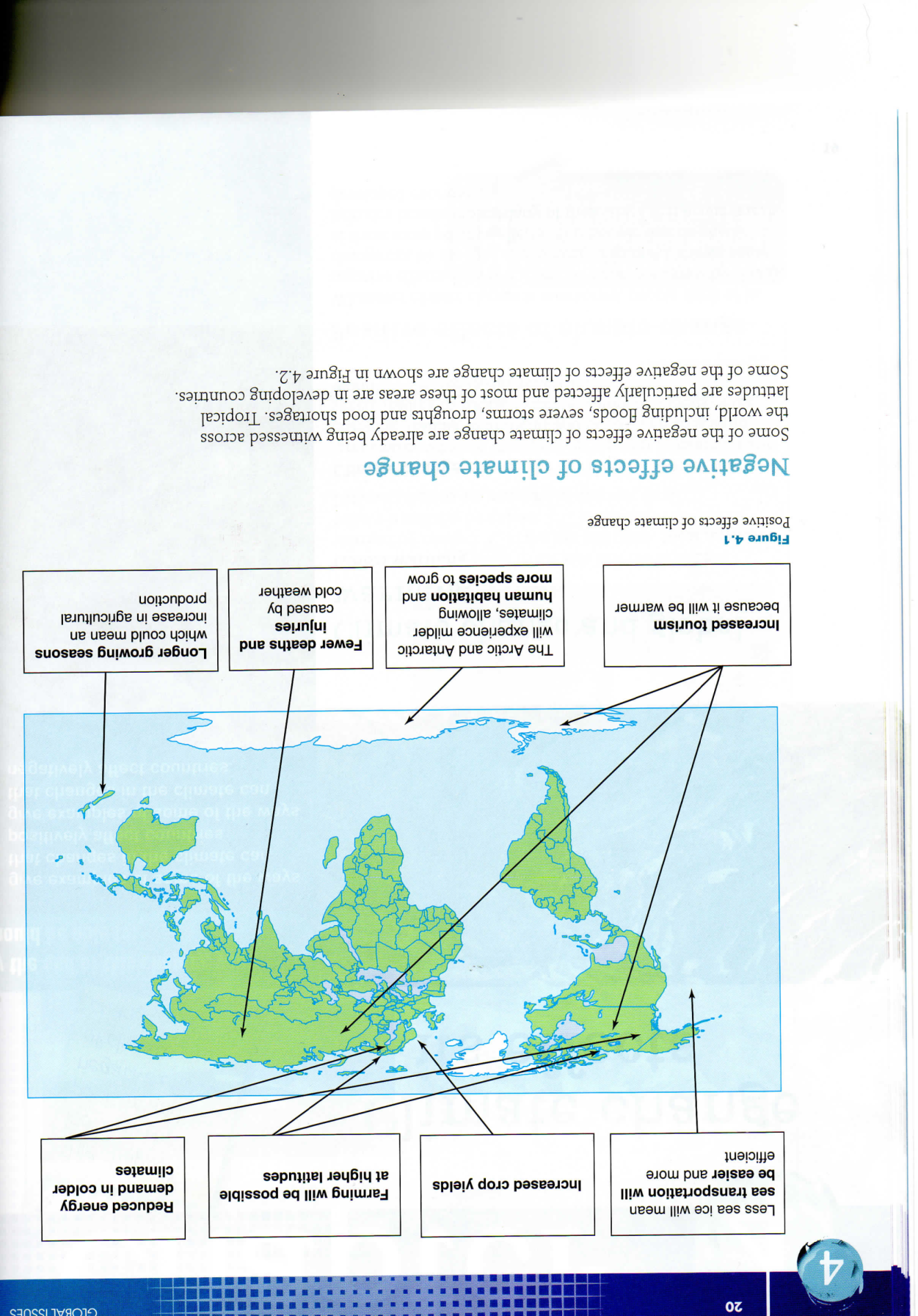
