Exe Estuary & Poole Harbour

Enquiry 1: How does weather and climate affect our lives?

Context and Learning Aims

If children and young people are to develop an informed understanding of the implications of climate change then an awareness of a range of key underpinning concepts is essential. Pupils therefore need to spend time engaged in learning activities that support them through enquiry to understand:

- **Weather**: the prevailing atmospheric conditions at any given moment in time (temperature, rainfall, wind, cloud cover, sunshine etc.) and that can change from one moment to the next;

- **Climate**: the general or average weather conditions experienced in a place over an extended period of time such as 30 years;

- **Place**: an area with definite or indefinite boundaries;

- **Distribution**: the way in which something is spread out over the Earth’s surface;

- **Environmental Interaction**: the ways in which the natural environment (in this case the climate) affects our lives;

- **Adaptation**: any change in the structure or behaviour of flora, fauna and human beings that make them better suited to its environment;

- **Change**: to alter or make different;

- **Cause and Effect**: how one thing leads to another.
Learning and teaching activities and curriculum progression

Key Question 1.1: What is weather?

Either project or distribute hard copies of the photographs in Resource 1.1. All of these images depict people around the world being influenced by the weather. Working in pairs support the pupils to describe the weather conditions in each photograph and to explain how people are being affected by the weather. Listen for and record key vocabulary e.g. wind, fog, snow etc.

Ask the pupils to consider whether the weather during the day so far has been the same? How has the weather changed since when they got up to come to school? Is the weather exactly the same as it was yesterday? How is it different today? Is the weather likely to be identical tomorrow? What things might change e.g. the temperature might be hotter or cooler; it might rain or there might be more sun shine. The important thing here is for the pupils to be supported to see that the weather is transitory and very changeable from one moment to the next, let alone one hour or day to the next.

Exploring the concept of weather with younger children

Sunny Days
A sunny day provides great opportunities to investigate light and shade in a variety of ways. Look for shadows of all kinds; people, trees, flowers etc. Are they the same? How are they different? Can you get away from your shadow? Why? Why not? How can we make our shadows change shape or disappear? Draw around each other’s shadows using playground chalks. Stand the children in the same spot every hour and re-chalk the shadow to show how it moves as the day progresses. Chase shadows try and jump on them. Make some simple shadow puppets indoors, for use outside. Create a simple sundial, using a stick that has been pushed into the ground, or position one using some play dough or plasticine. Make sure that there are plenty of sticks available so that children can make their own.

Rainy Days
When it rains get the umbrellas out and dance in the rain. Listen to the sounds that the rain makes. Attach small bells, corks or buttons to pieces of thread and tie them to the umbrella spike. Take them outside in the rain and listen for some unusual sounds. Put welly boots and waterproofs on and jump in puddles. Discover different ways to collect the rain. Examine raindrops on leaves, grass, windows and flowers. Provide magnifying glasses so that the children can look really closely. What do they notice? Challenge the children to bring a puddle in doors using sponge or pipettes to transfer the water in the puddle to a container. Watch puddles disappear in stages by drawing in chalk around them and watch them shrink in size as the water evaporates. Ride vehicles through puddles and notice the different kinds of tracks they make. Sprinkle cooking oil in puddles to make ‘rainbows’ as well as powder paints and inks. Float different things in the puddles. Investigate a range of materials to see what is waterproof and what is not.
Cold, frosty, icy and snowy days
When it is frosty place gloved hands in frosty places and watch it thaw. Scrape ice from windows and photograph the frost and use the photographs as inspiration for creative work, indoors and out. During very cold weather place containers of warm water outside at the end of the day and then return to it first thing in the morning when the liquid has frozen. Bring it indoors and watch it thaw out again. Press gently with welly booted feet on shallow frozen puddles. Look for bubbles underneath. Listen for the cracks as puddles break. In snowy or frosty days fill squirty bottles with warm water and add food colouring. This can be squirted onto the snow to make patterns and pictures or even to ‘write’ with. Children can also make marks using sticks to scrape in the snow, while painting in the snow gives children the chance to see how melting snow affects both the mark and the colours, as they mingle. Using snow as a canvas allows the children to see contrasts of colour and texture. The children can collect items to make the pictures such as sticks, berries, stones and soil. Set up skittles or bottles weighted slightly with water and use them as targets for snow balls to encourage hand-eye co-ordination. A target can also be chalked onto a wall and snowballs thrown against this. Marking numbers onto the target will encourage number recognition. Things can be frozen into ice and then hung up as ‘glass’ ornaments outside. Using a variety of containers to freeze the water in allows the children to see the different rates of melting for big and small, or thin and thicker pieces of ice. Anything can be placed into the water to freeze into it, from berries to leaves to items relating to topics of interest. To allow them to hang, weight the end of a long string and drop it into the water, wrapping the other end of the string around a stick propped over the container. Once frozen, the string can be tied round branches or fences.

