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# CLOUD BURST AND FLASH FLOOD



## WHAT IS A CLOUDBURST?

A **cloudburst** is a sudden rainfall which can be quite unexpected, very abrupt, accompanied by hail and thunder.

## WHAT HAPPENS?

It usually occurs in high altitude areas due to the formation of a low pressure area on the top of a mountain. The low pressure zone attracts clouds to the top of the mountain with great force. When they hit the peak, the moisture content is released in the form of rain. In some cloudbursts, up to 5 inches (almost 13 centimeters) of rain can fall in an hour, often in the form of extremely large droplets. All heavy rains are not necessarily cloudbursts.

Because of the amount of rain involved, a cloudburst can be quite dangerous, especially if it lasts for several hours. Flooding is common with cloudbursts, sweeping away people, animals

and land on its way. Often, these severe rainstorms appear in the summer, and in farming communities, they are sometimes welcomed, as a cloudburst can irrigate crops very thoroughly.

#### WHAT IS A FLASH FLOOD?

A **flash flood** is sudden flooding that occurs when floodwaters rise rapidly with no warning within several hours of an intense rain. They often occur after heavy rainfall, usually from a storm.

#### WHAT HAPPENS?

A flood results from days of heavy rain and / or melting snows, when rivers rise and go over their banks whereas flash flood is caused by excess water, usually from a storm. This usually happens downstream from the storm as heavy rains produce more water than the area can handle with nothing to block its buildup or soak it into the ground.

Flash floods can be caused by:

- a heavy rain in an area with *high runoff (no absorption)*
- a prolonged heavy rain feeding into area *watercourses*
- a sudden snow melt
- a rain on frozen soil which melts the snow in addition to the rain volume which cannot be absorbed into frozen ground
- a breakage in a dam or *containment system*
- high tides
- storm surges
- *tsunamis*
- *downstream blockage* of the river channel

These all lead to the same effects

- destruction of roads and bridges
- faster erosion of river banks
- disruption of water supplies and waste treatment
- danger to the life and property

<b>Tsunami:</b> series of waves caused by earthquake and underwater earthquakes
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# SOME SAFETY MEASURES

## BEFORE

- ✓ Make an emergency kit.
- ✓ Make an emergency plan.
- ✓ Tell an adult if you hear a flood warning on the TV or radio.



## DURING

- ✓ Listen to the authorities and safety officials.
- ✓ If there is any possibility of a flash flood, move immediately to higher ground.
- ✓ Help your family to move more important items to an upper floor.
- ✓ Do not walk through moving water. Just six inches of rapidly moving water can make you fall.
- ✓ Turn off utilities at the main switches or valves if instructed to do so. Disconnect electrical appliances. Do not touch electrical equipment if you are wet or standing in water.



- ✓ Ask an adult not to drive into flooded areas. If floodwaters rise around your car, abandon the car and move to higher ground if you can do so safely. You and the vehicle can be quickly swept away.

## AFTER

- ✓ Stay away from flood water. It could be contaminated, meaning contain dangerous substances.
- ✓ Stay away from moving water. It can knock you off your feet.
- ✓ Stay out of the way of emergency workers so they can do their job easily.

## TEST YOUR KNOWLEDGE

### I. Unscramble the following words

1. LAFHS LOFDO
2. OWNMTDRASE LOBAKCEG
3. SUNASTIM
4. LOCDU UTBSR

### II. Fill in the blanks from the following words

*Cloudbursts, Flash flood, Drive, Unpredictable*

1. Cloudbursts are highly \_\_\_\_\_
2. All heavy rains are not \_\_\_\_\_
3. Cloud burst may cause \_\_\_\_\_
4. Do not \_\_\_\_\_ through flooded areas

### III. Match the column

Sl no.	Column A	Column B
1	If there is possibility of flash flood	It could be contaminated
2	Inform an adult	If you hear a flood warning on TV or radio
3	If you are wet or standing in water	Move immediately to high ground
4	Stay away from flood water	Do not touch electrical equipments

## ACTIVITY

Find out if Sikkim or any other state in India has experienced Cloudburst and Flash Floods in the recent past. Include the following information:

1. When did it occur?
2. Where did it occur?
3. What was the loss to people, land and property?
4. What was the action taken by the Government after that?