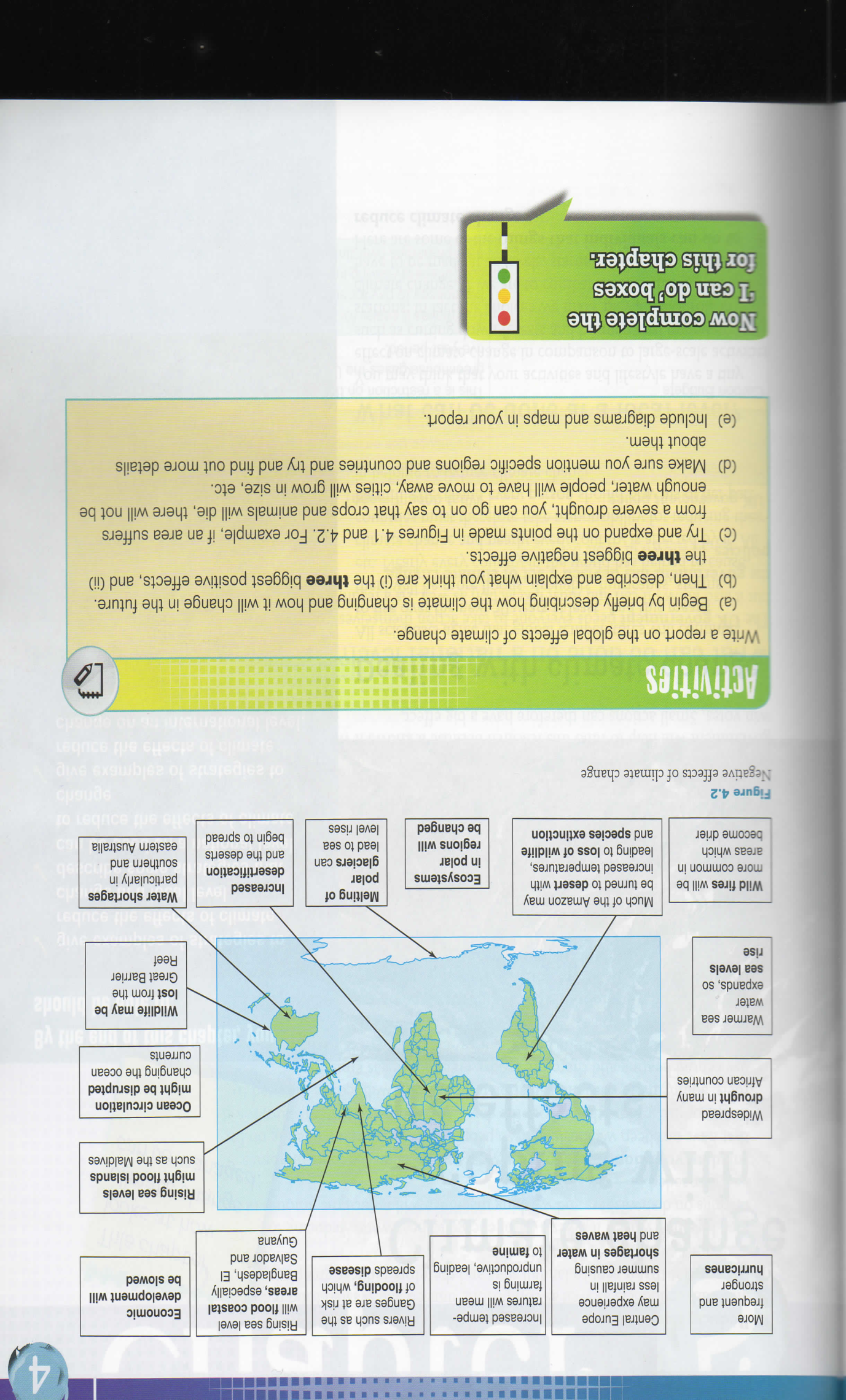
**Climate Change Case Studies**

