Section 3: Lesson Ideas

Links to the National Curriculum

At **Key Stage 1** the farm visit can widen the pupils' first-hand experience in a whole range of visual, tactile and other sensory situations. Within this are the important messages of the life cycle and seasonal change. There is a wealth of opportunity for language development and literacy skills.

At **Key Stage 2** the visit can stimulate and excite pupils' curiosity. It also satisfies their curiosity as they begin to apply their knowledge and understanding of ideas. Pupils can consider the farm as a good example of an environment affected by human activity, think about attitudes to farming, the rural environment and the conflicts of interest that arise.

They talk about their work and its significance and communicate their ideas using a wide range of language.

At **Key Stage 3** many different subject requirements can be satisfied. For example, in history, the adaptation of farm buildings over the centuries can offer first-hand evidence of social and technological changes. This readily promotes the skills of handling and assessing. Pupils can investigate and debate a wide range of complex issues and begin to understand the environmental, social and economic implications.

At **Key Stage 4** farm visits can be used to deliver examination subjects both academic and vocational. Contact with farmers will help to focus on the real-life application of skills within the workplace, engaging pupils with contemporary issues and focusing on their role as users and consumers.

Farming and growing, and the natural environment can enrich the curriculum for children and young people of all ages and abilities. Here are some examples:

Literacy

Speaking and listening

Asking farmers and other countryside workers questions

Reporting back on a farm visit

Predicting what will be seen on a visit

Describing feelings, observations, tastes and sounds

Reading & Writing

Reading signs

Writing instructions for visitors

Making signs (warning information)

Writing stories, poems and accounts of a farm visit

Writing a letter to a farmer

Creating a farming glossary

Writing a newspaper article

Numeracy

Counting what is found on the farm, e.g. trees, sheep, cows etc (shepherds often count in twos)

Creating number problems requiring counting

Calculating how much feed the farmer needs to buy or make

Developing comparative vocabulary e.g. bigger than, heavier than

Recognising patterns e.g. tiles on a roof, symmetry in nature

Finding numbers around the farm (ear tags, machinery, maps with field sizes shown)

Finding out about farm payments

Working out the age of a tree

Shape, space and measures

Spotting shapes around the farm: circles (tyres), triangles (roof apexes)

Watching a tractor working - considering the angles it turns

Measuring tree circumferences

Measuring distances and calculating areas, e.g. the area of a winter paddock

Science

Going on a sensory trail around the farm - what can you hear, smell, see, touch

Friction: investigating tyres on farm vehicles - why are they different, what is their purpose?

Comparing plant growth in different areas of the farm, e.g. woodland, grassland

Going on a materials trail - artificial, natural and their different applications

Finding living and non-living things

Finding out how different animals move, grow, use their senses and reproduce

Considering health and safety on a farm

Investigating different soils

Aquatic invertebrates
Terrestrial invertebrates
Life cycles

Design and technology
Watching vehicles working and thinking about moving parts
Designing and building gates, fencing, animal pens

Information Technology
Creating a video of a farm visit
Making a herd or flock database (ear tag number etc.)
Monitoring light, temperature and sound
Researching different farming methods on the internet, e.g. tropical, organic

History
Investigating farming methods from the past
Looking at old equipment, tools and machinery
Considering what is was like to live and work on a farm in the past
Digging for Victory; land girls
The Iron Age

Geography
Measuring rainfall and relating it to water supply
Making and following maps
Comparing urban and rural landscapes, populations, employment structures
Recording and classifying land use and how it has changed
The farming year
Environmental change and farming - urban growth, conservation, recreation

Art
Recording observations and feelings
Finding out about rural crafts
Using natural materials to create sculptures
Making natural dyes
Looking at the work of famous artists and how they have interpreted the

countryside

Exploring natural patterns and textures

Music

Making music using natural materials

Using music to represent aspects of the farm, e.g. tractor working, a walk through the woods

Finding out about folk songs

Considering the meaning behind harvest hymns

Citizenship

Asking questions and taking part

Finding out about other people in society

Caring for animals and the environment

Rules and laws

Respect for property

Media issues

Human and animal rights

Cleeve Common Habitats

There are many habitats at Cleeve Common that can be observed during an educational visit:

- Hedges (If you want to carry out a hedgerow study, please use this website: http://www.hedgelink.org.uk/hedgerows/hedgerowsurveyarea.html)
- Species rich grassland (Identify the different grasses and flowers)
- Stone walls (If you want to carry out a lichen survey using trees and stone walls please use this website for free packs: http://www.opalexplorenature.org/)
- Stream and ponds (see later factsheet)
- Woodlands
- The exposed quarry face from an old limestone quarry. (Geology)
- Archaeology: the three scheduled monuments provide plenty of history.

