention and preparedness. Government of India has been stressing the need to sensitise the young learners to the basic elements of the management of these disasters. Accordingly, the board has decided to introduce disaster management as part of its front line curriculum in Class VIII in the subject of Social studies from the Academic year 2003–2004. It will be taken up gradually upto Class X and will also become part of our assessment system.

A lot of care has been taken in development of instructional materials. Emphasis has been given on preparedness and mitigation of disasters.. This makes the material equally valuable for parents and the community along with teachers and students. Exercises and activities have been built-in to ensure that students get involved in the learning process. Stories and newspaper articles have been used to show the impact of disasters. Teachers are expected to evaluate students on written work, project activities and preparation of kits, plans, etc. Special attention will be given to specific vulnerabilities of the areas.

I express my gratitude to Sh. M.P. Sajnani, Director (Disaster Management), Ministry of Home Affairs, Government of India for his personal involvement in the process of development of the instruction material. I am also thankful to the team of experts Dr. Kamala Menon, Ms. A. Venkatachalam and Ms. P. Thakur who have worked on the preparation of the chapters. Under the able guidance of Sh. G. Balasubramanian, Director (Academics) CBSE, Ms. Sugandh Sharma E.O. CBSE and Ms. Aparna Kanda, Programme Associate (Vulnerability Reduction and Sustainable Environment) UNDP coordinated the entire activity and provided necessary assistance. I express my appreciation and thanks to all these persons.

ASHOK GANGULY,
CHAIRMAN, CBSE

Chapter 1

BEING PREPARED – A VITAL PART OF DISASTER MANAGEMENT

India with its vast population and unique geo-physical characteristics is one of the world's most 'disaster-prone' countries. Natural hazards such as cyclones, earthquakes, drought, floods or landslides occur in different parts of India in varying intensity. This means that we are all 'vulnerable' in different degrees to disasters caused by these hazards. On the East Coast, cyclones occur frequently. In the interior of the Plateau or in the Himalayas – earthquakes, and in the Ganga-Brahmaputra plain, floods are more common.

Rajasthan or Western Orissa often experience severe drought, as do other areas in South India. In addition to this, social conditions that govern the way communities live, further affect the extent to which people are affected by the hazard. In order that we protect ourselves from the harmful effects of a disaster, we have to prepare ourselves in advance, to face them better.

INDIA IS DISASTER-PRONE...

- ✓ OVER 55% OF THE LAND AREA IS VULNERABLE TO EARTHQUAKES
- ✓ 12% TO FLOODS
- ✓ 8% TO CYCLONES
- ✓ 70 % OF THE LAND UNDER CULTIVATION IS PRONE TO DROUGHT

The process involving activities that help us to face disasters effectively is commonly known as *'disaster preparedness'*.

When disaster strikes, it affects us directly, and immediately. While the Government,

Important Terms*

1. ***Disaster Management:*** the range of activities designed to *mitigate* the effects of disasters and emergency situations and to provide a framework for helping people at-risk to avoid or recover from the impact of the disaster. Managing disasters includes steps to be taken prior to, during, and after the disaster, and involve preparedness, mitigation, response and recovery.
2. ***Disaster-proneness***: the likelihood of a place being affected by a disaster
3. ***Natural Hazard:*** A physical event or phenomena which may cause injury or loss of life, damage to property, social and economic disruption or environmental degradation
4. ***Vulnerability:*** in simple terms is the potential for loss to an individual, community or place because of a disaster, which is affected by geographical as well as social conditions
5. ***Disaster Preparedness:*** The set of activities and precautions that a community collectively takes before a disaster occurs, in order to reduce the impact of a disaster, and to cope with it efficiently.

** All terms are explained in context, to make the student understand important aspects of disaster management. Formal definitions will be attempted in Class 9 & 10*

International Agencies such as the United Nations, or Red Cross, and Panchayats in rural areas assist us when faced with a disaster; ***the community, however is the first responder.***

We students are an integral part of community, and have an important role to play in being prepared. Hence it is imperative that we prepare ourselves adequately to prevent, face and respond to disasters. History has shown us that where communities have been prepared to face disasters, lesser lives have been lost, less significant damage to the environment has occurred, and property has been better conserved.

People living in an area may be vulnerable to more than one disaster. For instance, a coastal area may face floods and cyclones frequently, while being located in an earthquake zone. Such an area is called a 'multi-hazard' zone. Our country is divided into various zones based upon the vulnerability of the area to various disasters. When these zones overlap, we have a multi-hazard zone.

A hazard in simple terms is a 'potential' disaster. It is an event that may lead to a disaster. For instance, a flood is a hazard. When it occurs, and if people are not prepared to face it, it may wash away persons, homes, cattle and valuables. Then, the flood becomes a disaster. But if people are evacuated along with valuables to a safe shelter, cattle is herded onto a higher area such as a mound, and houses are built with adequate features to make them flood-resistant, the flood remains a hazard and does not become a disaster.

Natural and Manmade disasters

Important Terms*

1. ***Community:*** People who live together in a village or urban area, who can be identified as a local group with a common way of life
2. ***First responders:*** The persons or group of people who are immediately affected by a disaster, and are the first to respond and help to cope with it, before government or relief agencies can rush to the area.

The selfless bounty of nature is a gift to mankind. It is an eternal source of sustenance: it gives us air, water and food, and of course a home to stay. For centuries though, Mother Nature has been combining its gifts with its often-inexplicable moods of destruction and fury. These times of turmoil over land and water, or hazards often lead to disasters, with large losses to life, livelihood and property. Disasters are some times referred to as 'calamities'.

Common hazards faced by us in India are earthquakes, drought, floods, cyclones, landslides, forest fires, a large number of fire accidents, etc.

Earthquakes: The Earth we live on is made up of large plates of land that float over

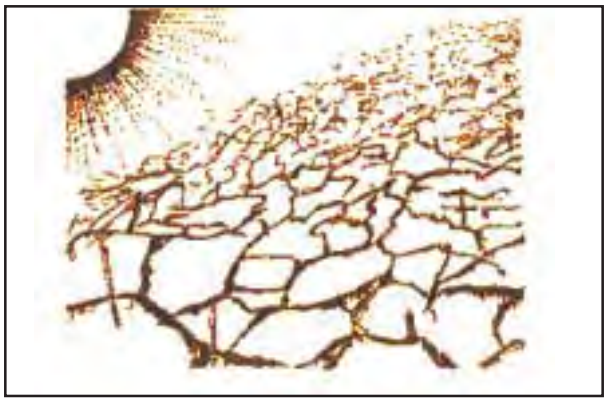
an ocean of semi molten rock. For thousands of years these plates have been constantly moving and shifting. (65 million years ago such shifting caused the Himalayas.) These movements in the Earth's crust cause earthquakes, when two plates collide with each other, releasing energy.

Earthquakes that occur under water, in the oceans, cause huge waves called tsunamis that have some times raced across the ocean at 8000 km/h. Earthquakes are more likely to occur along faults. Delhi, our capital city lies near a fault, and is hence highly earthquake-prone. The fact that it is also densely populated and has crowded residential areas makes it more vulnerable to disaster.

Drought: is a natural phenomenon, which happens when an area receives lesser rainfall

Important Terms

1. ***Faults:*** are places in the earth where the rocks are broken and the rocks on one side have moved in some direction relative to the other. Faults are planes, not lines



then expected, or in comparison to the normal rainfall levels for the area. It is a dry situation characterised by deficit rainfall, lack of water for household use or agriculture, or a deficiency of surface or sub-surface water leading to acute shortage of water.

Environmental degradation is a major factor that increases the effects of drought. De-forestation, soil erosion (by wind and water), loss of bio-diversity and excessive use of ground or surface water result in drought. It causes large-scale starvation, loss of assets and livestock and death. Drought is a perennial feature in some states of India.

Floods: are caused when water rises above and beyond its normal place or course,

causing areas to be submerged with water for prolonged or short periods of time. They are caused primarily due to the peculiarities of rainfall in the country, and are the most frequent and often most devastating disaster in India. While the Ganga and Brahmaputra rivers cause the largest floods in India, other areas in the west, east and south also experience floods.

Cyclones: A cyclone is a storm that occurs

Important Terms

1. ***Normal rainfall***: When the rainfall for the monsoon season of June to September for a place is within +/-19% of its long period average, it is categorised as normal. When the monsoon rainfall deficiency exceeds 19%, it is categorised as deficient or scanty.
2. ***Environmental degradation***: in simple terms is the reduction or deterioration of environmental resources that harms us in many ways.
3. ***Bio-diversity:*** is the term for the variety of life and the natural processes of which living things are a part. This includes the living organisms and the genetic differences between them and the communities in which they occur. The concept of biodiversity represents the ways that life is organized and interacts on our planet. This balance or equilibrium is challenged by environmental degradation

due to a difference in temperature and pressure of air, over the warm waters of the Oceans. It is accompanied by strong gales and lashing rain, and tidal waves that cause floods in coastal areas. A cyclone can carry the power to destroy concrete buildings, blow away a cement roof, uproot trees, and wash away homes in villages.

Manmade disasters may result from major accidents or inadvertent as well deliberate actions of individuals, groups or governments. For example terrorists may blow up a train or building with explosives. Manmade disasters could be nuclear (The nuclear attack on Hiroshima and Nagasaki in Japan in 1945). Nuclear weapons when used cause a lot of destruction through the generation of heat, fire and radiation. Biological disasters can be caused by preserving and releasing germs of deadly diseases such as small pox,jaundice etc, or by polluting water with such germs in a particular area. The use of Anthrax by terrorists to eliminate people in the USA in 2002 could be called a biological weapon.

Manmade disasters could also be caused by the misuse or spread of dangerous chemicals. The release of Methyl Iso-Cyanate or MIC, a lethal gas in Bhopal in 1984 in an industrial accident caused the death of many persons almost instantly. Almost two decades later, people are still suffering from the after effects of this disaster.

More common manmade disasters are major fires, land, air or water accidents caused by collisions, breakdown, etc., and collapse of bridges and buildings.

Manmade disasters are preventable. For instance, by adhering to rules that govern the way a building must be constructed (these are called Building Bye Laws, and are issued by the Government), we could ensure that it is strong and durable. Nuclear Non-Proliferation Treaties are agreements made internationally by countries, mutually agreeing not to develop nuclear weapons for mass destruction. Further, by adhering conscientiously to safety measures in industries, accidents that cause suffering could be prevented.

Natural Disasters too can be mitigated. By being prepared to face and respond to them effectively, we not only conserve the advances made by civilisations, but also minimise the losses that disasters inflict upon communities, that some times take us years backwards in progress. Disaster Management hence helps us to adapt ourselves to nature and learn to use it to our advantage

Taking care of our environment plays an important role in the mitigation of disasters. While economic development is necessary to match the demands of increasing population, we have to ensure that it does not result in environmental degradation. Development should therefore be planned in a judicious manner and in tune with sustaining and protecting our environment.

Important Terms

1. ***Building Bye Laws*** : a set of rules and regulations that prescribe the standards for construction of, spacing between and access to buildings. The purpose of these laws is to ensure that all constructions in the country conform to disaster resistant designs, as well as layout.
2. ***Mitigation :*** Actions that reduce the severity of damage caused by disasters to people and property such as cyclone resistant houses in cyclone prone areas.

