



## FLASH FLOODS IN INDIA - GS III MAINS

Q. India is the worst flood-affected country in the world. How does anthropogenic induced flash floods impact the ecosystem of India and also bring out how flash floods are unique from the regular floods? (15 marks, 250 words)

**News:** *Afghanistan flash floods kill more than 300 as torrents of water and mud crash through villages*

### What's in the news?

- More than 300 people were killed in flash floods that ripped through multiple provinces in Afghanistan, the UN's World Food Programme said, as authorities declared a state of emergency and rushed to rescue the injured.

### Key takeaways:

- A climate-sensitive nation, Afghanistan was battered by a similar calamity in April as heavy rains and flash floods resulted in the deaths of at least 100 people across 10 provinces in Afghanistan.
- Afghanistan's vulnerability to climate change is exacerbated by its relatively **dry winter**, making it challenging for the soil to absorb rainfall.
- This vulnerability is compounded by the nation's prolonged **history of conflict**, spanning four decades, and its status as one of the poorest countries globally.
- According to scientists, **Afghanistan is among the least prepared nations to confront the consequences of global warming.**

### Flash Floods:

- Flash floods are floods that occur suddenly and with little warning, usually within six hours of the onset of heavy rainfall.

### Features of Flash Floods:

- They are characterized by rapid and intense inundation of water, which can cause significant damage and pose a threat to life and property.
- Flash floods are often associated with cloud bursts, storms, cyclones, or other intense weather events.
- Flash flooding commonly happens more where rivers are narrow and steep, so they flow more quickly.
- They can also occur in urban areas located near small rivers, since hard surfaces such as roads and concrete do not allow the water to absorb into the ground.

### Causes of Flash Floods:

#### 1. Heavy Rainfall:



- When the rate of precipitation exceeds the soil's ability to absorb water, the excess water quickly runs off, leading to flooding.

## 2. Saturated Soil:

- If the soil is already saturated due to previous rainfall or a prolonged wet period, it cannot absorb additional water, leading to an increased risk of flash flooding.

## 3. Drought Conditions:

- Surprisingly, flash floods can occur after a period of drought.
- Dry and hardened soil cannot readily absorb sudden heavy rainfall, resulting in rapid runoff and flash floods.

## 4. Cloudbursts and Thunderstorms:

- Cloudbursts are sudden, intense rainfall events localized in a specific area.
- Thunderstorms can also produce heavy rainfall over a short period, contributing to flash floods.

## 5. Melting Snow or Glaciers:

- Rapid melting of snow or glaciers, especially in mountainous regions, can contribute to flash floods downstream.

## 6. Breaches or Dam Failures:

- Sudden release of water from upstream reservoirs, breaches in landslide dams, or embankment failures can lead to flash floods.

## How Flash Floods are Different from Floods in General?

### 1. Speed of Onset:

- Flash floods have a rapid onset, occurring within a short span of time, often within a few hours or even minutes.
- On the other hand, floods typically develop gradually over a more extended period, often days or weeks, as a result of sustained rainfall or melting snow.

### 2. Duration:

- Flash floods are short-lived events that subside quickly once the intense rainfall or water accumulation event ends.
- Floods, in general, can last for days, weeks, or even months, as they are the result of prolonged precipitation or continuous water inflow.

### 3. Intensity:

- Flash floods are characterized by their high intensity. They involve a sudden surge of water with immense force and velocity, often leading to significant destruction.
- Floods, although they can also be powerful and destructive, tend to have a lower peak intensity compared to flash floods due to their longer duration and slower rise in water levels.



#### 4. Warning Time:

- Flash floods provide little to no warning time since they occur rapidly.
- In contrast, floods typically offer more advance warning as they develop gradually, allowing for evacuation plans to be implemented and emergency measures to be taken.

#### 5. Geographic Scope:

- Flash floods are usually localized events, occurring in specific areas where intense rainfall or other factors lead to rapid water accumulation.
- General floods, on the other hand, can cover larger areas, including river basins, coastal regions, or expansive low-lying areas.

#### Flash Floods in India:

- India is the worst flood-affected country in the world after Bangladesh and accounts for one-fifth of the global death count due to floods.
- In India, flash floods are often associated with cloudbursts.
- The young Himalayan mountain range is highly prone to flash floods owing to overflowing glacial lakes formed due to the melting of glaciers.
- Depression and cyclonic storms in the coastal areas of Orissa, West Bengal, Andhra Pradesh cause flash floods.
- States of Arunachal Pradesh, Assam, Orissa, Himachal Pradesh, Uttarakhand, the Western Ghats in Maharashtra and Kerala are more vulnerable to flash floods caused by cloud bursts.
- Floods in Assam, Bihar, Uttar Pradesh, Orissa and Andhra Pradesh are generally caused by breaches in embankments.

#### Impacts of Flash Floods:

##### 1. Loss of Life and Injury:

- They can lead to drowning, injuries, and even loss of life, especially in areas where warning systems and preparedness are inadequate. measures are

##### 2. Property Damage:

- Floodwaters can damage or destroy homes, buildings, and infrastructure such as roads, bridges, and utilities.

##### 3. Displacement and Homelessness:

- Flash floods can force people to evacuate their homes, leaving them temporarily or even permanently displaced.

##### 4. Crop and Livestock Losses:

- Floodwaters can destroy crops and wash away livestock, leading to significant losses for farmers and agricultural communities.



## 5. Spread of Waterborne Diseases:

- Stagnant water after flash floods can become breeding grounds for disease-carrying mosquitoes and other vectors, leading to an increased risk of waterborne illnesses.

## 6. Erosion and Sedimentation:

- Flash floods can cause erosion of soil and sediment deposition in water bodies, affecting aquatic ecosystems and contributing to siltation in rivers and reservoirs.

## Government Initiatives to Mitigate Flash Floods:

### 1. Flash Flood Guidance Services:

- The Indian Meteorological Department (IMD) developed a reliable system to deliver the required products in real-time to support the creation of warnings for flash floods about 6-12 hours in advance at the watershed level for the flash flood-prone South Asian countries, namely India, Nepal, Bhutan, Bangladesh, and Sri Lanka.

### 2. South Asian Flash Flood Guidance System (FFGS):

- The South Asian FFGS was introduced by the India Meteorological Department (IMD).
- It is intended to support emergency response teams.
- Aids in the prompt creation of evacuation preparations by governments before flooding actually occurs.

## Way Forward:

- The need to have strict implementation of the **Flood Plain Zoning Act** which can regulate the constructions within the flood plain of a river.
- **Landslide risk zonation mapping** be completed on priority. Development and enforcement of guidelines, regulations and codes for landslides is critical.
- Construction of **flood protection embankments** in the flood-prone areas, construction of dams, and afforestation should be done.
- Effective **stabilization of slopes** in weak zones can be undertaken using scientific techniques available at national/international levels.
- **Blasting for developmental activities** be avoided as it may destabilise the weak rocks in mountainous regions.
- The existing **emergency communication system** is reviewed regularly to ensure last mile connectivity during disasters.
- **Investments** in development related to weather, glacial lakes, river flow monitoring, etc. are fundamental for improving the accuracy of risk mapping.