Education Scotland
Foghlam Alba

Weather and Climate Change

Weather

See accompanying ‘weather’ videos in Glow:
http://tinyurl.com/gn9tkz8

Transforming lives through learning

Weather

Weather is a popular context for learning in many schools as children and young people have direct experience of different types of weather and the impact it can have on their lives, from sunny school trips to sports days cancelled because of heavy rain. This makes learning relevant, immediate and meaningful. It also offers strong links to different curriculum areas and can provide an effective context for interdisciplinary learning within Curriculum for Excellence.

The theme of weather also arouses the natural curiosity of children and young people and provokes many questions that can provide opportunities for further study, scientific enquiry and investigation such as 'Where does rain come from?' and 'What makes thunder and lightning?'.

Weather also provides an important starting point for understanding seasons, climate and climate change. It has an international dimension - many schools compare and contrast weather data with partner schools around the globe and individual weather events in one part of the globe can affect us too.

Reflective questions

- How can we develop in learners a curiosity and understanding of the environment and their place in the living, material and physical world?
- How can we establish the foundation for more advanced learning and future careers in the sciences and the technologies?
- How can we enable learners to locate, explore and link features and places locally and further afield?

Types of weather

If you want to experience and learn about different types of weather then Scotland is probably the best country in the world to do it!

Our ever-changing weather provides fantastic opportunities to measure, compare, record, analyse, investigate and observe different weather conditions and also to take learning outdoors and experience it, feel it, touch it, see it, smell it and taste it.

The investigation of different types of weather can be used to introduce children and young people to new vocabulary, terminology, symbols and concepts including: precipitation, temperature and pressure. Progression and depth can also be built into learning. For example, in the experiences and outcomes at the early and first levels, children investigate how water changes from one form to another. In second to fourth levels they then go on to investigate changes of state in increasing depth.

In Scotland we also have a whole collection of terms and phrases to describe the different types of weather: humid days are described as ‘close’ or ‘clammy’; rain can be drizzly or torrential. Phrases such as these can be used in creative writing whilst interpreting, preparing or presenting weather reports provides children and young people with other opportunities to develop literacy, design and language skills.

Reflective questions

- How can we build in suitable opportunities for progression within the curriculum?
- How do we use weather as a theme to connect learning across many areas of the curriculum?

About seasons

A season is a division of the year marked by changes in weather, ecology and hours of daylight. Countries across the world experience seasons in different ways. In Scotland we have four seasons: spring, summer, autumn and winter. However, some climates only have two or three seasons, which may be described as hot, dry, cold, wet, rainy or monsoon.

Most scientists believe that climate change is already having a significant impact on our seasons. Analysis of historical weather observations shows that winters in the North and West of Scotland are on average 60% wetter than they were in 1961 and the growing season has increased by up to 33 days. Predictions indicate that climate change is likely to exacerbate these changes and that in future we can expect wetter winters, drier summers and less snow and frost. These changes won't be uniform across the entire country and we can expect regional variations.

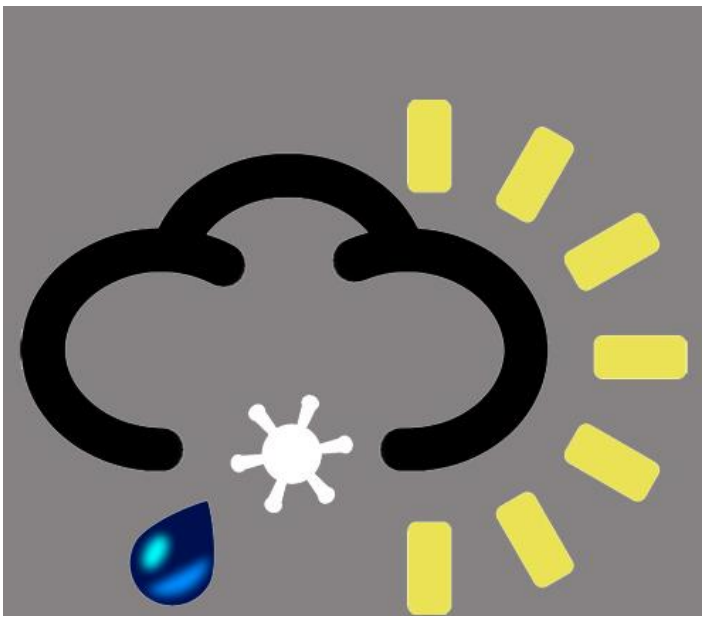
One major concern is that these changes to our seasons will upset the delicate balance of nature and have a significant impact on plant and animal populations - damaging our rich biodiversity and affecting important industries such as agriculture, fishing and tourism.