Sample Lesson Ideas to be adapted according to Key Stage (taught by Cleeve Common team.

Lesson 1) Pollination

- Sweep Net and identification activity.
- Use hand lens to look at reproductive parts of different flowers.
- Play pollination game (KS1, KS2)
- Guided walk to look at seed dispersal methods.

Lesson 2) Soil

- Geology- look at different soil types and how they formed at Cleeve
- Activity- soil tests- sort different samples into different groups
- Worm survey, use identification charts.
- KS4- compaction, scientific decisions.

Lesson 3) Food and Farming

- Look at cattle and sheep and talk about managing them and the grass.
- Activity- match the crops with the end products.
- Discuss sustainable farming and organics.
- Resource use and resource protection.
- Take home activity on where food comes from.

Lesson 4) River of Life

- Activity- River sampling (kick sampling, bug pots and lenses to identify animals).
- Taxonomy.
- Relationships and interactions of plants and animals.
- Life Cycles (dragonfly/newt)
- Calculate the flow in the water by measuring depth, width and speed (time and distance).
- Take home activity on saving water.

Lesson 5) Hedgerow Safari

- Hedgerows in the landscape (history)
- Hedgerows- what they can teach us about ecology.
- Use field surveying and sampling techniques.
- Follow keys for identification.
- Food chain and Food web activity.
- Take home activity on creating habitats for minibeasts.

Lesson 6) Life Cycles

- Eggs, nests, homes.
- Adaptation activity.
- Seasons.
- Finding food and feeding.
- Courtship.
- Decomposition and Decay.

Lesson 7) Our environment under threat

- What pressures are there at Cleeve? (Tourism and Recreation)
- A look at some of our rarest species and how we conserve them
- Resource scarcity
- Habitat Destruction
- Take home activity for what we can do to conserve our native flora and fauna.

Lesson 8) Iron Age Life

- 2000 years of History
- Iron Age life – object handling and discussion
- Story telling
- Visit Iron Age Hill Fort

Additional example activities could include

- A themed walk which can be varied according to group interest, availability etc. e.g. historic, conservation, wildlife, geology, linked to the National Curriculum.
- Observing and discussing farming practices and the farming year.
- Map-based exercises and navigation between points around the farm.
- Art activity – create a natural colour pallet by rubbing natural vegetation such as soil, grass, bark onto a card strip. Discuss colour and shade.
- A question and answer session (Ask the farmer activity)

Fact sheet: farming in the Cotswolds

A Cotswolds Farming Study was commissioned by the Cotswolds AONB Partnership in 2004.

The findings included the following statistics:

• Agricultural land accounts for 83% of the total area of the AONB.

• 82.7% of the agricultural land in the AONB is Grade 3. (1. See below)

• 6.4% of the agricultural land in the AONB is Grade 4.

• The total area of land in agricultural use in 2002 was 168,388 hectares, compared with 170,995 hectares in 1990.

• Dairy cattle numbers have decreased markedly, from nearly 25,500 in 1990 to just below 15,700 in 2002.

• The total cattle numbers have declined to just over 70,650 - a fall of nearly 35,000 (approx 30%) since 1990.

• The number of beef cattle has fallen from 11,750 to nearly 10,100 (i.e. by just over 14%) over the same period. The Farming Study anticipates significantly reduced levels of production nationally over the next decade, with effects concentrated in more marginal areas. 2 Health threats such as BSE and TB have caused much uncertainty and risk.

• Sheep numbers have also decreased significantly by nearly 82,000 (over 24%). The Farming Study expects this to continue, which means that problems of grazing on important unimproved grassland sites will be accentuated and prospects

for further arable reversion are weakened.

