Key Concepts (Cont...)

Examples of woodland food chains

hazel nuts ➢ wood mouse ➢ tawny owl

oak leaf ➢ caterpillar ➢ blue tit ➢ sparrowhawk

dead leaf ➢ earthworm ➢ blackbird ➢ fox

Inter-relationships

All living things are connected to all other living things in some way or other. This could be through a food chain, air cycle, the soil cycle or one living thing that may rely on another completely different living thing in some other way; for example woodpeckers need holes in trees to make their nests; oak trees need Jays to spread their acorns far and wide and so help the trees to grow in new places.

Places to visit

Castle Eden Dene

Hawthorn Dene

Crimdon Dene (less suitable)

Links to other sections in this pack

Geology and the landscape 1.3
Magnesian limestone grassland 1.9

Curriculum Links

Science

KS1 AT Levels 1-3		
Sc1 1,2	Sc2 1,2abdefg4,5	

KS2 AT Levels 3-5		
Sc2 1,4,5bcdef		

Geography

KS1 AT Levels 1-3
1abd,3ab,5a,7ab

KS2 AT Levels 3-6
1abc,2abd,3abe,7abc

This topic also has strong links to the National Curriculum in English and ICT

Resources

Books

Grasses, rushes, sedges and ferns - Fitter, Fitter and Farrer *Collins*
Woodland Nature guide - Cloudsly Thompson *Crowood*
The ever changing woodlands - Readers Digest
Collins Field Guide to Insects - Michael Chinery
The Wildflower Key - Francis Rose - *Warne*
Field Guide to the Trees and Shrubs of Britain - Reader's Digest
Field Guide to the Animals of Britain - Reader's Digest
RSPB Handbook of British Birds Holden and Cleeves
DK Pocket Nature Fungi - Evans and Kibby
See also invertebrate and flower books in Section 1.9

Websites

www.the-woodland-trust.org.uk
www.smallwoods.org.uk
www.communityforest.org.uk
www.wildlifetrust.org.uk
www.ukbap.org.uk/habitats (follow link to access habitat and local action plans)

1.10 The Wooded Denes

Our wooded denes are wildlife havens and green oases which are real natural treasures along the Heritage Coast

Development of the Denes

The denes are the product of erosion caused by the melt water from a succession of ice ages. The last Ice Age finished approximately 12,000 years ago. The torrents of melt water carved deep into the underlying rock leaving a very bare and desolate looking landscape.

Gradually as the ice retreated with the warming climate the denes were colonised by lichens, mosses, tussock grasses and ground-hugging shrubs. Soils slowly developed with the changing climate and the denes and surrounding countryside gradually became wooded. The trees and plants here now represent the climax vegetation for the denes under the present climatic conditions, with some changes in species due to human interference.

The denes are influenced by the underlying magnesian limestone which makes the soil less acidic. Plants that like acidic soil cannot grow well here and are out-competed by those more tolerant of the limey conditions.

The typical trees and shrubs you will find in the denes are ash, wych elm, yew (particularly in Castle Eden Dene), english oak, hazel and hawthorn. There are also a number of introduced trees such as sycamore, larch and spruce.

Plants on the woodland floor vary with changing soils; typical are dog's mercury and wood anemone, some striking plants such as herb paris and a range of woodland grasses such as tufted hair grass and creeping soft grass.

The structure of a woodland

The best woodlands for wildlife have four layers of vegetation (see illustration in Section 3):
The canopy - trees such as ash, elm and yew

The under storey - shrubs such as hazel and hawthorn plus sapling trees

The field layer - plants such as dogs mercury, wood anemones and bluebells

The ground layer - mosses, fungi, dead leaves and dead wood

The more layered the woodland, the more varied the wildlife it can support, as some animals need several layers to feed, breed and find shelter. For example several species of birds will feed in the ground layer and nest in the shrub layer or canopy. Some species of butterflies for example the white-letter hairstreak will lay eggs only on a particular tree species (elm) but feed in the field layer itself on the nectar of various woodland flowers.