**Worldwide changes**

**Positive Effects of climate change**

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**Negative effect of climate change**

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**The following case studies show the potential impacts of climate change on a developing country (Bangladesh) and on a developed country (Florida USA).**

* Describe the human and physical geography of both places
* Explain some of the effects of climate change
* Give reason why each place finds it difficult to deal with the impact of climate change.

**Case Study**

**Bangladesh**

**Physical geography of Bangladesh**

Bangladesh is a small country is South Asia. It has a land area of 147,000km squared, of which 80% is a flat floodplain. Three very large rivers flow through Bangladesh: the Gages, Brahmaputra and the Meghna, all of which join together to form the Gages Delta before emptying into the Bay of Bengal.

Bangladesh is very-low lying country with much of it at or near sea level. In fact, 90% of the whole country is less than 10 metres above sea level. Its only hills are in the southeast and northeast.

Bangladesh typically has three seasons: mild winters between October and March; hot, humid summers between March and June; and a warm, rainy monsoon season between June and October. It is one of the rainiest countries in the world and can suffer extreme river and sea floods. Bangladesh also suffers from hurricanes (cyclones) that affect the country between May and November, as well as occasional severe droughts.

**Human Geography of Bangladesh**

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| --- | --- |
| Population | 150 million |
| Population Density | 1000 people per square km |
| GNI per Capita | $1940 |
| Human Development Index Position | 140th out of 177 countries |
| % of people employed in agriculture | 66% |
| Rural/urban population | 75% rural/ 25% urban |
| % people malnourished | 30% |
| Capital City | Dhaka |

**Effects of climate change on Bangladesh**

Bangladesh is the most vulnerable country to climate change in the world. Over recent years the effect of global climate change has been very obvious here. Some of the effects that the country has witnessed are described below.

1. **Rises in sea level**

Sea levels around the world are rising every year because of polar ice melting (in particular the Greenland ice sheet) and warm water expanding. In 2000 the World Bank estimated that Bangladesh would see sea level rises of 10cm by 2020. By the end of the twenty-first century it is expected that sea level rises will reach at least one metre in Bangladesh. The devastating effects of a 1m sea level rise would include 16 million people being affected as 17,000 km squared of land is submerged. A sea level rise of 5 metres would see 18 million people affected as 22,000km squared of land is submerged.

1. **Increase in hurricanes**

It is thought that hurricane (cyclone) activity has increased globally over the past century. Some scientists say that the number of hurricanes each year has doubled. This substantial increase in hurricanes is due to rising sea temperatures. Not only have hurricanes become more frequent but they are also increasing in intensity making them more powerful and dangerous. Bangladesh now averages sixteen cyclones in every 10 years. Five of the worst cyclones in history have been in Bangladesh. In 2007, Cyclone Sidr Killed 6000 people as it ripped through the coastal areas of Bangladesh. The following year cyclone Aila killed a further 8000 people. Both Cyclone Sidr and Cyclone Aila are classed as ‘super-cyclones’ and to have two in two years is very unusual.

1. **Flood and flash floods**

Bangladesh is a very small country but it has 250 rivers which flow over almost flat floodplains into the Ganges delta and the sea. It is therefore very vulnerable to floods. However, the frequency and severity of the flooding is increasing. In the nineteenth century, six major floods affected Bangladesh; in the twentieth century there were 18 major floods. Severe floods can cover over 60% of the country and remain there for several weeks. Bangladesh is the worst country in the world for flooding.

1. **Extreme temperatures and drought**

Temperatures here can reach over 40 degrees Celsius which, combined with the very high humidity in the rainy season, become almost unbearable. But now temperatures are becoming even higher, especially inland in northern and western parts. In addition, every few years Bangladesh suffers from drought which can quickly cause famine in the countryside.

