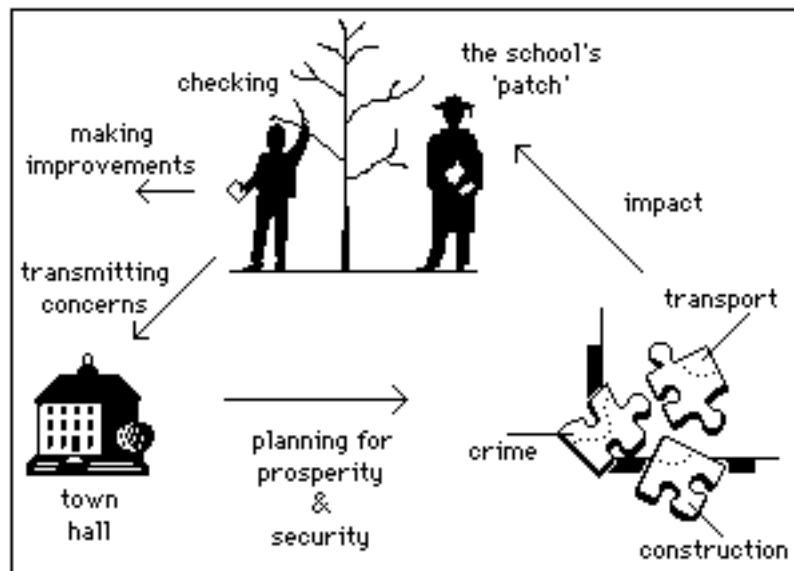


## SCAN In The Curriculum

a neighbourhood environmental enquiry system for curriculum development to integrate environmental care with sustainable development.



### Key Stages 1-3

A selection of subjects, topics, programmes of study, and knowledge maps, showing where SCAN's practical approach may be developed to reinforce the local context

Compiled from the thoughts and practice of SCAN teachers

### PREFACE

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## PREFACE

SCAN promotes the use of the neighbourhood of the school, and the community served by the school, as educational resources for studying those elements of the curriculum that have a bearing on sustainable development. The approach is to get answers to questions which quantify the local quality of life and neighbourhood biodiversity. In this sense, SCAN's approach is that of socio-biological environmental appraisal, and the communication of the local character of 'people' and 'place', from school to school.

This approach first becomes feasible in relation to child development, and requirements for practical instruction, at Key Stage 2. This is why SCAN's starter pack is presented at this level. It links survey sheets firmly to targets in programmes of study in the National Curriculum, and stresses that problems have to be quantified in order to launch actions for improvements. At Key Stage 1, simpler, less structured ways of eliciting responses from children about their environmental concerns, such as pictures with simple messages, are more suitable. These will lead to survey forms in future years

Key Stage 3, is characterised by more specialised idiosyncratic practical approaches to information gathering. For pupils at this level, who have never experienced environmental appraisal, the Key Stage 2 pack will meet the basic requirements of geography, but generally, the practical work is more variable and opportunistic. The choice of community problems to study, particularly concerning local wildlife, depends largely on the teacher's interests, personal initiative, and availability of problems.

A national barrier to standardising surveys is that local curriculum resource centres, make different recommendations as to the type of framework they wish teachers in their area to follow. For example, a county advisory service may specify connections from pre-packed practical sheets, to one or more curriculum objectives. Schools in another county, which follow their own district council's particular approach to the Local Agenda 21, will take a more variable line. Also, teachers, both primary and secondary, may use practical work as an opportunity to encourage creativity in the production of worksheets. In this respect, some have found the basic Key Stage 2 forms too cumbersome, being without pupil-ownership in their design. Nevertheless, they are regarded as necessary models for customisation.

The National Curriculum is now institutionalised, and there is less need for central guidance on how to link practical work with its attainment targets. Feedback from secondary teachers indicates that it is more important to produce a support-format which stresses opportunities for local curriculum development. Indeed, some primary schools are using SCAN in this context. That is to say, practical work emerges from programmes of study at all levels appropriate to issues in their the Local Agenda 21. This curriculum orientation is exemplified in the following pages, which tease out 'threads of sustainability', within, and between, subjects. The aim is to stress continuity of a Post-Rio syllabus, from Key Stage 1 to 3. Practical work increases knowledge and understanding of sustainable development through opportunities in the curriculum for community input to local economic plans. For many teachers, this alone seems to be a very worthwhile achievement.

This guide has been prepared to accompany the Key Stage 2 appraisal forms, a set of practical schemes called 'bioscopes', and a self-indexing library text file, the 'SCAN Hyperbook'. Bioscopes fulfil the need for flexibility in choice of practical approaches to evaluate local impacts on nature. The hyperbook, which will be regularly updated, is to provide teachers with a broader scene of 'sustainability'.

SCAN's unique role at all key stages is to provide a network for dissemination of practical exemplars that are local expressions of programmes of study, cross-curricular topics, and schemes of work. This is the way SCAN will be driven by teachers.

