

Run off and Controlling factor

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Definition of Runoff

- ❖ Runoff can be defined as the portion of the precipitation that makes its way towards rivers or oceans etc, as surface or subsurface flow.
- ❖ Portion which is not absorbed by the deep strata.
- ❖ Runoff occurs only when the rate of precipitation exceeds the rate at which water may infiltrate into the soil.

Runoff Process

■ ***When rainfall occurs:***

- ❖ A part of rainfall/precipitation is intercepted by vegetation.
- ❖ Some part is stored in depressions on the ground surface known as *depression storage (S_d)*, which later infiltrates or evaporates.
- ❖ Some part of rainfall is absorbed by the soil, the amount of which depends upon the soil moisture condition at the time of percolation.

□ ***Now if the rain continues further;***

- ❖ The water starts infiltrating/percolating to the water table and if the rate of rainfall or the rate at which the water is reaching the ground exceeds the infiltration rate (f), resulting the *surface detention (D)*.
- ❖ This water flow overland and joins the rivers, lakes, streams, oceans, etc, and is known as *surface runoff*.

Portions of Runoff

1. Surface runoff
2. Groundwater flow
3. Direct precipitation over the river stream.

One can say runoff as surface runoff.

- 1) The surface runoff is important for maximum flow.
- 2) Where as the ground water flow is important for minimum flow.
- 3) Direct Precipitation over the river or stream is negligible.

So for peak flow we are generally concerned with surface runoff and therefore we can say runoff as surface runoff.

Factors Affecting Runoff (Mod GargSK)

1. Precipitation characteristics,
2. Shape and size of the catchment,
3. Topography,
4. Geological characteristics,
5. Meteorological characteristics,
6. Character of the catchment surface,
7. Storage characteristics.

1. Precipitation characteristics

- ✓ It is the most important factor for runoff
- ✓ Runoff depends on the type of the storm and its duration, which causes precipitation.
- ✓ Runoff depends on the intensity of rainfall.
- ✓ More the rainfall, more will be runoff.
- ✓ If the rainfall intensity is very less and it rains as light showers then much of the water will be lost in infiltration & evaporation resulting less runoff.
- ✓ If precipitation is in case of snow then less runoff.

2. Shape and size of the catchment

- ✓ Runoff depends upon size, shape and location of the catchment.
- ✓ Generally more rainfall on smaller area resulting in greater runoff.
- ✓ Less runoff in larger catchments because due to uniform rainfall over the entire area, thus only few tributaries of the stream feed water to a main stream during a particular storm.

3. Topography

- Runoff depends on surface smoothness and slope.
- If slope is steep, flow will be quick and less evaporation and absorption, resulting greater runoff.
- If the catchment is in mountainous area and on the windward side of the mountain, then more rain fall resulting more runoff.

4. Geological characteristics

It is one of the important factor.

- It includes the type of surface soil, subsoil, type of rock and their permeability characteristics.
- If soil and subsoil is porous, seepage will be more resulting reduction of the peak flood.
- If the surface is rocky, then absorption will be nil resulting more runoff.
- If rocks have fissures, are porous in nature, have lava funnels water will be lost resulting less runoff.

5. Meteorological characteristics

- Runoff may also be affected by temperature, wind and humidity.
- If temperature is low and ground is saturated then runoff will be greater.
- If temperature is high and greater wind velocity give rise to greater evaporation loss and resulting in less runoff.

6. Character of the Catchment surface

- Runoff depends upon the surface conditions like drained, undrained, natural or cultivated.
- If the surface has no natural drainage then absorption loss will be more.
- If more area of a catchment is cultivated resulting less runoff.
- Vegetal cover reduces the runoff in smaller storms.
- No vegetal cover reduction in bigger storm.

7. Storage characteristics

- The artificial storage such as dams, weirs, etc and natural storage such as lakes, ponds, etc tend to reduce the peak flow.
- They also give rise to greater evaporation losses.

Thanks