## DID YOU KNOW?

- ✓ A mere 2 feet of water can float a large vehicle or even a bus. This is why you should never drive through flooded roads.
- ✓ Flash floods can bring walls of water from 10 to 20 feet high.
- ✓ Floods are the most widespread natural disaster aside from wildfires.

# AVALANCHE AND GLACIAL LAKE OUTBURT FLOOD



## WHAT IS AN AVALANCHE?

Avalanche is large amount of snow sliding down a mountainside. It can be compared to a landslide, only with snow instead of earth. It is also called a snow-slide and happens on mountains with extreme amounts of snow fall and build-up. Wherever snow is lying on ground on an extreme and sufficient angle there is potential for a sleeping avalanche.

## WHAT HAPPENS?

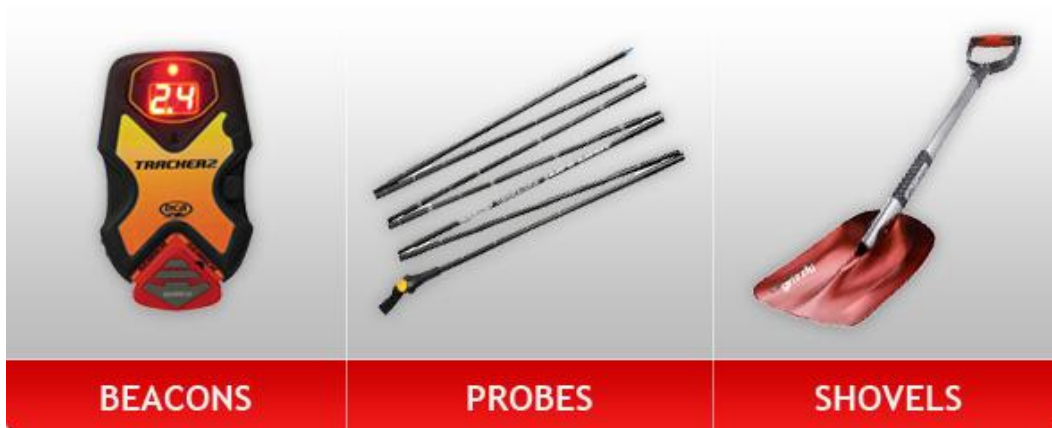
The snow packed down on the surface cannot support itself with all the weight. When another factor is introduced, such as a person's step, this helps to loosen the snow and an avalanche occurs. Major temperature changes, rapid wind speed and man-made influences are the main causers of why avalanches occur.

Three main factors effect whether or not avalanches are probable to occur. These three factors are the weather, the snow pack and the terrain.

# SOME SAFETY MEASURES

## BEFORE

- ✓ When traveling in areas of snow, always travel in a group. Ensure you have an experienced group leader. Always stay within view of your group. Never travel alone.
- ✓ When travelling in avalanche prone areas, always carry safety equipments like beacons, probes, shovels, etc.



- ✓ Heed warning signs and stay alert in avalanche prone areas.
- ✓ Ask driver to drive carefully in avalanche areas.  
Avalanches may reach the road without warning.



- ✓ If an avalanche blocks the highway, remain in your vehicle and fasten your seat belts. Wait for assistance. It is easier to find a car in the snow than it is to find a person.
- ✓ If you live on a farm, ask elders to move livestock away from those areas.



- ✓ If pastures, pens or egress roads are below a slope that is steep and accumulates snow, be careful when heavy snow falls on old frozen snow and is then followed by a warm period.

## DURING

- ✓ Stay indoors.
- ✓ If you become caught in an avalanche, try to:
  - Push machinery, equipment or heavy objects away from you to avoid injury.
  - Grab onto anything solid (trees, rocks, etc.) to avoid being swept away.