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## 1 SCAN IN THE CURRICULUM

### 1.1 Introduction

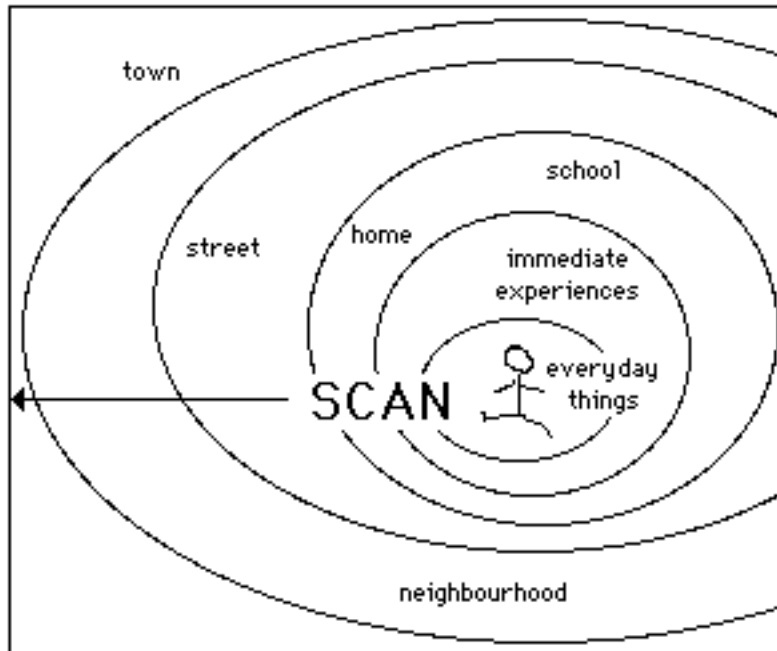
SCAN is a non-prescriptive environmental enquiry system, spanning Key Stages 1 to 3, for using the school's neighbourhood as an outdoor laboratory. It provides tools, exemplars, and subject contexts for a school to pursue its own programme of curriculum development which involves pupils in the progressive understanding of problems issues and challenges of local economic development.

It is suitable for meeting a wide range of attainment targets, in 'science' and 'geography', and the non-mandatory cross-curricular subjects of 'environmental education', 'economic and industrial awareness', and 'education for citizenship'.

### 1.2 The Concentric Model

As children get older they generally venture further afield. They become more adventurous. Their environment expands, their range of experience grows, they become more able to cope with abstract ideas. SCAN is a set of procedures and tools which may be used promote the 'concentric' approach to curriculum development from Key Stage 1, helping select content and sequence in the context of the local environment. Surveys and appraisals can begin with things which are part of everyday life, asuch as family classroom and school; then expand to explore the neighbourhood, town and district. Communication of results and feelings to other SCAN schools can shift the focus towards cross-country comparisons. This concentric approach to information gathering is in the mainstream of the first three key stages. SCAN does not require teachers to do things they do not already do. The new slant is that the surveys integrate class work with plans to make environmental improvements. From year to year, learners constantly return to these ideas, but with different local examples, and with differing degrees of complexity. Also, they communicate to see the broader picture.

Fig 1 SCAN's procedures and tools help curriculum development, working through Key Stages 1, 2 and 3, from the familiar to the unfamiliar.



## **2 SUBJECTS AT PRIMARY LEVEL** (Key Stages 1-2)

At primary level SCAN has proved valuable for developing a practical approach to the following programmes of study in science and geography.

### 2.1 Science Life Processes and Living Things

#### Key Stage 1

- **Variation and classification**

- (a) Pupils should be taught to recognise similarities and differences between themselves and other pupils;
- (b) Pupils should be taught that living things can be grouped according to observable similarities and differences.

- **Living Things in Their Environment**

- (a) Pupils should be taught that there are different kinds of plants and animals in the local environment;
- (b) Pupils should be taught that there are differences between local environments and that these affect which animals and plants are found there.

#### Key Stage 2

- **Variation and classification**

- (a) how locally occurring animals and plants can be identified and assigned to groups, using keys which separate organisms into families and species..

- **Living things and their environment**

- (a) Adaptation

- Pupils should be taught that different plants and animals are found in different habitats;
- Pupils should be taught how animals and plants in two different habitats are suited to their environment;



(b) Feeding relationships

- Pupils should be taught that food chains show feeding relationships in an ecosystem;
- Pupils should be taught that nearly all food chains start with a green plant;

(c) Micro-organisms

- Pupils should be taught that micro-organisms exist, and that many may be beneficial, e.g. in the breakdown of waste, while others may be harmful.

## 2.2 Geography: Where and How We Live

### Key Stage 1

Because much of the pupils' learning should be based on direct experience, practical activities and fieldwork in the local area, SCAN offers opportunities to develop knowledge, understanding and skills through small-scale geographical enquiries, which focus on geographical questions, e.g. "What/Where is it?", "What is it like?", "How did it get like this?".

SCAN provides the tools to carry out the required to

- describe and compare places and features, and offer explanations for aspects of what they observe; g become aware of places beyond their own local area;
- express their own views about places and environments.

SCAN is also directly applicable to develop the theme "The Quality of the Environment", which requires pupils to:-

- express views on the attractive and unattractive features of the environment;  
and
- investigate activities which have changed the environment and consider ways in which they can improve their own environment.

### Key Stage 2

- **Change**

SCAN is relevant to the additional enquiries needed to answer the question, "How and why is the environment changing?", with respect to the required studies of three places; pupils should be given opportunities to:

- (a) describe and compare places and features and offer explanations for their observations;
- (b) recognise and describe geographical patterns and begin to offer explanations for them;

(c) identify and describe human and physical processes and describe some of their effects;

(d) become aware of how places fit into a wider geographical context and of the links between places;

(e) identify geographical issues and recognise that people have different views about them.

The IT basis of SCAN's recording and back-up facilities is particularly relevant to gaining the geographical skills of using IT to gain access to additional information sources and to assist in handling, classifying and presenting evidence, e.g. recording fieldwork evidence on spreadsheets, using newspapers on CD-ROM, using word processing and mapping packages.

- **Places**

Communicating with SCAN schools in other places should bring together the aspects of physical, human and environmental geography which help to give localities their character, and allow pupils to operate on an area larger than the one studied at Key Stage 1.

