Module 1

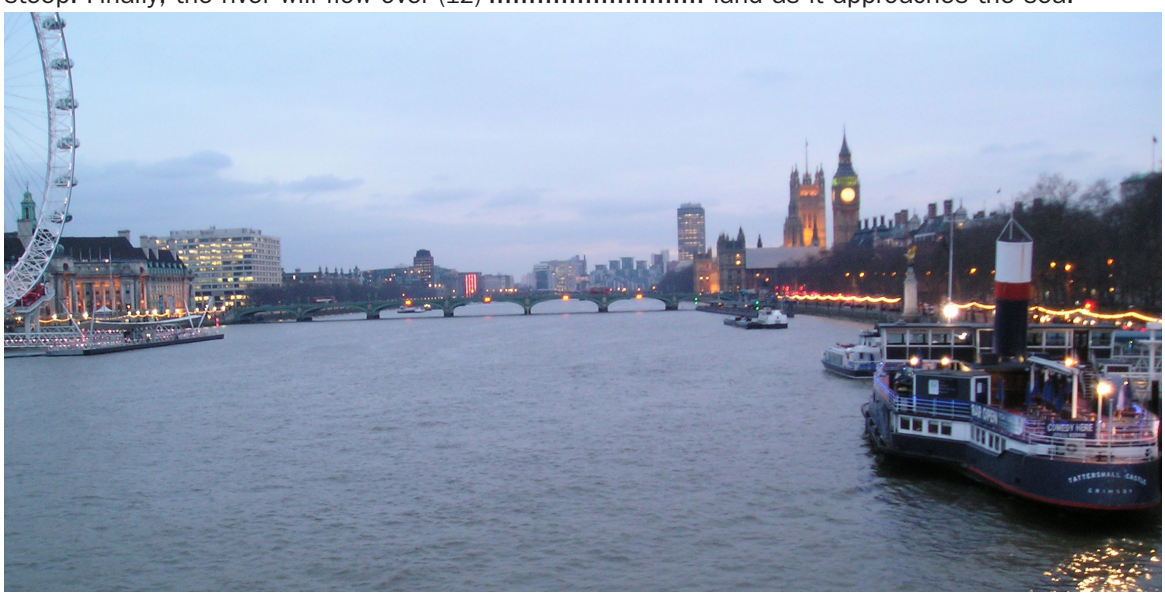
The environment

A • River landscape

1 *Complete the text with the words in the box.*

area • caves • channel • confined • flat • geologic • glaciers • natural • ocean • precipitation • waterfalls • wide

A **river** is a (1) ..... watercourse, usually freshwater, flowing towards an (2) ....., lake, sea or another river. A river is part of the *water cycle*. Water within a river is generally collected from (3) ..... through surface runoff, groundwaters, springs and the release of water stored in natural ice and (4) ..... . *Potamology* is the scientific study of rivers. The water in a river is usually (5) ..... to a *channel*, made up of a *stream-bed* between *banks*. In larger rivers, there is also a wider *floodplain* shaped by *flood-waters* over-topping the channel. Flood plains may be very (6) ..... in relation to the size of the river (7) ..... . Most, but not all, rivers flow on the surface. *Subterranean rivers* flow underground in (8) ..... or caverns. Such rivers are frequently found in regions with *limestone* (9) ..... formations. The *source* of a river is often in an upland (10) ..... . Near the source, a river flows over steep slopes through a series of (11) ..... and rapids. As the river flows towards its mouth, the slopes become less steep. Finally, the river will flow over (12) ..... land as it approaches the sea.



The Thames in London

2 *Match each word in yellow to its definition.*

A watermill in Austria

Rivers have been used for *navigation* for thousands of years. The earliest evidence of navigation is found in the *Indus Valley Civilisation*, which existed in north-western Pakistan around 3,300 BC.

River navigation provides a cheap means of transport and is still used on most major rivers of the world, such as the Amazon, Ganges, Nile and Mississippi. In some heavily forested regions, such as Scandinavia and Canada, lumberjacks use rivers to float felled trees downstream to lumber camps for further processing, saving much effort and cost by transporting the huge heavy logs by natural means.

