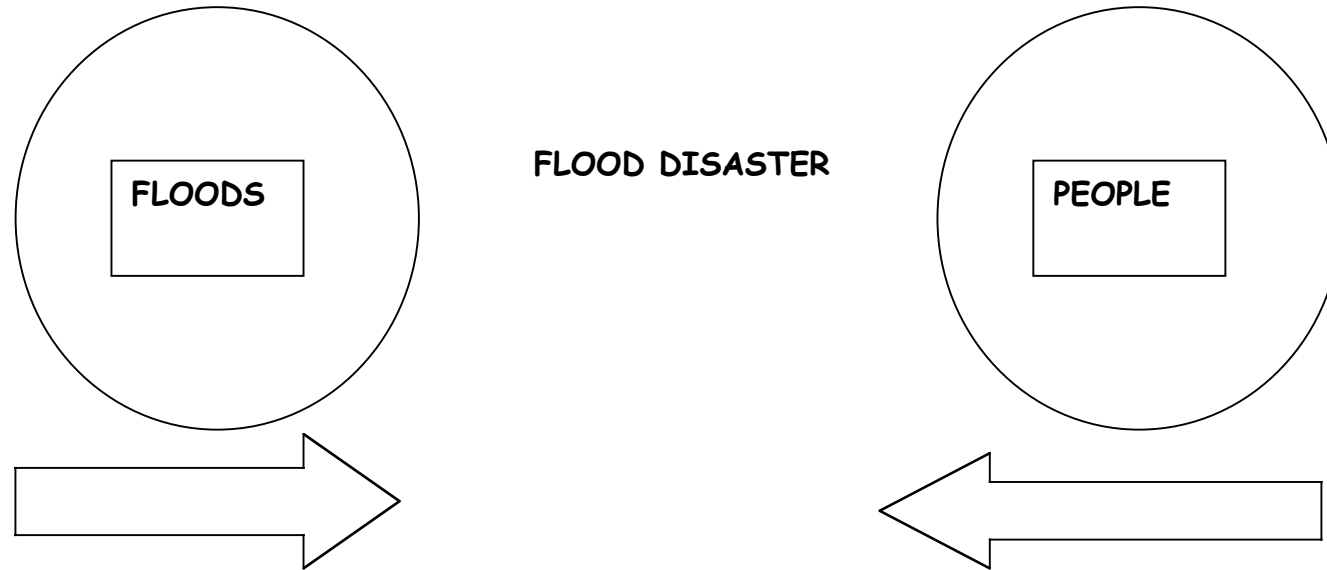


### Resource sheet 1: Why did Mrs. McCormack's tea-rooms disappear down the river on August 18th?

1. Most of the local farmers have ploughed up their grass meadows next to the river, and now grow crops on the floodplain.	2. This summer has been one of the worst on record, there have been several periods of prolonged rainfall, the ground is very saturated.
3. Paul Appleton, the local forester, will BE busy next year, he has to plant thousands of new trees to replace those he harvested earlier in the year.	4. Mrs. McCormacks' shop is located in a small scenic village that lies at the confluence of two of the areas' main rivers.
5. Scientists believe we are beginning to see the results of global warming.	6. More tourists arrived in the village this year thanks to the new roads that have been built.
7. Mrs. McCormack's customers loved the view offered by her tea-room's waterfront location.	8. The village has expanded rapidly in the last few years, several new property developments have been built.
9. On 16 <sup>th</sup> August the Environment Agency issued a severe weather warning.	10. Flood insurance for the properties in the village is extremely expensive.
11. The BBC showed images of the flood devastation on the morning of the 19 <sup>th</sup> August.	12. The flood damage has been estimated at £10 million.
13. The village bridge was made of several arches, in times of high water this could get blocked with material.	14. The village rugby team now played on a ground that in the past was marshland.
15. The two river valleys are formed on a layer of thick rock.	16. The sluice gate (which formed part of a basic flood alleviation scheme) was not properly maintained, sometimes it could get jammed.
17. Mrs. McCormack's son Ben enjoyed trekking up the slopes of the steep river valleys.	18. The local council designated less money to flood protection every year, "what was the point there hadn't been a flood for 60 years.
19. The river embankments were gradually feeling the effects of all the tourist activity along the river.	20. Two years ago local fisherman, concerned about the destruction of the river, launched a successful campaign to stop the regular dredging of the river.
21. On the 17 <sup>th</sup> August villagers were issued with sandbags.	22. In the early part of the evening of 18 <sup>th</sup> August, Mrs. McCormack was airlifted by helicopter to safety.
23. The emergency pumps arrive on the morning of 18 <sup>th</sup> August, but it's too late, they just aren't powerful enough.	24. At the height of the floods boulders the size of cars were being washed down the river.
25. The clean up operation will take weeks and the village will take over 18 months to rebuild.	26. Before the rivers course was altered, it used to meander slowly across the floodplain.
27. Only those buildings above the floodplain remained undamaged.	28. Mrs McCormack had to take out a loan to finance the opening of her tea-rooms.
29. Peat from the surrounding moors has been removed.	30. Nobody expected the storm to be quite so severe.

