

## Chapter 6 Change is happening, how will we cope?

### Activity Guidance

#### Learning intentions of this chapter

- To understand that the process of change is continuing, on this occasion we have to meet the challenges that climate change is presenting us with
- To recognise that the changes need to be positive to engage with everyone
- To recognise that the changes fall into two categories:

**adapting to the changes** (preparing for the changes that are now inevitable and may increase further if we do not reduce our emissions). In other words - adapting to cope with the impacts/problems of climate change.

**mitigating** (limiting further climate change by *reducing greenhouse gases*). In other words - actively doing something about climate change itself. This is the focus of Chapter 7.

#### Overview of the activities in this chapter

These activities focus on adapting to change. They encourage children to look at examples of adaptations to local environments/climates around the world. Then, using their knowledge about the likely impacts of climate change in their own area (See Chapter 3), children consider the adaptations that may be necessary in their lives.

#### Session 1

##### Starter Activity: Animal adaptations

##### Learning Intention:

- **To understand the purpose that adaptations serve, using familiar animal examples.**

##### Key question: How do animals adapt to their environments?

Children match the animal with the habitat/climate and then choose the appropriate adaptation feature. Children complete the missing information about how the adaptation helps the animal to survive in its environment. The adaptations chosen are mostly related to climate, feeding and movement. Activity sheet provided.

**Plenary:** Children feed back to the class and teacher draws out the key ways in which animals are adapted. For example:

**Protection against the cold:** thick fur and body fat (polar bear, seal), feathers (penguins)

**Adapted for movement :** webbed feet (duck); digging paws of mole and fur that brushes both ways for moving in tunnels; tails used for balance and gripping (monkey) and well developed hands and toes that can also grip.

**Cooling:** elephant ears (blood pumped through the ears to disperse heat)

**Feeding:** wading birds long legs, and bills for probing in the sand for food.

## Session 1

### Main Activity: Winning ticket!

#### Learning Intention:

- To learn about the range of *short term adaptations* that people make to help them to survive in different climates.

#### Key question: How do people adapt to their environments?

In small groups children are given a '**Prize holiday ticket**'. Ticket templates are included. There are 8 different tickets, with holiday destinations from around the world. The destinations have a variety of climatic conditions. A **small fact file** of temperature information, rainfall etc has been provided for each destination. However, older/more able pupils would be able to access further information from atlases or the internet. The children have a limited amount of time (e.g. 30 mins) to think of all the things that they would **pack in their suitcase (sheet provided)**. They have to give explanations for their choices. Support may be needed to focus their attention on the climate of their destination and the essentials that will keep them safe, healthy and comfortable.

**Plenary:** Children feedback in most appropriate way.

Key points to draw out:

#### 1. The short term nature of these adaptations. For example:

- a water proof coat can be put on and taken off in under a minute; wellies/boots can be worn
- extra layers can be quickly added if cold, or taken off if wearer is too warm
- sun cream and hats can be used to help us cope with strong sunshine
- insect repellent can be used

#### 2. People are good at adapting quickly to changes in their environment. Why is this?

- Range of technologies, goods available
- Well organised social structure
- Mobile (particularly important if cannot adapt to conditions quickly enough – e.g. disaster situations - drought, flooding etc). Some people are able to use cars, planes and other forms of transport to move large distances in short periods of time.

#### 3a. Is the same true for the animals that you looked at in the starter activity? (No)

#### 3b. Why is it harder for them to adapt quickly?

- Mobility
- Specific adaptations limit degree of flexibility, therefore there is often a lack of alternative suitable habitats and habitat corridors
- Lack of suitable food sources or ability to access food sources
- Competition for habitats and food sources

**Extension, homework:** children could use the internet and other information sources to find out about animals that are under threat from climate change, both in this country and around the world.

## Session 2

### Learning Intention for the session:

- To learn of some of the *longer term adaptations* to climate that people make.

**Key Question:** How do people in other parts of the world adapt their homes to the climate?

### Starter Activity: Home swap!

Appropriate clothing is only a small part the range of adaptations that would be needed for the children to live in these destinations all year round. The design of homes, schools and community buildings would be critical if children were going to live there comfortably on a long term basis.

In this activity the children begin by looking back at their destination's climate information from the previous activity, and summarise the main challenges which this poses to the local community. They then begin to predict how the local people may have adapted their homes to enable them to live there all year round. Worksheet enclosed.

### Main Activity: Make yourself at home!

Children could use the internet and other information sources to look at examples of the houses from their destination and pick out the main ways in which they have been adapted to the climate.

Alternatively, or in addition to this, they can use the prepared examples enclosed:

### Spot the adaptations!

#### Wet Environments:

Images 1 and 2: Children annotate images of homes in parts of Asia with the adaptations and the purpose that these adaptations serve.

#### Coping With The Heat (Australian examples)

### Plenary: Key questions

- **In what ways do people adapt the designs of their houses to their environments/climate?**
- **How do these houses compare to ours? What adaptations do we make now?** Look at local buildings and the school.
- **Might we have to adapt the style of our homes in the future, and why?** You may need to refer back to the ancient tree and coloured leaves. The next session recaps the possible climate changes for the North West and develops the design idea further.