To face disasters better, we need to understand their causes and effects, as well as what we as students can do to help in the effort toward creating a more disaster-resilient society.

In a disaster situation, a large number of agencies, the Government and communities come together to help in coping with the after-effects of the disaster. In recent times, these agencies, also called civil-society have been collaborating even in times when there is no disaster, to put in place, an effective Disaster Management Plan. A Disaster Management Plan for a country is made up of a number of plans at various levels such as the community, the block/taluka (in rural areas), the district and state integrating into a National Plan. At the community level, it is called the Community Contingency Plan, about which you will learn more in Class 9.

Women and Children in Disaster Management…

Our mothers have an important role to play in disaster management, since they manage our homes, all our needs and us.

We as future responsible citizens of our country can do wonders in assisting our elders in preparing and coping with disasters.

Form groups in your class to identify the role of women and students in preparedness, mitigation and response and share your findings.

29th October is National Day for Disaster Reduction. The children in the picture above are creating awareness in their neighbourhood on the importance of being prepared for disasters.

Important Terms:

1. ***Disaster-resilient society***: is one that can endure the effects of a disaster, while minimising the occurrence where possible, and the destruction that can be caused by it.
2. ***Civil Society:*** a term used to describe the various organisations that come together to pursue the interests of communities, development goals, etc., including disaster management in recent times. It includes development organisations such as the United Nations or the Red Cross, Civil Defence, NCC, NSS, Scouts and Guides, hospitals, ambulance services, educational trusts, etc. as well as the public and private sector industries and institutions. Civil Society forms an important part of disaster preparedness and response.

What is a Community Contingency Plan?

It is a series of assessments and evaluations followed by the development of proposed plans of action in anticipation of a natural or human-made disaster. This involves:

1) identification of the potential threat, e.g., proximity to an active volcano, settlements on seismic faults or flood plains, history of drought, food shortages, or epidemics, etc.;

2) identification of likely impact of disaster, e.g., number of people potentially affected, disruption of food or water supply, transportation system, or communication channels, damage to property, roads, health facilities, duration of disaster and its effects;

3) identifying methods to mitigate the disasters such as shelter-belt plantations to break the intensity of cyclones along the coast

4) anticipating and developing optimum response to such a threat, e.g., educate/ alert population to potential risk, develop notification and evacuation plans, provide means of transporting people, food and medical supplies;

5) Identification of existing resources, e.g., areas where shelters could be established, sources of food, water and medical supplies, communication and transportation systems, location of reconstruction equipment.

6) Conducting periodic 'mock drills', which are a simulation of a disaster to assess and improve the effectiveness of the disaster preparedness plan of a community or system

EXERCISES

1. What do you understand by disaster preparedness? In India, which are the common disasters we have to be prepared for?
2. What role do you see for yourself in making your community disaster-resilient? Discuss in groups, and share your findings with the class.
3. Discuss methods organise yourselves to manage disasters.
4. When does a hazard transform into a disaster?

Chapter 2

EARTHQUAKES

Ahmedabad 26th January 2001

Improperly built high-rise buildings crumbled and cracked

WHEN THE EARTH SHOOK:

More than 13,000 people were killed, at least 15 lakh injured, 3.4 lakh buildings damaged, and about 7.8 lakh houses destroyed in the Gujarat earthquake of 26th January 2001. Many bridges and roads were damaged. This earthquake, with its epicentre at Bhuj occurred along a fault in the east-west direction. The stress that caused this earthquake was due to the Indian plate pushing northward into the Eurasian plate.

An earthquake in simple terms is a sudden trembling or shaking movement of the earth's surface, called the crust. Most earthquakes are minor tremors. Larger earthquakes usually begin with slight tremors but rapidly take the form of one or more violent shocks, and end in vibrations of gradually diminishing force called aftershocks. The subterranean point of origin of an earthquake is called its focus; the point on the surface directly above the focus is the epicenter. The magnitude and intensity of an earthquake is determined by the use of scales, such as the Richter scale and the Modified Mercalli scale.

Important Terms:

1. ***Crust:*** the solid surface of the earth
2. ***Tremor:*** shaking of the ground
3. ***Epicentre:*** the place on the surface of the earth directly above the hypocentre
4. ***Richter scale:*** a scale which classifies the magnitude (force) of an earthquake
5. ***Modified Mercalli scale:*** a scale which classifies the intensity (effects) of an earthquake
6. ***Hypocentre:*** the place deep in the earth's crust where an earthquake starts

Why do earthquakes happen?

The earth's crust is made of massive interlocking blocks of rock called tectonic plates, which resemble a jigsaw puzzle. These blocks float on a layer of semi-liquid rock called the mantle. This flowing semi-liquid rock causes the blocks in the crust to move against or relative to each other. As tectonic plates collide or move, pressure is built up.

This pressure is released when these plates slip or slide relative to each other, resulting in a fault. These movements cause vibrations to pass through and around the earth in waveform, just as ripples are generated when a pebble is dropped into water.

Earthquakes are natural phenomena. They cause the most sudden of all disasters, without any warning time. Floods and cyclones, the hazards that cause the other major sudden disasters have a warning period, and hence can be anticipated to some extent, allowing for evacuation and protection. Earthquakes happen without notice, and are not predictable or preventable. We can however reduce the damage that they can cause. Most of the damage is caused not by the earthquake itself, but by the buildings that we live in, especially in urban or semi urban areas with concrete structures. The picture shows a high-rise building succumbing to the Gujarat earthquake in 2001 because the required structural engineering norms were not adhered to during construction and design of this building.

How are people affected by earthquakes?

The effects of earthquakes are diverse. People are more likely to die or be injured where large numbers of people live close together, and where local buildings are not designed to resist earthquakes. *About 95 per cent of people killed in an earthquake are killed by falling buildings*. Earthquakes are most dangerous when they happen at night. This is because people may sleep through the first tremors (foreshocks), and so have less time to prepare. Also, lying flat in bed means that you are more likely to be hit by falling objects than if you are standing up. The effects of an earthquake are strongest in a broad zone surrounding the epicentre.

Important Terms:

1. ***Mantle:*** the semi-liquid layer of rock below the earth's crust
2. ***Fault :*** a place where two or more blocks of the earth's crust join

An earthquake can cause other dangerous events, such as landslides, floods, fires, and huge ocean waves called tsunamis.

Why are some people more at risk from disasters than others? Simply, Some people are more at risk because of where they live. Others may be more at risk because of their socio-economic situation.

Certain types of disasters are specific to certain geographical areas. Earthquakes commonly happen along a geological fault (a place where two sections of the earth's crust join). Other types of natural hazards, such as flooding, are widespread across the globe.

Earthquake vibrations last longer and are of greater impact in unconsolidated surface material, such as poorly compacted fill (loose soil) or river deposits; bedrock areas receive fewer effects. Hence, flexible structures built on bedrock are generally more resistant to earthquake damage than rigid structures built on loose soil.

When disaster strikes, the poor are usually the worst affected. This is because they are likely to have less choice about where they live, and many poor communities are forced to settle on dangerous land – on steep hillsides, or in river floodplains for example. In poorer regions, people often build their own houses, and may not have access to information about how to make their homes safer. Even when people do have information, they may not be able to afford stronger, better-quality building materials.

In parts of Iran, which are vulnerable to earthquakes, the days are hot and the nights are cold. Houses are often designed with thick walls and heavy roofs, which are excellent for insulating people from extreme temperatures, but not so good at resisting earthquakes

After a disaster, poorer people find it hard to recover. The physical injuries and destruction, the loss of livelihoods can have serious long-term consequences. If people lose vital tools, or means of transport, then they will have no way to support themselves and their families for the future. They are usually people with no insurance, and will probably have to make do with whatever they can find.

They may find it very difficult to regain the position they were in before the disaster struck.

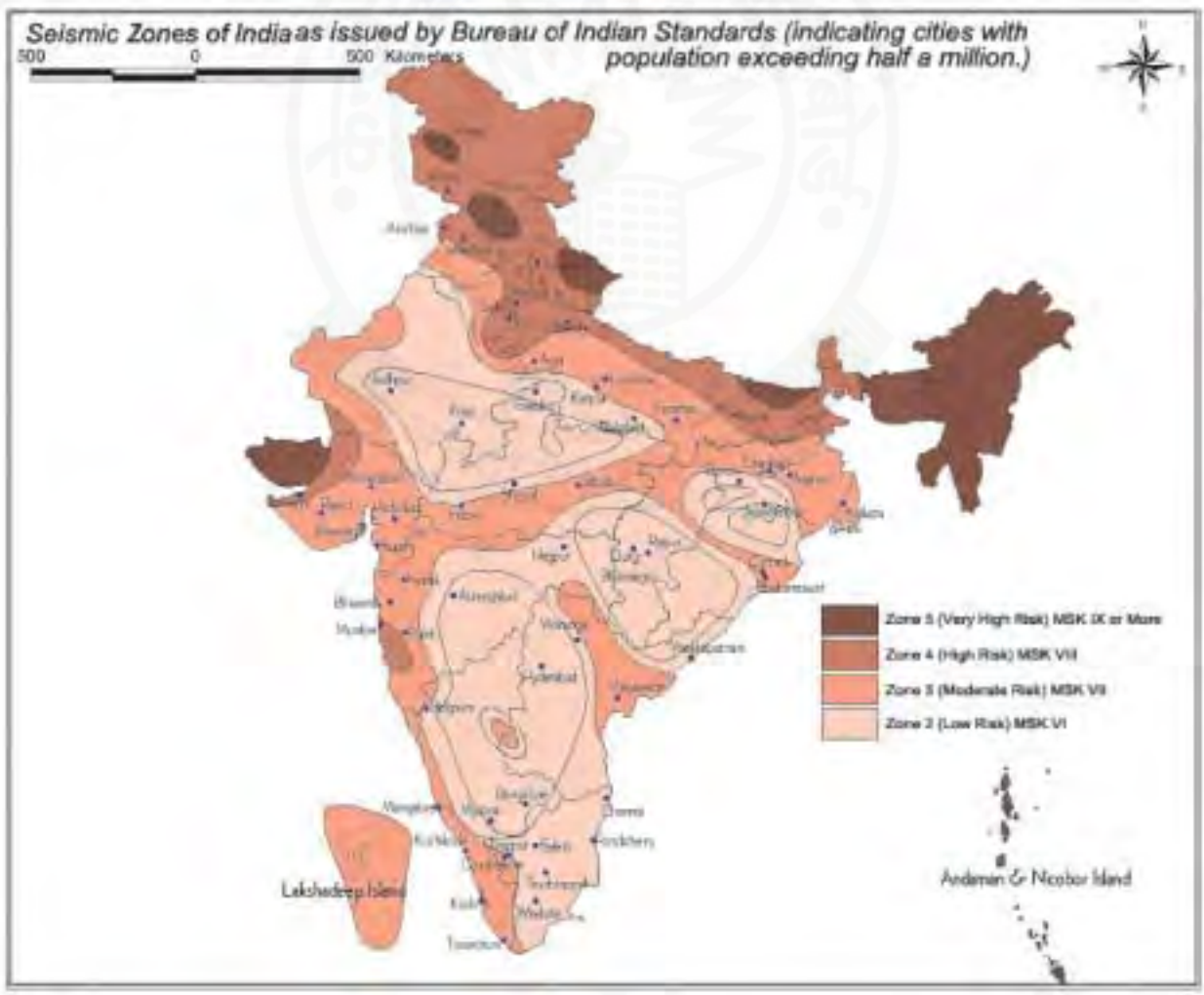
Earthquakes in India

In one form or another, disasters will always be with us. Technological solutions, which try to prevent disasters from happening, may appear attractive, but in reality such solutions can never work alone. The best approach is a combination of good education about the risks, and better preparation.