SCAN's use of common enquiry forms helps meet the requirements to study these localities systematically by:-

(a) describing the physical and human features of the locality, e.g. cliffs, valley, housing estate and the environmental issues, e.g. water pollution, proposals for a new supermarket that give the localities their character;

(b) observing and suggesting how the features of the locality influence the nature and location of human activities;

(c) investigating recent or proposed changes in the area;

(d) recognising similarities and differences between the localities;

(e) appreciating how the localities are set within a broader geographical context and how they are linked with other places, and should provide opportunities to understand why aspects of the local area are as they are and why they are changing.

- **Themes**

SCAN is directly relevant to practical work on two of the four required themes of study, by making enquiries within the context of actual places.

(a) Economic activities

By surveying the provision of goods and services and the use of land, pupils should be able to:

- identify how goods and services needed by the community are provided;
- investigate how land is used in different ways, e.g. for farming, buildings, leisure, manufacturing industry, forestry, tourism, out-of-town retail sites;
- investigate a particular issue which demonstrates how . conflicts can arise over the use of land and recognise that people have different views.

• **Environmental Change**

By setting up enquiries about changes to the environment, pupils should be able to:

(a) identify ways in which people affect the environment, e.g. by quarrying, building reservoirs or motorways;

(b) investigate ways in which people attempt to look after and manage the environment, e.g. by restoring damaged footpaths or combating river pollution.

### 3 SUBJECTS AT SECONDARY LEVEL

#### 3.1 Key Stage 3 Science

##### Questions for the Curriculum

SCAN schemes and associated survey work sheets and databases are concerned with finding answers to four questions about biodiversity:-

- What is special about the biodiversity of your neighbourhood
- How is biodiversity generated?
- How is biodiversity lost?
- How is biodiversity protected?

These questions are at the centre of the Biodiversity Convention, signed at Rio, and are embodied in the UK Biodiversity Strategy. The Strategy sets out the scientific principles of biodiversity from which practical routes emanate for national and community action to maintain and increase biodiversity. In this context, SCAN work has to be integrated with curriculum targets related to topics and concepts of biological science.

##### Science Targets

The objective is to fulfil curriculum targets at Key Stages 3 for which pupils study:-

Plants as organisms: their parts; how they reproduce; germination; requirements for growth.

Classification, variation and inheritance: Similarities and difference between plants animals and within populations; use of keys; inheritance and variation; natural selection and selective breeding.

Care for living things: Human impact; pollution; managing the environment.

Living things and the environment: The rhythms of life; habitats; feeding relationships.

SCAN offers a series of schemes, for environmental surveys termed 'bioscopes' , to encourage the use of the local neighbourhood as an educational resource for science, with cross references to geography. Together they also make a package for raising awareness, and gathering local information, which are both relevant contributions to fulfilling the Local Agenda 21 biodiversity action plan.

Time-SCAN- keeping a nature diary (study areas 1&4);

Tree-SCAN- recording neighbourhood trees as individuals (study areas 1,2,3,&4);

Grass-SCAN- sustainable management applied to the schools grassy habitats (study areas 1,2,3 &4);

Air-SCAN- making simple measurements of air pollution (study area 3) ;

Bird-SCAN- studying local birdlife in the context of the world of birds (study areas 2,3,4);

Minibeast-SCAN- studying soil and animals that roam its surface (study areas 1,2,4);

Square-SCAN- creating a local geographical information system check off the presence or absence of fairly common species, using a gridded map (study area 3);

Work-SCAN- creating classroom, mini-nature businesses, and carrying out surveys of organisations that affect, or protect, the local environment and its productivity (study area 1,2 &3).

Council-SCAN- How to approach your council to find out about its policies and actions that affect local biodiversity (study area 3)

### Target Topics and Contexts

The following summary outlines the topics that are commonly used as a scientific reference for environmental work at Key Stage 3. They fill out the curriculum study areas 1 to 4 above. They are all relevant to learning about 'biodiversity', but the concepts particularly relevant to gathering local information required to produce and operate a biodiversity action plan are in bold.

The topics are:

Spaceship Earth: Diversity: Adaptations: Niches: The Geological Calendar: Food Chains and Pyramids: Microbes and Minibeasts in a Food Web: Rhythms of Life; Environmental Change: Managing the Environment: Environmental issues.

- "Spaceship Earth"

Pupils should gain knowledge with understanding about:-

- (a) How the Earth contains everything that we need to survive:- water, oxygen, fuel, different habitats, raw materials for making things.
- (b) How water is recycled in the water cycle.
- (c) How oxygen is recycled through **photosynthesis** and **respiration**.
- (d) How a green plant uses photosynthesis to make food for itself. The plant may then be used by a herbivore as food. The **herbivore** may be eaten by a **carnivore**. **Food chains** transfer some of the energy of the Sun to every living thing on the planet.
- (e) How our neighbourhood is part of 'Spaceship Earth', but some parts have probably become polluted with emissions from power stations, factory smoke and car exhausts, and made unavailable for wildlife because of buildings and roads.
- (f) How our environment must be carefully looked after so that it is fit for future plants and animals to live in. It should be **conserved**.

(g) How **pollution** can affect the balance of the environment.

(h) How some waste material can be recycled, some is **biodegradable**, some is indestructible.

- "Diversity"

(a) General

Pupils should gain knowledge with understanding about:-

- How **ecology** is the scientific study of ecosystems- combinations of living things (**organisms**) and their **habitats**; good start for an ecological investigation is to identify the organisms in the habitat; there are millions of different kinds of living things on Earth; this biological variety in a particular place is called its 'biodiversity'
- How we classify living things (put them into sets) to make sense of the living world.
- How the most obvious sets are **animals, plants and bacteria**; each of these large sets, called **kingdoms** is classified into smaller sets; animals might be classified by their common names.