## Session 2: Extension, homework

### What happens if we don't adapt our homes?

Flooding in the UK and North West: A Case study on **flooding in Carlisle 2005**

Resources provided:

- My property is about to be flooded. What should I do?  
Adapted text from the environment agency website.
- North still fighting flood effect (news article about Carlisle floods)
- Charles visits food hit Carlisle (news article about Carlisle floods)

Flooding: other examples

- What is it like to have you home flooded?  
Article including quotes from a lady whose home was flooded. Could be used as a shared text to illustrate the extent of flood damage and the huge personal and emotional impact that flooding can have.

### What is being done in the UK to protect homes along the coast?

Resources provided in **Background Information for Teacher's** section:

- Information and images on coastal **flood defences and coastal erosion**

### Curriculum links

**Science:** Life Processes and living Things: Living things in their environment (5b,c)

**Geography:**

Geographical enquiry and skills

Knowledge and understanding of places

Knowledge and understanding of patterns and processes

Knowledge and understanding of environmental change and sustainable development

Useful websites for this Chapter:

<http://www.environment.gov.au/soe/techpapers/indigenous/population.html>

<http://www.greenhouse.gov.au/yourhome/technical/fs54.htm>

[www.velib.paris.fr/](http://www.velib.paris.fr/) For MFL teachers wishing to use this example within French.

<http://www.recycledproducts.org.uk/view/index.cfm> examples of recycled products.

<http://www.carbonneutral.com> information on how to be carbon neutral.

<http://www.forumforthefuture.org.uk/greenfutures/> optimistic magazine that's also on line, lots of useful ideas and up to date examples.

<http://www.informationinspiration.org.uk/> examples of greener design products.

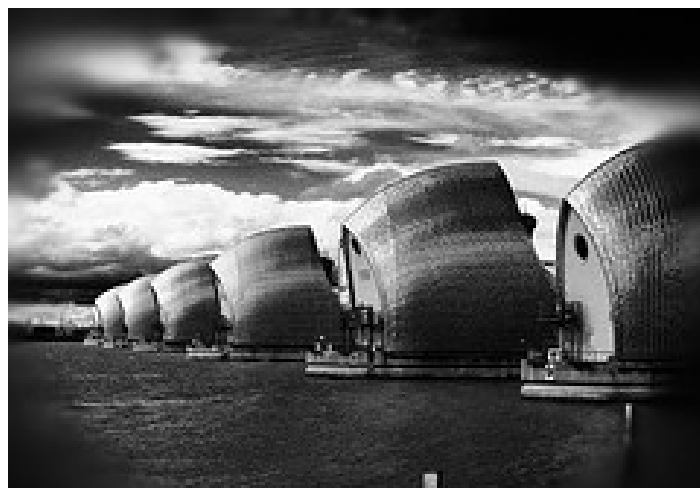
<http://www.sdchecklist-northwest.org.uk> a free to use tool for designers and planners in the North West

## Chapter 6 Change is happening, how will we cope?

### Examples of Existing Flood Defences

#### The Thames Barrage

Following the disastrous events of the 1928 and 1953 floods, the UK government started the construction of a flood defence scheme for London. By far the largest and most expensive part of this scheme is the Thames Barrier.



The Barrier, officially opened in 1984 and costing around £535m, is perhaps London's most recognisable flood defence structure. The Barrier was designed to protect London up until the year 2030 from surge tides (humps of water which move eastward up the estuary when certain weather conditions occur out in the North Sea).

The Barrier forms part of an overall flood defence scheme for London, which includes other smaller barriers at Barking and the Old Royal Docks, as well as several kilometers of raised walls in the upper and lower parts of the estuary. The existing defences serve their purpose for the time being, but will soon become out of date if left unchanged.

#### The Future

If London's flood defences were left as they are, the protection provided will gradually decrease as sea levels continue to rise. To tackle this problem, the Environment Agency is currently undertaking a series of studies considering flood risk management in the Thames Estuary. The studies will eventually be used to work out the right level of protection for London and the Thames Estuary for the next 100 years.

Source: The Environment Agency

## Examples of sea walls



Sea wall on the  
Isle of Wight

Robin Hoods Bay



Blackpool sea front

## Examples of coastal erosion



Happisburg beach (Norfolk) where properties have been lost to the sea in the past fifteen years due to coastal erosion, fortunately with no loss of life.



Happisburg beach, Norfolk where erosion is lowering the beach threatening the seaside properties.



St Bee's beach, Cumbria showing the sea wall and groynes.

St Bee's beach, Cumbria showing rock armour or rip rap, forming a type of sea wall.



## The Antarctic

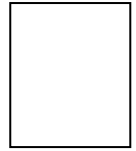
The Antarctic has 6 months of daylight and 6 months of darkness (winter).

Average summer temperature: - 6 degrees C (that's much colder than our winters)

Average winter temperature: - 34 degrees C (that's unbelievably cold!)

