

KEY LEARNING

- The benefits and costs of flood plain zoning
- What flood warnings and preparation involve
- How planting trees and river restoration help
- The benefits and costs of those strategies

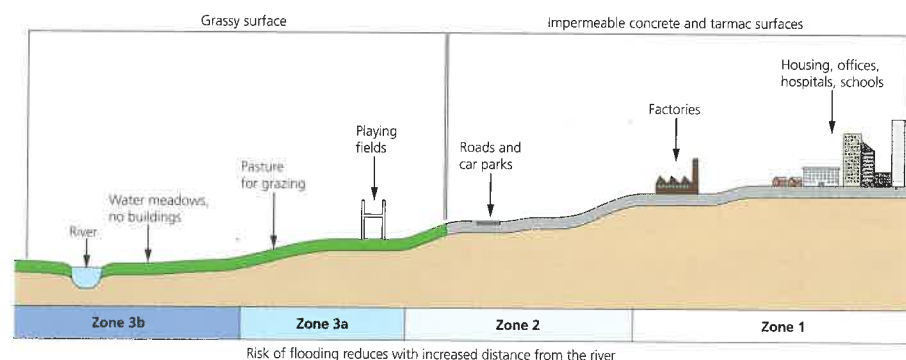
River management: soft engineering

A soft engineering strategy involves adapting to a river and learning to live with it. It is cheaper, but often less effective than hard engineering. Soft engineering includes **flood plain zoning**, **flood warnings**, preparation, planting trees and river restoration.

What is flood plain zoning?

Flood plain zoning is where land in a river valley is used in such a way as to minimise the impact of flooding. In England and Wales, the Environment Agency (EA) categorises land into four flood-risk zones and issues flood risk maps.

Local authorities are required to use these maps to produce flood-risk assessments and to guide decisions regarding new building applications. The land use zones shown in Figure 11.49 show how land can be used sustainably by having different land uses parallel to the river. More permanent structures can be installed further away from the river without any substantial economic or social costs, should flooding occur.



▲ Figure 11.49 Flood plain zoning

How do flood warnings and preparation work?

The EA and other agencies, such as district councils, and the Water and Highways Authorities co-ordinate efforts to devise and carry out action plans for areas at risk. Distinct roles are identified for the emergency services, the armed forces and voluntary groups such as the Royal National Lifeboat Institution.

The meteorological office analyses data from its 200 automated weather stations and passes this to the EA, who uses it, along with river level data, to provide updated flood alert information. The media, and occasionally sirens or loudspeakers, publicise this information. The EA provides a flood map website, a three day flood forecast, and personalised warnings. The EA also provides information on how to prepare oneself for a flood. This is summarised in Figure 11.50.

How does planting trees help?

Planting shelter belts of trees across slopes and woodland in floodplains (rewilding) reduces the risk of flooding, as trees intercept water by taking it up through their roots. Wales plans to plant ten million trees over the next five years.

How does river restoration help?

River restoration is when a river that has previously been hard engineered is restored to a natural channel. For example, near Sutcliffe Park in Greenwich, River Quaggy had previously been re-routed through underground drains, but by 2007 it was brought back to the surface and restored close to its original meandering course. Part of the floodplain was lowered to create a floodwater storage area, and wildflower meadows and avenues of trees were planted.

What are the benefits and costs of these strategies?

Strategy	Benefits	Costs
Flood plain zoning	<ul style="list-style-type: none"> By restricting building on the active flood plain, local authorities do not increase impermeable surfaces, so the risk of flooding is reduced It is low-cost: only administration costs are involved. Traditional water meadows by a river (Figure 11.49, zone 3b) are protected from development. In some meadows, cows may graze there when it is not flooded. By conserving the flood plain, planners provide a welcome green space in UK towns. 	<ul style="list-style-type: none"> This approach has limited impact as many UK cities have already sprawled over the active flood plain. It is very difficult to get planning permission to extend or rebuild homes in the flood plain. There is a housing shortage in the UK. Restricting building makes the problem worse. Restricted supply will inflate house prices. Habitats are destroyed due to increased building on other greenfield sites.
Flood warnings and preparation	<ul style="list-style-type: none"> This is a very cheap way of protecting people and their property, as it is largely dependent on communication via the internet. The EA's personalised flood warning option makes people feel more secure and more in control If people are warned in advance of a flood, then they protect their valuables earlier It is a way of ensuring people's safety without having to invest in high-cost hard engineering 	<ul style="list-style-type: none"> Flood warnings are only effective if people listen and take action. Education is needed: not everyone listens to, or has access to, the media or the internet. It does not help people living in areas prone to flooding. The clear-up operation is distressing, people may have to move to temporary accommodation, their insurance costs will increase and their houses will be difficult to sell
Planting trees	<ul style="list-style-type: none"> Reduces water flowing downstream as shelter belts of broad-leaf trees can reduce surface runoff More carbon dioxide is absorbed Adds variety to the landscape and new habitats. Increases biodiversity Relatively inexpensive as there are EU grants available 	<ul style="list-style-type: none"> Changed appearance: countryside wooded rather than open grass, arguably artificial looking and less aesthetically pleasing Loss of potential grazing land
River restoration	<ul style="list-style-type: none"> Creates new wetland habitats and increases biodiversity, e.g. damselflies Increased water storage areas reduce risk of flooding downstream – the River Quaggy scheme has protected 600 homes and businesses from flooding Aesthetically pleasing – visitor numbers to Sutcliffe Park have increased. 	<ul style="list-style-type: none"> Possible loss of agricultural land and flooding of crops near the river Can be expensive: the initial cost of restoring River Quaggy was estimated at £1.1 million Not always the most effective or practical strategy

▼ Figure 11.50 Environment Agency Flood Warnings



FLOOD ALERT

Flooding is possible.
Be prepared



FLOOD WARNING

Flooding is expected.
Immediate action required



SEVERE FLOOD WARNING

Warning
Severe flooding
Danger to life

Activities

- 1 Explain the land use zoning shown in Figure 11.49.
- 2 Draw a flow chart to show how information is gathered and communicated to the public to warn them about a risk of flooding.
- 3 Go to the website www.environment-agency.gov.uk/flood. Read the leaflet. Assume you live by a river. Make a flood action plan for your family.
- 4 Evaluate the UK government's policy of not building on flood plains. Consider the costs and benefits of flood plain zoning. Then write a short report (300 words) to give your conclusions.

Fieldwork: Get out there!

Select a 50 metre stretch of river that runs through a settlement and which has a path alongside it.

- 1 With an adult, walk along the path and gather information to demonstrate how land use is zoned parallel to the river (how it changes on both sides as you look further away from the river). Take a photo.
- 2 Draw an annotated sketch map and annotate your photo to present your findings.