- Keep your mouth closed and your teeth clenched.
- If you start moving downward with the avalanche, stay on the surface using a swimming motion.
- Try to move yourself to the side of the avalanche.
- ✓ When the avalanche slows, attempt to:
  - Push yourself towards the surface.
  - Make an air pocket in front of your face using one arm.
  - Push the other arm towards the surface.
- ✓ When the avalanche stops, begin to:
  - Dig yourself out, if possible.
  - Relax your breathing, particularly if you cannot dig yourself out.

- Stay calm and shout only when rescue searchers are near.



## AFTER

- ✓ Listen to radio / television alerts from local authorities.
- ✓ Inform adults if you spot an avalanche site. Do not go near an avalanche site.
- ✓ Be cautious in avalanche prone areas.

### WHAT IS GLACIAL LAKE OUTBURST FLOOD?

Global climatic change during the first half of the twentieth century has had a significant impact on the high mountainous glacial environment. Many big glaciers melted rapidly forming a large number of glacial lakes. Due to an increase in the rate at which ice and snow has melted; the accumulation of water in these lakes has been increasing rapidly. Sudden discharge of large volumes of water with debris from these lakes causes glacial lake outburst floods (GLOFs) in valleys downstream.

Also, glacial lake outburst may be triggered by earthquake, landslide, avalanche, rock-fall, etc. Such outbursts can lead to discharge of millions of cubic metres of water and debris in a few hours and can cause catastrophic devastation and flooding up to hundreds of kilometers downstream. The sudden flooding can lead to serious damage to life, property, agriculture, livestock, forests, ecosystems, the livelihoods of mountain communities heavily dependent on mountain ecosystems for sustenance, as well as precious socio-economic infrastructure/assets like hydro-power, electricity, communications, roads and bridges. All of these can induce

forced migration and undermine the sources of livelihood of mountain people and downstream communities.

## SOME SAFETY MEASURES

### BEFORE

- ✓ Always listen to early warnings issues by local authorities.
- ✓ Since GLOF may be triggered by earthquake, landslide, etc be alert when particularly when such events occur.
- ✓ If you live in downstream areas, pay attention when river level rises or river volume increases.
- ✓ If there are warnings on lake outbursts, ask elders for evacuation to safer places.

### DURING

- ✓ Follow an evacuation plan if required.
- ✓ Listen to your elders / authorities.

### AFTER

- ✓ Listen to radio / television alerts from local authorities.
- ✓ Do not go by yourself to flooded areas.
- ✓ Learn ways by which you may help your community in case of such events.

# TEST YOUR KNOWLEDGE

## I. Unscramble the following

1. AVNAHLAEC
2. LOGF
3. NOSW LISED
4. EAOBCN

## II. Fill in the blanks from the following words

*Earthquake, Snow, Snow slide, Careful*

1. Avalanche is also known as \_\_\_\_\_
2. Avalanche is movement of large mass of \_\_\_\_\_
3. GLOF may be triggered by \_\_\_\_\_
4. In avalanche areas, ask driver to be \_\_\_\_\_

## III. Match the column

Sl no.	Column A	Column B
1	Beacon	Stay on the surface using a swimming motion
2	If you become caught in an avalanche	Cracks and whooping sounds
3	If you start moving downward with the avalanche	Keep your mouth closed and your teeth clenched
4	Good warnings of a pending avalanche	Safety equipment

## DID YOU KNOW?

- ✓ In 90 percent of avalanche accidents, the victim or someone in the victim's party causes the snow slide.
- ✓ Any slope capable of producing an avalanche eventually will. Cracks and whooping sounds are good warnings of a pending avalanche.
- ✓ Avalanches kill more than 150 people throughout the world every year.

# BIOLOGICAL DISASTER



## WHAT IS BIOLOGICAL DISASTER?

Biological disasters are disasters caused by enormous spread of a certain kind of living organism – that may be spread of a disease, a virus, an epidemic, or a sudden growth of the population of a certain kind of plants or animals, e.g. a locust plague.