Windy Days
On windy days help the children to experience the sensation of the wind in their faces. Create some streamers, flags or balloons tied to a fence or post to show how windy it is. Move these around to different places in the school grounds to find the most sheltered and windiest spots. Fill up a washing up bowl to almost overflowing so that the wind will ‘catch’ it and create small waves and ripples. Make some simple sailing boats with the children and investigate what happens when they are put to sail on the water. Wash the doll’s clothes and let the children peg them out on a windy day and watch them dry. Make wind chimes from reclaimed materials including some metal, such as old keys, bells, and cutlery and so on and hang on wire coat hangers. Hang outside and listen to the noises they make on windy days.

Exploring the concept of weather with older children
Talk to the children about different ways of remembering what the weather is like each day. Children can record the weather in a variety of ways. This could include taking photographs or recording the daily weather on a chart using symbols. Some children may well be familiar with the symbols used on television weather charts. The children can be shown a number of television weather forecasts to point out the symbols which are used. This can be reinforced by giving the children a sheet of different weather chart symbols or older children could think up their own symbols. A weather diary can be kept for a week or two, recording the weather conditions 2-3 times in the morning and again in the afternoon. Self-adhesive and reusable weather symbols can be stuck onto a laminated map of the British Isles.
Using the same laminated map, older children can be encouraged to think up and present their own one minute weather forecasts in the style of television meteorologists. These can be imaginary but produced to a brief i.e. a winter’s day, a summer’s day, a very windy cold day or more directed according to a definite weather report which could be done on a separate map outline.

Similarly, older children can measure the force of the wind using the Beaufort Scale over a 5 or 7 day period (perhaps measuring it two or three times a day) and the direction in which the wind is blowing using eight points of the compass. This data can then be recorded as a wind rose for the week.

Comparisons can be made over several weeks to ascertain the prevailing wind direction for the school grounds.

**Exploring the concept of change with younger children**

The very youngest children have no understanding of ‘time’ as governed by adults or the clock. A baby’s understanding of time is formed through predictability and things that are consistent in their lives each and every day. A number of experiments with different materials and substances can also promote a sense of change such as germinating seeds, dissolving salt in water, boiling pasta or rice; dissolving coffee granules, freezing and thawing water or pouring water onto a sand tray so that it makes little rivulets and carries the sand away. Three and four year olds explore time in a personal sense. Their idea of time centres on significant events such as birthdays and seasonal celebrations. They recall familiar sequences such as washing their hands before snack time. Words such as yesterday, today and tomorrow become understandable when linked to a particular event or activity which has meaning for each child.