(b) Animals

- How animals are classified by **zoologists** (animal scientists) using their structural features; animals are put into the same group if they have certain important features in common; the **vertebrates** (animals with backbones) are one of the major animals groups.

(c) Plants

- How plants are classified into several major groups; flowering plants are one of the major groups.
- How until recently **botanists** (plant scientists) also classified fungi such as mushrooms and algae such as seaweed- as two major plant groups; these now belong to two different kingdoms.

- "Adaptations"

Pupils should gain knowledge with understanding about:-

(a) How the huge variety of animals and plants is not evenly distributed over the Earth; ecologists study those characteristics of plants and animals that allow them to survive in their habitats; any living thing is most often found in the habitat where it has the best chance of survival.

(b) How living things are **adapted** to their environment; adaptations are adjustments to environment to ensure survival, such as the ability to cope with cold, and one-on-one relationships where both benefit (**mutualism**)

(c) How living things that are not adapted reasonable well to their surroundings will become extinct:-

- this may happen when important features of the environment **change**:
- when there is **competition** from other living things for food or space.

- "Niches"

Pupils should gain knowledge with understanding about how biodiversity means the range of differences between species and within a particular species.

An example is the 'apple barrel' model of Thomas Henry Huxley, a zoologist living at the time of Darwin. He the first to produce the following simplified picture of biodiversity; in response to the question, 'Why are there so many different kinds of living things'

Huxley said, "The world is like an apple barrel; you can fill the barrel with apples, but there are still spaces between the apples, that can be filled with sand. When the sand reaches the top, there is still space to be occupied between the grains. Water can be poured into the barrel to fill these spaces; only then will the barrel be full".

Pupils should gain knowledge with understanding about how:-

- (a) each living thing occupies its particular 'safe place'; a place that ensures safe food, shelter and security to reproduce;
- (b) there are as many different kinds of living things as there are different ways of living;
- (c) its' way of life, that is the way it functions, determines where a particular species can live;
- (d) together, the two characteristics, its way of life, and where it lives, determine an organism's 'place in nature'; this 'place' is called its 'niche';
- (e) two different species cannot occupy the same niche because in competition they cannot be exactly equal, and one will inevitably oust the other;
- (f) much of evolution has been a hunt for unoccupied niches i.e. these are the spaces in Huxley's 'apple barrel world'.

- "The Geological Calendar"

Pupils should gain knowledge with understanding about:-

(a) Geological time

How fossils found in rocks show that in the past a succession of different groups have represented a particular way of life; this geological calendar shows the decline of the seed-ferns coincided with the rise of the cycads, and the decline of these coincided with the rise of the flowering plants; the decline of the amphibians coincided, with the rise of the reptiles, and the decline of these coincided with the rise of the birds and mammals; big as is the world, and numerous as are its niches, there is a limit to the number of groups of organisms that can occupy them, and the result of the competition to occupy these niches is reflected in a gain and loss of creatures of the past, which is called **evolution**;. species producing the most diversified descendants, in structure constitution and habits, will be better enabled to spread out into the widely diversified niches available in nature, and so be enabled to increase in numbers.

(b) Extinction

How many previously secure niches are now unsafe because of the sprawl of human economic development; this is reducing local biodiversity and leading to decline and extinction, first of rare species with specialised niches, but increasingly of commonplace plants and animals in our fields and gardens.

- "Food chains and pyramids"

Pupils should gain knowledge with understanding about:-

(a) Flows of energy

- How the flow of energy through an ecosystem begins when green plants trap light energy from the Sun in photosynthesis; the energy is transferred from plants to animals in food chains.
- How, for example, a mole is part of a food chain; the mole eats a lot of food in one month, perhaps 1500g of worms, but most of this is not changed into body tissue; only some food is used for growth: other bits are **egested** (expelled) as waste. some is broken down by respiration to give energy for body heat and movement.
- How a pyramid of numbers of animals in a food chain is a way of showing these ideas; the size of each layer in the pyramid represents the total **mass** of living things (**biomass**) at that level in the food chain; the pyramid shape shows that only some of the food eaten is changed into body mass; each level is usually about one-tenth of the mass of the level below it.



(b) Food Webs

- How in real life most organisms are part of many food chains; food chains are linked together within a habitat; the result is complicated diagram showing that one animal may eat, or be eaten by, several others; it is called a food web. Food webs consist of a balance between many **herbivores** and a few **carnivores**, the **predators**, which prey on on them.

(c) Decay

- How death and decay of living things are important processes of an ecosystem. Uneaten food eventually **rots**; the soft remains of an animal decay quickly; even the bones finally disappear; dead leaves that fall the ground gradually fade away. Grass clippings rot and change into **compost**; all living things will eventually die and decay.
- How microbes **decompose** (break down) the remains of living things like apples and bones; n this way they obtain energy and materials to grow and reproduce; **microbes** (microscopic creatures) grow best in warm and moist conditions, and when the decaying matter is pressed together into a bundle.

- "Microbes and Minibeasts in a Food Web"

Pupils should gain knowledge with understanding about:-

(a) How microbes that cause decay are called decomposers; there are other decomposers like worms, slugs and woodlice (the **minibeasts**); decomposers are an important part of every food web because they:-

- eat biomass that other living things cannot use;
- return **minerals** which plants need back to the soil.