Nutrient cycles and the woodland recycling centre

Woodland plants require the plant nutrients present in solution in the soil in order to grow. These must be in an inorganic form in order to be taken up by the roots. Dead plant and animal material is full of plant nutrients but in an organic form which roots are unable to absorb. The woodland floor is a recycling station for these nutrients. Many of the invertebrates present in leaf litter are involved with shredding and breaking down plant material thereby assisting the fungi and bacteria present to convert the organic compounds present back into inorganic compounds which can then be taken up by the roots. If it wasn't for the activity of the fungi, bacteria and detritivores in the leaf litter, very soon the soil would have no more nutrients left and the woodland would die. This process occurs in all natural systems and without it all life on earth would cease to exist. (see illustration in Section 3)

Interactions and adaptations in a woodland

Food chains and energy flow

The vast majority of ecosystems including woodlands have sunlight as their energy source. Plants fix the energy present in sunlight in a form that can be passed along the food chain often as sugars. Plants are the primary producers within the woodland ecosystem.

Food chains are structured in levels. The next level after primary producers are the primary consumers, the plant-eaters or herbivores. In woodlands these animals could be plant-eating insects such as caterpillars, seed-eating animals such as wood mice or grazers such as roe deer.

Animals that eat the primary consumers are the carnivores and omnivores. There can be several levels of consumers ending with the top predator at the end of the food chain, which in the case of woodlands could be a badger, fox, stoat, weasel, tawny owl, sparrowhawk etc. (See ‘food chain’ under key concepts)

Inter-relationships

There are many examples of inter-relationships in a wood. A good example of an inter-relationship in a woodland is given by the white-letter hairstreak butterfly described above.

Several species of gall forming wasp lay their eggs in the buds or leaves of oak trees. The tree then produces a layer of plant material around the developing larva both protecting it and feeding it.

Jays gather and bury acorns often forgetting where some have been buried. These continue to grow. Jays are one of the key distributors of oak trees allowing a much wider distribution from an individual parent tree than would otherwise be possible.

Management

There are no woodlands left in Britain that have not been altered by human activities to a greater or lesser extent. Woodlands are classified as ancient or recent, primary or secondary. Ancient woodland is that which has existed since at least 1600 and usually much longer. Often these places have been continuously wooded since trees first grew after the last ice age.

Usually the older a woodland the better it is for wildlife. All of our denes are ancient woodland but vary in their wildlife value. Castle Eden Dene is the most valuable and is a National Nature Reserve. The more natural the tree cover the better.

The denes vary in the extent of interference by humans. They have all suffered from planting of non-native trees such as spruce and larch or colonisation by non-natives such as sycamore.

Native trees support a rich variety of wildlife. They crossed the land bridge from Europe into Britain and spread north as the climate warmed. The whole woodland ecosystem came with them including the animals that feed on them and shelter in them and the plants that thrive under them. Non-natives were introduced by humans and came without their ecosystems. They have been introduced into a different type of woodland to the one that they developed with.

Fewer of our native animals and plants can feed on these non-natives needing or preferring native trees such as ash and hazel.

Usually the best form of management for our denes is to encourage our native trees and gradually remove the non-native species. This helps to preserve the plants and animals belonging in the woodland, providing the right growing conditions for the plants and the right food and shelter for the animals.

Woodlands provide a wider range of habitats if they contain a varied structure. Among the structural features that make a woodland more valuable for wildlife are open sunny glades and tracks with wild flowers, old trees with plenty of rot holes and dead wood and branches, ponds, streams and rocky outcrops. This is an addition to the four layers previously mentioned.

History

Humans have long used woodlands to meet many of their needs including a source of food, medicine, firewood and building materials.