Towards the end of the EYFS, most children can begin to compare their present day objects with the ‘old’ things of their parents and grandparents. Use a number of old objects with which children can compare the modern equivalents such as telephones which deepen the child’s understanding of the passage of time. The concept of change can therefore be explored with children in a number of ways. Illustrated story books such as *The Very Hungry Caterpillar* by Eric Carle and the excellent *Whatever the Weather* by Wendy Body (Pelican Big Books) are a proven method. In addition the concept can be explored at a personal level with children through asking them to bring in baby photographs of themselves. Asking the children to consider how they have changed in say, the past year, is a fruitful mechanism for getting them to think about change. How have they changed? Examples might include getting taller, needing new shoes as they grow up, bigger clothes, learning to ride a bike or swim etc. Similarly, ask the children to think about what may have changed at home e.g. arrival of a sibling, a new extension, garden, television or car perhaps? Around the school grounds children can be encouraged to look for changes in the environment such as trees losing/growing leaves, the grass growing and needing cutting or the process of germinating seeds etc. Children can be encouraged to consider a number of everyday items that have changed considerably over time such as a candle lamp, lantern and electric light or various telephones (traditional table top with number dial, cordless telephone and cell phone). A visit to a local museum with a ‘hands on’ approach is a perfect way for children to increase their sense of time and change through handling real ‘old’ objects to compare with new. Many museums now have handling
collections with real ‘old’ objects to compare with new. Many museums now have handling collections even for the youngest of children. By handling objects, children can explore materials, textures, shape, time and place, and learn how to care for things.

**Exploring the concept of change with older children**

Older children will be able to look at a range of photographs such as those in Resource 1.2 which illustrate ‘before’ and ‘after’ images of the same scene. Ask the children to consider what has changed and to suggest reasons why? Similarly, photographs taken at the same spot to depict changes brought on during the seasons can be used to generate discussion and observations of change. Considering the concept of change presents a great opportunity to investigate the local area and community of the school. The following questions could be investigated with the children:

**What was the local area like in the past and how was it used then?**

- Obtain old photographs of places in the local area and compare with the present day;
- Invite long established members of the community into to talk about their lives and the changes they have seen. The children can prepare questions to ask in advance of the visit;
- Invite members of the community who have lived locally for only a relatively short period of time. What attracted them to the area and what are their impressions?
- Look for old baseline maps of the local area and add new developments to them;
- How has the school changed since it was first built – aerial photographs; school grounds developments etc.
- Support children to access old census records of the local area from sites such as http://www.ukcensusonline.com/census/1841.php and http://www.nationalarchives.gov.uk/records/census-records.htm
- How have the number of people and their occupations; place of birth etc., changed since 1841?

**What is the local area like now; how is it used and how is it changing?**

Children can work with digital cameras to record how the local area is being changed today. This can be on the small scale e.g. digging new flower beds or more significant such as a new housing estate, road; factory or building. Be sure the children really scrutinise change and don’t miss things such as extensions; satellite dishes; mobile phone masts; traffic lights; hedgerow planting or removal; tree planting/removal; litter bins etc. What do the children think of these changes? How are they benefitting the local environment and/or community? The children can upload their photographs onto the grid squares of their local area on the geograph website at http://www.geograph.org.uk/
What changes would you like to see in the future in the local area and how can you help with this?

What does the local area need to improve it? What do we mean by improvement anyway? One person’s improvement may be another persons’ worst option. On a baseline map of the local area encourage the children to consider and locate things which would benefit:

- Someone who is unemployed;
- Someone who is a wheelchair user;
- Someone who is retired and no longer drives a car;
- A young person who wants something to do at weekends;
- A local nature conservation organisation which wants to see more trees and open spaces;

Further ideas related to investigating change in the local area is available from the Geographical Association’s Getting to know your local area at: www.geography.org/resources and from the Historical Association: Urban spaces near you: cross-curricular walk at http://www.history.org.uk/resources/resource_3879.html

