# Climate change and sustainability
## in Northumberland

### Schools Resource Pack

**September 2025**

Northumberland
County Council

# Content

# An Introduction to the resource

This resource pack is designed to be used by teachers and support staff, as well as those in senior leadership roles. It tells the story of climate change, climate action, and sustainability using a Northumberland lens.

## Why is climate education important?

Climate change impacts all aspects of our lives and how we live. Many of our global challenges overlap with climate change. For instance, poverty, wildlife extinction, major weather events (floods, storms, droughts etc.) are all exasperated by climate change. Due to the complex nature of the climate issue and its interaction with all aspects of life, it is necessary to shift education about climate change away from individual subjects, such as geography or science, and to incorporate it's teaching into all subjects and all aspects of school life.

Education is critical for encouraging behaviour change and helping people to make informed decisions about their actions. It is important to teach children about their impact on the world from a young age, as this helps to foster an appreciation of the natural world that sustains us and instill environmentally friendly habits for life. Moreover, understanding climate change and feeling supported at school to take action on it can empower students to make decisions and take action, rather than feeling anxious or overwhelmed by the scale of the issue.

Climate change is becoming a key issue for governments at international, national, and local levels. Green technology, green jobs, and the sustainability sectors are growing and will become increasingly significant. Education around climate change, issues, and solutions is crucial to give our students the skills they need and prepare them for these new opportunities within green careers.

## The resource

**What this resource is NOT:**
This resource is NOT a lesson plan.
This resource does NOT contain lesson activities or worksheets.
This resource is NOT a comprehensive summary of climate change issues and solutions.

**What this resource is:**
This resource is a Northumberland case study.

There are lots of resources out there on climate change. We did not want to reinvent the wheel (although we have sign posted to the Ministry of Eco Education which has complied great resources into a single space for teachers).

It is, however, difficult to find information about the local history, impacts, and solutions of climate change within Northumberland. This resource fills that gap to provide the information teachers need to make teaching about climate change specific to Northumberland.

## Why the Northumberland focus?

**Reduced workload**
There are many high-quality resources online about Northumberland, however asking teachers to individually collate all of these for each lesson or subject would be a demanding task.

**Tackling climate anxiety**
Looking at the issue of a global scale can make Climate Change feel distant, overwhelming, and an impossible challenge. This can leave students and teachers alike feeling disconnected and overwhelmed. This resource focuses on the local challenges and solutions to climate change, connecting it to our lives and empowering students to take action in Northumberland.

**The bigger picture**
Northumberland County Council has declared a climate emergency.
Everybody has a role to play in meeting the 2030 carbon net zero target for Northumberland.
Schools are in a unique position to educate, empower, and inspire both their students and their wider communities to take action on climate change and contribute to the bigger picture.

# An Introduction to the resource

This resource pack is designed to be used by teachers and support staff, as well as those in senior leadership roles. It tells the story of climate change, climate action and sustainability using a Northumberland lens.

## The Ministry of Eco Education

This resource has been structured in line with the **Ministry of Eco Education curriculum.** The Ministry of Eco Education is a charity providing free support to schools to help them embed sustainability across their curriculum. The charity is funded by Dale Vince, founder of Ecotricity the UK's renewable energy provider and owner of Forest Green Rovers, the world's greenest football club.

The Ministry of Eco Education saves teachers time and energy by weaving together the best free resources from 100's of organisations into series of lessons, aligned to the national curriculum and framed around big questions.

Some of these questions include: What's really renewable? Is nature the answer? How much stuff is enough? Does anything ever go away? Is the climate breaking down?

There are seven key themes within which each enquiry question fits: Energy, nature, water, society and policy, transport, food and waste

Teachers can use as much or as little to inspire their lessons. They have also brought together the wealth of opportunities around education for sustainability into a logical journey for the whole school to work towards becoming a zero-carbon school.

Watch this video to find out more about the Ministry of Eco Education:


## How to use this resource

This Northumberland Schools resource pack is structured using these key themes from the Ministry of Eco Education.

Within each of the Theme pages you will find:

- Northumberland case studies and stories based upon the theme
- Key terms
- An 'Explore the area section': This contains ideas for field trips or days out
- A 'Learn more about Northumberland' section: This contains related online resources about Northumberland
- A 'Learn more about this topic': This contains links to MoE lesson plans, which bring together a whole host of resources related to the enquiry question

To access the Ministry of Eco Education's free resources linked in this booklet, sign up here.

# Context

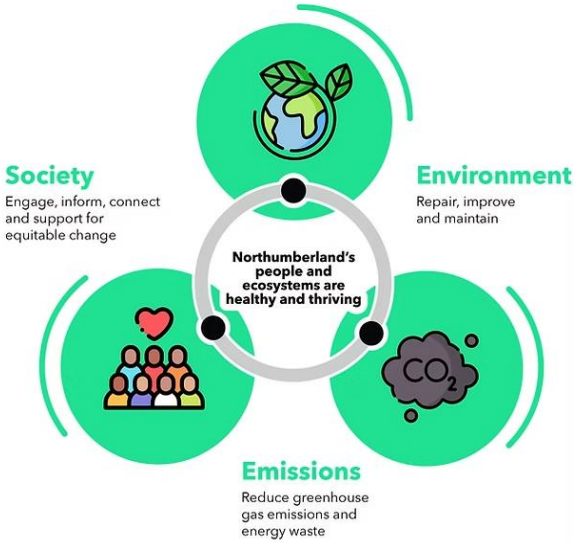
This section highlights the key context within which this resource sits, including Northumberland County Council's climate change ambitions for the whole of the county.

## Northumberland County Council's climate ambitions

1. By 2030 we want to balance the amount of carbon dioxide the Council emits with the amount it removes from the atmosphere.
2. By 2040 we want the number of greenhouse gas emissions produced in Northumberland to be balanced by the amount removed.

Our plan outlines how we're going to reduce greenhouse gas emissions across Northumberland and looks at the three key areas highlighted below.

- **Society:** Engage, inform, connect and support for equitable change
- **Emissions:** Reduce greenhouse gas emissions and energy waste
- **Environment:** Repair, improve and maintain





Read Northumberland County Council's Climate Change Action Plan 2024 – 26.

# Context

This resource pack sits within a wider drive toward improved education on climate change and sustainability within Northumberland's education sector. We hope this pack will be a useful resource for educators to help contextualise the climate crisis within Northumberland. There is already fantastic work going on within schools and education providers across Northumberland within this area. Alongside this resource, NCC is coordinating a sustainability network for students, teachers, and schools in Northumberland to share ideas, support each other and take action against climate change.

## Northumberland Schools Sustainability Network (NSSN)

**About NSSN:**
The NSSN is a regional branch of the UKSSN that brings students, teachers, and school staff together across Northumberland. The network is student led, primarily by secondary school students. However, the projects and initiatives will involve both secondary, middle, and primary school students. The network will also provide a space for teachers and staff to collaborate across the schools, in order to share resources, ideas, and support each other.

