

## **River Flow and water Management**

### **1. Explain why infiltration is the crucial 'valve' in the water cycle.**

Infiltration is very important due to its position in the water cycle. Its position is very close to the start of the cycle, creating knock on effects to stages later on in the water cycle. The amount of infiltration that occurs decides the amount of water that will carry onto later stages. If a low amount of water infiltrates it means a higher amount of water will flow through overland flow and through flow. Once an amount of infiltration occurs it will set the amount of water that will be above ground. After infiltration occurs percolation occurs moving the water further underground.

### **1b. Explain each of the factors that can affect infiltration rates.**

**Rock Type** – The rock type can affect the amount of infiltration as different rocks have different amounts of permeability. The more permeable the rock the more water it will allow in, meaning greater infiltration. Impermeable rocks such as granite won't allow water into them eliminating ground flow. Soils create the same effects. Soils such as clay with smaller pore, air spaces allow less water in creating slower infiltration rates.

**Shape of the Land** – Steep slopes encourage overland flow more than infiltration due to the effects of gravity and the shorter time that it takes to infiltrate. On flatter land, where overland flow isn't as successful the amount of infiltration is greater as the water has no other path or option to take, other than infiltration.

**Land Use** – The use of the land is very important, as this will dramatically vary the amount of infiltration. In areas of urban development on the drainage basin will almost completely eliminate infiltration due to the use of impermeable concrete.

**Vegetation** - Vegetation increases infiltration as it reduces overland flow and increases rates of infiltration. But it also increases interception storage and, depending on the density of the vegetation can vastly decrease the amount of through flow through infiltration.

**Rainfall** – The amount of rainfall is very important as with an intense period of rain doesn't result in high infiltration rates. As infiltration is a slow process the sudden burst of precipitation can't be absorbed. A long period of rain on the other hand will increase infiltration rates as the process can keep up with a slow but steady amount of rainfall.

**Climate** – The climate is important as it can affect the ground itself. In periods of heat the ground can become baked meaning the amount of surface run off will increase. Also if the ground becomes frozen the same will happen resulting in lower infiltration rates.

### **2. Explain the term 'Water Budget' with reference to Fig.1.11.**

A water budget helps show us the detail of the processes that take place in the drainage basin on a yearly basis. It shows the balance of the water and the usage and

quantity of water at that time. Water budgets can be compared to see how the drainage basins in different climates act. Looking at figure 1.11 we can see how the processes vary in the contrasting climates. The more temperate climate of Birmingham shows only a small period in the height of summer when there is water deficiency. The term means there is a shortage in the balance of the water. We can also see that after this period of deficiency the drainage basin recharges itself with the autumnal rain. It then reaches a point where there is surplus, too much water that is needed. This would result in overland flow due to the soil contain the optimum amount of water. In contrast, in Greece we can see there is no period of surplus water. For the last spring and summer months we can see the drainage basin is suffering from deficiency. For a long period of time there is insufficient water supply. This means the supply of water must be carefully rationed or the basin will dry up completely. The main factors affecting the moisture of the soil are the variation of inputs and outputs. The greater the input of precipitation and infiltration the more moist the soil will be, creating storage of the drainage basin. But the more moisture lost through evaporation, percolation and evotranspiration the poorer the soil will become. The type of soil also affects its storage capability. Smaller soil particles help retain water such as clay which is naturally a wet soil. Sandy soils on the other hand drain very quickly and suffer from low moisture content in the summer. There are likely to be sandy soils in Greece because of this.

### **3. Explain the significance of 'water budget' for Southern Water.**

Southern water must pay very close attention to water budget graphs and related information available to them as southern England has the worst record for water deficiency in the past. Although this is mainly due to the higher temperature in the south there are steps they can take to prevent shortages. Using water budgets they can study areas in the south to predict their patterns of storage of water to predict the distribution of water. Using past records they can find out the general pattern of when the amount of water is at its highest. Using the general pattern of our British climate it is safe to predict that the winter months will be wetter than the summer months. There is therefore likely to be a bigger chance of water surplus in those months. But the trouble is the usage of water in winter months will be lower than that of the summer months. The reason being is people don't need to water their plants or wash the car when the higher amounts of rain are already doing that for them. The time when people's usage of water increases is the time when there is water deficiency. Southern water need to use this information to keep storage of the excess winter water and not let it go to waste through overland flow into surrounding rivers. This water surplus needs to be stored as extra water in case there is water deficiency and extra water is needed. Although they cannot change people's demand for the water itself they can control the storage of the excess water. When the drainage basin reaches optimum capacity the excess water would go to waste or even cause flooding. If southern water stored the excess for summer months they could prevent shortages and even possibly prevent a hazard in the making.