**Resource sheet 2:**

Flood disaster:



### Resource sheet 3: How can we protect ourselves?"

The question on the lips of the residents of Mrs McCormack's village following the disastrous events of 18<sup>th</sup> August is "How can we protect ourselves?" Many people, along with Mrs. McCormack, lost their businesses and livelihoods and now fear for the future. Reports in the press indicate that the sort of flooding the village experienced is set to become more common place, and floods that perhaps occurred once every 50 years may now take place every 5-10 years. Fortunately, the local council is pretty efficient and it's started to develop a flood management strategy. Several experts were called in to offer their advice; engineers, geographers and geologists. However, there didn't appear to be a simple solution so the council decided to put together several proposals. After several weeks of intense planning and following a bit of fine tuning, 4 options for flood management were put forward; each with distinct advantages and disadvantages.

#### Option 1: HARD ENGINEERING:

This is about altering the course of the river and building structures to contain it when it threatens to flood. It means straightening the river so that the water is able to flow more quickly, building levees to stop rivers overflowing, dredging rivers to make them deeper and wider, and building dams to control the flow of water.

- Advantages:**
- Should be effective in reducing the risk of flooding in the short term.
  - Its impact will be immediate.
  - Residents will actually see where money is being spent, and may feel more secure.
- Disadvantages:**
- Cost; hard-engineering is extremely expensive and local residents finance any deficit in funding through their council tax.
  - In the long term its effectiveness decreases eg: the building of embankments will soon increase the amount of dredging that needs to take place.
  - Appearance; hard engineering is an ugly business, the river become far less pleasing to the eye.
  - Damage and destruction to plants and wildlife.
  - Knock-on effects; hard engineering in one place may lead to flooding in another place downstream.

#### Option 2: SOFT ENGINEERING:

This means using new natural methods of flood control. It means allowing rivers to flow freely and in some places letting them flood the land. It is about reforesting areas to reduce run-off into rivers and returning farmland to its natural state.

- Advantages:**
- Environmentally friendly, respects the natural environment and encourages the growth of wildlife habitats.
  - Cheap compared to hard engineering.
  - Pleasing to the eye, the river retains its natural beauty.
  - Sustainable.
- Disadvantages:**
- Its impact is not immediate.
  - Farmers will often demand large sums in compensation for loss of cultivated land.

- Local residents don't feel protected (this is a prevention strategy).
- There is a huge demand for development of the flood plain.
- It can prove very difficult, sometimes impossible to return a river to its natural course.

**Option 3: RETREAT:**

This would mean accepting the loss of that part of the village that was destroyed in the flood, and placing a ban on redevelopment of any area that might be at risk from flooding. A total ban on any sort of development of the floodplain would have to be introduced.