The NCC's role in this network is primarily as a facilitator. We want to make it easier for all schools across Northumberland to position sustainability and climate change as one of their core values and to help prepare their students for a future that will be shaped by climate change risks and opportunities.

Click here to find out more

To join the network, please email climate@northumberland.gov.uk

**About UKSSN:**
The UKSSN is an umbrella group set up in Spring 2021 to bring together regional school eco-committees and networks to allow diverse pupil voices from across the country to discuss and drive positive change for their futures. Those most involved are from secondary schools but there is a growing primary network. The UKSSN is now hosted by the environmental charity Global Action Plan through the Transform Our World school's programme. Many pupils, staff, and schools are doing excellent work on this area individually, but together through these networks, the voices of our young people are even stronger and brighter.

Read more about the UKSSN and view updates on their projects here.

# What is climate change?

The Framework Convention on Climate Change (UNFCCC) defines climate change as: 'a change of climate which is attributed directly or indirectly to human activity that alters the composition of the global atmosphere and which is in addition to natural climate variability observed over comparable time periods.'

**How will climate change affect the UK?**

For the UK, climate change means warmer, wetter winters, hotter, drier summers, and more frequent and intense weather extremes.

By 2070, the Met Office project projects the following for the UK:

- Winters will be between 1 and 4.5°C warmer and up to 30% wetter
- Summers will be between 1 and 6°C warmer and up to 60% drier

The effects of climate change will vary across the UK. In the North East, the effects of climate change are demonstrated in the table below.

| 2060-2079 | Summer rainfall | Winter rainfall | Summer temperature | Winter temperature |
|---|---|---|---|---|
| Low emission scenario | 11% drier | 6 % wetter | 1.5 C warmer | 1.1 C warmer |
| High emission scenario | 18% drier | 13% wetter | 3 C warmer | 2.4 C warmer |

**What about where your school is located?**

In collaboration with the BBC, the Met Office has created a tool to demonstrate and visualise how climate could change in your area, just enter your postcode.

**What do these changes mean for Northumberland?**

- Increased frequency and severity of extreme weather events such as storms and flooding are two significant risks that will affect the lives of people living in Northumberland.
- Much of our Northumberland coastline is at risk from rising sea levels. Use the map to explore which areas are at risk by 2050.
- Farming and agriculture in Northumberland is at risk: whilst hotter weather and higher levels of carbon dioxide can make growing some crops easier, expected droughts during the growing season will make growing more challenging and unpredictable.
- The risk of wildfires will increase with drier and hotter summers predicted due to climate change.
- The changing climate also impacts biodiversity in Northumberland, impacting upon population numbers of native species and allowing invasive species to gain a foothold.

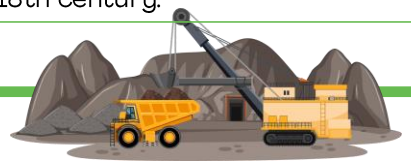
These impacts and more are discussed in greater detail under the themed sections.

# Energy in Northumberland

## 17th Century

Coal mining in Northumberland dates back to the 17th century. The North East dominates coal production in England at this time, with 40% of England's coal coming from mining pits in the North East by the beginning of the 18th century.[1]

By the late 19th century, the Port of Blyth becomes the primary coal port in Northumberland and briefly ships more coal than any port in Europe.[3]



## 1830

The first **Industrial Revolution** ends and the second begins, producing inventions such as the telephone and the lightbulb. During this century, coal replaces water as the main energy source, fueling the shipbuilding and iron production industries in the North East.[2]

## 1900

Coal production in the North East increases from 4.5 million tonnes in 1800 to 45 million tonnes by 1900.[4] By 1919, there are 223,000 coal miners working in the North East.[5]

## 1947

The coal industry becomes nationalised, forming the National Coal Board, meaning improved working conditions and wages.[6]

In 1957, high cost pits across Northumberland close down due to the increasing use of oil, the introduction of nuclear power, and the move to electricity.[6]

## 1984

The miners go on strike, protesting the closure of collieries by the conservative government under Margaret Thatcher. Over the next few decades, collieries began to close down across the country.[7]

The Ellington Colliery in Northumberland is the last pit mine to be shut down, officially closing in 2005.[7]

## 2000s

The UK government publishes a White Paper entitled 'Meeting the Energy Challenge' in 2007, an agenda with the target to strengthen the use of renewable energy sources and improve energy efficiency.[8]

The Port of Blyth was diversified to boost the economy of the area and regenerate the port as a thriving hub once again. In 2002, the New and Renewable Energy Centre was established to test new technologies. The centre was re-named as the National Renewable Energy Centre in 2012, and has invested over £160m in new test facilities and an offshore wind turbine site.[9]

The renewable energy sector expands over the decade, particularly offshore wind farms, beginning with two turbines on the Northumberland coast, the biggest in the world at the time.[10]

## 2010-2020

Following on from the relatively slow expansion of the renewable energy sector over the 00s, the government releases a policy paper stating the actions to be taken to meet the legally binding target of 15% of the UK's energy demand being sourced from renewable energy by 2020.[11] The government also implements the 'Carbon Plan' to improve energy efficiency.[12]

Northumberland County Council introduces the Affordable Warmth Strategy in 2010 to improve the energy efficiency standards of homes in the area . The strategy also promotes encouraging more energy efficient behaviours from residents.

## Recent developments

Northumberland County Council recently published the Climate Action Plan 2021-23, setting out seven priority action areas for improving climate action in the county.[13] The council aims to **decarbonise** heat through the improved energy efficiency of buildings, and investment in new technologies to support renewable energy sources. The council is investing in technology such as solar PV panels, electric vehicle charging points, and investigating the opportunities for district heat networks in seven towns across Northumberland.[13]

## Looking to the future

Northumberland is being nationally acknowledged as a leading region for energy development, recognised by the UK government as having 'Centre for Offshore Renewable Energy (CORE)' status – a partnership between central and local governments to support regional investments in renewable energy.[14] Northumberland has also set a target of a carbon neutral county by 2030 to contribute to the UK target of a net-zero nation by 2050.[15]

**What does the future look like to you?**

# Energy in Northumberland

## Key terms

**Industrial Revolution:** used to describe a historical period, beginning in 18th-century Great Britain, which brought about a transition from creating goods by hand to using machines.[16]

**Nationalised:** the process by which a government takes control of a business or industry.[17]

**Renewable energy:** energy produced from sources that are naturally replenished and do not run out. For example the sun or wind.[18]

**Energy efficiency:** to use less energy to perform the same task - eliminating energy waste.[19]

**Decarbonise:** refers to the ways in which an organisation reduces its carbon footprint by reducing its greenhouse gas emissions. For example, carbon dioxide or methane.[20]