But before we discuss possible ways to mitigate the impact of earthquakes, or prepare to face them better, let us find out which areas are most vulnerable to earthquakes in India.

The Himalayas are the world's youngest fold mountain ranges. This makes the subterranean area of the Himalayas geologically very active, increasing the probability of earthquakes here.

This is evident in the map below, showing the area around the Himalayas in the highest earthquake risk zones.



Delhi our Capital City and Mumbai, our commercial capital both of which are densely populated, are in Zone 4, a high risk zone. The entire North East Region and the Kutch Region of Gujarat are in Zone 5, meaning that the people of these areas are most vulnerable to earthquakes. The Deccan Plateau, historically believed to be an area of low seismic activity experienced two major earthquakes in recent times –in Latur, (1993, magnitude 6.4 on the Richter scale) that caused substantial loss of lives and damage to infrastructure, and in Koyna, (1967 measuring 6.5 on the Ritcher scale) the strongest ever in the Deccan peninsula, confirming that peninsular India is also vulnerable to earthquakes. **233 out of 597 districts in India fall in seismic zones 3, 4 and 5.**

Which zone does your village or city fall in? Has your village or city ever experienced an earthquake?

How do we measure Earthquakes?

The severity of an earthquake is related to *magnitude*, that is, the seismic energy recorded on a seismograph and *intensity* meaning the observed effects that the ground shaking has on people, buildings, man-made structures and natural features.

There are different ways of measuring earthquakes. The Ritcher Scale (which is open-ended) is a method of measuring the energy, or intensity of an earthquake (how strong it is). The Mercalli Scale (which has twelve classes) is a way of measuring the effects of an earthquake (how damaging it is). An earthquake that is small in magnitude (low on the Richter scale) can still cause a lot of damage (high on the Modified Mercalli scale).

Hence, an earthquake measuring 8 on the Ritcher Scale is stronger than one that measures 4. Similarly, some of the classes on the Mercalli Scale are explained as follows:

Class I - III	Not felt, except by very few people.
Class IV - VI	Felt by nearly everyone. Some windows broken. Unstable objects fall over. Pendulum clocks may stop.
Class VII - X	Everybody runs outdoors. Buildings designed to resist earthquakes and made of strong materials are hardly damaged; ordinary buildings are moderately damaged; buildings not designed to resist earthquakes, or made from weaker materials, are severely damaged. Earthquake is noticed by people driving cars.

Class XI - XII	Total devastation. Earthquake waves are seen on the surface of the ground. Objects are thrown upwards into the air.

PREPARING FOR AN EARTHQUAKE

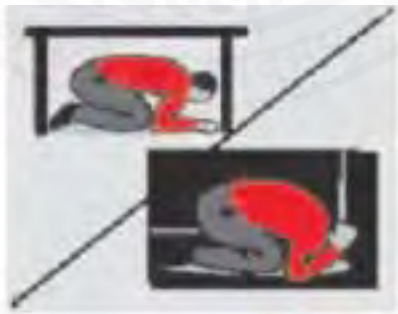
When an earthquake occurs, buildings that are not earthquake-resistant may fall, the walls may collapse trapping people under the rubble. The railway and road routes may be dislocated, increasing the time taken for external aid to reach the disaster site.

1. It is important to ***help survivors quickly***. We have learnt that people living in the region usually carry out most of the first-aid and rescue work, who we call first responders. Hence we have to ***train ourselves in basic rescue and first-aid functions***. Contact your nearest Red Cross office or Public Health Centre or VHW to organise training for your class.

DROP, COVER AND HOLD in the event of tremors.

If you are indoors when an earthquake strikes, stay there. ***Drop, cover, and hold,*** *protecting your eyes by pressing your face against your arm, until the shaking stops. If unable to drop, cover, and hold because there's no table or desk nearby take other protective action. For example, sit on the floor against an interior wall away from windows, skylights, doors, and things that could fall.*

DROP ***COVER*** ***HOLD***



Important Terms:

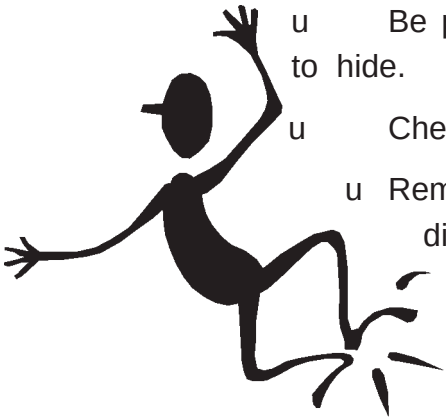
VHW: Village Health Worker, responsible for first aid and basic medical assistance in rural areas and disseminating information on health issues.

2. In the long run, we can ensure the safety of our homes and schools by ***retrofitting existing buildings*** (which we have learnt is to strengthen buildings structurally to make them disaster resistant) to make them earthquake resistant, using ***appropriate technology in building material*** (you will learn more about these technologies in higher classes), and by insisting that ***new constructions adhere to norms*** such as the Building Bye Laws, about which we have briefly learnt. In rural areas, we students can create awareness about the earthquake vulnerability of the area, and what housing designs are best suited to withstand the earthquakes.

3. In case of tremors,

- Duck (bend down) under the desk. Stay away from windows, bookcases, filing cabinets, heavy mirrors, hanging plants, fans and other heavy objects. Stay under cover till the shaking stops.
- If in rural areas, exit your home or school building and move to open fields or areas. DO not push others, and practise this simple exercise every 1st Monday of the month, if you live in zone 4 or 5.
- If your are in a HIGH RISE BUILDING, move against an interior wall and protect your head with your arms. If you have a scooter helmet wear it. Do not use the lift. Stay away from the windows because glass windows can shatter and cause injury.
- If your are OUTDOORS move to a clear area, away from trees, signs, buildings, electrical wires and poles.
- If you are DRIVING pull over to the side of the road and stop. Move away from flyovers, power lines and advertisement boards, jump out of the car and crouch on its side. DO NOT SIT INSIDE THE CAR.
- If your are in a STADIUM, THEATRE, or AUDITORIUM stay inside. Do not rush out towards the exit. Stay in your seat and cover your head with your arms and stay calm till the shaking is over. Then move out in an orderly manner, let younger children, elderly and disabled people leave first.

4. AFTER THE TREMORS SUBSIDE....



- Be prepared for after shocks and remember to find places to hide.
- Check for injuries and first treat yourself. Then help others.
- Remain calm and self-assured and help others who are distressed.
- Check for fire. If near a phone, call the Fire Department (101) or Police Control Room (100) or get assistance in case of a fire. Do keep a bucket of sand ready to put out the fire.

5. If you live in a moderate to very high risk zone, it is possible that after an earthquake your school could become a relief centre. Your teacher would be a member of the Disaster Management Committee of your village or area. In such a case the school would benefit from ——

> Activity:
>
> Discuss in your class and make lists of items for each of these three kits and what it would cost. Can you all contribute to the lists?

- An **Activity Kit** for children who may need to stay at the school after the disaster. This kit can have books, papers, colour pencils and chalk so that young children can draw and write and cope with the trauma they have been through.

  It could also contain games, toys, toffees (which should be replaced before they are stale), etc.

- A **Sewing Kit** to repair and stitch clothes
- A **Cleaning and Utilities Kit** that is very essential for health and hygiene.

It is relatively easy to assess our earthquake risk based on our location with respect to the seismic zones, and other factors such as whether we live in urban or rural areas, seismically safe buildings, etc. Adequate mitigation and preparedness measures can be taken, through concerted efforts. You as a student have an important role to play in educating your people on earthquake risk, as well as creating awareness on how to cope with sudden disasters. The tips given in this lesson should certainly help to prepare you, your classmates, family and community better, to face earthquakes with confidence.

Earthquakes are destructive. But sometimes, they do afford an opportunity for communities to start afresh and improve on their pre-disaster conditions, as witnessed in Gujarat and Latur after the major earthquakes that devastated them.

ACTIVITIES

Organise your School First Aid Kit:

Find out from your teacher or nearest doctor / VHW what you can add to this list

1. Sterile gauze Pads
2. Adhesive Tape
3. Bandage to create slings for fractures
4. Fever reducing and anti-inflammatory tablets
5. Anti-diarrhoea tablets
6. Antiseptic liquid and ointment
7. Hydrogen Peroxide skin disinfectant
8. Cotton wool
9. Oral Rehydration Salts
10. _____
11. _____

1. What is a seismograph? Where is it usually kept in your city? If you live in a village, can you find out where the nearest seismograph is kept?
2. What would you do if you find that some one is trapped inside a building under the rubble and you can hear the person, though you can't see him or her? Can you find out if your village or Gram Panchayat or Block/Taluka has specialised search and rescue teams for disasters, if you live in a rural area? If you live in a city, do you know if such teams exist?
3. How would you deal with a person who has lost everything in an earthquake and is shocked? Find out more about trauma counselling. Who can be a good counsellor?
4. How would you prevent bleeding from a wound on the arm?

5. Make posters to tell people what to do when there are tremors. Display them in prominent places in your village or area, if in zones 3-5.
6. Make an illustrated comic type information sheet on the DROP, COVER & HOLD routine for people or children who cannot read and explain it to them.
7. What precautions should one take when one enters a building that has cracked or collapsed because of an earthquake?
8. Are there Ham Radio Operators in your village or area? Find out more about Ham Radio.
9. Draw a map of your village or area, locating your school, houses, ponds, tanks, etc., as well as open spaces and high-rise buildings. Mark an emergency evacuation route plan, for use in case of an earthquake. Take your plan to your local DMT. Do they have a community contingency plan for your village or area? Take their help to locate possible relief centres and cattle protection areas (if in a village). If your village or area does not have a DMT yet, your teachers could help you with this exercise.

EXERCISES

1. Which earthquake vulnerability zones do you live in? (Use the map)
2. What would you do if you were going home from school and there was an earthquake?
3. Where would you go if you were in the games field and there was an earthquake?
4. What activities would you do with children who have witnessed and experienced an earthquake when they come to a relief camp or shelter?
5. List simple do's and don'ts in the event of tremors or an earthquake.
6. How does preparedness help you and your community when an earthquake occurs.

Chapter 3

CYCLONES

A school building lies in shambles after the cyclone, wind and water ravaged the village

The extract on the right from a newspaper gives you an idea of the devastating power of a cyclone. The Indian subcontinent is the worst cyclone-affected part of the world, as a result of low-depth of the Ocean bed and the way our coast is shaped. The Indian Ocean is one of the six major cyclone-prone regions of the world.