(b) How microbes tallow the elements of life, like nitrogen and carbon to be used over and over again; this is called **recycling**.

- "Rhythms of Life"

Pupils should gain knowledge with understanding about:-

(a) How living things respond to seasonal and daily changes in different ways. Here are some examples of this:-

- a deciduous tree sheds its leaves in autumn and grows new leaves in spring. The coloured pigments in the leaves change at different times of the year;

- a hedgehog is an example of an animal which **hibernates** during the winter. Its metabolism slows down during the winter enabling it to conserve energy and live through harsh conditions when there is little food. It uses up a store of energy during hibernation. In spring it becomes active again.
  - a chrysanthemum comes into flower in the autumn when the day length is decreasing. Nurseries wanting to get these plants to flower in other times of the year can achieve this in a growing room by reducing the amount of light each plant receives.
  - nocturnal animals become active at night. In a zoo, nocturnal animals are kept in the dark during the day so that visitors can see them moving around.
  - many flowers open only when the sun shines, and some have a definite time, usually during the late morning when the petals open. Pollinating insects have a daily rhythm of activity which matches the availability of nectar.
- "Environmental Change"

Pupils should gain knowledge with understanding about:-

- (a) How early humans survived by hunting for meat and gathering seeds, berries and plant roots; they moved from place to place and the local environment recovered quickly from any damage they caused.
- (b) How after the last Ice Age ended in North Africa and Europe about 10000 years ago, people began to settle in villages, increase in numbers and make more permanent changes to their surroundings; they cut down trees to make room for their crops and animals; on the North African coast the once dense forests disappeared; they cleared land was over-used and became infertile and dry; winds swept the soil away and the land became part of the Sahara desert; some sea ports became so silted up that they had to be abandoned.
- (c) How today the effects of human activity are greater still; our huge population demands ever-more land for farming, more raw materials for industry, and more factories for goods to improve our standard of living.
- (d) How these demands cause environmental damage that will affect us all; for example, CFC gases used in aerosols, refrigeration systems and foamed plastics, damage the layer of ozone gas above the Earth which protects us from the harmful rays of the Sun; even if all production of CFCs were stopped now the **ozone layer** could take 60 years to recover.

(e) How damage to the ozone layer worries most people, many shoppers refuse to buy products that contain CFCs; this is forcing manufacturers to develop safer chemicals and CFC-free aerosols.

- "Managing the Environment"

Pupils should gain knowledge with understanding about:-

(a) Impacts on Environment

How people change the environment in which they live; these changes should be carefully controlled to protect the environment from damage, otherwise we will all suffer; for example, we burn fuels like coal, oil and natural gas to provide useful heat energy, but we should remember that fuels can cause pollution when they burn; the fuel that powers a car contributes to environmental damage through the **exhaust gases**.

(b) Management of water

How our water should be clean. It should not contain

- harmful microbes;
- much dissolved material;
- bits of twig, mud, animal remains and excreta.

How clean tap water is so important that people are employed to manage the water supply. e.g. Your tap water has probably been cleaned in a local **water treatment plant**, and the pipes are a physical link with the jobs of 'water managers'.

- " Management of Wildlife"

Pupils should gain knowledge with understanding about:-

(a) How the biodiversity of any habitat is affected by :-

- the **physical systems**, such as climate, that mould rocks, and determine the condition of soils;
- the **biological systems** that govern variety and productivity of food chains;
- the **cultural systems** that tap people into physical and biological processes, according to how we see the environment, as a source of **things we value**.

(b) How management of wildlife is a set of actions directed to sustain its present biodiversity, or restore it to a better condition. It sets **goals** for environmental conditions; **monitors** the spatial impact of any change in condition against the goals; and has **action plans** to counteract any deviation from the goal.

- "Environmental issues"

Pupils should gain knowledge with understanding about:-

(a) How humans have always changed their surroundings; nowadays we change the environment on a vast scale; we build huge factories to make things, we grow our food on farms using large quantities of chemicals, as fertilisers, and to kill weeds and pests, we design roads for fast transport; sometimes our human activities will have unexpected results; these may well cause harm to plants and animals.

(b) How some environmental problems become headline news; because we are concerned to do something about them, they are called 'issues'; some environmental issues are so worrying to people that public opinion has led to changes in the law; for example, it is now illegal to pick wild flowers in the countryside.

### 3.2 Geography

#### Using the Neighbourhood for Practical Work

The need to generate an educational climate for civic involvement with planning has been an unattainable lodestone of local government for at least a century. Planners are agreed that some form of ongoing environmental appraisal carried out within the community is the key. SCAN is an innovation to take community appraisal into the school. It helps young people take on a role of local surveyors of 'place' and its 'issues'

For each neighbourhood, and its features, the curriculum states that the enquiries should be based on pupils asking What is it?: Where is it?: What is it like?: How did it get like this?. SCAN focuses the answers through practical work relevant to the local Agenda 21 as a route to get action about things that concern them.

#### Syllabus objectives

SCAN surveys satisfy the syllabus requirements that pupils should:-

- collect and record information;
- communicate information and ideas;
- identify and name physical and human features of the locality;
- recognise the features that give the places their character;
- express views on the attractive and unattractive features of the locality;
- investigate how land and buildings are used;
- identify similarities and differences between localities by studying landscape, weather, transport, jobs;
- identify differences between local environments that affect which animals and plants are found there. These differences, which influence local biodiversity, can be studied by:-
  - describing and grouping rocks and soils on the basis of their characteristics;

- understanding the water cycle, and the part played by evaporation and condensation;
- assigning locally occurring animals and plants to groups using keys,
- discovering how animals and plants in two different habitats are suited to their environment, and recognise that the idea of evolution provides an explanation.