## Learn more about this topic

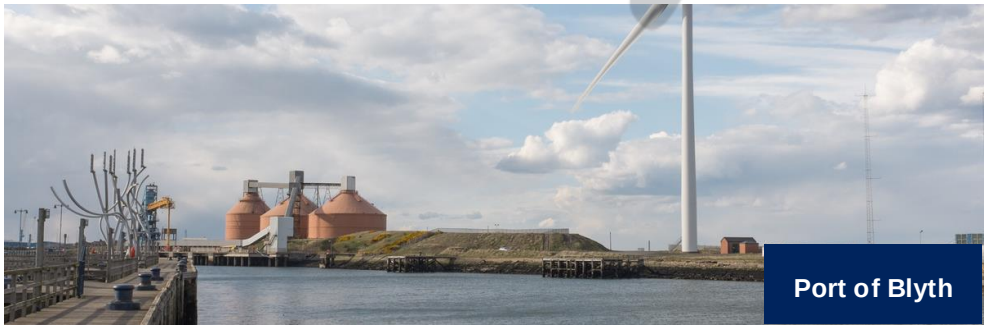
The Ministry of Eco Education has created lesson plans based upon the following enquiry questions for this topic:

- What is really renewable?
- Is carbon a magic ingredient?
- Is the future electric?
- How should we heat our homes?
- Can gas be green?
- Do we need to insulate our homes?
- What does it take to make a cup of tea?
- Is community energy the answer?

MINISTRY OF ECO EDUCATION

## Explore the area

- Blyth STEM Hub
- Queen Elizabeth II Country Park - an example of restored industrial land
- Lynemouth Power Station
- Woodhorn Coal Museum



Port of Blyth

## Learn more about Northumberland

- Port of Blyth Offshore Wind Farm
- Blyth Offshore Demonstrator
- Climate Action - Northumberland Energy Analysis
- Northumberland County Council Climate Action Plan - Priority Action Area 3 (Heating)
- Northumberland County Council Climate Action Plan - Priority Action Area 5 (Renewable Energy)
- Bring it on - Engineering for Climate change in the NE
- Vattenfall onshore wind farm
- Northumberland Net Zero

Woodhorn Museum

# Nature in Northumberland

## From the land...

The landscape of Northumberland has been shaped by its geology, climate and changes in land use. Although 80% of the landscape in Britain is rural, only 20% of the population live in these areas.[1] The variety of alternative opportunities has encouraged rural-urban migration over the last century.

## Farming

In the early 18th century, growing demand from industrial regions led to a rise in food prices, and so increased farming profits. Northumberland transformed into an efficient farming region over the following years, namely due to the new harvesting technology pioneered by Northumbrians such as Thomas Ilderton.[2] During both world wars, most of the land was converted from grassland to arable due to the Government's aim to feed the population and limit imports. Following on from the world wars, farming saw a shift from traditional methods of horse power to modern technologies.[3] More recently, many farms in Northumberland use modern technology to cultivate multiple forms of crop and to raise their livestock. They benefit from programmes from DEFRA such as the 'Farming in Protected Landscapes' scheme to support local farmers working in the AONB region of Northumberland - 75% of the Northumberland coast is a farmed landscape.[4]

## Afforestation

The afforestation of Northumberland has changed the traditional landscape of the county. The Great Northumberland Forest is a prime example of an afforestation scheme in the county. The scheme is an amalgamation of multiple parcels of woodland across Northumberland - of various sizes and types - with a total of one million trees to be planted between 2020 and 2024.[5] Afforestation boasts multiple benefits, from mitigating climate change through absorbing carbon dioxide, to improving health and wellbeing by providing spaces for recreational use. The Great Northumberland Forest will host a variety of woodland sizes and types to suit local needs, such as farming or biodiversity.[6] The approach of this scheme is to promote the planting of the right tree, in the right place.

Beyond absorbing carbon dioxide (**sequestration**), these trees are also able to do the following: reduce flood risk through absorbing water via photosynthesis; reduce the risk of landslides through increasing the stability of slopes as their roots anchor the tree and reduce soil movement; and provide habitats for a variety of species to increase their resilience to climate change.[6] *For specific local case studies, see the ArcGIS story linked in the Northumberland resources section.*

## Peatland restoration

The Northumberland Peat Partnership brings together stakeholders to manage and restore **peatland** habitats in Northumberland - particularly on the Partnership Area which encompasses the area of Northumberland north of the A69.[7] National efforts would see 35,000 ha of damaged and degraded peatlands being restored, preventing 9 million tonnes of carbon dioxide from being released by 2050.[8] Beyond actively locking away carbon, healthy peat also has the capability to reduce the risk of flooding. For example, there are three major river catchments in the North Pennines AONB: the rivers Nent, West Allen and Wear. Healthy peat is able to slow down rainwater flow from these rivers, and so reduce the risk of flooding in lowland areas.[9]

## Northumberland National Park

The status of a 'National Park' is the highest form of landscape protection in the UK. Northumberland National Park was established in 1956.[10] The park is one of the least populated of the National Parks, although it covers an area of over 1,050sq km, and was officially given **Dark Sky Park status** in 2013.[11] With the park having such a variety of landscapes, almost one third of the land is made up of priority habitats, recognised for their environmental importance and wildlife. Additionally, 10,000 hectares are **Sites of Special Scientific Interest** (**SSSI**).[11] Although the coastline was not included within the boundaries of the national park, it's designation as an AONB provides a similar degree of conservation and protection.[10]

# Nature in Northumberland: Land

## Key terms

**Peatlands:** ecosystems that contain deep accumulations of decomposed organic material (peat).[12]

**Sequestration:** the capturing, removal, and storage of carbon dioxide from the earth's atmosphere - for example through forests or oceans.[13]

**Dark Sky Park:** land possessing an exceptional or distinguished quality of starry nights and a nocturnal environment that is specifically protected. [14]

**Sites of Special Scientific Interest:** a formal conservation designation to describe an area of particular scientific interest.[15]

## Learn more about this topic

The Ministry of Eco Education has created lesson plans based upon the following questions for this topic:

- Is the climate breaking down?
- Does it matter if species go extinct?
- Is nature the answer?
- Is the weather changing?
- How important is soil?
- Who lives near me?
- Where have all the trees gone?
- How should we use land?
- How does nature grow?