12th May 1990

Andhra Pradesh coast was hit by a severe cyclonic storm on 8th May 1990 with wind speed about 240-250 km/h and 5-6 metre-high storm surges. The area all along the coast of Krishna and Guntur districts was affected severely by the storm, which was accompanied by gales and heavy rainfall. Other areas were affected by flooding due to heavy rainfall. The cyclone affected 9 of the total 23 districts, while the number of villages affected was 5,923. The cyclone killed 928 persons and around 24,000 cattle. A total of about of 7.8 million people were affected by the cyclone. About 827,100 houses were partially damaged while 569,000 were completely destroyed. More than 500,000 hectares of agricultural and horticultural land was affected. Total damage to property was worth Rs 125 million.

Source: Press Release, Government of Andhra Pradesh

Look at this picture. It shows children standing outside their school whose roof was partly blown off, during the Orissa Cyclone on 29th October 1999.

Every year cyclones take their toll on thousands of people, and property. *But the magnitude of destruction can be reduced to a large extent through knowledge and preparedness.*

What Is a cylcone?

A cyclone is a region of low atmospheric pressure, which occurs in the hot oceans of temperate and tropical latitudes. It is a swirling atmospheric disturbance, accompanied by powerful winds (exceeding the 300 km/h sometimes) blowing in a clockwise direction in the **Northern** hemispheres and anti clock wise direction in the **Southern** hemisphere, by pouring rain, and enormous waves in the ocean. Cyclones occur due to a combination of warm sea temperature, high relative humidity and atmospheric instability.

In a cyclone, clouds gather around a centre that is called the **"eye of the cyclone".** A zone of calm, accompanied by good weather characterises the eye. It is in edge of the eye called the "wall of the eye" (in a radius of 20 to 30 kilometres) that the worst conditions prevail, with devastating winds. So, as the eye of the cyclone crosses an area, the wind drops. As it passes, the wind speed rises again, and hence the calm should not be confused as the 'end' of the cyclone.

The diameter of the cyclone is often several hundreds of kilometres. That of the eye varies between 20 and 50 km and the cloudy mass of the cyclone raises to occupy all of the troposphere.

Important Terms:

Troposphere: The layer of the Earth's atmosphere that is closest to its surface, between 0-10 km. Most (90%) of the Earth's atmosphere lies within the Troposphere.

What happens during a cyclone?

The principal dangers from a cyclone are:

(i) Gales and strong winds; (that may uproot trees, destroy telephone lines and electricity poles which may disable power and communication)

(ii) Torrential rain that can cause flooding

(iii) High tidal waves (also known as 'storm surges'). Most casualties are caused by coastal inundation by tidal waves and storm surges.

The rise in water level caused by a storm surge can cause severe flooding in coastal areas, particularly when this surge coincides with the normal high-tide.

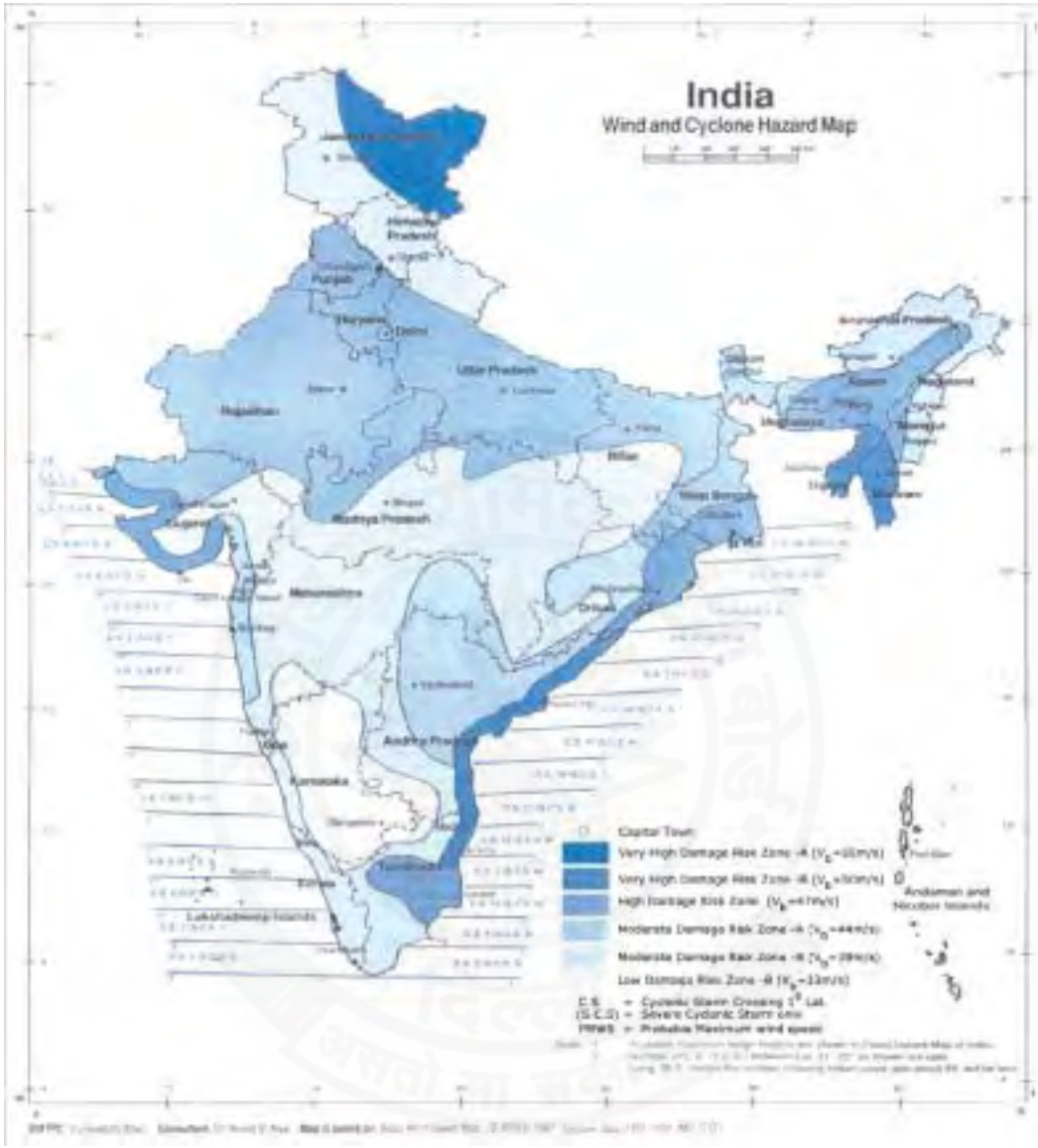
Preparing for cyclones

Knowing about the areas that are most likely to be hit by cyclones is the first step towards preparedness. Cyclones usually occur between 5-20 degrees latitude, North and South of the equator.

Important Terms:

Storm Surge: is simply water that is pushed toward the shore by the force of winds swirling around the cyclone. This advancing surge combines with the normal tides to create a cyclonic tidal wave, which can increase the mean water level by more than 15 feet. The slope of the continental shelf also determines the level of surge. A shallow slope of the coast causes deeper inundation and flooding.

Wind and Cyclone Hazard Map of India:



The eastern coastline is more prone to cyclones as around 80 per cent of the total cyclones generated in the region hit there.

The entire East Coast is vulnerable to cyclones arising mainly in the Bay of Bengal. The states most exposed to cyclone-related hazards, including strong winds, floods and storm surges, are West Bengal, Orissa, Andhra Pradesh and Tamil Nadu along the Bay of Bengal. Along the Arabian Sea

DO YOU KNOW ?
Storms such as cyclones in India are known as hurricanes in the Atlantic Ocean, typhoons in the Pacific Ocean, and Willie-Willie in Australia

on the West Coast, the Gujarat and Maharashtra coasts are more vulnerable compared to the southern part. The **frequency of tropical cyclones is the greatest in the Bay of Bengal and Arabian Sea** as compared to other cyclone-prone areas in the world.

Cyclones and Environmental Degradation

Forests along the coast act as natural wind and water barriers, shielding the coastal communities from the destructive power of cyclones and storm surges. They form natural windbreakers to reduce the impact of cyclonic storms on the coastal areas. But deforestation and encroachment of the coastal shelterbelt area, as this forestland is known, by paddy cultivators, prawn farmers, etc. has been depleting these forests.

Are we increasing our own vulnerability?

True, natural calamities are hard to avert. But in Orissa the ordeal was also man-made. There has been a systematic destruction of mangrove and other tropical trees having branches that send down roots. This growth protected the coastal areas. Greedy people have deforested the coastal areas, leaving no impediment between the sea and habitations.

13 November 1999, Rediff on the Net (adapted from the internet news site)

Cyclone forecasting and warning

The Indian Meteorological Department (IMD) is responsible for cyclone tracking and warning. Cyclone tracking is done through the INSAT satellite and 10 cyclone detection radars. Warning is issued to cover ports, fisheries and aviation departments. The warning system provides for a cyclone alert of 48 hours and a cyclone warning of 24 hours. There is a special Disaster Warning System (DWS) for dissemination of cyclone warning through INSAT satellite to designated addresses at isolated places in local languages.

Cyclone warning and mock-drills work wonders:

This is evidenced from the difference in loss suffered during cyclones of comparable intensity that hit the Andhra Pradesh coast in 1977 and 1990. The cyclones were accompanied by high storm surges of huge intensity. The number of deaths in 1977 was over 10,000 whereas the loss of human lives in 1990 was less than 1,000. Timely warnings issued by the IMD enabled the administration in evacuating and transporting over half a million people from the affected areas, who had practised their disaster preparedness and response plans over and over.

Managing Cyclones....

Managing any disaster requires at the outset, a clear definition of the role to be played by every individual in a community. We have learnt that a Community Contingency Plan is a list of activities a village decides to follow, to prevent loss of life, livelihood and property in case of an emergency. It also identifies in advance, actions to be taken by individuals in the community so that each one is aware of specific responsibility when an emergency warning is received. The community makes the plan, with the help of civil society, government functionaries and elected representatives of the people.

As a student, you have an important role in creating awareness and disseminating information.

In The Cyclone Seasons:

1. Listen to radio or TV weather reports and in case of a cyclone warning, ensure that everyone is alerted. This is usually done through loudspeakers or by going from house to house.
2. Identify safe shelters (cyclone shelters, pucca buildings, etc) in your area, and the closest and safe route to reach them.
3. Keep an emergency kit ready at home
4. Check your house and surrounding areas to see if it is secure. Doors, windows, the roof and walls should be strengthened before the cyclone season through retrofitting, repair, etc.

5. Store adequate food grains and water in safe places.
6. Keep your important papers in the emergency kit.
7. Keep a list of emergency addresses and phone numbers such as the local police station, Block or taluka office (in rural areas) on display
8. Conduct mock drills for yourselves, imagining that a warning has been given.

Upon A Cyclone Warning

1. Listen to your local radio, TV or community warning system for further information
2. Close all windows and doors. Secure doors and stay indoors.
3. Keep food items in waterproof bags.
4. Prepare or update a list of assets and belongings of your house and give information to volunteers and other authorities about your near and dear ones.
5. Get the emergency kit ready and in case of warning of a severe cyclone, move with your family to a strong pucca building or cyclone shelter.
6. Do not venture into the sea
7. Wear warm clothing for protection

If You Have To Evacuate

1. Keep track of radio updates and advice.
2. If the wind suddenly drops, do not venture out, as this could be the eye of the cyclone. Wait till the official 'all clear' declaration.
3. If in a vehicle, stop, but away from the sea and trees, power lines and water courses.