Exploring the concept of cause and effect with younger children

The practice of predicting helps children to grasp the concept of cause and effect. Children can be asked questions such as Do you think it will rain tomorrow? They can then look at the school weather chart to see the pattern of weather for the last few days and go outside and observe the pattern of clouds. Whether they are right or wrong is immaterial; the key element is the enquiry that led to an informed guess. Similarly, asking the question ‘what will happen if ….?’ and applying this to switching a switch, turning on the kettle, turning on the oven, putting water in the ice cube tray of a refrigerator’s freezer compartment etc. A number of experiments with different materials and substances can also promote a sense of change and cause and effect such as germinating seeds, dissolving salt in water, boiling pasta or rice; dissolving coffee granules, freezing and thawing water or pouring water onto a sand tray so that it makes little rivulets and carries the sand away. Getting children to make ‘magic potions’ from a range of resources including cake mixture, sawdust, gloop, glitter, instant snow powder, food colouring and oil.
Exploring the concept of cause and effect with older children

The curriculum offers a wealth of opportunity to explore the concept of cause and effect which can be illustrated in every subject. For example:

- In Science a good example of cause and effect would be the effect of the moon’s gravitational pull which causes tides;
- In Religious Education the children might consider an incident such as when Rosa Parks refused to give up her seat on a bus in 1955?
- Another practical example is the potentially negative impact of poor eating habits to our health and the importance of a balanced diet.
- In English, literature is full of cause and effect. Children’s stories like: *If You Give a Mouse a Cookie* by Laura Joffe Numeroff [Laura Geringer Books, 1985] contain numerous examples of what happens and why. In classic literature, events also happen for a reason such as in Shakespeare’s *Romeo and Juliet*. Romeo killed himself because he thought his love Juliet was dead.

The **MSC Napoli** was a large cargo container ship which was beached close to Branscombe on the Jurassic Coast in Devon on 18th January 2007. The disaster hit international headlines because hundreds of people were attracted to the local area to scavenge for items that were being washed up such as motorcycles, car parts and shampoo bottles. The situation intensified as local police were unsure as to whether this constituted stealing or safekeeping. In addition local people were literally stuck in their homes as their small village was gridlocked with traffic and people carrying things off the beaches. In terms of environmental pollution, beaches along the Jurassic Coast were littered with items washed out from the cargo. This included packets of oil-covered biscuits which attracted sea birds that then fell ill after ingesting the oil. A mass effort was launched to clean the beaches and rescue oil-covered birds. Today the beaches around Branscombe are back to normal, but remnants from the cargo containers are still being washed onshore after heavy winter storms.

All of the resources for the following learning activity are available from the Jurassic Coast World Heritage website at:

http://jurassiccoast.org/education/download-resources/604-msc-napoli-disaster-case-study

Without any introduction distribute the set of photographs of the story of the **MSC Napoli** in 2007. Ask the pupils to sequence the photographs in the correct order, telling the story to each other as they do so. Allow time for different groups or pairs of pupils to feedback their ideas and to tell their story of events. What initial ideas do they have about what might have caused the wreck and the effects of the running aground?

Now distribute the sets of information cards (**Resource 1.3**). Read through each piece of information on the cards and ask children to sort them into three sets: background information; causes of the wrecking and effects of the wrecking. What is the real story of the Napoli? How much of the real story did they get right to begin with? Anything that surprised them at all or that they had not anticipated? Be sure to make the link to the weather conditions and Windstorm Kyrill which hit the English Channel with so much power and
overwhelmed the Napoli. Without this storm occurring there would not have been a wreck. It was the most powerful windstorm in the Channel area for over 100 years. Take time before moving on to check understanding of key vocabulary such as salvage, list, pollution, looters etc.

Show children the partly completed front page of the Dorset Echo for January 22nd 2007 and explain that they are going to plan and then write the rest of the front page news story. Read through what has been done already particularly emphasising the bold and emotive headline, the sub-heading providing a little more detail and the effective use of graphic and emotive images.

As a model of media recount writing, distribute and read through the newspaper article ‘New runway would obliterate village’ and point out key conventions used referring to the annotated copy of the same article and the separate summary sheet of conventions.

Following the stages in the sequence of writing allow time for children to draft and rework their own news stories adopting as many of the conventions discussed previously as possible. Emphasise that they must include in their stories a summary of both the main causes and effects of the wrecking of the MSC Napoli. Take time for feedback and presentation by each pupil and display.

Key Question 1.2: What is climate?