MINISTRY OF ECO EDUCATION

## Explore the area

- Hauxley Wildlife Discovery Centre
- Northumberlandia Visitor Centre
- Kielder Obsevatory
- National Landscape Discovery Centre
- Chillingham Wild Cattle
- Kielder Water and Forest Park
- Plessey Woods Country Park

Kielder Observatory

## Learn more about Northumberland

- Northumberland Wildlife Trust 'Exploring Nature' education sessions
- The Great Northumberland Forest ArcGIS story
- 'A forest for the future' Forestry England video
- Northumberland Wildlife Trust 'Green Influencers'
- ArcGIS map - Northumberland's Historic Landscape Charter


A forest for the future | Rushy Knowe woodland creation

# Nature in Northumberland

## ...to the sea

The Northumberland coast has been an incredibly valuable landscape, both regarding the historic and natural environment. Historically, the Northumberland coastline is known for its castles and town defenses, but also for its industrial and transport heritage. In 1958, the coastline was designated as an Area of Outstanding Natural Beauty (AONB) by Natural England.[16]

## Marine protected areas

There are 11 marine protected areas within the inshore waters of the Northumberland and Berwickshire Coast.[17] A marine protected area (MPA) describes a marine area which is given legal protection in recognition of the natural environment found there.[18] These range between Marine Conservation Zones (MCZ), Special Areas of Conservation (SAC) or Special Protection Areas (SPA). For example, the grey seal is a recognised feature of the Berwickshire and North Northumberland Coast SAC, meaning that they are legally protected from being disturbed, injured or killed.[19] Equally, there is legislation to control the introduction of non-native species in order to reduce disturbance to native species.[20] More recently, the Northumberland coast has been identified as a potential Highly Protected Marine Area (HPMA). One such area being Lindisfarne as it has some of the most diverse intertidal and subtidal habitats in the North Sea, being home to rich communities of species.[21]

## The geology of the coast

The Northumberland coast boasts incredibly complex geodiversity. In terms of hard rocks, most of the coast is underlain by a series of limestones of a lower carboniferous age. The alternate layers of sandstone and shale form uneven wave-cut platforms and sharp headlands. The Farne Islands are formed of an igneous rock derived from the Whin Sill, which materialised as volcanic magma cooled.[25] As this magma cooled, the Whin Sill contracted which produced the distinctive vertical cracks seen on the Farne Islands rock.[26]

Along the coastline are also multiple sand dune landscapes, with Northumberland having one of the longest stretches of semi-continuous dune coast in Britain. Some sand dunes in Northumberland date back as far as 3000 years ago, for example at Holy Island or Bamburgh.[27]

## The Farne Islands

The Farne Islands are a National Trust site off the coast of Northumberland, under legal protection as a Marine Reserve and a Site of Special Scientific Interest (SSSI). The reserve consists of 28 islands and is home to multiple species, such as grey seals, puffins, Arctic terns and Eider ducks.[22] Puffins are a IUCN red-listed bird species as the population has severely declined over the last 25 years. However, conservation efforts on the Farne Islands have meant that puffins here have sustained a substantial population.[23] Similarly, great efforts have been taken to maintain the grey seal colony, with the Farne Islands having the longest history of counting the seals of any colony - counting started in 1952 by the Natural History Society of Northumbria.[24]

## Living Seas

The Northumberland Wildlife Trust has joined the national Wildlife Trust campaign 'Living Seas'.[28] Northumberland Wildlife Trust is collaborating with other wildlife trusts, providing consultation and advice for the protection of Marine Conservation Zones (MCZs). An MCZ is a type of MPA. There are eight MCZs designated off the Northumberland coastline, falling under the 'Northern North Sea' management zone.[29] These zones protect a range of marine elements, from seafloor habitats and mudflats to marine mammals and seabirds. For example, the Berwick to St Mary's MCZ holds nationally important numbers of breeding common Eider sea-duck.[30] Eiders are valued particularly on the Northumberland coast as it is believed that this duck inspired St Cuthbert to create the world's first conservation legislation in the 8th century to protect this species.[31]

# Nature in Northumberland: Sea

## Key terms

**Area of Outstanding Natural Beauty:** a landscape of high scenic quality that has statutory protection to conserve and enhance the natural beauty of its area.[32]

**IUCN Red List:** the world's most comprehensive source on the global extinction risk of an animal, fungus or plant species Marine Protected Area: defined areas established for long-term conservation and sustainable use.[33]

**Marine Conservation Zone:** designated to protect species, habitats, ecological processes and features of geological importance.[34]

**Special Areas of Conservation:** designated to protect habitats and species of European importance.[34]

**Special Protection Areas:** classified to protect bird species of European importance and regularly occurring migratory birds.[34]

## Learn more about this topic

The Ministry of Eco Education has created lesson plans based upon the following questions for this topic:

- Is the climate breaking down?
- Does it matter if species go extinct?
- Is nature the answer?
- Is the weather changing?
- How important is soil?
- Who lives near me?
- Where have all the trees gone?
- How should we use land?
- How does nature grow?

MINISTRY OF ECO EDUCATION

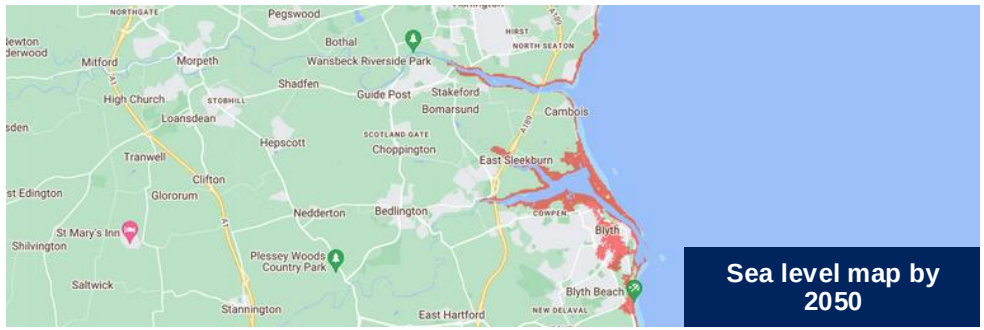
## Explore the area

- Kielder Salmon Centre
- Druridge Bay Country Park
- Farne Islands Nature Reserve
- Northumberland Coast AONB
- Guide Cresswell Pond Nature Reserve
- Druridge Pools Nature Reserve
- Holy Island

Druridge Bay

## Learn more about Northumberland

- Interactive sea level rise map
- 'Championing the North Sea' Wildlife Trust video
- 'Mudlarks' - Beach School sessions for young children
- Coast Care volunteering community
- The Northumberland Coast Path
- Northumberland Wildlife Trust 'Living Seas' campaign
- Proposed Highly Protected Marine Areas in Northumberland