Rivers have been a *source of food* since pre-history. They can provide a rich source of fish and are a major source of fresh water, which can be used for drinking and irrigation. It is therefore no surprise to find most of the major cities of the world situated on the banks of rivers.

Rivers help to determine the urban form of cities and river corridors often offer opportunities for *urban renewal* through the development of pedestrian and cycling paths along their banks.

Fast-flowing rivers and waterfalls are widely used as *sources of energy* for water-mills and hydroelectric plants.

Before the invention of steam power, water-mills for grinding cereals and for processing wool and other textiles were common across Europe.

The coarse sediments, gravel and sand generated and moved by rivers are extensively used in building construction. In upland rivers, there may be rapids or even waterfalls. Rapids are often used for recreation and sport practising, such as kayaking or rafting.

Rivers have been important in determining political boundaries and defending countries. For example, the Danube was a border of the Roman Empire.

Rafting on the Colorado

1. evidence	☐	a. The hot mist that forms when water boils.
2. lumberjacks	☐	b. Sloping land along the sides of a river.
3. irrigation	☐	c. Something rough, not smooth.
4. banks	☐	d. Crushing something until it becomes a fine powder.
5. water-mills	☐	e. A reason for believing that something is true.
6. steam	☐	f. They cut down trees which will be used for building.
7. coarse	☐	g. Water supply to help crops to grow.
8. grinding	☐	h. A machine powered by a large wheel which is turned by moving water.

B • Flooding

Flooding in Vernazza

3 *Sentence puzzle. Put the words in the phrases below in the correct order, then complete the text with them by writing the appropriate letter.*

a. hold great too to .....

b. river a of the size .....

c. serious causes water damage .....

d. utilities to disruption communications and public .....

A flood occurs when the discharge of a river is (1) ..... . Water will flow over the banks and occupy the floodplain. While (2) ..... will vary with seasonal changes in precipitation and snow melt, it is not a significant flood unless the (3) ..... to land areas like villages, towns (e.g. Genoa in November 2011) or other inhabited areas or to the environment, as well as (4) ....., such as electricity, gas and potable water. Most flooding is a combination of climatic factors, drainage basin factors and human activities.

YouTube Missouri River flooding 2011

C • River management

4 *Read the following text and answer the questions.*

Flood management techniques can be divided into **hard** and **soft** engineering options. 'Hard' options tend to be more expensive and have a greater impact on the river and the surrounding landscape; 'soft' options are more ecologically sensitive.

Dam on the River Duero, Portugal

Hard engineering options	
Dam construction	Dams are often built along the course of a river and the water is usually stored in a basin behind the dam. This water can then be used to generate hydroelectric power or for recreation purposes, but building a dam can be very expensive and sometimes it forces people to move. A dam may have the potential for enormous environmental damage; e.g. China's highly controversial Three Gorges Dam project hit the headlines for weeks when the Chinese government announced that almost five million people had to move from their homes near the dam area. YouTube China's Yangtze Dam displaced YouTube How hydroelectricity works
River engineering	The river channel may be widened or deepened to allow it to carry more water, or straightened so that water can travel faster along its course. Altering a river channel may lead to a greater risk of flooding downstream, as the water is carried there faster.

Soft engineering options	
Afforestation	Trees are planted near the river. This is a relatively low-cost option, which enhances the environmental quality of the drainage basin.
Managed flooding	The river is allowed to flood naturally in places, to prevent flooding in other areas – for example, near urban areas.
Planning	Local authorities and the national government introduce policies to control urban development close to or on the floodplain. This reduces the chance of flooding and the risk of damage to property.

Different interest groups have different views about flood management techniques: governments often prefer large hard-engineering options, such as dam building. Profits can be made from generating electric or leisure revenue. Environmental groups and local residents often prefer softer options, such as planting trees. Soft options cause little damage to the environment and do not involve the relocation of communities. Effective flood management strategies should be economically, environmentally and socially sustainable.

1. Where are dams often built?
2. How can water be used?
3. What are the disadvantages of dam building?
4. What does river engineering deal with?
5. What engineering options can be considered ‘soft’?
6. What should effective flood management strategies be?