Management methods developed to exploit the woodlands to their full. Many trees grow back multi-stemmed if cut down. This practice, called coppicing, provides a quick crop of stems for weaving fences called hurdles, the wattle in wattle-and-daub walls, fodder for cattle and faggots for burning. Larger trees provided the timber for buildings, carts and ships. Some coppice trees were left to grow thicker stems and cut to make charcoal for use in iron smelting. Coppiced oak was stripped of its bark for tannin to be used during the leather tanning process.

With the arrival of the Industrial Revolution many woodlands started to fall into decline and the strong links between local communities and their woodlands started to breakdown. Woodlands once vital in supplying the needs of local people have now become more important to them as a recreational resource.

Key Concepts

Habitats

A habitat is the place where animals and plants live and that supplies all of the things they need to live and have young. Habitats vary a lot according to physical factors such as temperature, amount of water or rainfall, amount of light, depth of soil, how windy it is and many other factors besides.

A habitat can change due to the effects of the living things present. If trees grow in a grassland habitat for example, it becomes more sheltered and moist; it also becomes more shady. It gradually becomes a woodland habitat. The animals and plants present change as the habitat changes. Most prefer to live in just one habitat although some can live in more than one.

A woodland habitat is made up of a mixture of layers of vegetation starting with trees, below which is a layer of bushes, below which are growing grasses, ferns and woodland flowers and finally right at the bottom is a layer of dead leaves, fallen branches, fungi and mosses. These layers provide a variety of places for animals to live, for example a woodpecker nesting in a hole in a tree or a wood mouse nesting under a fallen log and feeding on nuts and berries from the shrub layer. (see diagram of woodland structure in Section 3)

All things are best suited to live in certain places and in certain ways. They are adapted to live in the habitat in which they are found and to a certain way of life.

Adaptations

Adaptations can take many different forms. Some may be physical, such as the wings on a butterfly and its long tube like mouth for sucking up nectar. Others may be behavioural, for example woodlice need to be in damp places and if you expose them to light (possible drying-out) they scurry away to hide in the dark and damp again.

Squirrels
Squirrels are rodents that learned to live in trees. The primary adaptation to an arboreal life was the development of strong hook-like claws on the back feet at an angle that allows the squirrel to attach into the bark and hang and move facing down the trunk of the tree. The tail has developed as an excellent tool to assist with maintaining balance.

Woodpeckers
The woodpecker is able to cling to bark because it has two backward pointing toes as well as two forward pointing ones on each foot; other birds have only one backward pointing toe. This allows it to get a firm grip and cling onto and under branches. Its chisel like beak, with built-in shock absorber, allows it to hammer into bark and dead wood looking for minibeasts. In addition to this it has a very long tongue which it uses to collect minibeasts from inside the wood.

Wood anemones
Wood anemones, like many woodland plants, flower early in the year before the leaves on the trees block out the light. In this way the leaves of wood anemone can capture enough sunlight to allow it to make seeds.

Nutrients Cycles and decomposition

Plants need plant food (nutrients) in the soil in order to grow. When a plant dies it is still full of these plant foods. If they aren't released back into the soil other plants will not be able to use them to grow. When a plant, or an animal, decomposes in the soil it releases all the plant food it contains back into the soil. The fungi (many of them produce toadstools) and the bacteria that live in the soil do this important job of recycling plant nutrients. They are helped by many of the animals that live in the soil and leaf litter such as earthworms and springtails. (see illustration in Section 3)

Food chains

All living things need energy to help them grow, move and reproduce. This energy comes from the Sun. Plants, for example grass, can catch the energy in a beam of sunlight and turn it into sugars. Sugars are stored sunshine energy. An animal that eats that plant, for example a rabbit, gets all the stored sunshine energy in that plant and can use it to grow and produce muscle, bone and baby rabbits. If that animal is eaten by another animal, for example a fox, the fox will get all the stored sunshine energy in the animal that is eaten.

Plants (e.g. grass)
↓
Plant-eating animal - a herbivore (e.g.rabbit)
↓
Animal-eating animal -a carnivore (e.g. fox)

This is a simple food chain. All food chains start with sunshine energy trapped by plants.