Sea level map by 2050

# Water in Northumberland

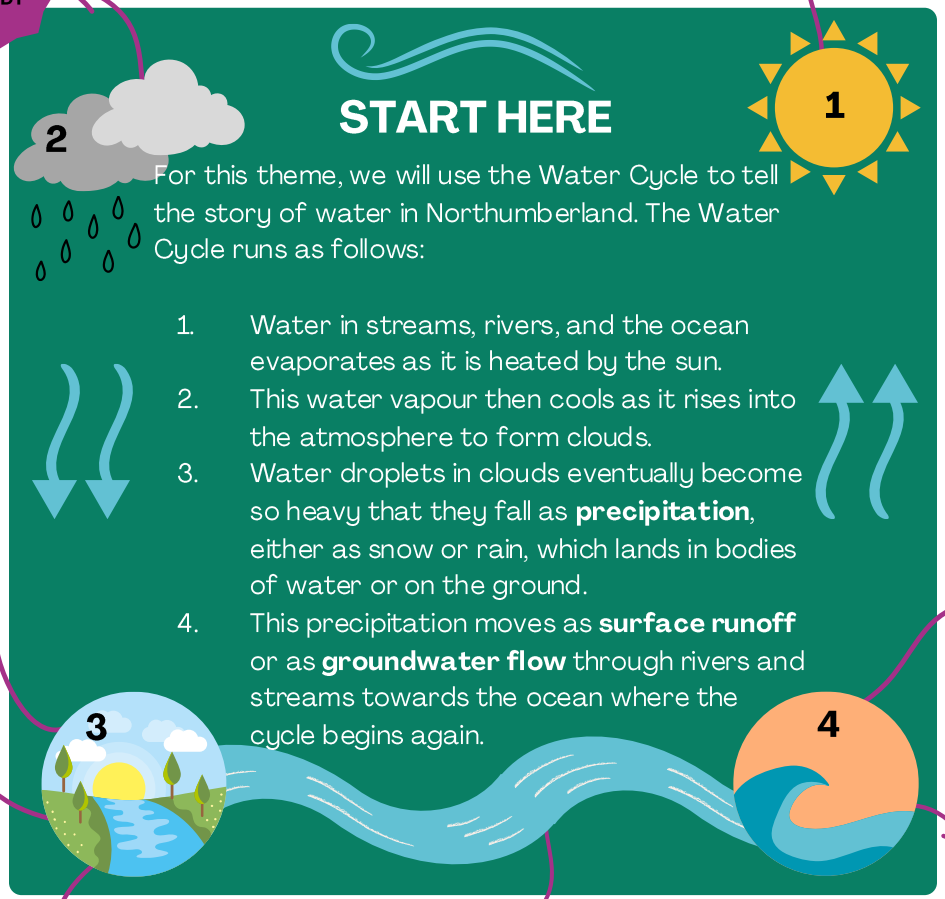
High volumes of **precipitation** can lead to extreme flooding events. In 2008, between 6-7th November, areas of Northumberland experienced over one month's worth of rainfall (80-150mm) within a 24 hour period.[4] The River Wansbeck burst its banks, affecting 1000 residents in Morpeth, and the River Coquet cut off Rothbury, causing further damage.[4] The heavy rainfall fell onto an already **saturated catchment**, and any existing flood defense was overwhelmed by the sheer volume of water.[2] By the end of the 24-hour period, almost 1000 homes and businesses were flooded.[5]

CASE STUDY

Winter 2015 saw three major rainfall events that resulted in widespread flooding across Northumberland. Between the 5-6th December, flooding was caused by downpours brought by Storm Desmond. The Environment Agency issued 24 Flood Warnings, and water levels were so high in Corbridge that residents had to be rescued from their upper floors. On the 26th December, Storm Eva caused flooding that once again primarily impacted Corbridge.[6] Finally on the 5-6th January 2016, Storm Frank resulted in flooding. As land across the county was already **saturated**, this limited **infiltration** into the ground, causing increased **surface runoff**.[6]

CASE STUDY

Kielder Water in Northumberland is an example of a **water transfer scheme** - whereby a large amount of water is transferred from a source of surplus to an area in deficit.[1] This releases water into local rivers such as the Tyne, Derwent and Tees. Kielder Water is a 200bn litre basin surrounded by Kielder Forest, Europe's largest man-made woodland area.[2] It is also the site of Europe's largest hydroelectric plant, producing an average of 20,000MW of electricity per year.[2] The scheme was created in the late 1960s to help with an unexpected rise in the demand for water to support the industrial economy.[3] Although the scheme has several clear benefits, the creation of the reservoir meant that farmland, woodland and homes were cleared in the process of flooding the valley.




LIFE WADER (Water and Disturbance Environmental Restoration) is a five-year project on the Northumberland coast that aims to improve river, intertidal, and marine habitats.[13]
It will improve water quality, address excessive levels of macro algae in intertidal areas, control non-native species, and reduce the effects of human recreation on wildlife.[13]
The scheme will improve the habitats of four Special Areas of Conservation and two Special Protection Areas in Northumberland, covering over 49,000 hectares of land and water.[14]

CASE STUDY

Northumberland National Park hosts some of the cleanest rivers in England. Low levels of pollutants enter the waters in this area as a result of responsible farming, fewer roads and little urban development.[7]
Four out of five of the cleanest rivers in England are found here, each originating from the Cheviot Hills. These rivers are home to salmon, otters and sea trout.[8]

The Northumberland Coast AONB Management Plan 2020-24 aims to address several issues facing the coastline. One such issue is water quality. Holy Island and Burdle Bay waters are failing to meeting standards for nitrogen levels set out by the Water Framework Directive (WFD).[12]
The unfavourable nitrogen levels are thought to be the result of diffuse agricultural **runoff**, inappropriate management of sewage treatment works, and natural nutrient recycling.[12] The Environment Agency investigated the problem and were able to rectify multiple private septic tanks that were discharging directly into coastal waters, and identify a surface water outfall which had a foul water sewer misconnected to it.[12]

A healthy peatland improves the quality of water reaching rivers. Almost 70% of UK drinking water is derived from peat dominated catchments, however 80% of UK peatlands are in a degraded or damaged condition.[9]
The Northumberland Peat Partnership is a scheme that has brought stakeholders together to restore peatlands, with an aim to improve water quality in the area.[10]

The main rivers in the North Northumberland Coastal Plain are the Aln and the Coquet. In particular, the Coquet catchment has physical characteristics that cause the river to respond quickly to a rapid onset of flooding.[11] Several methods of management are recommended for catchments such as this, from the avoidance of inappropriate development on the floodplain to the promotion of sustainable land management practices that reduce **runoff** and erosion. Additionally, improving the **infiltration** rate of water, particularly through arable soils, would help to reduce the rate of rainwater **runoff**.[11]

# Water in Northumberland

## Key terms

**Precipitation:** precipitation is water released from clouds in multiple forms (e.g. rain, snow, hail).[15]

**Surface runoff:** where excess liquid flows across the land surface as there is more water flowing than the land can absorb.[16]

**Groundwater flow:** some precipitation infiltrates into the ground and flows underground.[17]

**Water transfer scheme:** water taken from a place of surplus to a place of deficit.[18]

**Saturated catchment:** a catchment where so much water has infiltrated the ground, the pore spaces are full and so the water table is at the surface. Any excess water will flow overland as runoff.[19]

**Infiltration:** the process by which precipitation or water soaks into subsurface soils and moves into rocks through cracks and pore spaces.[20]

## Learn more about this topic

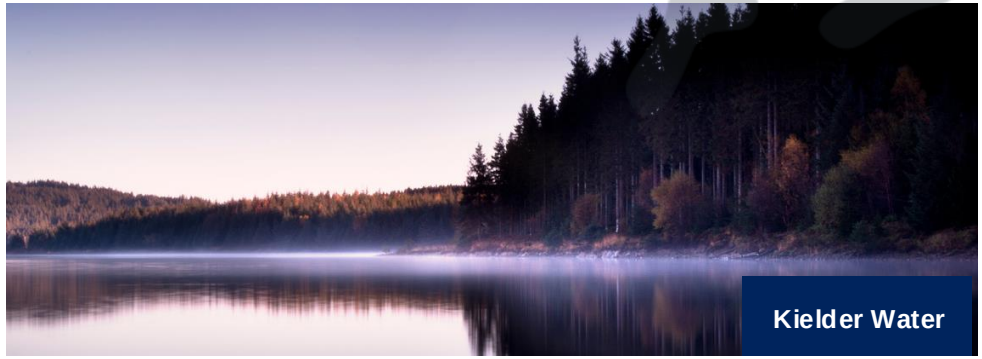
The Ministry of Eco Education has created lesson plans based upon the following questions for this topic:

- Do we live on a blue planet?
- Why are our rivers polluted?
- Why is all the ice disappearing?
- Will we run out of water?