### Neighbourhood Appraisal

SCAN survey/work sheets are concerned with finding answers to eight questions about place:-

- What is special about your neighbourhood?
- What are the forces that have shaped, and are shaping, your landscape?
- How much water does your community use, and for what purposes?
- How stable is your weather?
- What goods and services are provided in your community?
- How is your community changing?
- What natural resources are you using?
- What are local businesses doing for Rio?
- What is your local council doing for Rio?

These questions are at the centre of Agenda 21, signed at Rio, and are embodied in the UK Strategy for Sustainability. The Strategy sets out routes to national and community action ensure that economic development is sustainable.

- **Reporting**

- (i) Basic needs

- The above surveys encourage more detailed reporting the community with respect to the following basic needs.

- COMMUNITY

- HOME

- FOOD

- CLOTHING

- WATER

- Where it comes from; Its use Its quality in sea, rivers or ponds

Focusing on any one of these basic needs sharpens up the application of SCAN surveys to produce a comprehensive sense of place. The aim is to encourage SCAN schools to use the guidelines in conjunction, with the SCAN survey pack, to produce story-boards for their own reports (paper, video, multimedia) to share with the adult members of their community, and other schools. Comparisons with other communities are important to determine what is missing.

Exemplars are provided showing how to identify features of daily life, most of which are suitable for devising indicators of sustainability. A class has to decide for itself which features to use, and devise simple monitoring methods that can be used from year to year. There are many things to be investigated such as: quality of life; consumerism; buildings; how things used to be; use of natural resources by families; studying the management of a business.

(ii) Indicators of change and sustainability

SCAN's general practical objective is to check-out the local quality of life in the context of sustainable development. The UK strategic response to the Rio Environment Summit defines sustainable behaviour as any actions of local government and business that are planned to help maintain a supply of local jobs in the context of:-

- reducing the need for non-renewable resources;
- making use of renewable resources;
- reducing our demands on nature as a sink, or dump, for wastes and surpluses;
- adjusting our demands on nature to match its ecological productivity;
- reducing the need for civic clean-up operations;
- improving the visual appearance of the neighbourhood.

In practice this planning strategy is expressed in the Local Agenda 21, which is a package of environmental campaigns led by local councils to discourage actions which:-

- are unnecessary (e.g. driving where you could easily walk);
- are extravagant (e.g. using 100 w bulbs where 25 w would do);
- are anti-social (e.g. allowing your dog to foul the pavement);
- are destructive (e.g. uprooting amenity planting);
- are divisive (e.g. development without community consultation);
- are hazardous (e.g. using insecticide where pests could be removed by hand);
- cause problems for others (e.g. leaving gates open in the countryside)..

SCAN supports the campaigning role of the Local Agenda 21, which is to increase awareness of 'bad' behaviour in the use of the environment and its resources, and recommend, or actively promote, 'good' actions. Behaviour can only be changed if people are able to make comparisons with appropriate norms. Beneficial actions, and the visual results of 'good' behaviour have to be defined. In order to make an effort to move from 'bad' to 'good' behaviour, people have to see their position, and how it changes over the years, on some kind of scale. These home/community 'markers' to measure improvements are called 'indicators of sustainability'.

Examples that may be incorporated into regular SCAN surveys are:-

- family 'pledge-lists' of actions taken to consume less;
- use of bottle banks;
- trends in the use of fuel and power by the local council;
- number (and health) of trees in the street;
- level of crime against persons and property;

- vandalised civic amenities;
- number of local shops;
- number of homeless people.

Each community will have its own pattern of unsustainable behaviour. The baseline has to be determined for each issue, so that it may be measured and monitored by people living there, who thereby 'do their bit for Rio'.

### (iii) Pride of place

A general indicator which sums up a person's commitment to the Local Agenda 21 is 'pride of place'. Without pride of place, campaigns, for example against littering and excessive energy consumption, tend to be a constant drip into a social sponge. In this respect the Local Agenda 21 is fundamentally about encouraging a feeling that the local patch is special, and a place where most people are doing their bit for Rio. A consequence of our rootless society is that civic pride has, increasingly, to come from deliberate education to raise awareness, and encourage responsibility, and back the active commitment of individuals. Action plans for sustainable development need this local involvement. Agenda 21 is about co-operation to create communities where people work alongside local authorities, businesses and other organisations, to raise the quality of life in ways that won't deny future generations a decent quality of life too.

This process of education starts with the recognition, and evaluation of features of the neighbourhood which make it distinctive. Through the procedures of evaluation, people become involved in protection and management, checking on trends in jobs, services and natural resources. Comparisons with elsewhere are important to determine what is missing.

### Integration of Practical Work with the Curriculum

The geography syllabus says pupils should develop their knowledge, by describing and comparing their own locality, and its features, with two other places, one of which should be an economically developing country.

The SCAN methods of enquiry meet most of the study requirements of geography at all levels. The links develop from first two Key Stages where SCAN meets most of the curriculum targets. These requirements are aimed at giving pupils opportunities to express their own views about places and environments. Additionally, the SCAN science theme of 'sustaining local biodiversity' can link geography and science through objectives which require studying the ways in the local environment is managed to protect living things.

As well as these general enquiries, SCAN supports more detailed study of one of the following three statutory themes, each of which is central to understanding sustainable development and biodiversity.

Weather- Pupils should observe, describe and record a range of weather conditions of the local area, and investigate the effects of weather on themselves and their surroundings.

