

## Floods

Floods can turn an entire floodplain into a lake. The diagram on this page shows some of the ways people might be affected.

**Q1.** What has happened at **A** ?

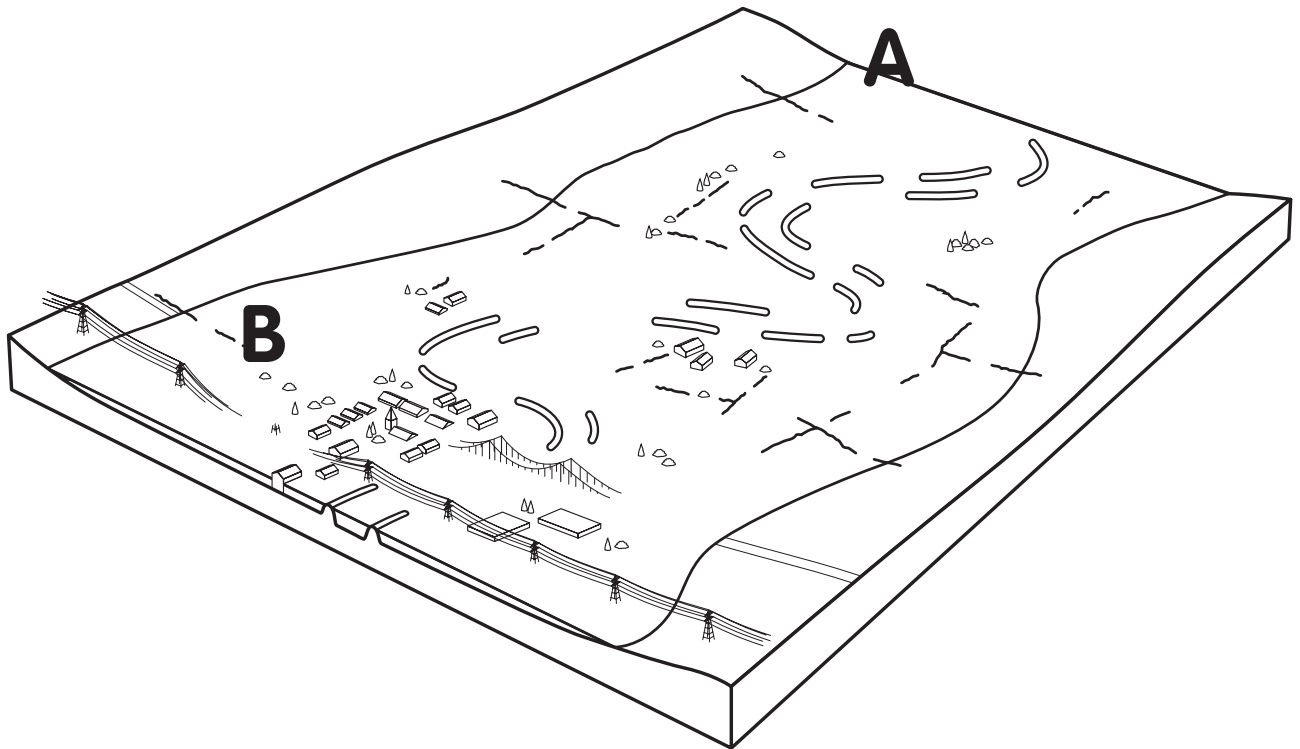


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**Q2.** What has happened at **B** ?



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**Q3.** Put a circle around a farm that has been affected by flooding. Describe some of the problems that might affect the farmer.



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## Answers

**Q1. The levees have been breached.**

**Q2. Power lines have come down.**

**Q3. Farms are severely affected by flooding.**

**Not only are crops waterlogged and potentially destroyed, but animals may be cut off or even drowned. Farms readily become isolated, and they have the special task of feeding and looking after animals. It is often very difficult to move animals away before flooding occurs because suitable grazing or pen areas have to be found, and these are not readily available.**

## Background support

Soils, and especially rocks, can store large amounts of water, and this constant seepage keeps rivers flowing between rainstorms. But soil water is also available to plants, and they often take the lion's share of the rainfall. Thus, about a third, or less, of rainfall eventually reaches rivers, the rest is transpired back to the air by plants.

Under normal circumstances rain seeps into the ground, filling up the soil and rock pores, and – over time – pushing water out at the stream banks.

Water can flow over the surface when the soils are full of water. This usually happens in winter when plants are dormant and not using water to transpire. At these times, the soils and rocks fill with water and rainfall will not be able to enter the soil, but will have to run over the surface. Most winter floods are produced this way.

There is another way of producing localised floods. If the rain falls too heavily to seep into the soil, as is often the case with severe thunderstorms, then the water that cannot seep into the soil flows over the surface and reaches the rivers quickly. This may produce flash floods.

Whatever the case, it takes time for rainwater or snowmelt to seep into soils and rocks, or even run over the surface of the ground, which explains why the main part of a flood always occurs some time after, and not at the same time as, the period of heaviest rainfall.

### Floods and the floodplain

The flat strip of land that occupies the centre of a river valley is called a floodplain. Flooding happens, on average, once every two to three years.

Floodplains, like so many parts of the landscape, change during periods of flood. The water flows very fast in a channel during a flood,

but the water that floods out of the channel spills over the floodplain as a thin sheet. In effect, it makes a large lake, but because the water does not flow quickly, it cannot carry the same calibre, or amount, of material that it was able to carry in the channel. So the material that reaches the floodplain slowly settles out and builds up the floodplains. This is why people affected by floods notice that their lives are disrupted by two effects: water and mud. This process accounts for the fertile soil that farmers have relied on for centuries and explains why farmers are often at risk in times of flood.

The amount of material that is laid down depends on the river basin. Some rivers, like the Nile in Africa, the Huang He in China, and the Mississippi River in North America, carry very large loads of material and they can raise their floodplains by more than 10mm (0.4in) a year. However, in many rivers floodplains will be raised far less than this. Of course, the distance the material travels in water flooding from the channel depends on the size of the material. Sand and silt, which are heavy, will not travel very far. In some sand-laden rivers, such as the Mississippi River, large amounts of sand and silt are laid down close to the banks. Eventually these form long ridges of material known as levees.

Levees build up the channel walls, making flooding less likely. They also make people more likely to live on flood-prone land. But when the levees are broken down, or breached, then the impact of flooding will be far worse than in rivers without levees.

The effect of flooding will vary greatly depending on the ability of rescue services to cope with flood emergencies. Far more detail on this subject is available on the web site and also in worksheet A for unit 18, 'Coping with floods'.

### Across the curriculum

Using this material you can link:

- ▶ Historical patterns of flooding to see how many people have been affected on a selected river;
- ▶ Ideas about the cost of protecting homes built on the floodplain, as opposed to the cost of moving people permanently to safer ground;
- ▶ The reasons that people choose to live and remain on a floodplain;
- ▶ Why some people may not be aware of the flood risk (newcomers to an area, those a long way from the river, those who have not experienced an extreme event in their lifetimes, and so on).