High wind speeds make it feel even colder.

Wrap up warm!



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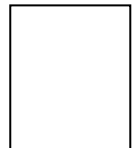
## Amazon Rain Forest

It rains every day here. It is hot, wet and Humid (feels sticky). Day length equals night length. Nights feel cool, compared to the daytime.

Average day time temperature: 26 degrees C (that's a hot summer day for us)

Average night time temperature: 10 degrees C (that's a mild winter's day for us)

Have you packed your waterproof jacket?



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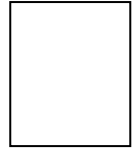
## Egypt - Cairo

Average January temperature: 9 degrees C

Average June, July and August: 21 degrees C  
(a very warm summer's day for us)

However, be aware that if you venture into the Nile Valley, summer temperatures can get up to 41 degrees C! (dangerously hot)

Watch out for the hot sand!



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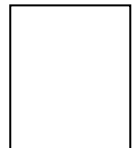
## Himalayas, Nepal

In the foothills and lower slopes of the mountains, summer temperatures can be 15 – 18 degrees C (quite similar to ours)

In winter the temperatures will be below freezing.

However, for the real explorers who go above 4 800m, the temperature remains below freezing all year, with snow and ice on the ground.

Keep warm!



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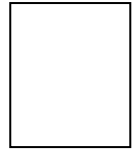
## Iceland - Reykjavik

Reykjavik has an average annual temperature of 5 degrees C (that's a cold winter's day for us)

Average January temperature: -1 degrees C  
Average July temperature: 11 degrees C  
(more like our autumn and winter temperatures)

Although it touches the Arctic Circle, it is warmed by the sea currents that flow past its coast.

Watch out for the fabulous thermal pools!



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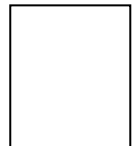
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## Florida - Orlando

Orlando has minimum temperatures of 16 degrees C and summer temperatures of 28 degrees C (this would be a *very* hot summer's day in the UK).

Watch out for the hurricane season from May - November

There are lots of attractions nearby, but be careful not to stay out in the sun too long!



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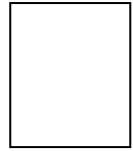
## Spain - Costa Brava

Between April to October, temperatures average 24 degrees C (this would be a hot summer's day for us).

During that time, night time temperatures fall to approximately 16 degrees C.

It does rain in the summer, but there have been some very dry summers recently.

Find shade during the hottest part of the day!



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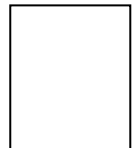
## Blackpool - UK

Blackpool has a very busy summer season, due to the beach and attractions.

Very popular for sandcastles and thrilling theme park rides.

Average January temperatures: 4 degrees C  
Average August temperatures: 16 degrees C

Cool sea breezes keep the temperatures down at the coast.



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Chapter 6 Climate Starter Activity

**Animal**

**Climate and habitat**

**Adaptations**

**How do these adaptations help this animal to survive?**



Polar bear

The Artic:  
Summer temperatures below 10 degrees Celsius, (our winter temperatures)  
Winter temperatures approx minus 34 degrees Celsius (incredibly cold!).

Thick fur.  
  
Stiff hairs on the pads of a bear's paws.

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Hairs on paws provide insulation and grip on the ice



Mole

Found all over Britain but not in Ireland. They prefer habitats where the soil is deep enough for tunnelling, but are not often found in coniferous forests, on moor lands and in sand dunes (probably because there isn't enough food for them).

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Mallard Duck

Found all over Britain, in towns and rural areas.

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**Animal**

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Winter temperatures approx minus 34 degrees C (very cold).

Thick fur.  
  
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Hairs on paws provide insulation and grip on the ice



Elephant

There are two species of elephant – the African and the Asian.

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**Animal**

**Climate and habitat**

**Adaptations**

**How do these adaptations help this animal to survive?**



Penguin

The Antarctic continent.

There is a thick layer of blubber under the Emperor's skin which is covered by a dense layer of woolly down.  
An overlapping coat of feathers grows over this layer.  
The outer feathers are covered in a greasy waterproof coating.

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Curlew

Found on the shores of the United Kingdom. Nests on moors and wetland areas.  
  
Is adapted to the current British climate.

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This adaptation helps them to find and eat worms, shellfish and shrimps.  
  
These help them to wade in shallow water and find food as the tide comes in.



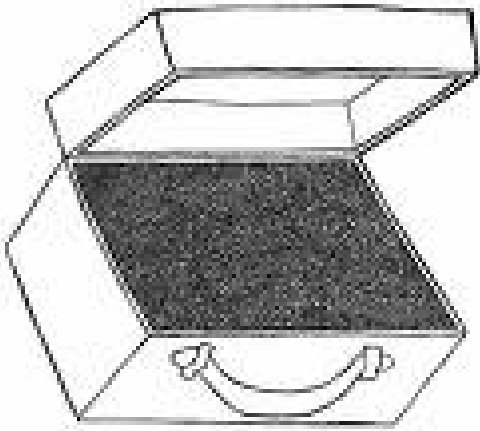
Monkey

Thailand, Southeast Asia.  
A range of habitats, including forest.  
  