• The total labour force was 5,211 in 2002, compared with 5,350 in 1990. There has been a 2.6% reduction in the agricultural labour force since 1990.

• There were 3,020 farm holdings in the AONB in 2002, with an average size of 56 hectares. However, there is an increasing polarisation in size. In all, 45% of all farm holdings were fewer than five hectares in size, although at the other extreme 13% were more than 100 hectares. All sizes in between were well represented.

• Crops and fallow is the dominant land use, accounting for 44% of agricultural land in 2002. Permanent grassland (31%), temporary grassland (7%) and rough grazing (3%) means grazing land of one form or another accounted for a further 41%.

• The principle crops in the AONB are Oilseed Rape, oats, wheat, barley, grass.

• Nearly 6% of agricultural land in the AONB is woodland. This is a very distinctive feature of the Cotswolds as it has two-thirds more woodland than the average for the South West region.

• Set aside has also been very significant. It increased by nearly four times from just over 2% in 1990 to nearly 8% in 2002. There was a sharp increase after

1995 but it is likely to decrease sharply as a result of the government target of 0% set aside in 2008.

• Both permanent grassland and woodland have increased slightly since 1990. For grassland this reverses a previous decline.

The ALC (Agricultural Land Classification) System is a land grading framework designed to give strategic guidance on land quality for planning purposes and is the responsibility of DEFRA (The Department for Environmental Food and Rural Affairs). It allows agricultural land to be graded from best (grade 1) to worst (grade 5) and provides a consistent, country-wide system of land classification. Assessment of agricultural land is based on the long-term, physical and chemical properties of the land and how they might restrict its use.

Fact sheet: how much do you know about the Cotswolds?

- Farmland covers most of the AONB.
- Over 1⁄2 of the country's flower-rich (Jurassic) limestone grassland is found in the Cotswolds.
- Cotswold stone buildings and villages are known the world over.
- The AONB has a network of drystone walls at least equivalent to the length of the Great Wall of China
- The AONB attracts 38 million day visitors each year.
- The native Cotswolds sheep was known as the 'Cotswold Lion',at one time providing wool for over 1⁄2 of England's cloth.
- The AONB has internationally important beech and yew woods.
- The AONB has a population of 139,000 but two million people live close by.
- Local stone has been quarried in the Cotswolds since Roman times.
- The endangered species of snail, Laurea sempronii, is found on just one wall in the Cotswolds.
- Tourism is one of the major industries in the AONB.
- The Romans arrived in the Cotswolds in AD47 building now famous roads, like the Fosse Way, and great towns like Cirencester.
- The Cotswolds has always been a favourite with artists and writers such as William Morris and Laurie Lee.
- The Cotswolds building style is famous: it includes a steep pitched roof, ridge tiles and coping; tall chimneys; large window sills of stone or wood; and detailed window surrounds of stone.
- In the Middle Ages, Cotswold wool merchants built themselves grand houses and endowed magnificent 'wool' churches which still stand today.
- The AONB has some of the finest gardens and arboreta in the country, such as Westonbirt National Arboretum.

Fact sheet: hedgerows

There are close to 450,000kms of hedgerows in Britain, with an annual average loss due to removal or neglect of 5%. Of the existing hedgerows it is estimated that 190,000kms are ancient or species rich. The oldest hedges are probably the remains of the ancient woodland that used to cover most of Britain. As villagers and landowners cleared the forest for agricultural purposes, they would leave the last few feet of woodland to mark the outer boundaries of their land. Hedges were also formed to contain domestic animals.

Hedges are actually very useful to the farmers. When compared to other forms of fencing they provide a good wind break, are less liable to be damaged by heavy snow falls and are easy to trim mechanically. When hedges are removed, the wind can blow over large distances, in dry weather this can cause soil in ploughed fields to dry out, and blow away seeds and fertiliser along with the fertile topsoil. Hedges provide homes for insect eating animals and birds, which prey on crop damaging invertebrates. Hedges also create micro-climates around them.

Hedgerows include a shrub layer, typically hawthorn, blackthorn, elder and dogwood, a ground flora layer with grasses and flowers such as dogs mercury and occasional large hedgerow trees such as oak.

