DRAINAGE BASIN STORES

In this essay I intend to give brief descriptions on 4 types of Drainage Basin Stores, and then explain how different human actions can influence these. As explained in previous pieces of work, the water system is made up of several stores and flows, one input (precipitation), and 3 outputs (run-off, evaporation, transpiration).

The four main stores I am working on today are Interception, Soil, Surface and Ground water.

Water will almost never land directly on a bare surface. Most commonly, when rain is falling it will first hit vegetation – e.g. the leaves on tree branches. The water can then be stored here. The term for this process is interception – the water has been intercepted from continuing through the hydrological cycle. However, the amount of water that is intercepted relies on a number of factors:

- The Type of Vegetation – trees and grass would give very different interception amounts due to being very different in structure.
- Precipitation Type – Snow, hail and rain have different characteristics and behave very differently when concerning interception and run-off.
- Precipitation Duration – different effects are produced by prolonged rainfall and short showers.
- Precipitation Intensity – varied levels of rain produce corresponding amounts of interception and run-off.
- Time of Year – each season has a different influence on the water cycle.
- Land Use – When concerning crops, different impacts on interception can be found.

These are all natural factors which affect the Interception store, but human factors can largely influence it as well. One example of this is Urbanisation. This means that large area's of land which were once lush and green will become covered in impermeable surfaces such as tarmac; any precipitation landing here will therefore not be intercepted as there is no vegetation to do so. Another factor is Deforestation. This is a growing concern in modern society as it is happening at a rapid pace, and although actions have been taken to redevelop forests etc we cannot possibly keep to the current rate. Without trees, interception rates will dramatically decrease, perhaps resulting in more flooding because the water will reach the rivers at a much faster pace. And even if we do manage to replace every tree we cut down with a new one, chances are it will be a different type of tree. This may not seem like a big deal at first, but we know that coniferous tress hold much lager amounts of water than deciduous ones do, so once again, water will reach the river much quicker.

Not all of the water which lands on a tree will be stored however. Some of it will take another path – a process called Through Fall. This is when water drops off leaves through the canopy and reaches the ground. It can then be stored in the soil. Initially, the soil store does not seem very important to humans – we can't use it for drinking water as it is too difficult to extract, and all moisture in the soil turns it into mud. But the reason it is so important is because the soil store is where all vegetation gets its water from (apart from interception). Without a water supply in the soil, the plants will be undernourished, and effectively will not grow to be a successful crop. Soil storage is highly variable though, I can be completely dry after a few weeks of little or no rain, yet it can be heavily saturated after prolonged rain. Even though humans don't directly depend on this store, we do affect if in several ways. For example, Farmers will often try to alter the saturation of soil in order to suit their crops needs. Irrigation adds moisture to any deficiencies, whilst drainage can reduce any excess moisture in the soil. Another way in which humans affect the soil store is by compacting land. If cars or heavy machinery are using a specific piece of land, be it a field entrance of a dirt track, the soil becomes so compacted that water can no longer infiltrate.

Next we come to the surface store. This can exist in many ways – puddles, ponds, lakes and wetlands. Due to its easy access this store is a major source for humans. Some of its uses are transport, fishing and recreation. However, 2 natural factors affect just how much water there can be at the store:

- Relief of land – flat areas of land are or basins are required to create a surface store because even a shallow slope can cause the water to drain away.
- Rock permeability – if rock is permeable there will not be a surface store as the water can pass through, but if a large surface store is needed then it must have an impermeable rock beneath it.

Whilst these to factors can clearly not be affected by humans, we can still change this store. Urbanisation means that much larger surface stores will exist because much of the surfaces will be impermeable. Using too much of a surface store can also have drastic affects – the Aral Sea is a prime example of this. Over the last 60 years, interference of rivers supplying water to this sea has meant that it has suffered a 70% decrease in size, and now exists as 2 lakes.

The Ground Water store can help counteract the overuse of surface store but mismanagement will have negative outcomes. The Ground Water store is found under the soil store, beneath the surface. The water may pass deeper into the store providing there is a suitable underlying parent material to act as an aquifer. Aquifers have an acute effect on the hydrological system. Having an aquifer present means surplus rainfall can be absorbed and later released during times of deficit rainfall. However, as previously mentioned, mismanagement can have serious consequences. If extraction (or ground water mining) rates are higher than recharge rates then the aquifer will diminish. But why the big deal? Well, if the ground water store dries out then this will affect the water table. The water table is the boundary between saturated and unsaturated rock beneath the surface. The water table will drop having large consequences on the rest of the hydrological system. By extracting water for industrial, farming and domestic use the hydrological system will be short circuited, affecting later stages in the system.

As you can see, the way in which we use water can have damaging affects upon the water system. We need to pay close attention to this fact in order to restore it for further years.