Climate: Hot all year (30 – 30 degrees Celsius).

Fingers and toes that grip well onto branches  
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## Chapter 6 Packing for a holiday



This is what we are going to take

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**What**

**Why**

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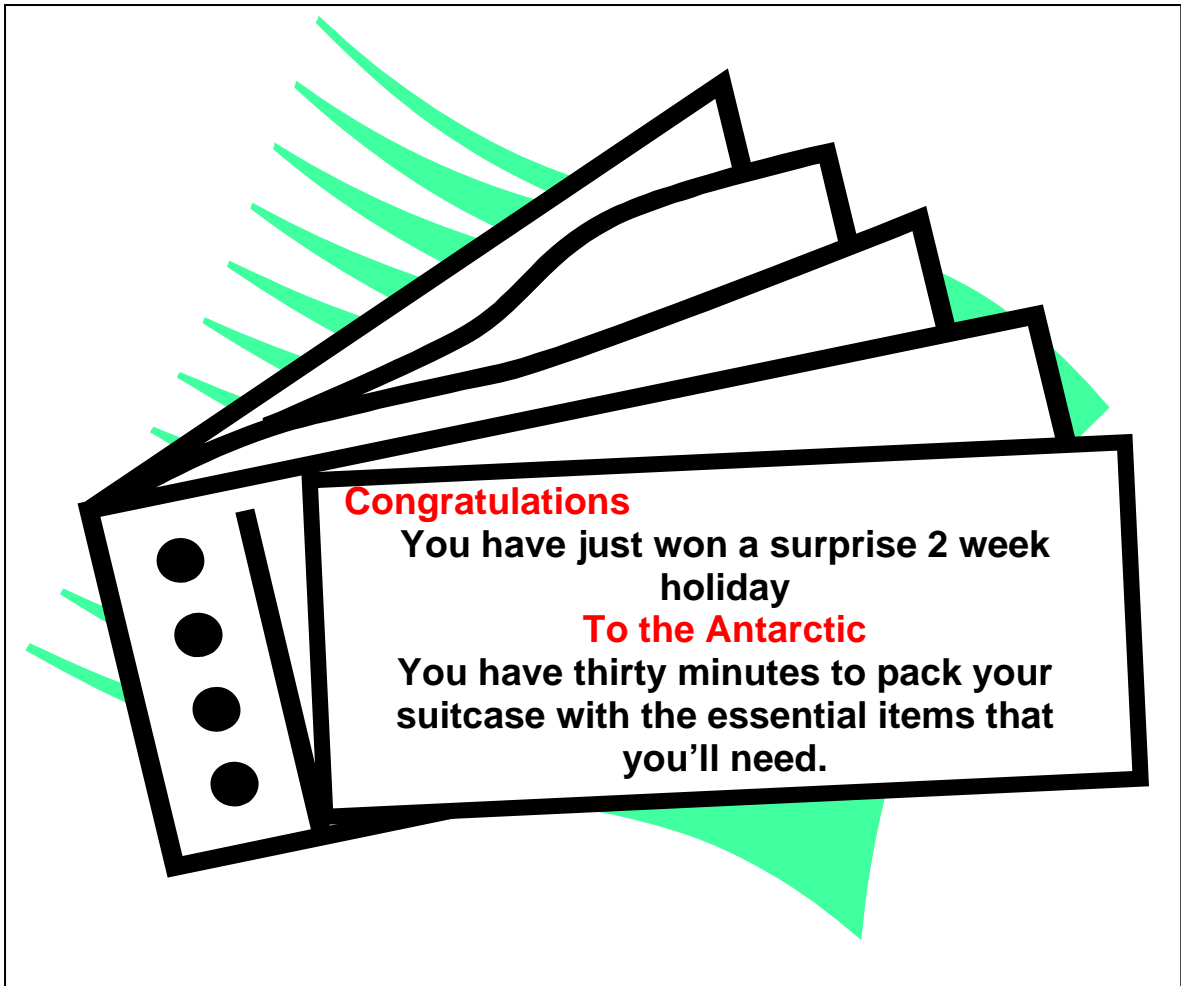
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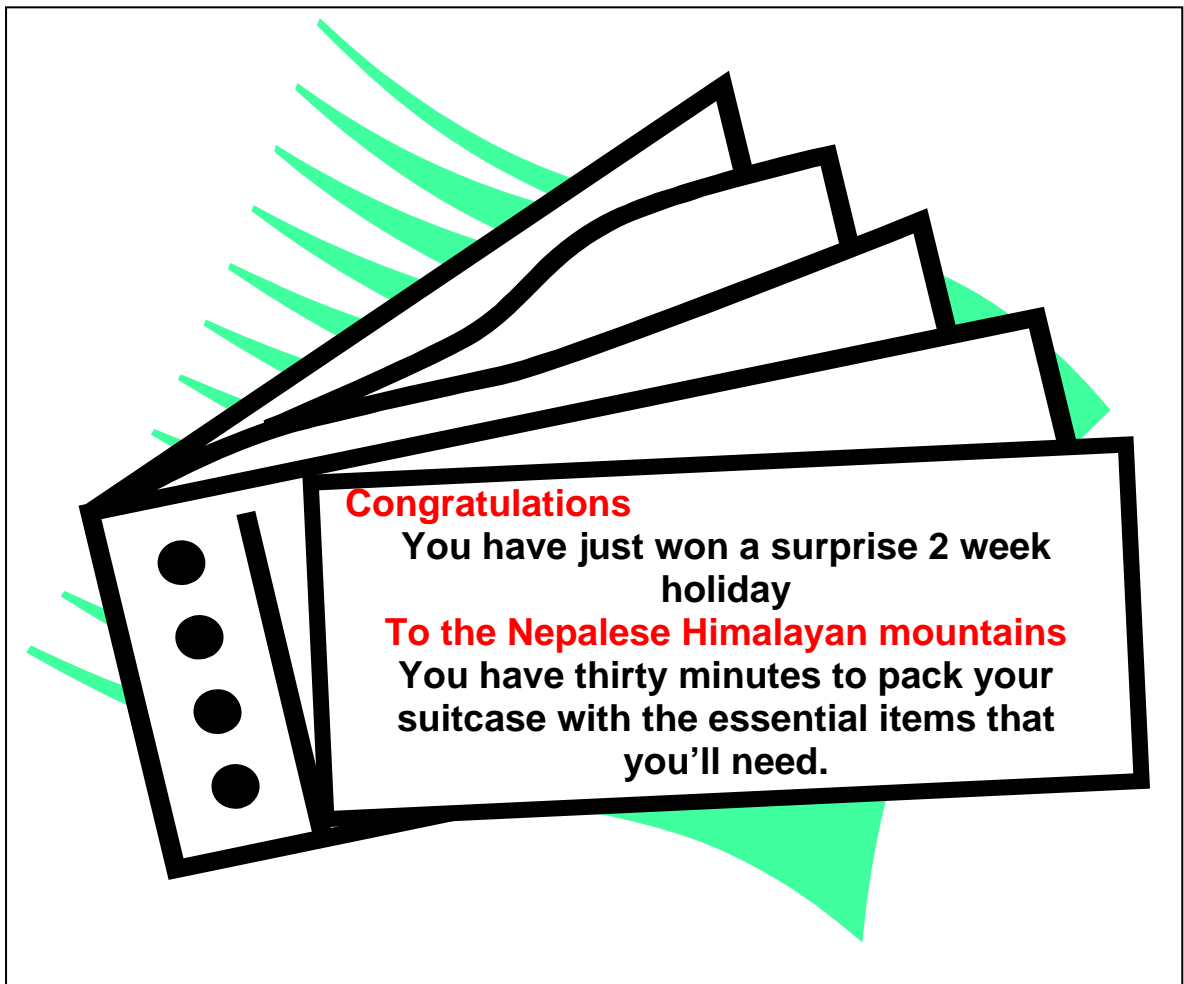