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| --- | --- | --- | --- |
| **Problems and Effects of climate change in Bangladesh** | | | |
| Sea level rises | Increased Hurricanes | Flooding | Extreme temperatures and drought |
| Land is lost  People lose their homes  Farmland is destroyed  Water shortages due to saltwater invasion  Increased water-borne and water-related diseases  Forced migration leads to ‘climate change refugees’  More people living in shanty towns  Loss of mangrove forest | Coastal devastation  Houses, communications and businesses destroyed  Loss of farmland  Large-scale loss of life  Cost of recovery prevents country developing | People are made homeless  Loss of life  Contamination of water leads to disease  Food supplies are affected as farmland and rice crops are destroyed  Industries affected  Communications can be badly damaged | Loss of life due to dehydration  Famine  Loss of livestock  Land is unusable for farming  Desertification  Heatwave causes fatalities |

**Managing Climate Change in Bangladesh**

Although the effects of climate change can be seen around the world over, they are most evident in the developing world, in particular Bangladesh. There are two reasons for this; first, the developing world is more dependent on the natural environment, and second, countries in the developing world do not have the means to protect themselves against the growing threat of climate change.

People living in Bangladesh are very heavily dependent on their natural environment through agriculture and fishing. With such a high percentage of people employed in these industries, the effects of climate change impact the whole country. To try to combat some of these effects of climate change on these industries Bangladesh has:

* Developed and introduced salt-resistant strains of rice
* Replaced rice farming which shrimp farming in areas where salt water has invaded farmland.
* Given $150 million to ‘climate proof’ agriculture, for example new sources of freshwater, cyclone shelters and more research into better crop strains.

Bangladesh is one of the poorest countries in the world and it is too poor to introduce sophisticated technologies that countries in the developed world might use. In order to try to fight the effects of climate change Bangladesh desperately needs help from other developed countries, which it believes it is owed as compensation for the global warming caused by these countries.

**Case study**

**Florida USA**

**Physical Geography of Florida**

Florida is the most south-easterly state in the USA. It is situated on a peninsula between the Gulf of Mexico and the Atlantic Ocean and it boarders the states of Georgia and Alabama to the north.

Florida is very low-lying, with approximately 50% of the land below 10 metres. In the south are many freshwater wetlands known as the Everglades and home to many rare and endangered species such as the manatee, American crocodile and panther. Inland, in the north, Florida has a few hilly areas; however, the highest point is still only 105 metres above sea level.

Florida’s climate is divided into two, with a warm temperate climate in the north, which has very warm, long summers and mild winters. The south of the state has a sub-tropical climate with hot and humid summers, a lot of rainfall and mild winters.

The state of Florida suffers disasters each year. From June to September Florida is the US state most at risk from hurricanes and it is also one of the most tornado prone states in the USA.

**Human geography of Florida**

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| Population | 19 million |
| Population Density | 353 people per square km |
| GNI per Capita | $48,890 (US average) |
| Human Development Index Position | 3rd in the world (USA) |
| % of people employed in agriculture | 3% US average |
| Rural/urban population | 21% rural/ 79% urban (US average) |
| % people malnourished | N/A |
| Capital City | Tallahassee |

Effects of climate change on Florida

It is thought that climate change will have the following effects on Florida:

* Temperatures will increase by 2-4 degrees Celsius over the next 80 years.
* Rainfall will become more intense.
* Droughts will increase, especially in the summer.
* Sea levels will rise. The sea level around Florida’s coast is increasing at a rate of approximately 2cm every 10 years. It is thought that by 2030, the sea level will have increased approximately 12cm and by as much as 1 metre by 2100. 80% of Florida’s population lives in the coastal areas where the land is very flat. A 30cm rise in sea level will move the shoreline inward by more than 300 metres.
* Hurricanes will become stronger. Florida has seen an increase in intense hurricanes in recent years, such as Hurricane Katrina in 2005 and Superstorm Sandy in 2012. Scientists believe that the number of category 4 and 5 hurricanes will increase by 80% by 2080. They also believe that the frequency of less intense hurricanes (category 1-3) will decrease.

