

**Lecture Series**

**Online (2020)**

**Hydro-Geography**

**MSC 4<sup>th</sup> + BS 8<sup>th</sup>**

**Lecture# 1: Date: 16-03-2020**

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**Flood**

**History in Pakistan**

**and its Major Types**

## **History**

In 1950, Pakistan witnessed first but severe flood disaster that claimed 2910 lives and affected more than 10,000 villages. •The need for a flood control program in the then East Pakistan (Bangladesh) was realized only in the late 60s that subsequently led to the incorporation of the program in the Fourth Five-Year Plan (1970-75) but efforts in this directing remained insignificant. One of the major floods in Pakistan began in late July 2010, resulting from heavy monsoon rains in the Khyber Pakhtunkhwa, Sindh, Punjab and, Baluchistan regions of Pakistan, which affected the Indus River basin. Approximately one-fifth of Pakistan's total land area was affected by floods, with the Khyber Pakhtunkhwa province facing the brunt of the damage and casualties (above 90% of the deaths occurred in that Province). According to Pakistani government data, the floods directly affected about 20 million people, mostly by destruction of property, livelihood and infrastructure, with a death toll of close to 2,000.

## **Floods.**

- Floods occur when a river gets more water than its channel can hold. So water flows over the banks and onto the flood plain. A flood is an overflow of water that submerges land that is usually dry. Floods are an area of study of the discipline hydrology and are of significant concern in agriculture, civil engineering and public health.
- It is a natural event or occurrence where a piece of land (or area) that is usually dry land, suddenly gets submerged under water. • Some floods can occur suddenly and recede quickly. Others take days or even months to build and discharge. • When floods happen in an area that people live, the water carries along objects like houses, bridges, cars, furniture and even people. It can wipe away farms, trees and many more heavy items.
- Floods are usually caused by heavy rain – but sometimes by ice or snow melting. A burst of heavy rain can cause a sudden flash flood. People get no warning so they may get trapped and drown.

## **Types of Flood:**

1: Areal Flood.

2: Riverine Flood.

3: Estuarine and Coastal Flood.

4: Urban Flood.

5: Catastrophic Flood.

### **1: Areal Flood.**

Floods can happen on flat or low-lying areas when water is supplied by rainfall or snowmelt more rapidly than it can either infiltrate or run off. The excess accumulates in place, sometimes to hazardous depths. Surface soil can become saturated, which effectively stops infiltration, where the water table is shallow, such as a floodplain, or from intense rain from one or a series of storms. Infiltration also is slow to negligible through frozen ground, rock, concrete, paving, or roofs. Areal flooding begins in flat areas like floodplains and in local depressions not connected to a stream channel, because the velocity of overland flow depends on the surface slope. Endorheic basins may experience areal flooding during periods when precipitation exceeds evaporation.

## 2: Riverine Flood.

- Riverine floods occur in all types of river and stream channels, from the smallest **ephemeral** streams in humid zones to normally-dry channels in arid climates to the world's largest rivers. When overland flow occurs on **tilled** fields, it can result in a muddy flood where sediments are picked up by runoff and carried as suspended matter or bed load. Localized flooding may be caused or exacerbated by drainage obstructions such as landslides, ice, debris.
- Slow-rising floods most commonly occur in large rivers with large catchment areas. The increase in flow may be the result of sustained rainfall, rapid snow melt, monsoons, or tropical cyclones. However, large rivers may have rapid flooding events in areas with dry climate, since they may have large basins but small river channels and rainfall can be very intense in smaller areas of those basins.
- Rapid flooding events, including flash floods, more often occur on smaller rivers, rivers with steep valleys, rivers that flow for much of their length over impermeable terrain, or normally-dry channels. The cause may be localized convective precipitation (intense thunderstorms) or sudden release from an upstream impoundment created behind a dam, landslide, or glacier.

### **3: Estuarine and Coastal Flood.**

Flooding in estuaries is commonly caused by a combination of storm surges caused by winds and low barometric pressure and large waves meeting high upstream river flows. Coastal areas may be flooded by storm surges combining with high tides and large wave events at sea, resulting in waves over-topping flood defenses or in severe cases by tsunami or tropical cyclones.

A storm surge, from either a tropical cyclone or an extra tropical cyclone, falls within this category. This rise in water level can cause extreme flooding in coastal areas particularly when storm surge coincides with spring tide, resulting in storm tides reaching up to 20 feet or more in some cases

#### **4: Urban Flood.**

Urban flooding is the inundation of land or property in a built environment, particularly in more densely populated areas, caused by rainfall overwhelming the capacity of drainage systems, such as storm sewers. Although sometimes triggered by events such as flash flooding or snowmelt, urban flooding is a condition, characterized by its repetitive and systemic impacts on communities that can happen regardless of whether or not affected communities are located within designated floodplains or near any body of water. Aside from potential overflow of rivers and lakes, snowmelt, storm water or water released from damaged water mains may accumulate on property and in public rights-of-way, seep through building walls and floors, or backup into buildings through sewer pipes, toilets and sinks. In urban areas, flood effects can be exacerbated by existing paved streets and roads, which increase the speed of flowing water. impermeable surfaces prevent rainfall from infiltrating into the ground, thereby causing a higher surface run-off that may be in excess of local drainage capacity. The flood flow in urbanized areas constitutes a hazard to both the population and infrastructure.

### **5: Catastrophic Flood.**

The term “catastrophic flooding” is generally used to describe the occurrence of exceptional or rare high magnitude floods.

Catastrophic riverine flooding is usually associated with major infrastructure failures such as the collapse of a dam, but they may also be caused by drainage channel modification from a landslide, earthquake or volcanic eruption. Examples include outburst floods and lahars. Tsunamis can cause catastrophic coastal flooding, most commonly resulting from undersea earthquakes.

**THANK YOU**