After The Cyclone.

1. Do not go out till officially advised that it is safe. If evacuated, wait till advised to go back. Use the recommended route for returning and do not rush.
2. Check for gas leaks before using the stove.
3. Dry electric appliances thoroughly before use.

4. Be careful of snakebites
5. Beware of fallen power lines, damaged bridges, buildings and trees
6. Do not enter floodwaters.

ACTIVITY I

Read the newspaper article given below :

29 October 1999

Hundreds feared killed as cyclone devastates Orissa coast

Several hundred people were feared killed as the super cyclone with a velocity of more than 260 kph battered 10 coastal districts of Orissa for more than eight hours today. The state government called in the army and the air force to help carry out relief and rescue operations. "You cannot imagine the devastation. More than 200,000 houses have been destroyed and vast tracts in the coastal areas submerged," Chief Minister Giridhar Gamang told the United News of India on telephone. He also spoke to Defence Minister George Fernandes to send in troops, air force helicopters and transport aircraft.

All the 10 affected districts remained cut off from the rest of the country with power supply and telecommunication links cut off. According to initial reports, heavy damage has been reported in the affected areas. Road links in certain areas have been cut off.

The cyclone hit Paradip port this morning at a speed of 260kph. The diameter of the cyclone was very big and all nine coastal districts of Orissa were affected badly. The storm of rare intensity left petrified residents fearing for their lives in the capital and the thickly populated areas along the coast. Massive loss of life and property was feared, but a clear picture will emerge only after the storm abates.

The hardiest of trees fell to the ferocity of the gales, which swept away much of what came in their way. Torrential rains continued to lash the capital city, which is about 65 km from the Puri coast. The flat terrain along the coast allowed the strong tidal waves to reach far inland without obstruction. The cyclone stormed Bhubaneswar at around 0830 IST. The gale speed had touched a howling 260 kph by 1500 IST. Telephone and electricity poles snapped like matchsticks, leaving the telecommunication network in shambles. Power breakdowns plagued the affected areas with little prospects of early restoration of supply. The air traffic control tower in Bhubaneswar reportedly suffered damage, leaving little scope for early resumption of air traffic. Fallen trees blocked the roads and the highway between Cuttack and Bhubaneswar.

The army moved in to provide immediate relief. Two signal attachments were flown in with INMARSAT terminals to re-establish telecommunication links. Electrical and mechanical engineers of the army are already trying to restore power supply.

Huts and other fragile structures collapsed, forcing the inmates to seek shelter in temples and schools. Tidal waves rose two-storeys high, breaking embankments at Talachua in Paradip and Erasama. Large parts were inundated in the coastal areas. But details

were not immediately available. Ships had been taken off the harbour. Several buildings, including the state secretariat complex, were damaged. Eyewitnesses said no tall tree was standing in the entire city anymore. Old-timers said they had never seen such devastation.

The building housing the UNI offices in the heart of the city was among the structures damaged. It forced the agency to shut down its computerised news operations. The only means of communication available was the telephone line, which also threatened to go off anytime.

Full details of the havoc wrought by the cyclone are yet to come in, but it was feared to have left a ghastly trail, especially in the coastal areas. Meanwhile, the railways cancelled 14 passenger and mail trains scheduled to run in the cyclone-affected areas.

Source: United News of India

1. Imagine that you were in Bhubaneswar when the storm struck.... Write down what you experienced and saw around you in a page. Share your experiences with your classmates.
2. In your view, what preventive actions could Orissa have taken to reduce the damage caused when the Super Cyclone struck?

ACTIVITY II

Make a contingency plan with all the members in your class and conduct a mock cyclone drill following a cyclone warning.

ACTIVITY III

How would you increase awareness among your community members about preparedness for cyclones? Make charts and illustrations, which shows this.

EXERCISES

1. What causes a cyclonic storm?
2. What are the hazards associated with cyclones?
3. What is the eye of a cyclone and what are its characteristics?
4. List the steps in preparing for a cyclone.
5. Besides natural causes, what are the man made reasons, which have contributed to increase in the impact of cyclones?
6. Which are the cyclone prone areas of our country?

Chapter 4

FLOODS

The story of Partho

12 years old Partho lives with his parents and three little sisters in a small village nearby the big Mahanadi River in Orissa, close to the coast. His father is a farmer and has a big large field where he cultivates rice. Rice needs lots of water to grow and so Partho's father was very happy when the monsoon started. If he could get good rice and sell it, he would have money to send Partho's younger sisters to school! One day it started to rain and it rained hard for many days. People were happy but the rain didn't stop. After ten days, the villager started to get very worried as the river was swelling. Their fields were at risk of being inundated by the water. Flooding is dangerous for the villagers as it could destroy their houses and crops and also kill them and their cattle.

Partho was home with his sisters when they heard people screaming that the river was starting to overflow. They were all very scared as their house was not very far from the river. Suddenly, Partho remembered what the teacher had told them at school a few weeks earlier during a cyclone and floods preparedness lesson. There was a cyclone shelter nearby the village where people could find refuge in case of cyclones and also floods.

Partho took his sisters to the shelter and they stayed there together with all the other villagers and also their parents. They had to remain in the shelter for three whole days and nights, watching helplessly as homes, fields, bullock-carts, everything got submerged. When they finally came out they were scared and very tired but at least they were alive!

Read the story given above. What helped Partho to save himself and his near and dear ones from being washed away? This is called PREPAREDNESS. Yes! Disasters occur in all the countries in the world. But the community that prepares itself to face them better survives better.

What is a Flood?

A flood occurs when water flows or rises above and beyond its normal place or course. The danger this causes to people and buildings is called the flood hazard. The most common kind of flood happens when a river overflows its banks, and water spreads on to the surrounding land, called a riverine flood.

This is caused by rainwater or melting snow draining into the river faster than the river can discharge water into the sea. The amount of water that a river can hold before a flood starts is known as channel capacity.

Other causes of flooding are strong tides, storms at sea, cyclones, and tsunamis. Sediment deposition or silting of riverbeds and the synchronisation of river floods with sea tides compound the problem of floods in the coastal plains.

Important Terms:

1. ***Flood hazard***: the risk of damage to life, livelihoods or property from flooding
2. ***Riverine flood:*** a flood caused when a river overflows its banks
3. ***Sediment:*** small particles of soil carried in a river which settle on the river bed, or on floodplains
4. ***Channel capacity:*** the maximum flow of water in a river

Other causes of floods

- Blocking of river channels by land slides
- Narrowness of the river
- Change in the course of the river
- Inefficient engineering design in the construction of embankments, dams and canals.

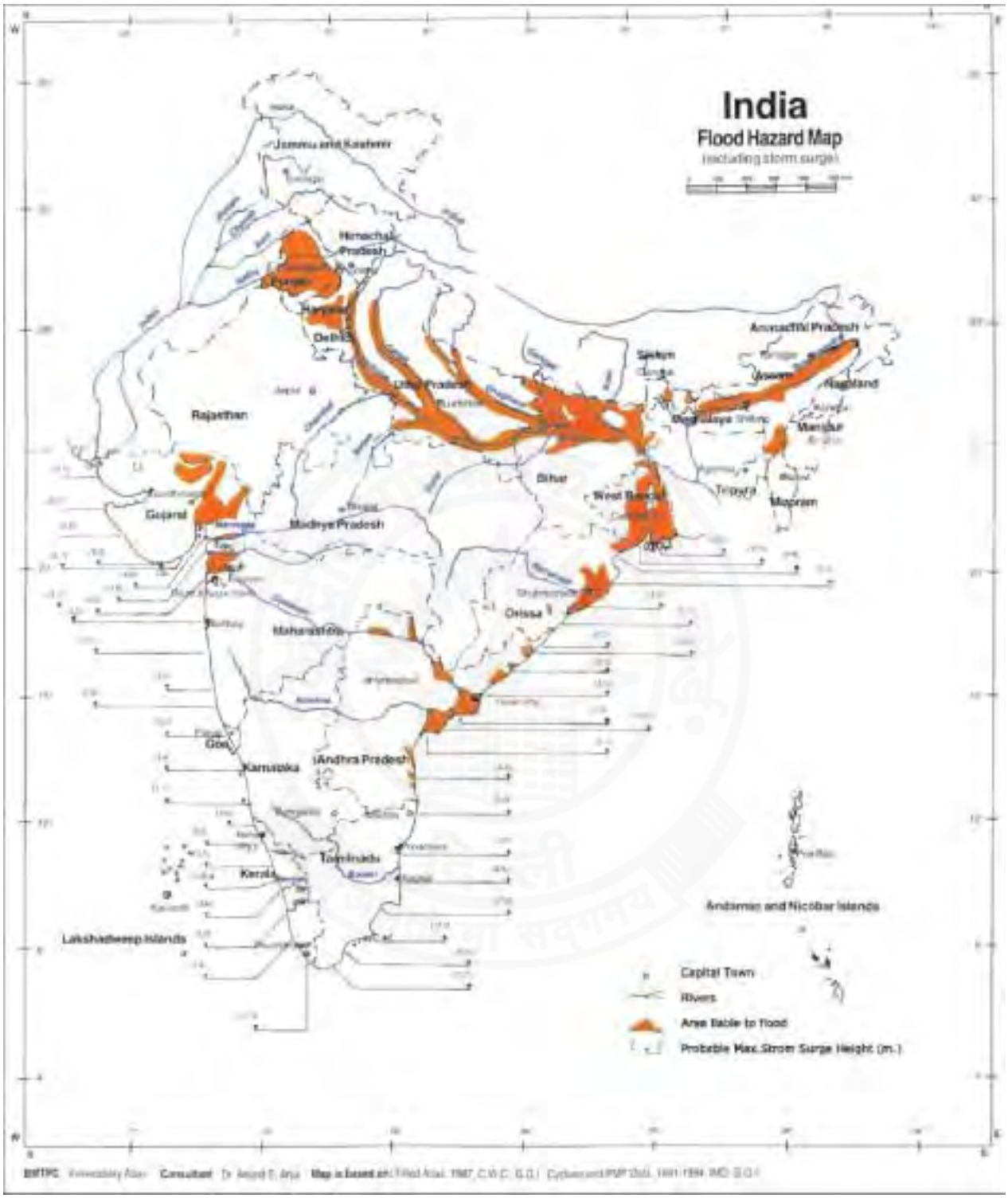
Activity: Write a caption for the above picture

Where do floods occur?

Unlike cyclones, floods are common to all countries. North and Eastern India are particularly prone to floods.

The most flood-prone areas are the Brahmaputra, Ganga and Meghana basins in the Indo-Gangetic-Brahmaputra plains in north and Northeast India, which carry 60 per cent of the nation's total river flow. In India it is spread over 15 states and about 47 per cent of India's population resides in the basin. The other flood-prone areas are the Northwest regions with the west-flowing rivers like the Narmada and Tapti, Central India and the Deccan Plateau with major east-flowing rivers like the Mahanadi, Krishna, Godavari and Cauvery.

The map here shows the flood-prone areas in India. The Ganga and the Brahmaputra cause maximum flooding.



