

## Characteristics of drainage basin

1. Size of the basin:

2. Shape of the basin: Can be any shape. Two parameters to identify shape:

(a) Form factor:

B is a hypothetical parameter. It cannot be measured directly. So it is expressed in terms of A and L.

With the change of form factor what will the variations in the shape of hydrographs?

(b) Compactness Co-efficient:

Parameters of hydrograph: Peak intensity, Time to reach peak, Volume of water

Hydrograph may change due to variations in rainfall event.

## Effect of Urbanization

The amount of surface runoff is related to covered land/bare land ratio.

At the pre-urban zone the amount of water released through the process of evapotranspiration is almost 40%, but for the urban it is only 25% due to lacking of green trees. So, obviously rest of the water must be drained off through the process of percolation and surface runoff. But as urbanization reduces the bare land so the amount of percolation is only 32% compared to 50% that of pre-urban zone. So, a huge surface flow occurs. If the city is not equipped with proper drainage system the city is water clogged. This sudden jumps in surface flow that adds to the river slump also causes urban flood.

So, engineering design is related to urban planning. We will have to design the storm sewer system according to the ratio of surface runoff whether it is 30%, 50% or 80%. Again these percentages also depend upon the policy taken for urban area and the proper implementation of the policy. So engineers and planners need to work with close integration.

**Effect on lag time:** Lag time is the time difference between CMP and CMR. (CMP = Center of mass of precipitation; CMR = Center of mass of Rainfall ) lag time is the time after which we get the peak intensity from the starting of rainfall. Before urbanization lag time was longer, but after urbanization lag time is shorter. That means the river as an outlet of a city area, is subjected to huge amount of peak discharge within a very short time. Most of the time of the year the rivers flow normally, but during rainy season they are subjected to a huge amount of water of the nearby cities. So the rivers remain no more capable of bearing a huge volume of water. Hence the rivers are needed to be dredged.

**Effect on GWT:** Due to urbanization a huge amount of ground water is extracted. However the ground is not being recharged due to lower rate of infiltration as an effect of urbanization. So the ground water table is decreasing day by day that is known as ground water depression. In Dhaka city the ground water table is decreasing 1-3 meters per year. There are a lot of evidence of ground subsidence in Bagkok, Thailand.

Changes in the runoff pattern:

Ground subsidence: All the structures exert load on the ground. The ground soil particles as well as the water molecules those are attached to the soil particles with a cohesive force bear all the loads. If the GWT goes on decreasing the cohesion between water and soil particles will be disturbed. So all the ground loads will be subjected to the soil particles. Hence Ground subsidence may occur.