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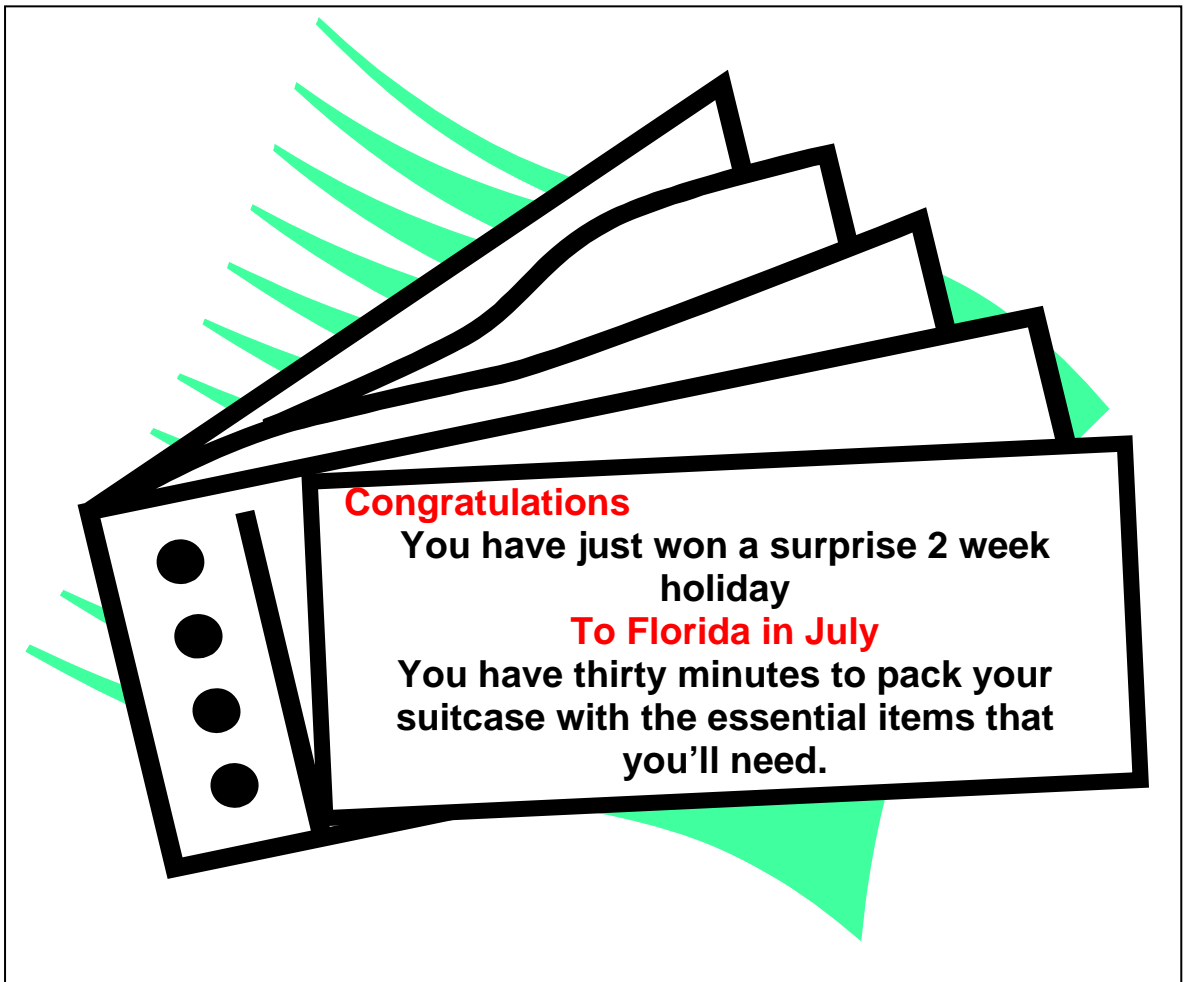
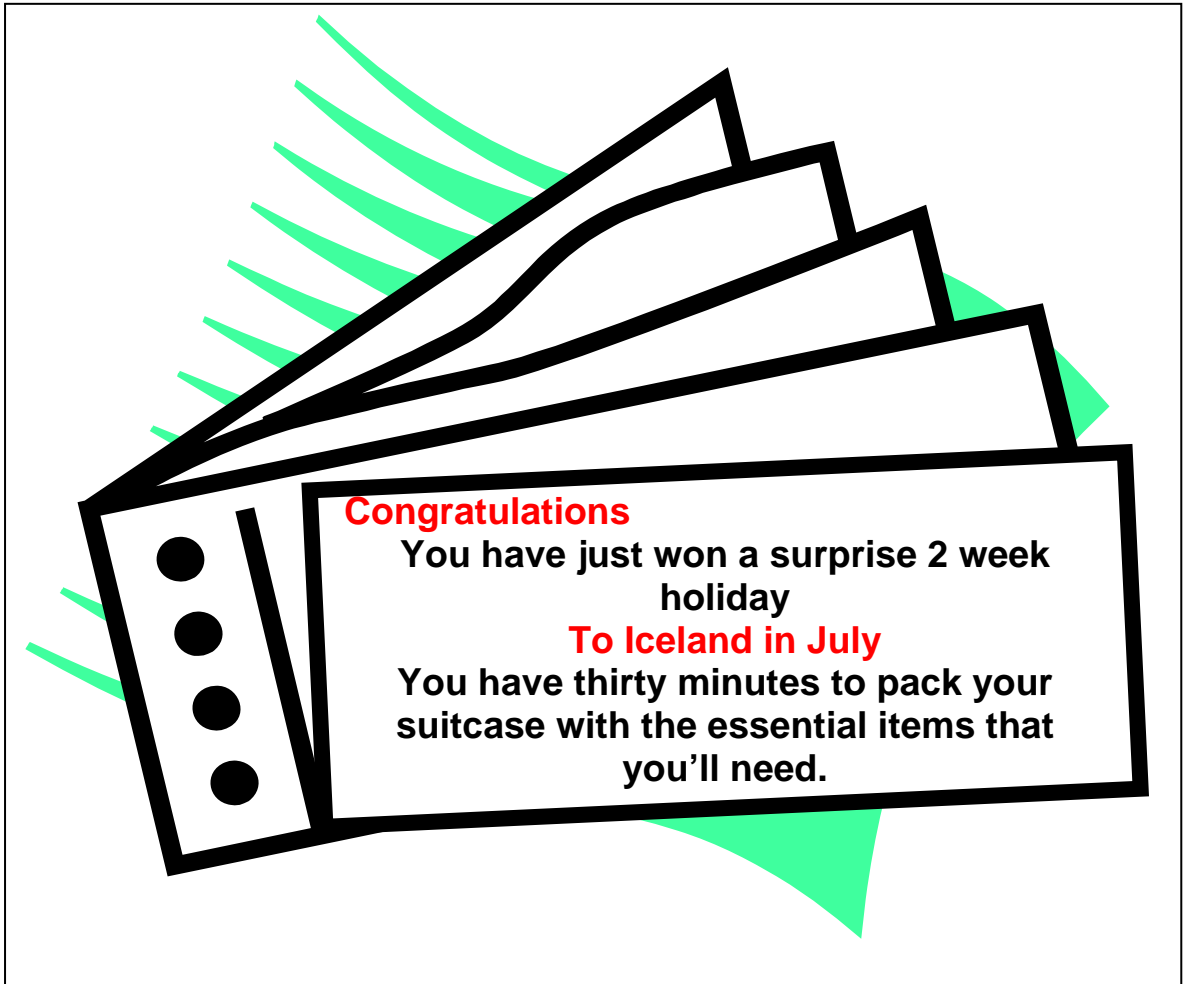
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# Home Swap