There is a very wide range of learning activities that will develop an understanding of the concept of climate, how different climate zones are distributed around the globe; and the kind of ways that living things and especially people in different places have to adapt to climate. The following are just examples:

Divide pupils into pairs and give them the set of 20 climate information cards (Resource 1.4). Read through each of the cards with the pupils to check understanding of vocabulary. Separate the cards into the 14 cards that give information about climate and the 6 cards that tell us about things that are found or happen in places because of the climate. Take time to discuss and take feedback from pupils and check accuracy.

Next give each pair of pupils the set of photographs of Baffin Island in Canada, Dorset, Manaus in Brazil and Tunisia (Resource 1.5). Encourage and support the pupils to describe and observe what they can see in each of the photographs. What do the photographs tell us about the kind of climate that each place will experience during the year? What is the evidence of climate? Make a list of key vocabulary on the whiteboard.

Now ask the pupils to allocate the information cards to the photographs and take feedback and questions. This can be extended to a semi summative piece of writing by asking the pupils to use the information on each photograph to complete the writing frame in Resource 1.6: Place 1 is most likely to have….Place 2 is most likely to have…etc.
Distribute the *Map of the main climate areas of the world* (**Resource 1.7**). The children can create a simple key for this map. White and light blue areas are polar. Mauve areas on the map have a boreal climate. Green areas are temperate; yellow subtropical and pink tropical.

Five zones are shown but there are only four photographs. Get the pupils to match up each of the four photographs with its correct climate zone: Baffin Island (Polar); Dorset (Temperate); Tunisia (Sub-tropical) and Manaus (Tropical). Which one is missing (Boreal)? Using an Atlas or large political wall map support the pupils to identify three countries that have a largely temperate, polar, sub-tropical and tropical climate and write them into the correct boxes on the sheet (**Resource 1.8**). Now the children can be set the challenge and undertake their own research on the fifth climate zone: Boreal. Can they come up with photographs and a description of what the climate is like over a year to complete the map exercise?

Ask the pupils to look again at the photograph of the Polar climate in Baffin Island and then give out the location map (**Resource 1.8**) and the additional set of photographs (**Resource 1.9**) which were all taken in and around the capital of Baffin Island called Iqaluit. What additional key things can be observed? What must life be like for the people who live there? What would be the attractions of living here and what would be the disadvantages (or constraints) do they think? How will people have to adapt their lives e.g. clothes; houses; food etc. to live there?

Now give out the *Climate graph for Iqaluit* (**Resource 1.10**). Tell the pupils that climate graphs are special graphs that geographers draw to compare the climate (particularly average temperature and precipitation) during the year of one place with another. Take time to explain to the pupils the conventions used e.g. the average temperature for each month in degrees C are read off to the left vertical axis and average monthly rainfall always shown as bars and measured in mm are read off to the right hand vertical axis. Average temperature maximums and minimums are shown as black and red lines respectively. Take time here to ask the pupils about what the climate graph is showing? How long are the summers and winters? In which season does most rain fall? Although rain is shown on the graph how will most moisture from the atmosphere reach the ground – snow?