Reflective question

- How can we enable learners to understand the interdependence between people, the environment and the impacts of actions, both local and global?

Measuring weather

Meteorology, or the study of weather processes and forecasting, has been around for more than 2000 years although significant scientific breakthroughs were only achieved in the 19th century when Vice-Admiral Robert Fitzroy invented weather forecasting as a means of reducing the number of sailors killed by storms out at sea. Fitzroy had earlier captained the Beagle's famous voyage around South America with Charles Darwin aboard.



Weather instruments

Traditional instrumentation such as thermometers and barometers are still used to measure and record the weather. However, low cost digital weather stations now offer schools the potential to measure, record and analyse a variety of weather data including precipitation, relative humidity, wind speed and direction, sunshine hours, air pressure, etc. These weather stations can often send data to display panels and computers in classrooms and provide a host of learning opportunities relating to social studies, mathematics, technologies, sciences and numeracy. This data can also be easily shared and compared with others around the globe through the internet.

Predicting weather

Measuring weather can be straightforward but predicting the weather is still enormously challenging. The invention of the computer in the 20th century led to the biggest breakthrough in this field. Today, the Met Office uses satellite technology and the largest supercomputer in the UK to predict the weather. These weather forecasts are more accessible than ever before thanks to 24-hour interactive TV, the internet and improvements in mobile phone technology.

Reflective questions

- How can we use active and outdoor learning approaches to provide motivating, challenging and relevant learning experiences?
- How can we use the context of weather to connect to people and communities around the world?
- How can we develop understanding of the role and impact of technologies in changing and influencing societies?

How weather affects our lives

Our ever-changing weather in Scotland impacts on our lives at many different levels. On a daily basis it can affect choices we make about whether to walk or take the car, what clothes we wear and whether outdoor events and pursuits are likely to get glorious sunshine or be rained off.

Health and lifestyle

It also has more serious implications, with dampness in homes blighting public health and high numbers of vulnerable people dying from the cold. A heatwave during the summer can impact on the health of vulnerable people whilst a mild winter can have a disastrous impact on the ski industry. Concerns about the weather can also impact on lifestyle, careers and emigration.

Emergency planning

Weather is also an important concern for those involved with emergency planning and civil contingencies. Should Hogmanay celebrations in Edinburgh go ahead despite strong winds? Should staffing levels in hospitals be increased during icy weather to account for injuries caused by slips? Should millions of pounds be spent on improving flood defences for a given location?
Most scientists are predicting that climate change will result in more severe weather. Should these predictions prove accurate then weather is likely to have an even greater impact on our lives in the decades ahead.
Visit the Ready for Emergencies website for resources on severe weather and flooding to help you explore this issue further.

Reflective question

- How can we enable learners to recognise the impact the sciences make on their life, the lives of others, the environment and society?

The Water Cycle

Water is unique. Its properties make it the only natural substance that can be found on Earth in all three forms at the same time: liquid, solid and gas. The water on Earth is constantly moving and changing from one form, or state, to another. This cyclical process, powered by the heat of the sun, is known as the water cycle.

The Water Cycle in Action

- The sun warms the oceans and other surface water including rivers and lochs. The oceans contain 97.5% of all the Earth's water.
- Some of the heated water evaporates into the air as invisible water vapour. Water vapour also evaporates from the soil and from the leaves and stems of plants (through a process called transpiration).
- Water vapour is carried high into the atmosphere by hot air currents rising up from the Earth's surface. As the water vapour rises, it starts to cool causing the water vapour to condense - forming clouds. Air currents move clouds around the world.
- Tiny water droplets clump together within clouds to make larger droplets. When the droplets eventually, by a very complex process, become heavy enough, they will fall out of the sky as precipitation.
- Precipitation may soak down through the Earth's surface and become groundwater. Groundwater either seeps its way back to into streams, rivers, lochs and oceans, or is released back into the atmosphere through plant transpiration.
- The rest of the water on the Earth's surface is runoff. This water empties into lochs, lakes, streams and rivers and is carried back to the oceans. This surface water is once again heated by the sun and evaporates.

Reflective question

- How can we enable learners to develop a secure knowledge and understanding of the big ideas and concepts of the sciences?