- Advantages:**
- Nobody would be at risk from future floods.
  - Money would not have to be spent on flood protection.

- Disadvantages:**
- People would have to be re-housed.
  - People would have to be compensated for the loss of their businesses.
  - There may not be enough land to re-house people in the local area.

**Option 4: DO NOTHING:**

This means re-building the area damaged by the floods and continuing with life as it was before the floods.

- Advantages:**
- Cost; money will not have to be spent on protection, prevention or compensation.
  - People can continue with life as it was before the flood.

- Disadvantages:**
- There is a risk that a similar flood could occur next year, again destroying buildings and businesses.
  - Unsustainable; this is not a long term strategy, flood risk is increasing as people's activities impact on drainage basins and because of climate change.

## Resource Sheet 4:

**BOBBY SUMMERS:** Bobby is a local farmer who has just secured a contract to supply vegetables to Tesco's; these he grows on fields located on the river's floodplain. He is keen to expand the area of land that he has under cultivation on his farm by cutting down several areas of woodland, and draining swamps and marshes. Although he was sad to see the devastation that the flood did to the village, his real concern was the loss of several fields of crops. Although he can bear the burden of such a loss this year, a repeat flood next year would lose him the Tesco's contract and put him out of business. Bobby wants the local council to act fast!

**PETER TYSON:** Peter is a local lad who works for the National Trust. He loves the countryside and spends his free time fishing and bird-watching. However, in recent years he has become unhappy at the state of the countryside, farms have become too big and industrialised, fields have been enlarged as hedgerows have been destroyed. He fears that several species of fauna and flora will soon become a rarity to the area as water meadows are given over to farming. He sees the floods as a mixed blessing, on the one hand nature has re-captured some of its land, but on the other hand it means that there will be calls for proper hard-engineering flood protection measures.

**JASMINE GALLOWAY:** Jasmine runs a small hotel in the centre of the village. The floods were disastrous for her business, although her hotel was not damaged, she has been unable to attract any guests since that fateful night of August 18<sup>th</sup>. Tourists are worried about returning to the area for fear of similar flooding at some later date. Furthermore, the village is still a mess and some of the attractions have yet to re-open after the floods. If businesses like hers are to remain afloat, Jasmine feels that the council has to not only protect the village from floods, but maintain the natural attraction of holidaying by the river.

**ANGELA ANDREWS:** Angela can't believe her misfortune, she spent the last five years saving money so she could put down a deposit on her first home, only to move into a property that now turns out to be prone to flooding. The estate agent didn't warn her that all the new houses on the estate were built on a floodplain. The floods of August 18<sup>th</sup> submerged the ground floor of her house totally underwater, thousands of pounds of damage was done and it now turns out that her insurance won't cover her losses. Although she loves the village and it is an ideal location for her work, she thinks she's made a big mistake, and is not sure she'll ever get her money back on her house.

## Resource Sheet 5

Who cares about the tourist industry? I just want my house protected from floods.

The National Trust tells me that so much damage has been done already to the rivers ecosystem, that food-webs will struggle to recover.

I think that flood protection is too expensive, there's no proof that it will even work!

If you continue to build on the floodplain then more floods are inevitable.

I'm telling you, without farming this community would be dead!

I've lived here all my life and I can't afford a house in the village, we need more affordable new homes.

Engineers shouldn't have altered the river in the first place.

All this talk of climate change is nonsense.

The river needs engineering for goodness sake.....we are living in the 21<sup>st</sup> Century!

At the moment we can't get flood insurance, companies say that it is too big a risk.

Most of the tourists visit because of the beautiful countryside, they love the river walks.

There is not much likelihood of the village being flooded like that again.

Engineering the river will absolutely ruin the fishing.

I don't think you'll find anyone willing to move home.

The tourist industry will not stay alive unless there is affordable housing for workers in the industry.

Straighter river channels, higher river banks, dredging and dams is what we need!

We must let nature take its course, aren't rivers supposed to flood anyway?