Jobs- Pupils should identify some of the jobs done by adults who provide goods and services for the community, and investigate why people make journeys, and where people in the community go to obtain goods and services

Quality of environment- Pupils should express views on the attractive and unattractive features of the environment and investigate activities which have changed the environment and consider ways in which they can improve their environment.

The curriculum recommends comparative enquiries between schools so that pupils become aware of places beyond their own local area. In particular, SCAN's investigative work could develop to compare:

- climatic conditions in other parts of the world;
- issues that show how conflicts can arise over the use of land and that different people have different views;
- how people look after and manage the environment to protect living things.

Two schools communicating the results of SCAN surveys on quality of life and biodiversity can generate a structured dialogue about sustainable development.

### **Topics and Concepts for Curriculum Development**

Suitable curriculum topics for customising or developing SCAN surveys as practical extension work are:

Places- The Neighbourhood:  
Shaping the land  
Using water:  
Weather and climate:  
Homes and jobs:  
Natural resources;  
Economic activity



- "Places- The Neighbourhood"

Pupils should gain knowledge with understanding about:-

(a) How the study of places includes identification and naming places on maps atlases and globes, and through observation in the context of field work. It involves identifying distinctive features of places and recognising similarities and differences between places. Local studies develop through the school in terms of an increasing spatial area, and depth of investigation. At the Key Stage 3 the neighbourhood can be the extended focus from the school for comparisons with other communities. The kinds of local development going on would provide an insight into the sources of money, ideas and technologies, and whether the changes are sustainable in the long-term.

- "Shaping the Land"

Pupils should gain knowledge with understanding about:-

(a) How, in a local context this involves assessing the underlying topography of the built environment in relation to surface and deep geology. There might also be opportunities to study local planning to cope with microclimates, and water flows, in relation to infrastructure and high-rise buildings. Local mineral working and/or land reclamation, provide resources for attitudinal surveys involving local residents. Coastal erosion and weathering of building stone might emerge as particular local expressions of the action of weather and climate.

- "Using Water"

Pupils should gain knowledge with understanding about:-

(a) How water in the community may be studied in relation to the sources of fresh water, the maintenance of local supplies, and the management of waste water from homes and factories. Water management is driven by the sources of pollution, its effects, and the solutions that are necessary.

- "Weather and Climate"

Pupils should gain knowledge with understanding about:-

(a) How a full understanding of weather requires an overview of the global systems of air flows as these interact with climatic zones. Most human activities are affected by day to day changes in the weather, which stresses the importance of accurate forecasting, not only nationally, but locally.

- "Homes and Jobs"

(a) How the places where most people live and work have now lost their original reason for being at a particular site. Development brings with it different functions. Large towns and cities, that have grown from first settlements, now have more than one function- usually shops and offices (commerce), housing (residential), factories (industry), and parks and playing fields (recreation).

(b) How towns and cities do not stay the same as time passes. Some parts are modernised and renewed whilst others fall into disrepair and decay. Town centres need to be modernised to attract people who are now more mobile; industry may move to bigger or more modern factories; older mass housing becomes expensive to maintain; failure of industry to compete with other places and countries may lead to dereliction of an entire neighbourhood. Old jobs are lost, new ones are created, but not necessarily in the same place.

(c) How the general increase in traffic is a major cause of change because of the space cars need to park, the preferential use of road transport, streets that were designed for pedestrians and horse-drawn traffic, and the wear and tear on roads that causes disruption when they have to be repaired. Then there is the health risk from transport exhausts, structural damage due to vibration, and road accidents. Most people would accept that it is not sustainable to allow traffic problems to go on increasing and both national and local government have very large on-going commitments to find solutions.

- "Natural Resources"

Pupils should gain knowledge with understanding about:-

(a) How the Earth is rich in natural resources which are the things found within, or on, the Earth, that can be used by people. Natural resources can be grown on land (livestock and crops), caught in the sea (fish and shellfish), mined or quarried. They can be divided into two types

- non renewable resources can be used only once, when they have gone they have gone forever;
- renewable resources will not run out provided they are not over-exploited at a faster rate than they can be renewed.

(b) How one way of prolonging the life of non-renewable resources is by recycling. This is evident in the provision of bottle banks, and local schemes for collecting domestic refuse that is separated by householders before collection by the local authority. Clean up operations are also evident in land-reclamation schemes (tips and holes resulting from mining, water treatment works at the sea outfalls for sewage, and the contingency plans drawn up to cope with marine oil spills and accidental air/ river emissions from chemical plants.

- "Economic Activity"

Pupils should gain knowledge with understanding about:-

(a) How land is a vital input for economic activity. We use land in many different ways. Some activities require a large amount, while others need only a small area. If a piece of land is in a desirable location, several companies may compete to own it. If there are many people interested in buying a piece of land, it becomes more valuable and its price goes up. Commercial land use is classified according to whether it is part of a primary activity (such as agriculture), a secondary activity (such as industry), or a tertiary activity (shops).