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| **Problems and effects of climate change on Florida** | | | | |
| Sea level rise in Florida | Sea Level rise in Everglades | Increased hurricanes and storm surges | More intense rainfall | Drought in Summer |
| Loss of land  Loss of mangrove  Loss of wildlife and ecosystems  Houses will be destroyed  Damage to water supply and drainage  Saltwater intrusion  Increased coastal erosion | Saltwater intrusion will destroy the Everglades, causing economic losses from tourism of as much as $ 1 billion.  Loss of many rare special of plants and animals. | Coastal devastation  Destruction of homes and businesses  Loss of life  Damage to economy  Fewer tourists | Widespread flooding  Damage to property  Damage to business/economy  Loss of life  Loss of crops | Possible fatalities  Loss of crops/farmland  Water shortages |

**How climate change is managed in Florida**

The developed world is in a far better position that developing countries to deal with the effects of climate change. Although developed countries are significantly affected by changes in the world’s climate, they have the money to protect themselves, which puts them in a better position. Florida is witnessing the effects of climate change now, and has put several measures in place in order to combat these effects:

* Raising low-lying roads
* Adding protective beach dunes
* Obtaining underground water from further inland
* Increasing the use of public transport
* Encouraging the use of solar power and other green (environmentally friendly) energies
* Raising sea walls
* Storing more storm water to supplement drinking water supplies
* Planting more trees in urban areas
* Protecting farmland and open spaces from development

Questions

Bangladesh

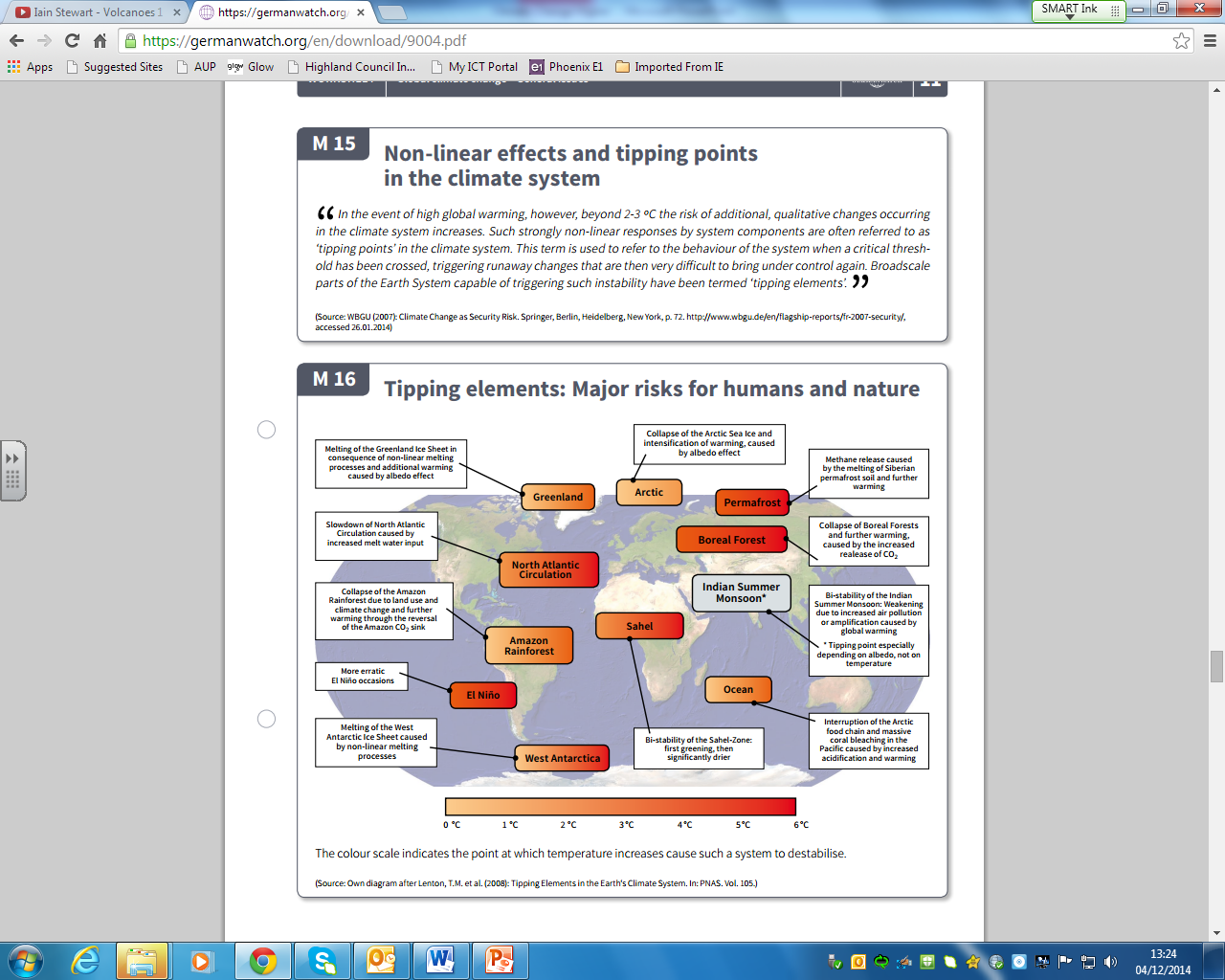
1. In what ways does the physical landscape make Bangladesh vulnerable to the effects of climate change? Why is this of a concern?
2. Choose two of the most serious effects of climate change on Bangladesh and explain how they will affect the country.
3. What evidence is there to suggest that the changes are happening now?
4. Explain in detail, why Bangladesh, like other developing countries, finds it difficult to manage the effects of climate change.
5. How is Bangladesh managing the potential impacts of climate change and what else could be done to reduce the issues?
6. Do you agree that other countries should help Bangladesh ‘as compensation’? Give reasons.

