Royal Geographical Society with IBG

Are you flood ready? – 'Geography explained' fact sheet

	Key questions and ideas	Key facts
Lesson 1: "I get knocked down, but I get up again"	**The government wants us to learn about and tackle flood risk by building up our personal resilience.**	Resilience is "an ability to cope with change while continuing to function normally" (definition obtained from the Waterworlds website). The government wants us to build up our personal resilience to flooding and other emergencies, "to reduce the risk from emergencies so that people can go about their business freely and with confidence". To this end, it has set up UK Resilience, a news and information website run by The Cabinet Office which concentrates on emergency preparedness, response and recovery. The website provides information and guidance for the public on a number of current high profile risks. On 12th September 2008, these were named as Avian Influenza (Bird Flu), Flooding, Foot and Mouth Disease and Human Flu Pandemic. In addition to this, the Environment Agency (a non-departmental public body of the Department for the Environment, Food and Rural Affairs) suggests some simple steps for protecting our homes and businesses from flooding. These include • **Sign up for flood warnings.** Floodline Warnings Direct is a free service that provides flood warnings direct to subscribers by telephone, mobile, email, SMS text, fax or pager. The service also provides simple advice on what to do before, during and after a flood. • **Obtain temporary flood protection equipment**, for example plastic covers to seal airbricks, sandbags and floodboards. • **Make an emergency flood plan** with your family so that you all know what to do during a flood, and practice the plan so that you're prepared. Further details of each step are given on the Environment Agency website. The organization also publishes a document called "Preparing for a flood" which gives practical advice on what to do to protect yourself and your property. In addition, it gives information on the current flooding situation in England and Wales. On 12th September 2008, there were 10 Flood Watches in place nationally. The BBC website also gives comprehensive advice on actions to take before, during and after a flood.
	No matter how well we prepare, nature can always surprise us.	According to the Intergovernmental Panel on Climate Change (IPCC), extreme flooding is "the most widespread direct risk to human settlements…, driven by projected increases in rainfall intensity and, in coastal areas, sea-level rise. Riverine and coastal settlements are particularly at risk, but urban flooding could be a problem anywhere that storm drains, water supply and waste management systems have inadequate capacity. Flood magnitude and frequency could increase in many regions as a consequence of increased frequency of heavy precipitation events, which can increase runoff in most areas as well as groundwater recharge in some floodplains". Between January and September 2008, regions within eleven countries experienced severe flooding:

Royal Geographical Society with IBG

Are you flood ready? – 'Geography explained' fact sheet

		China, Pakistan, Togo, India, Laos, Mexico, US, South Africa, Kenya The Philippines and Kazakhstan (updates can be found at www.global-greenhouse-warming.com/extreme-flooding.html). In June and July 2007, extensive flooding in England and Wales highlighted the susceptibility of many communities as several periods of very heavy rainfall overwhelmed drains, river channels and flood defences. Often, this occurred quickly and the location of the resulting flooding was difficult to predict. In total, around 49,000 houses and almost 7,000 businesses were flooded, and transport links, power and water supplies were disrupted. With adequate warning, the impacts of flooding can be minimized, but the unpredictability of the timing and location of floods means that, as in the cases above, nature can always surprise us.
Lesson 2: What are the causes of flooded homes?	**People face a variety of flood risks from a number of different causes.** **No home is entirely free from flood risk due to the human causes of flooding.** **Tsunamis can cause devastating flooding in some countries but occur only rarely.**	There are four main reasons that people living in the UK face a risk of flooding: • **River flooding** – when the river has burst its banks. This is due to heavy rainfall that has run off the land surrounding the river (this area is called the river valley and its boundary is called the watershed). • **Coastal flooding** – this can sometimes happen when there is a high tide and a storm is blowing at the same time. • **Pluvial flooding** – this is a weird word, what can it mean? Basically, when heavy rainfall collects in hollows and depressions where homes are located, local floods can occur. • **Plumbing flooding** – Broken pipes (when water in them freezes and expands) or broken boilers can cause floods. Old pipes and taps can break. Tsunamis, or tidal waves, can have a devastating effect on coastal areas. Caused by earthquakes at sea, the readjustment of the crustal plates jolts the seabed by several metres and displaces hundreds of cubic kilometres of sea water which form waves moving out from the earthquake's epicentre. In deep water, the waves move quickly but as they approach the coastline the sea bed in shallow water slows the waves, causing them to increase in height. An animation of a tsunami is available on the BBC website. The Asian tsunami of 26th December 2004 was caused by a magnitude 9.3 earthquake in the Indian Ocean off the coast of northwest Sumatra. Waves 20 metres high reached half a mile inland and over 200,000 people were killed in countries as far apart as Indonesia, the Maldives, Sri Lanka and Somalia. Further details on the Asian tsunami can be found in the case study resource that accompanies this lesson.
Lesson 3: What kinds of flood risk do we face in our schools and	**All buildings face some kind of flood risk, including students' schools and homes.**	5 million people live under the threat of flooding from rivers and coasts, that's one in ten houses in the UK. 200,000 of those are at very high risk, meaning that they have a one in 75 chance of flooding each year. However, this does not include the risk of flooding from plumbing, which affects every household. In spite of this, 40% of people in the UK do not have household insurance. On top of this, the