Next give the pupils a copy of the *Climate graph for Plymouth* (**Resource 1.11**) and remind them of what it shows – average monthly temperature and rainfall figures over a typical year. It does not mean that this will be exactly what Plymouth receives each year but it will be pretty typical of most years. Having ensured that the pupils understand this, give out the *data capture sheet* (**Resource 1.12**) which encourages the pupils to interrogate the two graphs and compare key information. Support the children to read off from the two graphs of Plymouth and Iqaluit and fill in the relevant boxes in the table. After the pupils have finished this exercise take enough time to debrief and check answers for accuracy. Take sufficient time to discuss the implications of what the data is showing, in particular the implications for how people live? For example, how would people grow food in Iqaluit, get their water or travel to school? Move the pupils on to understanding that anyone trying to live in Iqaluit would have to cope with an extreme climate and therefore have to modify or adapt their lives to the environmental conditions. Take feedback from around the group. What will be the top five climatic challenges of living in Iqaluit? How will transport, clothing, houses, water supplies etc. have to be adapted to the climatic conditions? Make a list on the whiteboard. Now show the film (**Resource 1.13**): *Ray Mears World of Survival – Arctic Baffin Island*. Ask the children to make a list of all the ways in which people and wildlife are shown adapting to the climate.
Next, give out the map of Bangladesh (Resource 1.14). Get the children to locate Bangladesh on a world map. Which continent is it in? Which countries border it? How does it compare in size to the UK? The outline map of Asia in Resource 1.15 can be printed off and used by the pupils to name and locate the countries of Asia. Explain to the children that this country suffers very serious flooding in most years. Now distribute or project the NASA satellite image of Bangladesh in Resource 1.16. Ask the children to suggest why there is such a flooding problem? The country is criss-crossed by many large rivers which meet at the centre of Bangladesh. What causes flooding? When the soil becomes saturated with rain water that it cannot absorb any more and the water runs off into rivers which quickly overflow. Now give the children the task sheet: Why are there so many floods in Bangladesh? (Resource 1.17) Here pupils complete the rainfall bar graph (Q1) and calculate the total rainfall in June, July and August combined (Q2). Encourage discussion and thinking around Question 3. What will happen to so much of the rain that falls in the summer months in a very flat land with many rivers? It is important that the pupils understand here that environmental factors such as the heavy rainfall, flat land and numerous rivers contribute to Bangladesh being so stricken by annual floods.

The worst floods to hit Bangladesh were those of 1998. Play to the children the ITN news report from that year (Resource 1.18). In this year (and in several years since) flooding occurred as a result of human factors which combined with the natural causes to create catastrophe. Give out the sets of information cards (Resource 1.19) to pupils working in pairs. Ask them to sort the cards in to sets:

- Causes of the 1998 floods
- Consequences of the 1998 floods

When they have done this ask the pupils to sort their set of Causes into natural causes and human causes. Take time to discuss this with the pupils and ensure that they understand how the two groups of factors combined to create such a disaster.

This work on flooding can be rounded off by reminding children that serious flooding does occur from time to time in Britain. A recent example is that of the Boscastle floods of 2004 in Cornwall. Give out the photographs of the devastating floods (Resource 1.20) and ask pupils to describe what they see. What was the main cause of the flooding evident in the photographs (a river overflowed its banks). The children can now access the Met Office website at http://www.metoffice.gov.uk/education/teens/case-studies/boscastle Encourage them to look at the slide show of images of the flood and then answer the following:

- What was the main cause of the flood?
- Two examples of destruction caused to houses and businesses
- One human impact other than the financial cost
- What the Environment Agency has done to try to prevent such a flood happening again

A relevant extension at this point could be to get the pupils to think about what might happen if their own home was flooded. Measure the height of 50cm against a wall and ask the children to think about what would happen if their home were flooded to this height. Discuss
the likely damage that would be done and if the floods carried on for a week what new problems would be created e.g. shortage of food and water etc. Next, introduce the idea of there being a prior warning to the flood. If they knew a flood was coming what could they do to prepare? Make a list on the whiteboard to assist the children with the next activity.

Finally get the children to prepare a set of instructions: What to do in the event of a flood that will be given out to everyone in their street, village, local estate etc.; in the event of a flood warning being given. What would they advise people to do before the floods arrive, during the flood and when the flood water begins to subside? Take time to progress the pupils through the stages of writing – modelling- drawing out conventions – drafting – reviewing – redrafting and then producing the final piece. As a model of the conventions of instructional writing the children can be guided through Resource 1.21: What to do in an earthquake and Resource 1.22: To all mountain bikers. The conventions of instructional writing at text, sentence and word level are detailed in Resource 1.23.
Sample Resources from Enquiry 1. The complete set of resources supporting learning in this enquiry are available on the accompanying DVD and online at www.licco.eu

Resource 1.1