The older the hedgerow the more diversity of animal and plant life the hedge will support. A hedge rich in species is one which contains 5 or more native woody plants in a 30m stretch.

Ancient hedgerows are defined as those which were in existence before the Enclosures Acts passed between 1720 and 1840. The enclosure act gave landowners the power to add large areas of common land to their estates, government officials supervised this claiming of land, usually marked with straight hedges. There was no such thing as wire fences at the time and wooden fences were expensive and costly to repair. A hedge was

cheap and self-renewing.

Hedgerows are very important habitats. They are the primary habitat for at least 47 species of conservation concern in the UK which includes 13 globally threatened species which is more than any other UK habitat. They are vitally important for butterflies and moths, birds, bats and dormice. Hedgerows have been recorded as providing shelter or food for 600 plant species, 1500 insects, 65 birds and 20 mammals. Another vital role of hedgerows are as corridors for wildlife, allowing species to disperse and move from one habitat area to another. Plants find it difficult to spread across open fields so ‘travel’ along the base of a hedge. The seeds of plants are dispersed along the hedge by birds and small animals. The plants in a hedge provide more varied foodstuffs than most woodlands making the hedge an attractive habitat in winter.

Since 1945 there has been a drastic decline in the amount of hedgerow remaining. Between 1984 and 1990 it was estimated that 25% was lost due to

neglect or outright removal. A hedge requires regular cutting and laying to maintain it. Cutting prevents the hedge from turning into a line of trees. Laying involves planting new young shrubs close together and then cutting partway through the stems or through a tree or shrub next to the gap and then laying the woody trunk down and weaving it. The main reason for neglect is a loss of traditional skills and the high cost of such labour. Using herbicides, pesticides and fertilisers up to the base of the hedge leads to too much nutrient and a decline in species diversity. Modern farming methods using large machinery do not fit well into small ancient fields and hedges also waste valuable crop-growing space, so many were removed. Since the 1950s the decline has been rapid, but Natural England are encouraging farmers to re-plant hedgerows and manage them correctly.

Fact sheet: wetlands

Wetlands are among the world's most threatened habitats - largely because of the effects and impact of people. In many parts of the world, people have historically had a love-hate relationship with wetlands.

Civilisation and agriculture began around wetlands. Major cities like London, Paris and New York, and communities from Hong Kong to the Okavango Delta, were built on wetlands. All of us use wetland products daily - as our ancestors have for millennia. Three quarters of the world's population still lives in or near wetlands and former wetlands.

For many people, though, wetlands were scary places - especially in the western world. They were places of monsters and malaria, of danger and disease.

In addition, they were thought of as wastelands. The normal response to marshes, swamps and bogs was to drain them. Ironically, wetlands are very productive areas. It has been estimated that a healthy marsh is 50 times as productive as grassland, and eight times as productive as nearby cultivated land.

All over the world, wetlands are drained for agriculture. Marshy soils are very fertile and good for growing crops. Wetlands are also drained for development, timber production and mosquito control. Many wetlands are destroyed by dredging and channeling streams for navigation; flood control; coastal development, and reservoir maintenance.

Wetlands have been filled in with solid waste, dredging spoils, and the products of road building and development.

Rivers, lakes and other waterways become polluted by discharged sewage, acid rain, industrial chemicals, detergents, fertilisers, and pesticides washed off public, private, commercial and agricultural land. Over exploitation of resources (like UK peat bogs for garden peat or tropical mangroves for firewood), and over hunting or fishing seriously threaten wetland and wetland species' survival.

51% of freshwater animal species worldwide (that we know about) are threatened with extinction.

Direct wetland destruction may cause indirect effects on wet habitats elsewhere like sediment buildups, changes in water flow and quality, or subsidence.

Natural disasters like droughts, hurricanes and erosion also affect wetlands.

The RAMSAR Convention on Wetlands of International Importance, especially as Waterfowl Habitat, is an intergovernmental treaty providing the framework for countries to adopt national action and international cooperation for the conservation and wise use of wetlands and their resources.

What you can do:

Turn off the tap when you brush your teeth.

Don't leave taps dripping.

Collect rain water in a butt to use in the garden.

Usegarden hoses sparingly or not at all.