MINISTRY OF ECO EDUCATION

## Explore the area

- Northumbrian Water site visits
- Kielder Water
- Bolam Lake Country Park
- Farne Islands Boat Trip




## Learn more about Northumberland

- Northumbrian Water Academy
- Northumberland Wildlife Trust 'Living Seas
- Northumberland Willdlife Trust 'Naturally Native' Young Rangers scheme
- Northumberland Wildlife Trust 'Naturally Native' Secondary School Lessons
- Yorkshire Wildlife Trust 'Save Our North Sea' video
- Wildlife Trust Northern North Sea Marine Protected Areas
- Seahouses Development Trust Youth Projects
- 'Sea the Change' – North East Coast charity

# Society, sustainability and policy in Northumberland

Climate change is affecting all of us, and we all have our role to play in finding a solution. However, each person has very individual motives pushing them to take an interest in mitigating climate change.

Northumberland County Council offers the Northumberland Environment and Climate Fund, offering financial support to organisations, including community groups and charities, in order to make changes to become more sustainable.[1] For example, a small bid could be made for event equipment costs or tree planting, whereas a larger bid could be made for paid community positions or **retrofitting.**[2]

The Northumberland Schools Sustainability Network is being developed in partnership with the **UK Schools Sustainability Network**, the Ministry of Eco Education, and Global Action Plan.[3] This is a regional network designed to provide students and staff with a platform to connect with others, share resources and collaborate on climate action.

I volunteer at a local environmental charity, and I am motivated by my passion for the environment and a desire for change.

I am a local school teacher. My motivations are likely to be similar to yours. What motivates you to act on climate change?

Northumberland County Council developed a toolkit for town and parish councils to support them in developing their own climate change action plans. The toolkit offers suggestions across multiple areas, ranging from waste to policy.[4]

Barndale School took part in the Big Northumberland Gear Change and won the Modeshift Stars SEND (Special Educational Needs and Disabilities) School of the Year National Travel Award for their commitment to sustainable travel.[8] The school focuses on student wellbeing, with time spent outdoors being a primary goal for the curriculum.

I am a councilor, and I am motivated by an interest in my local residents, and in improving my local community and their spaces.

I am a local resident with young children. I am motivated to act on climate change as I am concerned for their health and wellbeing, and want them to engage with the idea of sustainable living.

I am a local farmer, and I am motivated by mitigative practices that offer co-benefits for my farm, such as increased financial support. I value the inputs and outputs of my farm, and the communities it serves.

I work in the private sector and I am motivated by my customers. I value their opinions on climate change and use these to inform changes in my business whilst still ensuring financial success.

DEFRA has funded the 'Farming in Protected Landscapes Programme' to support farmers working in **Protected Landscapes** such as the Northumberland National Park.[6] Farmers and land managers can be financially supported to carry out projects that mitigate climate change, support nature recovery, or promote the landscape and its cultural heritage.[6]
For example, Alnham Farm received funding to add locally harvested seed to increase the value of the habitat as a pollinator resource.[7]

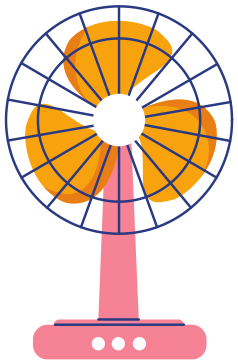
The Northumberland County Council's Climate Change Action Plan 2024 - 26 sets out the strategy for engaging with local businesses.[5]
For example, the council worked with Simpsons Malt in Berwick to gain support for a **biomass facility** which would substantially reduce gas consumption in Berwick. On a smaller scale, the council aims to showcase business who taking climate action to demonstrate and encourage other local businesses to operate in a more sustainable way.

# Society and sustainability policy in Northumberland

Climate change can also often highlight inequalities in our society. It is often those who contribute the least to climate change that suffer the worst consequences.

Children are one such group that is disproportionately affected by climate change. One example is that of air pollution. Air quality has worsened as a result of increased volumes of traffic. This is particularly an issue affecting children when roads surrounding schools are subjected to high concentrations of nitrogen dioxide and other pollutants released by vehicles during school drop off and pick up periods. Allendale Primary School engages in Northumberland's Schools Go Smarter programme and has achieved Modeshift STARs platinum accreditation for its endeavours to encourage sustainable active travel for the journey to school.[9] By encouraging families to Park and Stride to school and taking part in initiatives such as Living Streets WOW challenge it has been able to reduce single occupancy vehicle journeys to 1.26% (March 2023), compared to a national average of 43%.[9] By using alternative forms of travel there is now less congestion and air pollution outside the school gates.

This is just one example of the many inequalities highlighted by climate change. Another example is the increased frequency of **extreme weather events**, such as droughts, floods, or intense heat waves.



Another example would be the effects of the summer 2022 heatwaves. This was the first time that a temperature of 40°C has been recorded in the UK, exceeding the previous record by 1.6°C.[10] The Met Office and the UK Health Security Agency issued a **level 4 alert** for the first time since the heatwave plan was introduced in 2004, meaning that the government declared the heatwave a national emergency.[11] Across the five extreme heat periods during the summer of 2022, the UK Health Security Agency estimated total excess mortality in England was 2,803 for those aged 65 and over.[12]

Northumberland has an ageing population, having a higher proportion of over 65s than the North East regional average - 23.6% in Northumberland compared to 19.3% in the North East.[13] This **ageing population** is more vulnerable to heat exhaustion due to factors such as their medical conditions, social isolation, and a reduced ability to adjust to sudden increases in temperature.