**I'm thinking about homes  
in.....**

**What are the main challenges of  
this climate?**

**How do you think people will have adapted their homes  
to cope with the climate?**

## Chapter 6 Climate

### Charles visits flood-hit Carlisle

The Prince of Wales has toured the flood-ravaged city of Carlisle.

He saw for himself the devastation that left thousands of residents with sodden belongings strewn onto the streets.

The prince met homeowners in flooded Warwick Road, which was among the areas worst hit and where water still lies outside some properties.



The Prince wanted to see the devastation for himself

He also visited the Stagecoach bus depot at Willow Holme estate, where damage estimated at £3m was caused to the vehicles and premises.

Three people died in the storms which began last weekend, leaving thousands of homes without power.

Clarence House said the prince was keen to give his personal support to the relief effort in the city and had been kept informed of the situation.

A spokeswoman for the prince said: "He wanted to offer his support to people who have been affected and to the emergency services."

Richard Phillips was at his Warwick Road home with his family on Saturday when water started flooding in, devastating the property.

He and his wife have been forced to move into temporary accommodation while their daughter, who has special-needs, is staying with her sister.

Mr Phillips has been told by an assessor that the house could take six months to put right.

He told BBC Radio 4's Today programme: "It will take two months to dry out, then they have to plaster and that has to dry out and so on.

"We have found a place we can rent in a few days' time, but we have a special needs daughter and we want to get back to her as soon as possible.

"At the moment we are with friends and she is with her sister elsewhere in Carlisle but she needs to come back to us very soon."

Environment Minister Elliot Morley has already visited the city, where the cost of the flood damage could run into tens of millions of pounds.

He said plans for a £20m flood scheme for the city had been drawn up before the weekend's severe weather conditions and were in the process of being finalised.

Source: BBC News 24

<http://news.bbc.co.uk/1/hi/england/cumbria/4172489.stm>

## Chapter 6 Climate

### North still fighting flood effect

Up to 10,000 households in the town of Hexham in Northumberland are enduring a fourth day without running water as a result of the weekend storms.

Two water mains supplying Hexham and surrounding areas were washed away and Northumbrian Water engineers have been working round the clock on repairs.

Meanwhile, thousands of residents evacuated from flood-stricken Carlisle, Cumbria, are unable to return home.

About 5,500 homes across the county are still without electricity.

In the Hexham area a further 4,500 households were left without electricity on Tuesday after a fault at a bulk supply point. Most had been re-connected within an hour.

BBC correspondent Robert Hall, speaking from Hexham, said replacing lost water would require more than a mile of temporary pipework.

But reservoirs were "running dangerously low", he said.

A spokeswoman for Northumbrian Water said some supplies would be restored by Wednesday and the rest by Friday.

Over the weekend, three people were killed and two went missing after torrential rain and gales swept northern England and elsewhere.

Michael Scott, 63, of Hethersgill, Cumbria, died after a barn collapsed on his caravan.

Margaret Threlkeld, 79, and Margaret Porter, 85, both of Carlisle, died after their houses flooded.

Flooding in Carlisle has left schools, roads and the police headquarters closed, and the city's court and hospital are running skeleton services.

The Met Office said gusts of up to 60mph will batter Carlisle until Wednesday.

Southern Scotland, which has also been badly affected by floods, can expect gusts of up to 90mph before the end of the week.

**Flood watches** By 2230 GMT on Monday, seven flood warnings were in place in England and Wales, together with an additional 30 flood watches.

The Scottish Environment Protection Agency has issued three severe flood warnings, 15 flood warnings and a further 19 flood watches.

In other affected areas:

- Bad weather has prevented West Yorkshire Police resuming their search for a missing man in the River Aire near Bradford.
- Police in Scotland are still searching for Andrew MacDonald, 42, of Forres, who may have been swept away in the River Findhorn on Saturday morning.

In Wales, about 50 properties in the Conwy Valley, Llanrwst and Trefriw areas have been flooded.