Florida

1. Describe in detail the effects of rising sea levels on a) the people and b) the landscape of Florida.
2. What are Florida’s main concerns about climate change and how is the state dealing with them?

Combined

1. Explain the limitations of the solutions that are in place to reduce the impacts of climate change.
2. Which country would you consider to be more are risk in terms of economics if the predicated consequences occurred?



The effects of climate change are thought to have a chain reaction with one another (example: rising temperatures > melting ice caps > sea level rise…) Explain why this is a serious concern not only for the nature but for human civilisation. Use the diagram above to help you include examples.

**What solutions do we have towards climate change?**

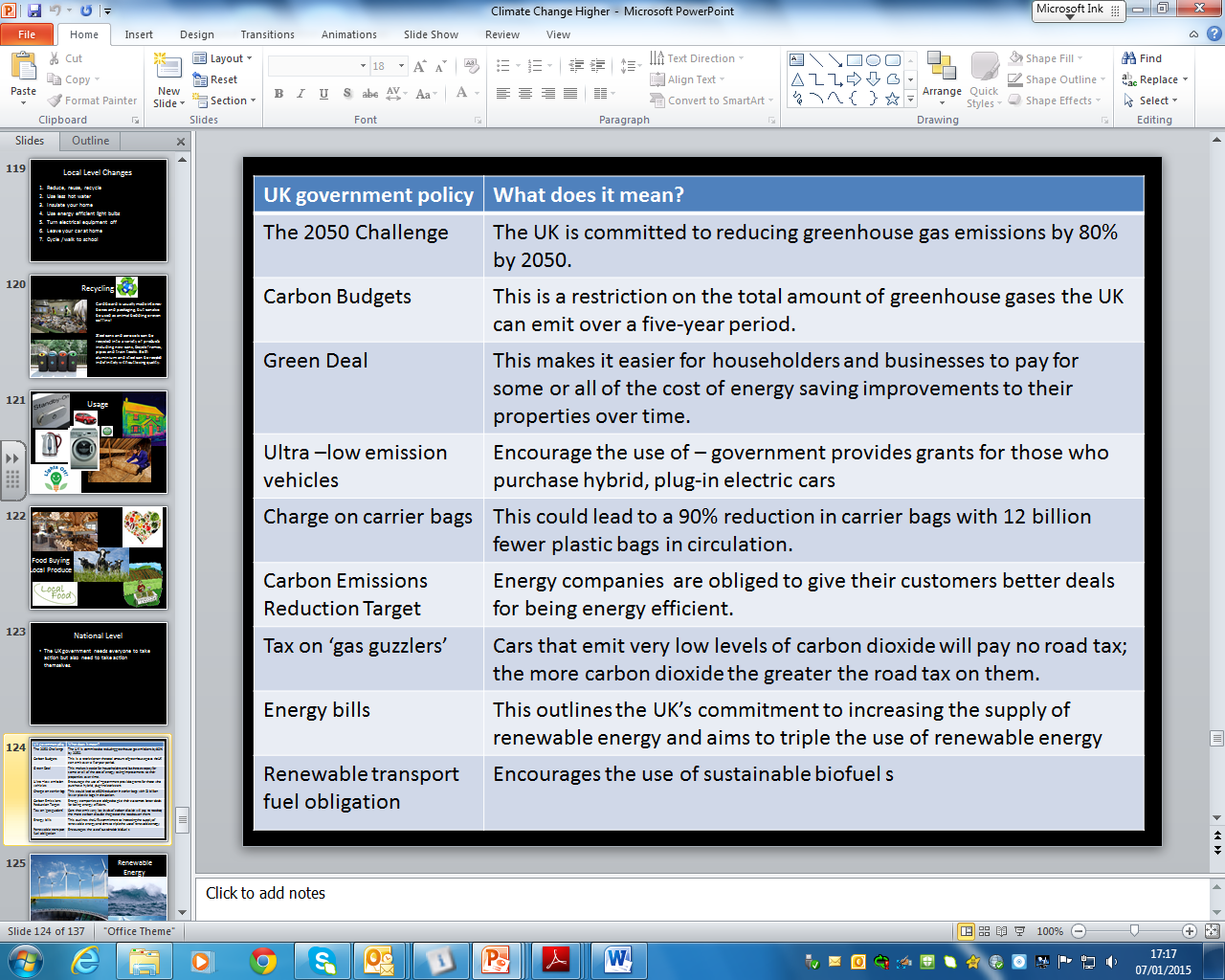
There are a number of different ways we can reduce our impact on climate change however governments and countries need to come together to make it successful.

**Local**

1. Reduce, reuse, recycle
2. Use less hot water
3. Insulate your home
4. Use energy efficient light bulbs
5. Turn electrical equipment off
6. Leave your car at home
7. Cycle / walk to school
8. Buying local produce

**National**

* The EU has committed to cutting its emissions by 20% by 2020
* There are a number of EU initiatives to reduce greenhouse gas emissions, including the European Climate Change Programme (ECCP) and the EU Emissions Trading System.
* They agreed that by 2020 at least 20% of all the energy used in the EU would be from renewable energy sources.
* They also made targets to reduce carbon dioxide emissions from new cars and vans, and to support carbon capture and storage technologies.



**Global/International**

**Kyoto Protocol** is an international agreement to limit the emission of greenhouse gases.

* 6 gases are mentioned in the contract with carbon dioxide being the most important contributor to climate change.
* The Framework convention on Climate Change (UN 1992) state the ultimate aim is: ‘ to achieve stabilisation of greenhouse concentrations…at a level that would prevent dangerous anthropogenic interference with the climate system .’
* Every country which signed up was committed to cut between 5% between 2008 and 2012 – they also had their own targets.
* Developing countries were not expected to reach the same level but were still expected to decline their emissions.

Its failures…

* Most emitting countries did not sign up.
* Most countries have not successfully met their targets.
* USA and China refused to sign it because they said it would harm their economic development.
* Has been replaced by the Doha Amendment 2012

Questions

1. These are some examples of solutions to climate change. What are their limitations?
2. What is the problem with only having local changes?
3. Why might the government frequently change its policies on climate change?
4. Should all countries have to commit to lowering their emissions?
5. Discuss the difficulties in establishing measures for reducing the anthropogenic effect as well as their implementation.