Northumberland County Council's vision is achieving value for money, tackling inequalities and driving economic growth.[14]

Northumberland County Council uses these values to ensure that each community group within Northumberland has its voice heard in order to address inequalities. The local councilors, elected by the community, represent public interest and individuals living within their ward. Which councilor represents you and your school? Do they know how you and your students feel about climate change? Find out **here!**

The council aims to tackle health inequalities by engaging the community in the planning and delivery of community-centered approaches to improving health and wellbeing.[15] For example, the Climate Champions scheme gives residents the opportunity to be actively involved in the council's aim to improve inequalities exacerbated by climate change.[16]

Northumberland
County Council

# Society, sustainability and policy in Northumberland

## Key terms

**Retrofitting:** this refers to any improvement on an existing building to improve its energy efficiency, by making the building easier to heat or by increasing its ability to retain heat for longer.[17] For example, through the installation of renewable technologies or insulation.[18]

**UK Sustainable Schools Network:** a community of educators empowering students to take climate action through establishing regional networks, whereby schools have student-led discussions and activities regarding climate change.[19]

**Protected Landscapes:** this is a term that encompasses National Parks and Areas of Outstanding Natural Beauty (AONB) - areas that are legally protected.[20]

**Biomass facility:** allows for the development of biomass as a fuel, derived from organic materials, to generate various forms of power.[21]

**Level 4 alert:** a level 4 heat alert is reached when a heatwave is so severe and/or prolonged that its effects extend beyond health and social care.[22] For example, power or water shortages, and/or where the integrity of health and social care systems are threatened. Illness and death may occur even among the fit and healthy and it will require a multi-sector national response.

**Extreme weather events:** occurrences of unusually severe weather or climate conditions that can inflict devastating impacts on communities and environments. For example, floods, heat waves, or droughts.[23]

**Ageing population:** a population where the proportion of older people is increasing. This is the result of people living longer as life expectancy has increased through an improved, healthier lifestyle and access to healthcare.[24]

## Learn more about this topic

The Ministry of Eco Education has created lesson plans based upon the following questions for this topic:

- Who does the Earth belong to?
- Is the future already written?
- What is net zero?
- Who is in charge?
- How many people is too many people?

MINISTRY OF ECO EDUCATION

## Explore the area

- Climate Cafe - informal social gatherings to discuss climate change
- Climate Action Northumberland - network with a mission to benefit and help sustain rural communities

## Learn more about Northumberland

- Northumberland County Council Q&A online events
- Natural History Society of Northumbria - Citizen Science
- Barndale School - Big Northumberland Gear Change - YT video
- Community groups in Northumberland taking climate action

Climate event

# Transport in Northumberland

Northumberland is a large, rural county meaning that it presents different challenges to more urban areas. Many residents rely on private vehicles as their primary mode of transportation due to the remote nature of many areas in the county. Transport is the single biggest contributor of **emissions** in Northumberland, accounting for 35% of **carbon dioxide** in 2018.[1]

## Northumberland Line passenger train

The Northumberland Line aims to improve transport links for local people and businesses by providing six new stations between Ashington and Newcastle, whilst still allowing the operation of freight trains that currently serve Lynemouth Power Station and the Port of Blyth.[2] Congestion and long journey times across these areas of Northumberland has contributed to economic decline as residents have moved to live or work in other regions, and so the provision of alternative transportation to cars or buses will provide benefits both for residents and for the environment.[2]


## Electric vehicles

As the county is large and rural, many residents depend on private vehicles and are unable to benefit from improved public transportation links. As a result, it is important to promote the usage of electric vehicles, particularly as the government has banned the sale of new petrol and diesel cars from 2030.[3] Northumberland County Council is working to replace our 70-diesel van fleet with electric vehicle alternatives.[4] 36 small vans have been replaced so far (March 2023). The council also promoting funding opportunities for residents to install home-chargers for their electric vehicles through schemes such as the Electric Vehicle Homecharge Scheme.[5]


## Big Northumberland Gear Change

This is a local campaign in Northumberland encouraging residents to travel more sustainably through cycling, walking or using public transport. Only 13% of all journeys made in the county are made on foot or by bike.[6] The campaign promotes environmental, financial, physical and mental benefits of using alternative transport, as well as different challenges and advice to support residents during the transition.[7] Some examples of these benefits include improved physical heath, reduced overall stress levels, savings on car finance payments, and significantly reduced emissions contributing to the current **climate emergency**.

## Sustainable travel starts with schools

Northumberland County Council supports schools to develop School Travel Plans. These plans set out how a school will promote safer, active and sustainable travel for the journey to school with a package of measures that encourage more sustainable travel choices. In Northumberland, we use the Modeshift STARS system for School Travel Plans, which is a national platform supported by the DfT.

# Transport in Northumberland

## Key terms

**Carbon dioxide emissions:** carbon dioxide is a colourless, non-poisonous gas that is formed through the combustion of carbon and in the respiration of living organisms. It is a greenhouse gas that traps heat in the atmosphere.[8]

**Climate emergency:** by declaring a climate emergency, a council is acknowledging that it needs to act on the causes and impacts of climate change.[9] Most councils have recognised this by developing climate action plans to transform targets and declarations into effective action.[9] For example, the Climate Action Plan 2021-23 set out by Northumberland County Council with the key target of a carbon net-zero county by 2030.

## Learn more about this topic

The Ministry of Eco Education has created lesson plans based upon the following questions for this topic:

- Should everyone get an electric car?
- How can we make places more liveable?
- Can we all fly?
- Should we walk more?

MINISTRY OF ECO EDUCATION

## Explore the area

- Restored railway: Aln Valley Railway
- Big Northumberland Gear Change
- Go Smarter, Go Active Northumberland Campaign
- Sustainable Transport For Northumberland Schools
- Heatherslaw Light Railway
- Royal Border Bridge

THE BIG NORTHUMBERLAND GEAR CHANGE

## Learn more about Northumberland

- EV Charging points across Northumberland
- Northumberland Line Passenger Train
- History of the Northumberland Line Passenger Train Campaign
- History of the Royal Border Bridge railway line in Berwick

# Food in Northumberland

## From the producers...

The National Farmer's Union (NFU) has set up a North East Net Zero Board which looks at how local authorities can work with farmers to help them achieve net zero agriculture by 2040.[1]

Red meat production in England produces a greenhouse gas **footprint** that is 2.5 times lower than the global average.[2]
Nevertheless, agricultural practices, particular the raising livestock, does contribute significantly to Northumberland's greenhouse gas footprint. Approximately 28% of Northumberland's total greenhouse gas emissions in 2020 came from the agricultural industry. Of these agricultural emissions, 67% were from agricultural livestock. Farming can also provide a sink for carbon dioxide by drawing down (sequestering) carbon dioxide from the air into soils and pastures.
This demonstrates the importance of working with the NFU, Northumberland's farmers, and learning from best practice examples of how farming in Northumberland can be part of the solution for a carbon neutral Northumberland.