Royal Geographical Society with IBG

Are you flood ready? – 'Geography explained' fact sheet

homes?		Environment Agency warns that many vital services have been built on flood plains and are at risk from inundation. This includes: • 2,215 power stations • 737 sewage and water treatment sites • 401 schools • 680 health centres • 99 police stations • 86 fire stations • 82 telephone exchanges • 46 ambulance stations • 13 hospitals (Figures from The Independent website: "Flood risk to power, schools and hospitals").
	Small amounts of water can do a lot of damage to the fixtures and fittings of a typical home or school.	Even a small amount of water can cause a lot of damage to properties. As little as 2.5 cm of water can damage cellars, walls, drainage, electricity, plaster, skirting boards, doors, radiators and window frames; damage totalling in the region of £16,750 and taking 55 days to repair. At depths of 100cm, additional parts of the property to be damaged will include gas, sockets and wiring, wall paper, kitchen units, appliances, plumbing, doors, stairs, soft furnishings and contents. At this depth, the damage is likely to cost around £37,300 and take 76 days to repair. According to the Norwich Union website, taking flood resilient measures within your home could save you £4,500 and 27 days of repair time for a flood of 2.5 cm, and £23,100 and 42 days of repair time for a flood of up to 1 metre.
Lesson 4: Flood-proof homes	**A range of adaptive measures is available to help families to build up their own levels of flood resilience.**	Measures can be used to make your home both resistant and resilient to flooding. Flood resistance measures add extra protection, preventing water from entering the home. Products for flood resistance include: • **Pump and sump systems**, which pump out water entering the house from the ground. • **Flood skirts or barriers**, which protect any possible inlet for water (e.g. windows and doors) and are drawn into position when there's a threat of flooding. • **One-way valves**, which prevent water backing up into the property from water outlet pipes. • **Water resistant sealants**, which are used around windows and doors and on porous materials such as bricks and water. Measures to make your house more flood resilient, on the other hand, aim to minimise the damage caused by flood water. These include: • **Replacing perishable materials**, for example replacing chipboard floors for concrete and swapping carpet for tiles. • **Moving expensive electrical equipment out of the way**, for example putting your boiler upstairs

Royal Geographical Society with IBG

Are you flood ready? – 'Geography explained' fact sheet

		• **Raising electrical points** above likely flood levels • **Replacing chipboard with plastic**, for example fixtures and fittings in the kitchen and bathroom. • **Replacing wooden frames and skirting boards** with plastic alternatives. • **Raising floor levels** – of course this is not always possible. • **Replacing insulation** from mineral to cell. • **Protecting joists** with a chemical damp proof course. (More information at www.floodresilienthome.com). Families who live in flood risk areas should also consider preparing a **flood kit**. This should include the following items: • Important documents, such as passports and insurance certificates, which can be expensive to replace. • A torch, in case the flood occurs at night and the power is affected. • A battery or wind-up radio to listen for important information. • A mobile phone to call for help. • Waterproof clothing, for example wellies and rubber gloves in case you have to enter the flood water. • A first aid kit to attend to any minor injuries. • Blankets to keep you warm if your heating has to be switched off. • Bottled water, as tap water won't be drinkable after a flood. • Non-perishable items of food in case you are not able to be rescued for several hours. More information is available on the Scottish Environment Protection Agency website.
	The human ability to adapt to risk is something we hold in common with many other peoples living in different places, all of whom are facing their own challenges.	Other natural hazards include: **Volcanoes:** can kill when they explode or through lava, pyroclastic flows, hot ash and poisonous gases. People often live near volcanoes due to the fertile soils found there, creating a hazard risk. Areas affected include South America's west coast. **Hurricanes:** can kill when strong winds destroy buildings and blow down trees and structures. They develop offshore in warm ocean regions. Areas affected by hurricanes are highly populated due to their location and climate, creating a hazard risk. Areas affected include the Caribbean and Florida. **Droughts:** can kill when water supplies are low, when crops fail, when fires start and when temperatures become too high for sick and elderly people. Many parts of the world experience droughts regularly or occasionally. A lot of these places, for example the Mediterranean and California are densely populated, creating a hazard risk. **Earthquakes:** can kill when buildings and other structures collapse. They mostly take place close to plate boundaries. Many coasts are plate boundaries and people are attracted to coasts to live, creating a hazard risk. Cities like Tokyo, Istanbul and Los Angeles are affected.
Lesson 5: Getting the message across	**How can we know when a flood is coming?**	Since the mid-1900s, scientists' ability to predict the arrival of extremely wet or dry weather has improved for many reasons:

Royal Geographical Society with IBG

Are you flood ready? – 'Geography explained' fact sheet

	There is a range of media available through which to issue flood warnings, and varying population characteristics mean that this range of media will always be needed.	1. **Satellite photographs.** Satellite images show weather systems developing long before they make landfall – often given forecasters several days' notice of heavy rain arriving. 2. **Soil moisture monitoring.** If soil is wet from previous storms then new rain cannot soak in and will flow fast over the land to the river, making the flooding even worse. Data can be sent from the monitoring equipment by radio, keeping scientists up to date with what's happening. 3. **Mapping.** Maps show how steep the gradient of the land is. This gives scientists an idea of how quickly rain will flow downhill. Geology maps show what rocks are present, and whether water can soak in. 4. **Hydrograph calculations.** Once scientists know how much rain is coming, the gradient of the slopes and the moisture content of the soil, they can compute hydrographs to show the height the river level is likely to reach. Floods can strike at any time, often with little notice. The Environment Agency aims to give up to two hours warning to homeowners before the onset of a flood, but sometimes this is not possible. Environment Agency warning messages only cover the risk of flooding from rivers and coasts. Flash floods and flooding from sewers and drains caused by heavy rain are not covered. Traditionally, flood warnings were given through visits from flood wardens, door knocking by neighbours, sirens, television / radio broadcasts and mobile loudhailers on vehicles. Today, the Environment Agent issue warnings in a number of different ways: • **Phone** – a recorded message will tell you if a flood warning has been issued for your area. • **Email / fax** – a flood warning message will be sent along with advice on what to do. • **SMS text** – a flood warning message will be sent. • **Pager** – you will be sent the Floodline number to call for further information. Different methods of receiving flood warnings will be suitable for different people. In the event of a flood, it is particularly important to consider vulnerable populations, for example, visually impaired people, hard-of-hearing people, elderly and disabled people, and children. Visually impaired people must be able to hear warnings. They may not watch television or be able to see rising waters. Braille printers are available for PCs meaning that email alerts have the potential to work. Hard of hearing people must be able to see warnings. They may not listen to the radio or hear sirens or door knocking. They can receive email or SMS warnings, or read subtitles on the television. People with impaired mobility must receive warnings well in advance of flooding as they may require additional time to evacuate. Many people, perhaps particularly the elderly, low income earners or the homeless may not own expensive communication devices like mobile phones, PCs and perhaps even televisions and telephones. These people are harder to warn, as are non-English speaking groups who may not understand warnings in English.

Royal Geographical Society with IBG

Are you flood ready? – 'Geography explained' fact sheet

	Care needs to be taken by agencies not to issue flood warnings too frequently, or people may stop listening.	You can refresh your memory of the story of the boy who cried wolf by visiting the Story Arts website. Agencies need to strike a balance between ensuring that people are given enough warning about a potential flood and giving out too many warnings (many of which result in nothing). People are more likely to take notice of warnings when they happen infrequently and are accurate.
Lesson 6: The river team players	**Drainage basins and flood plains are home to many different stakeholders whose activities may impact upon one another.**	Different groups of people who live or work alongside a river or in a drainage basin will have different priorities, and will use the river for different purposes. Sometimes user groups may be in conflict, with their activities having a negative impact on the activities or enjoyment of others. In addition, some activities may actually increase the risk that a river will flood. Some examples are listed below: • **Homeowners**: if they pave over their gardens to make a parking space they will make flooding worse as water cannot soak away. This makes things worse for everyone (this could equally apply to pub car parks!) • **Farmers**: if they remove trees or hedgerows then rain-water cannot be caught (intercepted). This allows more water to reach the ground and makes things worse for everyone. • **Industries**: they may pollute water, making it harder for tourist businesses (e.g. river cruises) to attract customers.
	For effective governance, one agency may need to take a leading role (an approach which has worked well for the River Mersey), and this is also important for water quality management.	In order to overcome the conflicts between different users of a river, it may be necessary to appoint a lead agency to oversee the management of the river. This organisation may be: • The Town Council or The Environment Agency • A conservation group or The National Trust • A special organisation e.g. Mersey Basin Campaign An example of effective management of a river environment, the Mersey Basin Campaign was set up by the government in the 1980s to restore water quality and riverside conditions in the River Mersey, which had become extremely polluted by industry and sewage. The Campaign got private industries, local government and charities working together to: 1. Improve water quality 2. Clean up the waterside environment and encourage new buildings and businesses to locate there. 3. Encourage public, private, community and voluntary participation in the clean up operation. They installed an oxygenation tank to improve water quality, meaning that wildlife could return to the river. There are now 30 species of fish in the river, including salmon. In addition, there has been regeneration of the Salford Quays area, and the annual Mersey Basin Week involves local schools and residents in clean-up, recycling and conservation activities.

Royal Geographical Society with IBG

Are you flood ready? – 'Geography explained' fact sheet