

## What are river processes and what landforms do they create?

### What processes are associated with rivers?

A river system or **drainage basin** is made up of **inputs** (e.g. rain), **outputs** (e.g. channel flow) and **processes** (transfers e.g. evaporation and stores e.g. lakes). Drainage basins are separated by areas of higher ground called a **watershed**. Within the channel there are three main processes:  
**Erosion** - Abrasion; Attrition; Hydraulic action & Solution  
**Transportation** - Traction; Saltation; Suspension & Solution  
**Deposition**

### What landforms result from these processes?

#### Waterfalls - Sipi Falls - Uganda



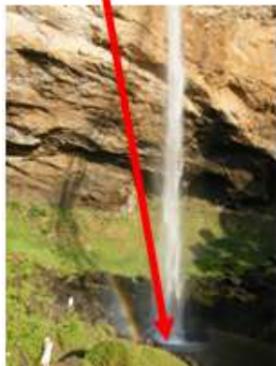
Hard rock layer (volcanic basalt in Sipi Falls) forms a resistant lip.



Soft rock (sedimentary limestone in Sipi Falls) is more easily eroded causing undercutting.



Plunge pool caused by hydraulic action and abrasion eroding the soft rock.

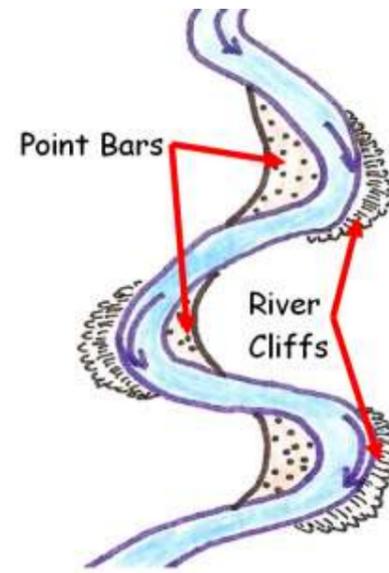
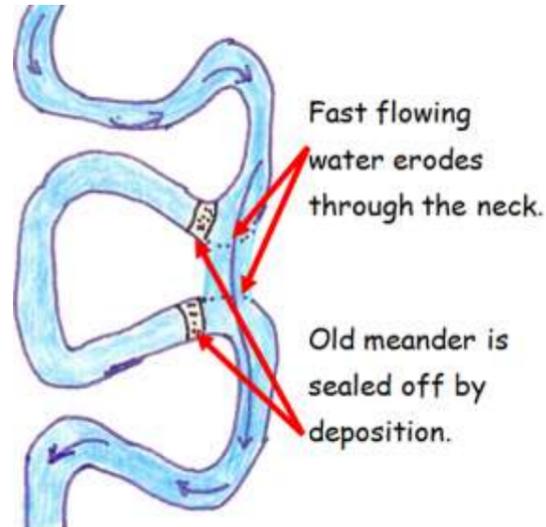


Waterfall retreats backwards leaving a gorge.



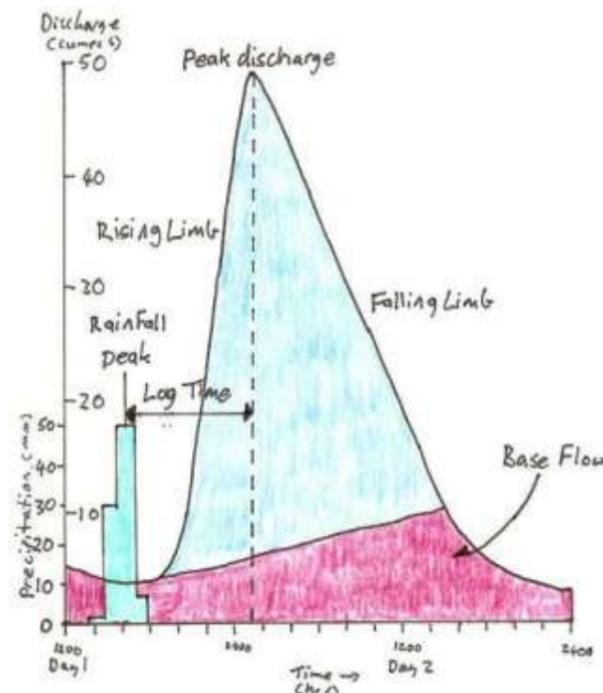
#### Meanders - River Taff - Cilfynydd

Fast water on the outside of the bend causes erosion forming **river cliffs**. Slow water on the inside of the bend causes deposition of material to form a **point bar** (slip-off slope).



### How do these landforms and processes affect the lives of people living along rivers?

Some landforms such as Sipi falls are spectacular and may lead to the development of **tourism**. Other such as meanders may cause problems - erosion and undercutting of the river cliff on the River Taff needs to be prevented to protect the railway. Other risks on the slip-off slopes include **flooding**.



Risk of flooding is shown on a type of graph called a **flood hydrograph**. If the **rising limb** is steep then the river is likely to flood if there is a short **lag time** then the river is also likely to flood. A high **peak discharge** is another danger sign.

Other effects could be to act as a **barrier** to people such as the River Severn acting as an economic barrier to Wales or as a **resource** such as the River Nile in Uganda which provides **water and hydroelectricity**.

### How should rivers be managed? How successful are different management approaches to the problem of flooding?

How successful are different management approaches to the problem of flooding?

In our DME we looked at:

**Hard options** - these are often larger and less sustainable options. Building large **dams** such as Llyn-On or **by-pass** schemes where tunnels are built to carry flood water - sometimes pumps are used such as on the River Rhondda. Other examples include large scale river **straightening** and large scale concrete levees. These have both been used on The Mississippi River in the USA. Hard options tend to be less sustainable because they have a bigger impact on the natural environment and also they cost more to build, maintain and operate.

**Soft options** - these are often smaller local schemes and are often more sustainable. Planting **trees** is a good option because trees intercept flood water but also provide habitats for wildlife and help fight climate change. Small scale **embankments** are another good example especially where they are built so that trees and bushes grow to create a habitat. These are more sustainable because they support wildlife and also cost less to build and maintain.

### Should we change our approach to river and floodplain management in the future?

You will need to decide - in the past people just thought that floods should be stopped - whatever the cost to the environment and the tax payer. Now we think:

- that building should be stopped on flood plains
- floodplains should be zoned
- managed wetlands are good in areas
- it is better to create forests instead of building dams.