The main season for floods in India is the west monsoon period of June to September. Nearly 75 per cent of the total rainfall is concentrated over a short monsoon season of four months (June-September). As a result the rivers witness a heavy discharge during these months, leading to widespread floods.

Effects of flooding

Flooding is one of the most destructive of all forms of natural disasters causing heavy economic and human losses.

Read the following news report:

Indians flee monsoon floods

Parts of Assam and the neighbouring state of Arunachal Pradesh remain cut off from the rest of the country, as flooding waters have destroyed transport links. Floods in the Northeast of India are an annual phenomenon. In August 2000, floods in the region killed 100 people, and left 70,000 people homeless in Assam alone. Environmentalists blame soil erosion, the silting of riverbeds and the increasing population in the flood plains.

Sunday, 7th June 2002, The Hindu

We should know, that

- floods are an annual feature in some parts of India.
- flooded areas may get isolated from the rest of the country.
- regions near coastal areas and rivers are more vulnerable to flooding.
- Economically and socially backward communities are more vulnerable to the destructive effects of floods. These communities take longer to come back to the kind of life they were leading before the disaster struck.

FLOOD PREPAREDNESS

Floods, which are a natural hazard, need not become a disaster, if we are prepared to deal with them. We know that trained DMTs (Disaster Management Teams) that are in the process of being constituted in each village or urban neighbourhood, would be

responsible for preparedness and response. Each one of us must be involved in the process of preparedness, creation of awareness and the working of skilled emergency response teams. This would reduce loss of life and minimise human suffering. This guide lists simple things that you and your family can do to stay safe and protect yourself from floods.

BEFORE FLOODING OCCURS

- Know the route to nearest safe shelters that you have learnt about earlier. You must have the following ready, to carry to the safe shelter, if need be. This is your Emergency Kit:
- First aid kit with extra medication for snakebite and diarrhoea.
- Strong ropes for tying things.
- A radio, torch and spare batteries
- Stocks of fresh water, dry food (chana, mudi, gur, biscuits, etc.), salt and sugar, kerosene, candles and matchboxes.
- Water-proof bags to store clothing and valuables
- Umbrellas and bamboo sticks (to protect you from snakes).
- If in rural areas, identify areas that are higher than the surroundings, or get your community to build an earthen mound to locate cattle, etc in the event of a flood.

WHEN YOU HEAR A FLOOD WARNING OR IF FLOODING APPEARS LIKELY

- Tune in to your local radio or watch TV for warnings and advice
- Keep vigil on flood warning given by local authorities.
- Keep dry food, drinking water and warm clothes ready
- In rural areas, prepare to take bullock-carts, other agricultural equipment and domestic animals to safer places or to pre-identified areas such as mounds.
- Check you emergency kit.

IF YOU NEED TO EVACUATE

- Pack clothing, essential medication, valuables, personal papers, etc. in water-proof bags, to be taken to the safe shelter.

- Inform the local volunteers or DMT (if available) the address of the place you are evacuating to.
- Raise furniture, clothing, appliances on to beds or tables (electrical items highest)
- Turn off power
- Whether you leave or stay, put sandbags in the toilet bowl and cover all drain holes to prevent sewage back-flow.
- Lock your house and take the recommended or known evacuation routes for your area to the safe-shelter
- Do not get into water of unknown depth and current.

DURING FLOODS

- Drink boiled water.
- Keep your food covered, don't eat heavy meals
- Use raw tea, rice water, tender coconut water etc. during diarrhoea
- Do not let children remain on empty stomach.
- Use bleaching powder and lime to disinfect the surroundings.
- Avoid entering floodwaters. If you must, wear proper protection for you feet and check depth and current with a stick. Stay away from water over knee-deep depth.
- Do not eat food that has got wet in the floodwaters.
- Boil tap water before drinking in rural areas. Use halogen tablets to purify water before drinking (ask Village Health Worker for details).
- Be careful of snakes. Snakebites are common during floods.

You as a student have also a very major role to play in preparing for disasters. In recent times volunteers have played a key role in helping people to rebuild their lives and restore normalcy whenever disasters have tormented the country. They have also played a vital role in creating awareness on disaster preparedness

PROFILE IN COURAGE

BIRA KISHORE GOCHAYAT

Bira Kishore Gochayat who works in Paradip, a port in Orissa, lived up to his name (Bira mean a brave). It was the fateful day of 30 October 1996, the second day of the terrible super cyclone, which battered the Orissa coast. Gales blowing at more than 250 kmph accompanied by lashing rains made the scene frightful, the strong gales pushing the sea waves inland by a few kilometres. Tidal surges at a height of 24 feet hit the shoreline washing away whatever lay in its path. Houses, human beings and cattle were swept off in the dangerously swirling current of the tidal surge. Bira fought to save himself as did so many others. As he perched himself atop of two-storied building, a relatively safe place, he spotted a man desperately battling the strong tidal current. Losing no time, Bira did what his conscience asked him to. He plunged into the swirling water and managed to catch hold of the drowning man and pulled him to safety. It was no easy job, he recollects later, with the strong gales buffeting the water in all directions. Barely had Bira put the man on dry land, he saw some other desperate hands waving at a distance. The rest of the morning saw a tireless Bira risking his life several times to fish out helpless people from the currents. On that day he managed to rescue ten persons from the jaws of death. The fact that his own hut had collapsed and all his personal belongings had got swept away did not distract him from worrying about the well being of others around him.

ACTIVITY 1

- Find out if your village or locality (if in a city) has a DMT.
- Ask how you can help to prepare for disasters, and create awareness.
- If your area is flood prone, do a survey and make a list of old people, women and young children.
- Survey your regions and note down the buildings on raised platforms, which can be used during floods as a safe-shelter. You must also find out the nearest route to the safe shelter, and how many persons it can hold.
- Make posters on how to save yourself from floods and stick them in public places like markets, school buildings, community centre, etc.
- Discuss with your friends and prepare a contingency plan for yourselves. Ask your DMP for the village contingency plans and how you can be part of it.

ACTIVITY 2

Read the newspaper extract of 2002 below:

In Assam, soldiers have helped rescue thousands of people marooned in remote villages, and more troops have been put on 'stand by' for relief operations. An army spokesman said that disaster management squads in speedboats and helicopters were also on standby. This is just the beginning of India's monsoon season, but the rains have been unusually heavy so far.

A. Find out which are the agencies and organisations that play an important role in flood preparedness and response.

B. Make a list of their local offices and people heading them. Ask your teacher to contact Red Cross or any of the other agencies to come and tell you how they prepare for floods and other disasters.

Read the following newspaper reports

ASSAM: Several embankments on the main Brahmaputra River have been breached, with water engulfing more than 600 villages. About 30,000 hectares of crops were also submerged. All rivers in Assam are flowing at dangerous levels threatening several new areas, officials said. The eastern district of Dhemaji was among the worst affected by a breach in the embankment, with at least 250000 people stranded by the rising waters.

UTTARKASHI: Heavy monsoon rains have triggered flash floods in parts of northern and western India. A cloudburst that hit nearby Uttarkashi district created a torrent of muddy water that swept away at least six villages while flowing down the mountains, said D.K. Gupta, from the state control room

MAHARASHTRA: Flooding in the western state of Maharashtra where a few cases of cholera have been reported close to Mumbai.

HIMACHAL PRADESH: More than 100 people were reported to have died in flash floods in the northern state of Himachal Pradesh earlier this week.

The river Sutlej, which runs through the state, was reported to have risen to more than 40 feet above its not level in some places.

BIHAR: Water from two of India's biggest rivers—the Brahmaputra and the Ganges—has engulfed thousands of villages. According to some estimates, nearly half a million people have been made homeless in the northern states of Bihar and Assam.

ACTIVITY 3

Identify the States and areas that are vulnerable to floods by the following rivers:	
1. Brahmaputra	
2. Ganga	
3. Sutlej	

ACTIVITY 4

Given below are the names of common rivers in India. Against each river, tick in the appropriate box to indicate whether it floods frequently or not.

River	Floods frequently	Does not flood frequently
1. GODAVARI		
2. BRAHMAPUTRA		
3. MAHANADI		
4. KAVERI		
5. GANGA		
6. SUTLEJ		

EXERCISES

1. List the causes for floods.
2. Suggest measures to prevent damage from frequent flooding.

   Two measures have been suggested, add more.

   1. Raising the height of public and private buildings in low lying areas
   2. De-silting river beds regularly
   3. _____
   4 _____
   5 _____
3. How can communities prepare to face floods?
4. What should a community do before every flood season, to be prepared?

Chapter 5

DROUGHT

What is drought?

The word drought instantly brings images of dry, parched land, no rainfall, crop-failures, starvation and bad living conditions to our mind. In simple terms, drought is a condition of acute scarcity of water, food, fodder and employment due to scanty rainfall in an area. Crop failure is a serious consequence of drought.

For the last 25 years, since the family of Shyamu shifted to Ramgaon, a small village near Bikaner in Rajasthan, the period between July to September every year, has been a time of insecurity, wait and prayer for rains. This is the monsoon period in Rajasthan, which is an arid region.

Almost every other year, the people of Shyamu's village have suffered from the disabling consequences of drought. "We villagers depend on agriculture for our living and when there is no rain we don't have money to buy even food, far from being able to pay school fees. The drought directly or indirectly affects all of us", says Shyamu's father.

The picture shows Shyamu and his friends praying for rain outside their school. The parched land they stand on is dry and cracked. Unfortunately, prayers do not bring rains. Let us find out from this lesson, what this village can do to mitigate drought….

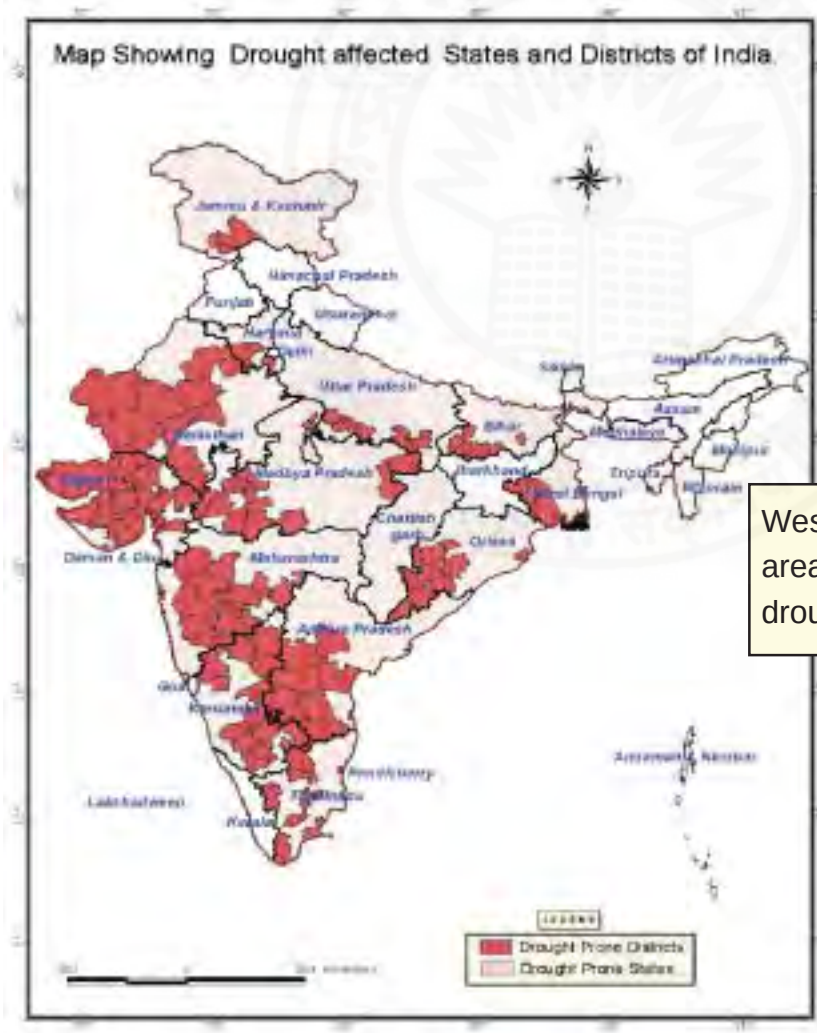
Important Terms

Arid regions: Regions that are dry and receive scanty rainfall, with very little vegetation.