Source: <http://news.bbc.co.uk/1/hi/england/4160387.stm>

BBC News



The flooding is starting to recede

“ I don't know where we are going to live and I don't know how long it's going to take to get sorted ”

Resident David Maskell

**'It's just a complete mess'**  
**Community spirit shines**

## My home may be about to be flooded. What should I do?



### **If you live in a flood risk area, your safety is your top priority. You should:**

- listen to local radio and Environment Agency Floodline bulletins (0845 988 1188) for up-to-date information on the flooding situation in your area;
- collect your personal belongings (including insurance and bank details and essential telephone numbers) and keep them in a waterproof bag;
- if safe to do so, move your furniture and belongings upstairs or to higher levels. Be prepared to turn off the gas, electricity and water at the mains;
- listen to the advice of the Police, Fire Service or Council and follow their instructions.
- contact your insurance company quickly if your house has been damaged. Staff there will be able to advise you on what to do next.
- if you are advised to leave your home by the authorities, lock your house before you go.
- make sure you have your insurance contact numbers and details with you.

### **Dealing with a flood and recovering afterwards is likely to be a very stressful time.**

- take care of yourself and your family.
- accept support from relatives, friends and neighbours.
- get proper food and rest.
- depending upon how bad the flood damage is, it could be between a few weeks and even several months before you can move back in. Be prepared for this.
- do not be afraid to ask for help.

Adapted from original source: <http://www.abi.org.uk/floodinfo>

## Case Study

### What is it like to have your home flooded?

“We had seen the water rising outside and knew it would be inside soon but we expected it to come through the doorways”, said Carol Mawle from Banbury in Oxfordshire. “I put towels down to block them but it did not help at all. As I heard gurgling noises from the walls I realised that the water filled the holes in the cavities and then it came through the skirting boards of the floor. It was eerie. One minute we were dry, the next minute we were walking on a moving carpet.”

By 3am she was forced to leave the bungalow. Her dogs were swimming in a river of sewage. “We live so far away from the river that even in our wildest dreams we didn’t expect this to happen to us.”

Carol and her husband returned to the bungalow at around 8am to see the water receding and the dirt, covering everything like a layer of film, became visible. “The shock doesn’t hit you until you realize that it wasn’t something that would disappear in a day”, continues Carol. “Getting water out of your house is relatively easy, the problem starts when you’re left with everything wet and ruined. The initial damage is nothing compared to the problems coping afterwards.”

Carol was lucky because she had an insurance policy that covered her household and its contents. “We lost everything. All our clothes, shoes, videos, cameras, kitchen electrical equipment, fridge, washing machine, dishwasher, all lost. I did a lot of tapestries as a hobby, they were all gone too, as they were kept in the bottom drawer.”

The only things Carol saved was the television and video recorder, as she had put them on the bed when the water first started to seep in, plus, the kitchen chairs which went on top of the kitchen table, and a set of glass coffee tables.

“The biggest loss was my photographs – favourite moments of the years gone by were lost and you cannot bring them back. I also had a painting from someone who has since died and although it did not get destroyed, it has watermarks on it and the paint is peeling“.

“You work over the years and save up to buy bit by bit, so the reward of your work is visible in your surroundings. In 24 hours it’s all wiped out, all gone. We could at least pay for everything from the insurance money but I know others might not be so lucky as they might choose not to include everything in the policy.”

Carol is more careful now and she keeps her personal belongings in top drawers and cupboards. The floods hit her bungalow too fast to even think of what she should do to reduce the damage. Now she knows that if she had put her photographs, paintings and most precious and valuable belongings up high she could have saved them. “There’s only so much you can do in a state of shock, especially in a bungalow. This is why it is most important to be prepared.”

Source: The Environment Agency

**Houses from Australia**



**Coping with the heat**

What do all these houses have that will help the house and people to stay cool in very hot weather?

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Do we have these on our houses?.....

How will these help the house to stay cool?.....

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## Spot the adaptations of this house

Use informative labels to explain what these are and why they have been used.

Sloping roof to shed the rainfall

Roof has large overhang to help to keep the building dry in the wet season and provide shade in the heat



Siem Reap, Cambodia

An interview with a local village:

“Why do people live in floating houses or on stilts? Is it to make sure that it stays dry in the floods?”

“It is not just that”, he said. “During the rainy season water flows through the villages like small rivers and the soil turns into mud. In the dry season, powdered sand in the living room can be as unpleasant as muddy feet and is more easily swept out of a high house. The space underneath is used for storage and shade”.

Stilts provide a ‘high and dry’ home in all circumstances.

Spot the adaptations of this house.  
Use informative labels to explain what these are and why they have been used.



Sloping roof to shed the rainfall away from the walls of the house



Roof stick out over the veranda. Rain water is shed onto the ground. Veranda and people stay dry

## Agusan Marsh, Mindanao, Philippines

The houses float on bamboo and logs. Because so many of the building materials can be found nearby, it costs only about fifty euros to build a house. It can be done in about two weeks.

The water level can rise over six meters, so when you fish for your living your house has to float. Also, the houses on water can better withstand an earthquake than the houses on land.

Sometimes houses are moved when the scenery becomes too familiar, when the village needs to be reorganised or to make way for the spirits of the ancestors to pass.

What happens when there is a storm? "We just let it pass and accept the damage", says Datu Kanliboko, a villager.