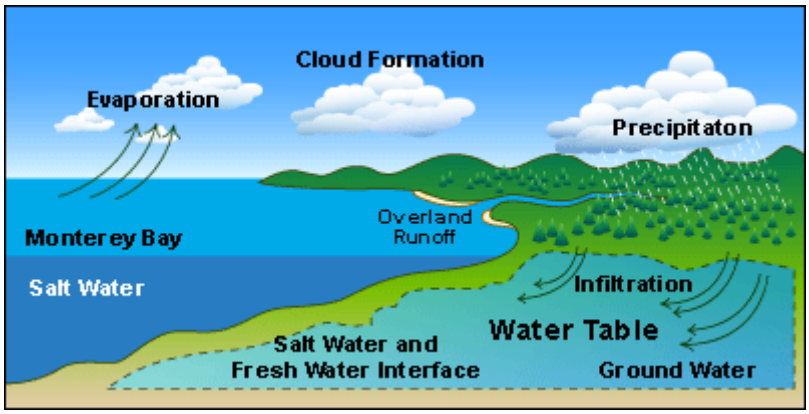
Keep glass, metal and paper in circulation, thus reducing the need to use wetland areas as rubbish dumps.

Garden ponds provide hours of endless fascination and five-star hotels for frogs, dragonflies and other wetland life.

Reduce the polluting potential of the water that goes down it. Use environmentally friendly household products.

Self Guided Lesson Ideas

The water cycle:



The water cycle is powered by solar energy and gravity. The sun's energy evaporates water from oceans, wetlands, soil and plants. About 84 % of the water vapour in the Earth's atmosphere is from the oceans. Warm air can hold more water than cold area - hence the higher humidity of many tropical areas.

People impact on the water cycle in two main ways:

First, we extract large quantities of freshwater from wetlands - rivers, streams, lakes and underground sources. Over extraction has led to groundwater depletion and intrusion of ocean salt into underground water supplies in some areas.

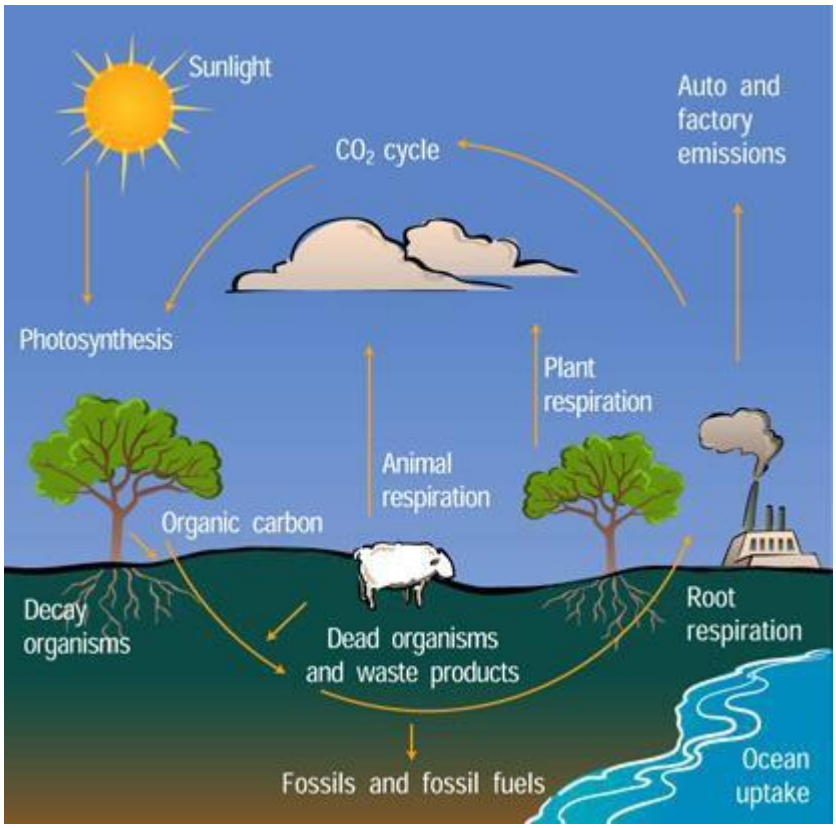
Second, we damage habitats by removing vegetation for development, mining, roads, farming, and other activities. Such impact may increase runoff and reduce seepage of water back into groundwater aquifers. It also increases the risks of flooding, erosion and mud slides.