Drought can lead to an acute shortage of drinking water and water for normal domestic needs, caused by deficiency in surface and sub-surface water. This is because scanty rainfall during drought is insufficient to recharge tanks and wells or underground water sources. There is also an acute shortage of water for agricultural operations, including the lack of moisture in soil to grow crops, affecting production. Hence lesser persons would be hired in the farms, leading to unemployment.

Are we all vulnerable to drought, like Shyamu?

Drought is one of the most widespread disasters that India faces, affecting more than 70% of cultivable land. Often, people do not react to drought like they do to other sudden disasters such as earthquakes, cyclones and floods, since drought conditions develop over a period of time, and without immediately perceptible changes to our environment. Hence, drought is called a ***'slow onset'*** disaster.



West Rajasthan and the Kutch areas of Gujarat are chronic drought affected areas.

The western belt including major parts of Rajasthan and Gujarat face frequent drought because of weak monsoons as well as degraded environment.

Among other prominent pockets of drought-prone areas figure Western Orissa and Rayalaseema & Telangana areas of Andhra Pradesh., Chattisgarh, Jharkhand, Central Maharashtra, Interior Karnataka, West Bengal, parts of Tamil Nadu and even water rich states like Punjab, Haryana, Bihar and Uttar Pradesh also experience drought due to insufficient rainfall in certain areas.

In India, 191 districts out of 543 are severely drought prone. In areas that experience drought frequently, the people are more vulnerable to its devastating effects. Two consecutive years of drought means a higher degree of vulnerability in the second year. In 2003, most parts of Rajasthan is said to be experiencing the fourth consecutive year of drought.

Also, certain sections of population living in drought-prone areas are more vulnerable than others. Usually, these sections are people living in rural areas, who depend on agriculture and animal husbandry entirely for a living, or tribals who depend upon forest produce.

Indirect aggravators of Drought?

We have learnt that prolonged scanty rainfall causes drought. In some areas, however, the effects of drought are magnified by other reasons:

Environmental Degradation, especially the loss of green cover affects rainfall received in the region, increasing the possibility of water stress. In areas where vegetation has decreased over the years, rainwater is easily washed away into rivers and the sea, and not retained by the soil, leading to low productivity. Over exploitation of water depletes the source faster than rainfall could recharge it, especially in areas that receive scanty rainfall.

What causes Environmental Degradation?

- ✓ Cutting down trees
- ✓ Soil Erosion
- ✓ Excessive use of ground or surface water
- ✓ Loss of biodiversity
- ✓ Global Warming

Important Terms:

Water-stress: Water stress occurs when the demand for water exceeds the available amount during a certain period or when poor quality restricts its use, and stress causes deterioration of fresh water resources

How does drought affect us?

We have learnt that drought results in acute shortage of water, fodder, food and employment. It affects us in different ways.

Drought affects Farmers: It causes loss of crops, lack of fodder and water to feed their cattle

Drought affects Poor Families: Constant drought reduces agricultural production. This leads to insufficient availability or supply of crops in the market. We learn in economics, that when demand is more than supply, the prices increase. Food-grains become costly, and poor people suffer because of inadequate purchasing power.

Drought affects Women: Even today, especially in rural India, women don't have the same status as men in society. This means that they are not given their fair share in access to nutritious food, good living conditions, education, health, etc. In a drought situation, when there is a dearth of food, women who are usually the last to eat at home, eat the least, and hence suffer from malnutrition. Drought also increases their work burden, since they have to work longer to earn the same wages, and often travel longer to fetch water, fodder and fuel-wood.

It affects people living in desert land: They depend more on animal husbandry than on agriculture. Severe scarcity of fodder and water and degradation of vegetation leads to their dependence on assistance from outside, in some areas.

It affects employment: A fall in agricultural production leads to a fall in employment opportunities for rural people who depend on agricultural labour for a living. It also causes people to migrate to other places in search of employment. These are called 'distress migrations'.

Drought affects Children also: Lack of nutritious food in drought affected areas results in malnutrition, which makes them more prone to various infections and diseases. It affects their health and education, since migrations take them away from school and health camps that also provide vaccinations. School-dropouts most often become wage earners, leading to higher child-labour.

Do you know?

Non-availability of moisture over most parts of the year, makes 68 per cent of the land vulnerable to drought in India. In 2001, more than eight states suffered the impact of severe drought. Find out how many states are afflicted by drought conditions this year… and mark them on a map of India.

Coping with Drought....

We have learnt that drought is a slow onset disaster, and hence gives us ample time for mitigation, preparedness and response, unlike sudden disasters.

We know that drought is a result of multiple causes, the main indicator and cause being abnormally low rainfall. The Indian Meteorological Department tells us the duration and quantity of rainfall expected every season, but this being a natural phenomena, is beyond our control. We can however make planned efforts to conserve natural resources, and prevent misuse of land and water.

Fact:

There is over 100 million hectares of degraded land in the country. Protecting, regenerating and restoring degraded land can reduce the pressure of population on cultivated land and keep forests and pastures safe to supply fodder for the animals.

Hence, while we cannot prevent drought, we can certainly reduce its intensity and impact through individual and collective actions. It is important to remember that any steps taken to mitigate or prepare for drought have to be sustained for a long period of time, and must involve a cross-section of people such as community, Panchayat representatives, volunteers, government functionaries, teachers and students. Let us now see how we can help.

Important Terms:

1. ***Degraded land:*** where crop yield is reduced due to various reasons such as pollution of top soil, soil-erosion, over exploitation, cropping patterns, etc.

Long- term Drought Mitigation Strategies

- ✓ Construction of Community Based Rain Water Harvesting Structures
- ✓ Promoting Watershed Programmes
- ✓ Increasing Forest cover through plantations
- ✓ Adopting drought resistant varieties of paddy and other crops
- ✓ Using alternative crops in drought conditions
- ✓ Capacity building of communities in Drought Management and introducing livelihood options besides agriculture and animal husbandry which are water intensive
- ✓ Encouraging crop and Seed insurance schemes

What can we students do?

1. **Conserve water**: Prevent misuse and wastage of water, and encourage recycling of water. Set up a Water Management Committee in your school and take turns to be members. Can you list three ways of recycling domestic water? (In cities, using water from a washing machine to wash your home and car is an example. In rural areas, directing water from the wash area to the fields or garden is another)
2. **Harvest Rain water** at home and in schools: Find out how you can collect rain water and store it, or use it to recharge a well, bore-well source or sump. Can you use your school as a model for roof-top rain water harvesting in your area?
3. **Plant trees and care for them**: Carry out campaigns for plantations. Find out the right trees for your area. This information will be available with the horticulture, forest or agriculture department or VAW if in rural areas. E.g. Eucalyptus trees must never be planted in dry areas, since they absorb all the water around them

Important Terms:

1. ***VAW :*** Village Agricultural Worker, responsible for disseminating information on crops, irrigation, pest-control, etc

ACTIVITIES

4. C A :

- Find out about the various Government Schemes meant to help people in drought-affected areas, and help your village or area to understand how to make use them. Take the help of your teachers to contact Government functionaries to find out what are the right crops to grow in your area, and what alternative crops can be grown in drought conditions. Also try and list what alternative employment or livelihoods people can seek when drought disables their normal living. Make charts to display this information in prominent places

- Make charts to disseminate information on water conservation and harvesting. Also create awareness on important Do-s and Don t-s before and during drought.

5. H DMT: We are now familiar with the DMT. Find out if there is a DMT in your village or area. Ask if a Community Contingency Plan for drought exists. Ask how you can help the various task forces. Does it use an early warning system?

6. M D - . A :

Don't
▶ Misuse or waste precious water
▶ Destroy natural vegetation such as forests, pastures, trees, etc
▶ Overgraze domestic animals
▶ Grow water-loving plants in water scarce areas
▶ Promote monoculture, and encourage mixed cropping

Historically, conservation of water has been a traditional practise in India.....

In the western and central Himalayas, diversion channels – 'guhls' were built to draw water from hill streams or springs. The length of these channels varied from 1 to 15 km, and carried a discharge of 15 to 100 litres per second.

In Meghalaya, bamboo pipes are used to tap spring water for irrigation, which finally reduces to 20 - 80 drops per minute at the site of the plant, functioning like a drip irrigation system.

The 'ahar – pyne' system of irrigation is prevalent in south Bihar. Ahars are rectangular catchment basins, and pynes are channels built to utilise the water flowing from the seasonal streams.

'Kunds' in the Thar desert, are covered underground tanks with an artificially prepared catchment area to improve run-off. The structure is shaped like a bowl with a lid

In the Malabar area, a 'Surangam' is a tunnel dug through a laterite hillock, from which water seeps out and collects.

Do you know if there are any traditional methods of water conservation in your village or area?

Can we now list out what Shyamu's village and other drought-affected people in India can do to mitigate the effects of drought?

We have learnt that while the natural causes of drought cannot be controlled, the impact of its effects on our lives, livelihoods and environment can certainly be reduced. "…..if care is taken and conservation becomes our way of life, even the desert can bloom. In future the needs of our country will be met and once again we can look forward to economic development for all. Being prepared and knowing what to do is necessary and each one of us can play a very important role in helping..."

M. S. Swaminathan, Eminent Agricultural Scientist

How much water can we conserve at home?

Do a simple calculation to find out:

The amount of water that you can conserve depends on the area of your roof and the amount of rainfall that your area receives on an average. Thus the amount of water you can conserve can be calculated using the following formula:

Volume of water (V) = Area of House (A) x Amount of rainfall (R) x

Efficiency factor (f)

The efficiency factor (f) denotes the efficiency of rainwater collection in your house (it is a % always less than 100%).

Thus for a house of 200 square metres roof area, and average rainfall of 70 cm and an efficiency factor of 50%, the volume of water that you can collect is

V =A x R x f

= 200m^2 x 0.7m x 50% = 70 m^3 which is 70,000 litres of water.

If **N** is the number of members of the family, and **w** the amount of water needed per person, then the total water needed by the family in a day is

W = N x w

If we assume that each person needs 100 litres a day (try and calculate how much water you consume in a day), and we assume that the family has 5 members, they need 500 litres per day.

Now we can calculate the number of days of water supply this family can enjoy from harvested rainwater as

D = V/W

=70,000 (litres) / 500 (litres/day) = 140 days

So this family can use rainwater conserved at 50% efficiency for their household needs for 140 days in the year, which is more than 4 months of the year!