**Linking Environment and Farming (LEAF) Demonstration Farm** aims to enable a more **circular approach** to farming and food systems through **nature-based solutions** that benefit both farmers and the environment.[3]

The Renner Farm in Northumberland has been linked to LEAF since 2005.[4] They use sustainable practices through efforts to improve animal health across the cow herd, which achieves 98% calving each year. This is done in conjunction with other sustainable practices such as hedgerow regeneration and the creation of an area where no nitrogen is applied in order to improve the quality of the habitat for wildlife.[5]
The Renner Farm also hosts an 'Open Farm Sunday' to educate a variety of groups from inner-city school groups or special educational needs groups, to elderly people from care homes. This gives visitors the opportunity to learn about how local farmers are producing sustainable food to a high standard, whilst benefitting both the farmer and the natural environment.[4]

Planet Mark is a sustainability certification. It aligns with the United Nations Sustainable Development Goals (UN SDGs), and the Science Based Targets Initiative (SBTi)'s Net-Zero Corporate Standard to help businesses set net zero targets.[6]

Ingram Valley Farm, an upland farm in the Cheviot Hills, was the first Planet Mark certified farm.[7] They practice sustainable and responsible farming, and passionately believe that carbon neutral farming is achievable in Northumberland. They practice rotational grazing, which supports a nutritious grassland for their livestock and also ensures the pastures act as carbon sinks (sequestering carbon as they grow). Soil fertility is also increased and there are additional benefits to wildlife and water quality.[7]
To help raise awareness on sustainable farming practices, Ingram Valley farm host educational visits for local schools and universities. Additionally, they offer farm safaris to help families and individuals to connect to the historic landscape and learn about the role of agriculture in the area.[8]

## ...to the consumers

This scheme verifies that businesses are producing or using local produce.[9] The scheme aims to raise the profile of local Northumberland businesses, and to improve the local economy by boosting local jobs and income. The scheme also produces a map to display all the local residents engaged with the scheme in order to promote these businesses.[10] Those involved range from butchers to B&B owners, and each category of business has different qualifying criteria.[9]

The scheme benefits not only the businesses involved, but also tourists, residents, and the county itself.[11] Tourists are able to get an authentic Northumberland experience, residents are able to support their local communities, and the impact on the local environment is significantly reduced.

# Food in Northumberland

## Key terms

**Footprint:** the total amount of greenhouses gases (such as carbon dioxide and methane) that are generated by our actions.[12]

**LEAF Demonstration Farm:** working farms committed to delivering sustainable farming practices.[13] These work within the Integrated Farm Management (IFM) framework which is a site-specific farm business approach.[14]

**Circular approach:** changing current behaviours and consumption habits into self-sufficient, efficient systems where waste can be turned into a resource.[15]

**Nature-based solutions:** solutions that work with nature to address challenges, providing benefits for humans and biodiversity. They are actions involving the protection, restoration or management of natural ecosystems.[16]

**Hedgerow regeneration:** the management of hedgerows provides wildlife corridors for linking different habitats, a home for a variety of insects and animals, and a food source for birds and mammals.[17]

## Learn more about this topic

The Ministry of Eco Education have created lesson plans based upon the following questions for this topic:

- Where should we get our food?
- Should we all go vegan?
- Is the future community farms?
- What happens to food waste?

MINISTRY OF ECO EDUCATION

## Explore the area

- Chainbridge Honey Farm
- Heatherslaw Corn Mill
- Regenerative agriculture - Ingram valley farm – farm safari
- Local markets across Northumberland

## Learn more about Northumberland

- 'Produced in Northumberland' initiative from Northumberland County Council
- Visit Northumberland's guide to fresh local food and drink
- Northumberland National Park guide to farming
- ArcGIS map - businesses under the 'Produced in Northumberland' initiative
- LEAF guide to farming and climate change

# Waste in Northumberland

Data from the Department for Environment, Food and Rural Affairs showed that Northumberland County Council collected an average of 490.1kg of household waste per person from homes in the area in 2020-21, rising from 469.6kg in the previous year.[1] The council has previously invested in improving existing household waste recovery centres, developing new recycling facilities, and constructing a new waste transfer station that supports the transfer of non-recyclable waste.[2]


## Prevention

The first step in the **waste hierarchy** is to reduce the amount we are wasting.[3] This starts with consuming less, do we really need the latest smart phone or new clothes that are in fashion for 2 months? Additionally, selecting items that have less packaging helps reduce waste and where we do need to buy new things choosing quality items allows those items to have a long life.

## Reuse

A circular approach to waste will reduce carbon emissions by keeping materials in circulation for as long as possible. One example of this in Northumberland is the RePaint shop in Morpeth.[4] This is a community initiative where the scheme accepts donations full or partially-full containers of paint from traders, retailers, manufacturers and residents. These are then available to buy from the shop for alow-cost of approximately £1-2 per litre.

There are also repair shops popping up over Northumberland, such as the Coquetdale Repair Cafe in Rothbury. Don't throw away and buying new - mend instead!

## Recycle


Home composting is a cheap and effective way to manage waste, as 40% of household waste can be composted.[6] Northumberland County Council is working with GetComposting to offer affordable compost bins for residents. Compost bins comprise of 'greens' for moisture and oxygen, such as grass cuttings or vegetable peelings, and 'browns' for fibre and carbon, such as toilet roll tubes or egg shells.[6]

To improve our recycling rates in Northumberland, it is important that people know what they can and can't recycle. For example, the council recycles plastic bottles, but does not recycle plastic tubs or trays. Learn more about this in the learn more section. The council also voted recently to extend its kerbside glass collection and recycling trial until 2023, collecting monthly from over 1000 households.[7]


## Recover

If the waste cannot be recycled or composted, it is used to generate energy. Northumberland County Council diverts over 90 000 tonnes of non-recycled household waste from landfills to **Energy from Waste** (**EfW**) **sites**.[8] This waste is transferred to the EfW site in Teesside where it is then passed through the furnace and burned at temperatures of 1000°C. The electricity generated goes to the local grid where it powers local homes and businesses.[8]

# Waste in Northumberland

## Key terms

**Waste Hierarchy:** this ranks waste management options according to what is best for the environment.[3] Priority is given to preventing waste, then reusing, recycling, recovery, then disposal. If the waste hierarchy is followed, then we should be minimising, if not completely eradicating, waste management by landfill.[3]

**Composting:** this is a natural process that involves controlling the decomposition (breaking down) of natural waste and recycling it into a fertilizer. Composting reduces the amount of waste sent to landfill - this is particularly good for combatting climate change as landfills create airtight spaces where air cannot reach waste, therefore it decomposes anaerobically (without oxygen) and produces greenhouses gases (particularly methane).[9]

**Energy from Waste sites:** these sites divert significant volumes of non-recyclable waste from landfill by providing a sustainable option for energy recovery and reduce dependence on fossil fuels. Large volumes of waste are combusted in an incinerator and the heat output generates electricity.[10]

## Learn more about this topic

The Ministry of Eco Education has created lesson plans based upon the following questions for this topic:

- Does anything ever go away?
- Who made my clothes?
- How much stuff is enough?
- Do we live on a plastic planet?
- Why does sewage end up in our rivers?

## Explore the area

- Coast Care beach cleans/workshops/volunteering
- Eco Morpeth - sustainable, eco-friendly shopping
- Book a tour of the West Sleekburn recycling plant
- Litterbugs community group - Amble
- Coquetdale Repair Cafe

## Learn more about Northumberland

- 'Going Green Together' supporting local organisations to tackle waste
- ReFill Northumberland Coast campaign
- Youtube video – how to recycle plastic in Northumberland
- Northumberland County Council - waste education poems
- Northumberland County Council - Energy from Waste process
- Northumberland County Council - a guide to composting at school

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**Images** via Canva.com

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