



URP-302: Urban Hazard and Risk Management

Topic 3: Flood

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What is Flood?

Inundation of land and human settlements by the **rise of water** in the channels and its **spill-over** present the condition of flooding

Difference of 'Flood' in respect to other natural disasters:

- Slow in occurrences
- Occurs in well-identified region
- Occurs during a specific time in a year



Causes of Flood

Meteorological:

- Prolonged and intense rainfall
- Cyclone and storm surge

Hydrological (increased runoff)

- Impermeable surface, resulting in low infiltration
- Lack of vegetation

Anthropogenic:

- Urbanization and deforestation
- Encroachment of flood retention areas
- Climate change and ice melting
- Unplanned flood control measures



Consequences:

Primary Effect:

- Floods damage physical infrastructures such as roads, rails, bridges, and human settlements.
- Millions of people are rendered homeless and are also washed down along with their cattle and property in the floods

Secondary Effect:

- Contamination of water
- Spread of diseases like cholera and hepatitis
- Shortage of food crops

Tertiary Effect:

- Economic hardship (rebuilding cost, food shortage, declined business, reduced tourism)
- Food shortage leading to price hike

Types of Flood

- **Riverine Floods/ Monsoon Floods:**

Riverine floods occur when a river overflows its natural stream bed due to *heavy rains*. The major rivers generally rise slowly and the process takes a few weeks.

- **Causes:** Rainfall, snow and ice melt, landslides, tidal influence, failure of control works, etc.
- **Intensity** depends on Basin characteristics, climate, soil, vegetation, drainage network etc.

- **Flash floods:**

Flash floods occur as a result of rapid accumulation and release of runoff waters from rain storms in mountainous areas. The high flow velocities of flash flood damage properties, and crops.

- **Causes:** Rainfall, landslides, failure of control works, etc.
- **Intensity** depends on Basin characteristics, slope, climate, soil, vegetation, drainage network etc.

Types of Flood

- **Coastal Flood:** Coastal Floods occur when high tidal waves caused by tropical cyclone spill over the coastal area.
 - **Causes:** Coastal storm surges, tides, earthquakes.
 - **Intensity** depends on sea conditions, coastline configuration etc.
- **Local/ Urban Flood:** The very high rainfall intensities and duration in the monsoon season often generate water volumes in excess of the local drainage capacity, causing local floods.
 - **Causes:** Heavy rainfall, failure of drainage works.
 - Intensity depends on drainage network factors, and man-made factors.

Measures to Reduce Flood Damage

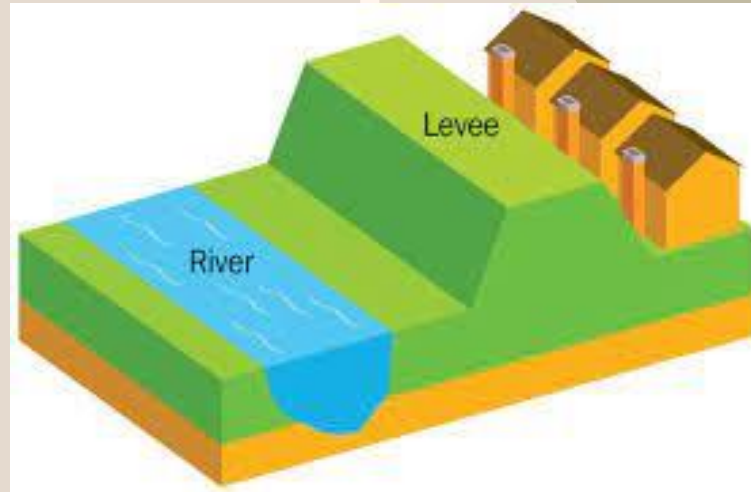
To reduce existing damage:

- Construction of Levee (built of soil, sand, rock), Flood wall (built of concrete), etc.
- Floodproofing of buildings
- Flood warning and preparedness planning

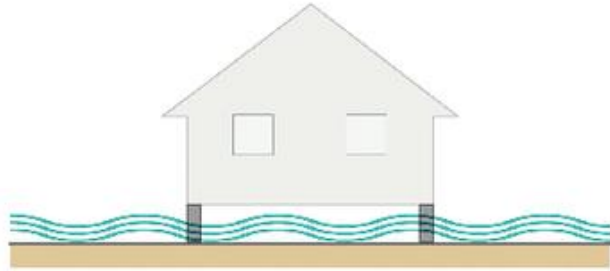


To reduce future damage:

- Land use regulation
- Prevent encroachment of flood retention area



Flood Proofing Measures



Elevation

Raising a building so that flood waters go under it



Floodwalls

Building a wall to keep flood water from reaching a building



Dry Floodproofing

Making the walls of the building and the openings watertight



Wet Floodproofing

Altering a building to minimize damage when flood waters enter

Dry Flood Proofing

- Dry floodproofing means **sealing a building** to keep floodwaters out. All areas below the flood protection level are made water-tight.
- Walls are coated with **plastic or rubberized** sheeting. Openings such as doors, windows, sewer lines, and vents are sealed with removable shields or sandbags.
- Dry floodproofing can only be done if the walls of your home are strong enough to hold back the floodwaters without collapsing.
- For this reason, dry floodproofing is not recommended if floodwaters are expected to be more than two or three feet above the ground level.

Wet Flood Proofing

- Wet floodproofing means modifying a building so that floodwaters will cause only minimal damage.
- Building materials below the flood protection level are replaced with materials that are **resistant to water**.
- Floodwaters are allowed into the building to counteract the pressure of the water on the out-side of the walls.
- In wet floodproofing, the areas are furnished with light, portable furniture that can be easily and quickly moved before a flood. Objects that are difficult to move, are either put on platforms or installed upstairs.
- This is the least costly floodproofing mechanism that can significantly reduce damage.

The background features a light gray base with several organic, flowing shapes. On the left, a large, solid reddish-brown shape curves upwards. On the right, a large, solid olive-green shape curves downwards. A thin, white outline of a leafy branch is visible in the upper left corner. The text "Thank you" is centered in a dark brown, sans-serif font.

Thank you