For your family:

A : Roof area to drain rainwater = _____ m²

R : Average rainfall/year for your area = _____ cm

f : Efficiency Factor = _____ %

V=A x **R** x **f**

N : Members of the family = _____persons

w : Amount of water needed per person = _____litres

W: Total water needs of your family/day =_____ litres (**N** persons***w** litres)

D = V/W

Important Terms:

1. ***Discharge:*** the volume of water that passes a given location within a given period of time. Usually expressed in cubic feet per second.
2. ***Drip-irrigation:*** a common irrigation method where pipes or tubes filled with water slowly drip onto crops. Drip irrigation is a low-pressure method of irrigation and less water is lost to evaporation than high-pressure spray irrigation.
3. ***Run-off:*** Runoff is water flow in the topsoil layer. Runoff reaches water bodies after it falls as rain and is discharged from the area
4. ***Laterite:*** A kind of soil or rock that water can percolate through. The water carrying capacity of laterite is very low, and hence is unsuitable for cultivation of major crops.
5. ***Monoculture:*** The use of land for growing only one type of plant. The practice of monoculture on a landscape has an effect that is the opposite of biodiversity, and can sometimes be responsible for the spread of plant diseases
6. ***Aquifer:*** a geologic formation that is water bearing, that stores and/or transmits water, such as to wells and springs. These water-bearing formations are capable of yielding water in sufficient quantity to constitute a usable supply for people.

EXERCISES

1. Choose the right answer to the following questions

   I. The greatest amount of fresh water on the Earth is found in:_____
      a. theoceans
      b. ice caps and glaciers
      c. aquifers
      d. surface water

   II. Groundwater is: _____
      a. not usable because it is dirty
      b. another name for watershed
      c. too far beneath the Earth's surface to be used
      d. another name for an aquifer

   III. Surface water: _____
      a. is used to produce electricity
      b. can be easily contaminated
      c. can be used for recreation
      d. all of the above

2. How does drought affect our lives?
3. List ways to conserve water in day to day use.
4. What actions will help us to mitigate drought, individually as well as collectively?
5. What do you understand by rainwater harvesting?

Chapter 6

Manmade Disasters - An Overview

We have so far discussed possible disasters that can result from natural hazards. We have also seen how human actions in some cases aggravate the disastrous effects of natural hazards. For instance, improper constructions can increase vulnerabilities to earthquakes in seismic zones where earthquakes are more probable. In drought prone areas, wastage of water, or environmental degradation by human actions can magnify drought conditions.

But disasters can also be manmade, as mentioned in the introduction to this book. For instance, rail, road or air accidents are manmade disasters. The threat of serious disaster looms large from the possible use of weapons such as nuclear bombs or the atom bomb that was dropped over Japan during World War II. These weapons are commonly called Weapons of Mass Destruction (WMD), which lead to the breakdown and collapse of social, political and economic systems that sustain communities. Inevitably agriculture and food production are major casualties.

Man-made disasters cost the most in terms of human suffering, loss of life and long-term damage to a country's economy and productive capacity.

Let us now look at the various types of manmade disasters briefly:

WMD

WMD can be broadly classified into three categories – as those that facilitate nuclear, biological and chemical warfare.

The cloud caused by the atomic explosion over Hiroshima

On August 6, 1945, an American B-29 bomber, the "Enola Gay" dropped an 8,900-pound atomic weapon over the city of Hiroshima Two thousand feet above the ground, the bomb, dubbed "Little Boy" detonated, instantly leveling almost 90% of the city. The destruction was incredible. More than 10 square kilometers of the city were instantly and completely devastated; a City center was literally vaporized. The ensuing fireball spread and engulfed many more kilometers of the City in fire. 66,000 people were killed, and 69,000 injured

On August 9, another plane dropped a larger bomb, code-named "Fat Man" over Nagasaki. Local geography spared Nagasaki from the near total devastation suffered by Hiroshima; but one third of the city was destroyed. It killed 39,000 persons, injuring 25,000 more.

With the advancement of scientific research in the world, several countries have acquired the technology to produce Nuclear Arms, which are more destructive and harmful than the atom bomb used more than half a century ago. There is also a risk of accidental exposure to harmful radiation from the several nuclear reactors that are used for generation of power. Theft of nuclear material can enable the creation of crude bombs commonly known as 'dirty bombs' which can be used by anti-social elements or terrorists.

The famous mushroom cloud over Nagasaki caused by atomic explosion

A young girl who was evacuated from Hiroshima a few days before the explosion said– "Suddenly I felt something warm on my left cheek and turned back. It seemed like a strong reflection from a mirror. Then a roaring sound shook the whole village. While I was wondering what had happened, a column of clouds appeared above the mountains in the south in a bright pink colour. Gradually it assumed the shape of a mushroom and rose to the sky. I felt something unusual had happened. However, I didn't ever imagine that the huge city of Hiroshima had instantaneously become a sheet of fire." She lost her parents in the incident.

How can we protect ourselves from nuclear radiation and attacks?

- Don't panic in the event of a nuclear attack or accident. Common indicators of radioactivity are nausea, dizziness, vomiting and disorientation, with no odour but a wave of heat. A nuclear explosion is followed by a 'blast' like the mushroom cloud in the picture above, which can cause instant blindness if viewed.

- Close all doors and windows, and stay indoors till further communication from the Government. Radioactivity does not penetrate solid structures, though fire may cause damage to buildings.

A

- Find out how Potassium Iodate tablets can be used to counter exposure to radioactivity.

Chemical Disasters

Chemical Disasters are caused by industrial accidents, irresponsible handling of hazardous chemicals, or by their deliberate use for destruction. Poisonous gases can cause wide spread devastation because of their nature: they spread easily, and affect large areas. Chemical WMD are relatively easy to manufacture using simple chemical processes, and chemical agents are easily available. Further, they are difficult to detect since chemical WMD are colourless and odourless

'An alarm call to mankind'... The Bhopal Gas Tragedy of December 1984

The Bhopal Gas Tragedy is a catastrophe that has no parallel in industrial history. In the early hours of December 3, 1984 a rolling wind carried a poisonous gray cloud past the Union Carbide Plant in Bhopal, Madhya Pradesh. Forty tons of Methyl Isocyanate (MIC) spread throughout the sleeping city. An estimated 2500 people died, people whose hopes and dreams were ironically bound with the technology and affluence the plant symbolised. About 300,000 suffered from agonising injuries from the disastrous effects of the massive poisoning

Residents awoke to clouds of suffocating gas and began a desperate flight through the dark streets. No alarm ever sounded a warning and no evacuation plan was prepared. When victims arrived at hospitals breathless and blind, doctors did not know how to treat them since emergency information on antidotes was not available.

ACTIVITY:

How can we prevent and prepare for chemical disasters?

1. Find out what industries exist close to your city or village, and whether any of the chemicals they use are ha ardous.
2. Find out whether an emergency plan is in place to deal with industrial accidents, and what antidotes can be used in case of poisoning of people, animals, water sources, etc.
3. Find out whether your local medical association is aware of how to treat patients suffering from exposure to these chemicals
4. Make a report of your findings and take the help of your teacher to inform suitable authorities such as the District Magistrate, Block or Taluka Development Officer, or Municipal Corporation as well as the closest PHC
5. Make a chart of simple Do-s and Don t-s in the event of a chemical disaster based upon information gathered from the industry

Do you know

1 That the first symptoms of a possible chemical leakage are irritation, burning and redness in the nostrils and eyes, followed by nausea, dizziness and disorientation? Pungent or bitter-sweet smells indicate the presence of a gas in the air

2 That panic induced fleeing during a gas leakage is harmful? Stay calm, in the same place, put a wet cloth on your face and breath through it. Most gases will dissolve in water.

3 Lying down close to the ground may help, since most hazardous gases are lighter than air, and will tend to rise upwards.

Biological Disasters

Monday, 22 October, 2001, 20:57 GMT 21:57 UK

Anthrax 'likely' in US postal deaths

A Postal worker in India with a package from the US during the anthrax scare of 2001

Source: BBC News Service

Two postal workers in Washington DC who died from unexplained causes were "likely" to be infected with anthrax, US officials said. Their bodies are being tested for anthrax symptoms amid circumstances described by health officials as "highly suspicious". The revelation came as US authorities confirmed that a second postal worker in the city had tested positive for anthrax infection, bringing the number of cases of infection nationwide to 10. The new victim had the more serious inhaled form of the disease. Of the cases of anthrax that have now been identified in the US, six are skin anthrax and four are inhaled anthrax. One man, an employee of a tabloid newspaper in Florida, died as a result of anthrax inhalation.

Biological weapons are referred to as a "poor man's nuclear bomb" because they are easy to manufacture, can be deployed without sophisticated delivery systems, and have the ability to kill or injure hundreds of thousands of people. Simple devices such as crop dusting airplanes or small perfume atomizers are effective delivery systems for biological agents. In contrast to chemical, conventional, and nuclear weapons that generate immediate effects, biological agents are generally associated with a delay in the onset of illness (hours to days). Moreover, illnesses from biological weapons are not likely to be recognized in their initial stages. With highly transmissible agents (eg, plague and smallpox), the time delay in recognition can result in widespread secondary exposure to others, including doctors and health staff.

Do you know

- That 100 gms. of Anthrax released over a major city may cause up to 3 million casualties

How do we protect ourselves from Biological WMD?

DO-S and Don't-s for Biological Disasters:

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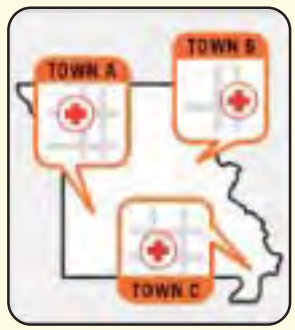

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ACTIVITY:

Can you organi e a mock drill in your class for the various manmade disasters, to see how you will prepare and respond to them?

Accidental Disasters

A large number of railroad accidents take place in India. Every other day, people get injured or die in small accidents. Larger railway accidents including collisions and derailments cause huge losses to life and inflict injuries and disabilities to many more.

"We saw railway coaches piled up like a multi-storey building. The one on top was burning."

- A volunteer at the Gaisal Tragedy of August 1999 in West Bengal.

The Railway Accident at Gaisal, 1999

Activity:

Organise a Traffic Safety Week in your school with the help of your teachers. Ask your local authorities how you can create awareness among commuters.

Various studies being done to analyse the occurrence of various kinds of disasters are showing that fire accidents are very large in number in India. Moreover, the studies also show that the amount of damage from fire hazards over a period of time has often been more than the damage caused by natural hazards such as cyclones or floods. From the nearest fire station, find out what are the simple Do-s and Don't-s that you can follow and create awareness on, to reduce fire accidents, and respond effectively to them.

EXERCISES

1. What causes manmade disasters?
2. How do manmade disasters affect us?
3. How would you protect yourself and your family in the case of a nuclear, disaster?
4. What simple Do-s and Don't-s can you list in case of a biological disaster?
5. How would you recognize the presence of a poisonous gas in the air? What precautions would you take to protect yourself and your family against its harmful effects?
6. Describe how you would help people involved in a road accident in your neighborhood.