Global freshwater consumption rose sixfold between 1900 and 1995 - more than twice the rate of population growth. The world water cycle seems unlikely to cope with the demands that will be made of it in the coming decades.

Follow the stream through the Washpool Valley. On a steep bank, water can run off into a ditch which can feed a pond or a stream. On level ground- water is absorbed into the water table. Try and saturate a small area of land and see how the water moves differently across the land. Discuss flooding and the importance agricultural land has in absorbing water when we have heavy rain.

Healthy soil is able to absorb more water. Compacted soils, or bare ground are more likely to be eroded by water, causing flooding and pollution as water washes the soil and nutrients into ditches and streams.

Carbon Cycle:



Plant producers remove carbon dioxide from the atmosphere (or from water in the case of aquatic plants) and convert it into sugars during photosynthesis. Animal consumers break down the sugars during aerobic respiration (involving oxygen) and convert the carbon back to carbon dioxide where it is returned to the atmosphere or water for reuse by plant producers.

Most of the Earth's carbon is stored in the oceans. This enters the atmosphere very slowly, as some sediments dissolve and form dissolved carbon dioxide. As water warms, some carbon dioxide reacts with seawater to form carbonate and bicarbonate ions. Some of these may react with the calcium in sea water to produce compounds like the calcium carbonate used to form the shells and skeletons of marine organisms. When these die, the shells and bones sink and are returned to theocean floor.

A smaller amount of carbon lies deep in the Earth as fossil fuel - coal, petroleum and natural gas. This is only returned to the atmosphere when such fossil fuels are extracted and burnt.

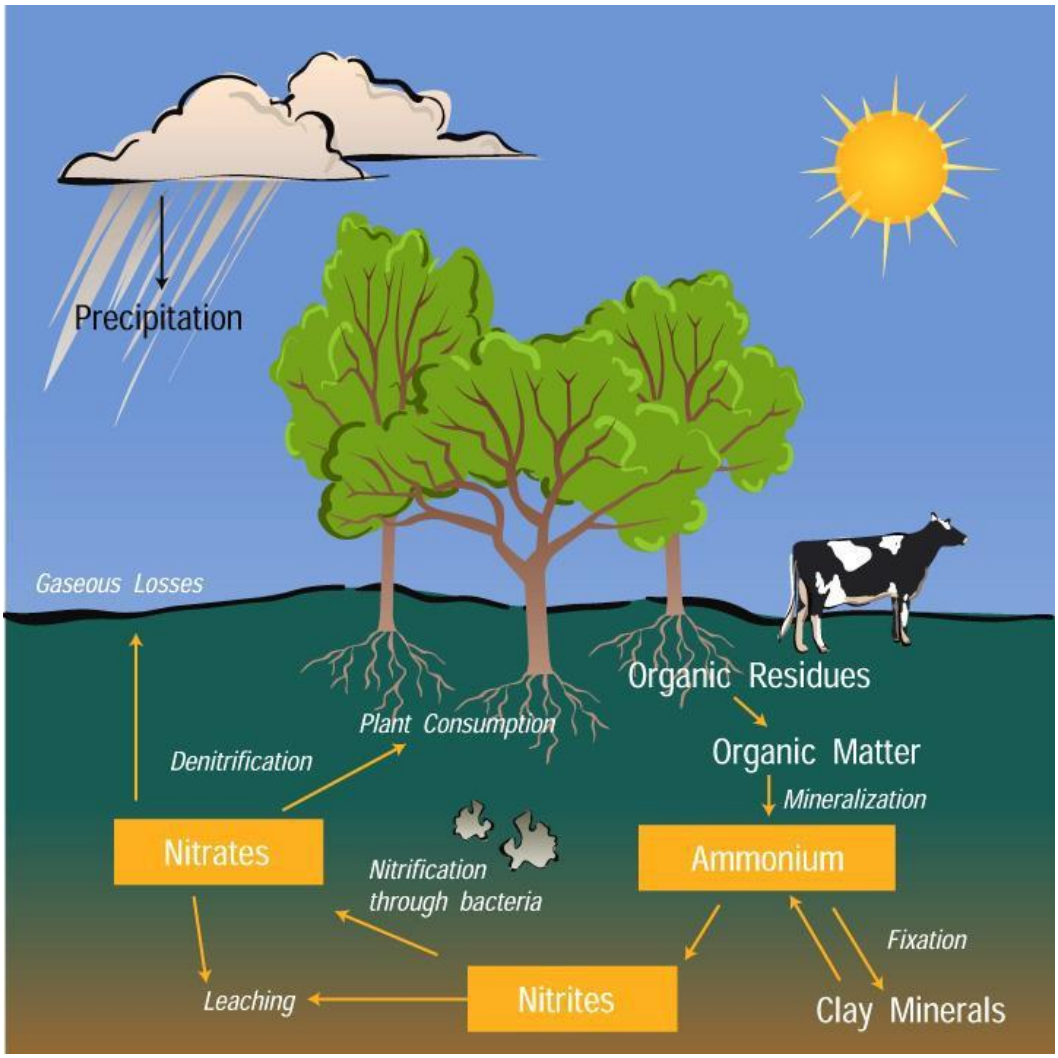
People impact upon the carbon cycle in two main ways as follows:

Deforestation which has left fewer plants to absorb carbon dioxide, and the increased burning of fossil fuels and wood.

Both of the above impacts have added more carbon dioxide to the atmosphere in

recent decades than plants have been able to remove. An increase in atmospheric carbon dioxide (and other gases) could accelerate the Earth's natural greenhouse effect with significant consequences for global climate patterns. This, in turn, may raise average sea levels, alter food production, and disrupt wildlife habitats.

The Nitrogen cycle:



Organisms need nitrogen as a component of many chemicals essential for life like proteins, RNA and DNA. Nitrogen is abundant in the Earth's atmosphere (78% volume), but it cannot be used directly by most animals. Nitrogen availability is often a limiting factor in plant and animal growth. Some plants, in nitrogen-poor acidic bogs, obtain nitrogen by catching and 'eating' insects. Many farmers add nitrogen-based fertilisers to soil to encourage crop growth.

Certain bacteria are able to convert nitrogen gas into chemicals that plants can use (mostly nitrate and ammonium ions). This is called nitrogen fixation. The bacteria live in soil, water and on nodules on the root systems of many plant species.

Animals obtain their nitrogen by eating plants or herbivores.

Decomposer bacteria break down nitrogen-rich organic compounds in dead bodies to simpler inorganic compounds. Other, more specialised, bacteria convert the inorganic compounds back into nitrites, nitrates, and eventually nitrogen gas, which is released to the atmosphere to resume the c ycle.

People impact upon the nitrogen cycle in several ways, including:

Burning fuel which produces nitric oxide. This combines with oxygen to form nitrogen dioxide gas, which may react with water to produce nitric acid, a component of acid rain. Acid rain damages trees and may damage aquatic ecosystems. Nitrous oxide (a heat trapping gas) is released into the atmosphere by bacteria on livestock wastes, and by commercial inorganic fertilisers applied to soil.

Nitrogen may be removed from the Earth's crust when nitrogen-rich mineral deposits are mined for fertilisers; when nitrogen is removed from topsoil by harvesting nitrogen-rich crops, and through leaching following irrigation. When grassland and forests are burnt prior to planting crops, nitrogen is also lost from top soil and nitrogen oxides are released into the atmosphere.

Runoff of agricultural chemicals and discharge of sewage may add excess nitrogen compounds to aquatic ecosystems.

FOOD CHAINS:

Spend a few minutes looking around Cleeve Common for different animals and plants. Allocate each child as a specific animal pr plant that you can see, and as a group form your own food chain. Make sure one of the children is the sun to start the food chain off!

Once you have been through this a few times with children as different things, you can start bringing in random events such as flooding, and what happens when foxes are hunted. When the chain gets broken- all the children thereafter have to sit down and can’t be part of the chain anymore. However- decomposers play an important part in food chains.

Birds at Cleeve Common:

Bring binoculars and print out this page. In pairs children can tick off the birds they see during the visit:

Skylark, lapwing, goldcrest, house sparrow, robin, crow, pigeon, blue tit, buzzard, heron, magpie.