## WHAT HAPPENS?

Biological disasters could be caused by

- Aerosols - Biological agents are dispersed into the air, forming a fine mist that may drift for miles. Inhaling the agent may cause epidemic diseases in human beings or animals.
- Animals – Some diseases are spread by insects and animals such as fleas, mice, flies, mosquitoes and livestock e.g. malaria.
- Food and water contamination – Some pathogenic organisms and toxins may persist in food and water supplies. Most microbes can be killed, and toxins deactivated, by

cooking food and boiling water. Most microbes can be killed by boiling water for one minute, but some require longer time. Follow official instructions.

- Person –to – person – Spread of a few infectious agents is also possible. Humans have been the source of infection for smallpox, plague, etc.

## SOME SAFETY MEASURES

# BEFORE

- ✓ Build an emergency kit.



- ✓ Build an emergency plan.
- ✓ Keep your surroundings clean.
- ✓ Do not dump garbage indiscriminately.
- ✓ Keep your drains clean.
- ✓ Do not consume contaminated water or food from outside.
- ✓ Do not play with medical wastes.
- ✓ Understand the cause and effects of diseases.

**Medical wastes:** Used needles, medicines that have expired, etc.

- ✓ Listen to warnings from local authorities.
- ✓ Wash yourself with soap and water and put on clean clothes.
- ✓ Check for medications and vaccinations.

## DURING

- ✓ Avoid going to crowded places.
- ✓ If you become aware of an unusual and suspicious substance, quickly get away.
- ✓ Protect yourself. Cover your mouth and nose, use face mask if required.



- ✓ Wash yourself with soap and water and put on clean clothes.
- ✓ If you feel the symptoms of a disease, do not ignore. Inform an adult immediately. Seek medical help. You may be advised to stay away from others or even quarantined.

- ✓ Co-operate with adults if they talk about vaccination. It is for your safety.
- ✓ If you are infected, obey instructions of doctors and adults. Do not neglect your health. Do not attend school unless you are completely healed.
- ✓ Be careful if others around you are infected. Take necessary precautions.
- ✓ Do not assume, however, that you should go to a hospital emergency room or that any illness is the result of the biological disaster. Symptoms of many common illnesses may overlap.

# AFTER

- ✓ Pay close attention to all official warnings and instructions on how to proceed.
- ✓ Listen to radio, television and emergency alert systems.
- ✓ Use common sense, practice good hygiene and cleanliness to avoid spreading germs.

## TEST YOUR KNOWLEDGE

### I. Unscramble the following words with the help of the meanings given

1. ACIVOCATNIN (used for protection from disease)
2. ALAMRAI (disease caused by mosquitoes)
3. NIEFCITON (illness caused by getting a disease)
4. OACNTNTAIMINO

### II. Fill in the blanks from the following words

*Cause and effects, Face mask, Garbage, Syringe*

1. Do not play with used \_\_\_\_\_
2. Protect yourself, use \_\_\_\_\_ if required
3. Understand the \_\_\_\_\_ of diseases
4. Do not dump \_\_\_\_\_ indiscriminately

### III. Match the column

Sl no.	Column A	Column B
1	Medical waste	Biological agents dispersed into the air
2	Aerosols	Going to crowded places
3	If you feel the symptoms of a disease	Expired medicines, used needles
4	Avoid	Inform an adult immediately



## ACTIVITY

Identify one disease caused by each of the following and list the different ways in which we can prevent it

1. Aerosols
2. Animals
3. Food and water contamination

## DID YOU KNOW?

- ✓ **Malaria** is a serious (sometimes fatal) disease that is spread by mosquitoes that have been infected by a parasite. The disease is spread when mosquitoes feed on humans.
- ✓ **Avian flu** is a flu type that affects mostly birds. You might ask why people should be cautious with it. This flu can be transmitted from birds to people, which is quite dangerous.