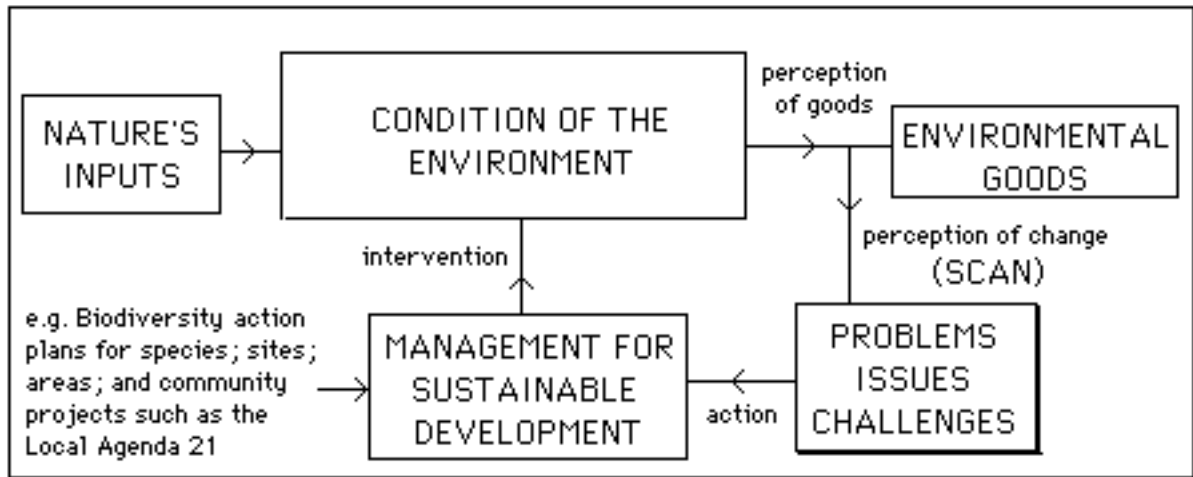
(b) How over the past hundred years there has been an ever-increasing shift of land use from primary to secondary uses. This shift now controlled by local plans for economic development as these are subsidised by central government. During the past 20 years there has been a large increase in land use for tourism. This is because people have more leisure time, they have become richer, more information is available about distant places, air travel has made it easier to travel, and purpose built resorts have been developed to match the uptake of 'package holidays'.

(c) How there has also been an increase in the use of rural land for recreation. Each year 100 million people visit National Parks of England and Wales. These places are identified by law for special protection and public enjoyment. Most of the land is privately owned but there are restrictions on the kinds of commercial development that can take place. This, together with the large number of people who wish to drive and walk through national parks provokes conflict with local people, mostly farmers, who live and work there, and pose environmental management problems of footpath maintenance, car parking, and wildlife disturbance.

- "Support for Geographical Modelling"

(a) How planning directed to sustain the present condition of an environment, or restore it to a past condition is a procedure universally used to control or regulate all kinds of human systems. It sets **goals** for environmental conditions; **monitors** the spatial impact of any change in condition against the goals; and **initiates flows of activity** (implementation and co-ordination of policies) to counteract any deviation from the goal ( Fig 2). This is a design for an environmental management plan, expressed as a system, that can be used to report on compliance, either to a locally defined objective, or a legislative target. Applied to this model SCAN surveys sharpen up local perceptions of adverse change, and urge schools to action to check adverse changes by making a reasoned intervention in the planning process (Local Agenda 21).

Fig 2 Position of SCAN in a model of local environmental management



## 4 CURRICULUM DEVELOPMENT AND BIODIVERSITY

### 4.1 A Biodiversity Continuum

The National Curriculum for Science specifies a pathway for learning about biodiversity which runs from Key Stage 1 to 3.

#### At Key Stage 1

Practical work on the diversity of life processes begins in the local environment. The emphasis is on **describing local environments**, and discovering how differences between them affect which living things are found there. The study of differences requires 'individuals' to be separated out from the living systems. At this point, the general structure of biology begins to emerge, and thinking about biodiversity is first promoted, when it is found that:-

- some individuals are more similar than others (diversity is expressed through the process of '**classification**');
- some individuals can be described by the differences and similarities of their parts; (diversity is expressed through **differences in structure and function**).

#### At Key Stage 2

There is an emphasis on how differences between animals and plants in two different habitats make them best suited for survival and reproduction in their environments. Some differences are **adaptations** of form and function to cope with the physical nature of the environment. Other adaptations ensure a successful outcome for one or more individuals when they encounter and interact with each other. **Sexual interactions** between pairs of the same species are essential for reproduction. Interactions between two species might benefit each species (**mutualism**), or might cause death or damage to one of them (**predation**).

#### At Key Stage 3

The above ecological ideas are developed to explain the fact that there is a huge variety of animals and plants, but they are not distributed evenly over the Earth. Study of this **geographical distribution** reveals that any living thing is most often found in the habitat where, on balance, it has the best chance of survival. This balance is disturbed when features of the environment essential for survival change, or when there is **competition** from other living things for limited resources, such as food and space. By the end of Key Stage 3 'mutualism', 'predation' and 'competition' should have been revealed as the three great ecological interactions between species which influence local biodiversity. Since humans now interact competitively with all living things, **managing the environment** to maintain biodiversity is an important aspect of local planning.

To support this process of understanding of biodiversity it is important that practical work should be developed to:-

- describe local environments;
- classify individuals within, and between, species:

and provide exemplars of:-

- differences in structure and function between species;
- adaptations;
- sexual interactions;
- mutualism;
- predation;
- geographical distribution;
- competition;
- managing the environment.

## 5 CROSS-CURRICULAR THEMES

### Key Stages 2 and 3

The National Curriculum recommends non-mandatory themes for schools wishing to develop cross-curricular work. Themes relevant to SCAN focus on 'management of nature' (Theme of Environmental Education), 'producers and consumers' (Theme of Economic and Industrial Understanding), and 'the individual and society' (Theme of Education for Citizenship)

#### 5.1 Environmental Education

##### Focus on "People and Environment"

- **People**

At Key Stage 1 it is natural for youngsters to focus on themselves and the here and now of their limited experiences of the environment. However, this human orientation is also valuable in later years as a thread to follow through Keys Stages 2 and 3. . Many of the so-called 'principles' of biology can be taught as well with humans as with other life forms, and some can be taught better. As mammals go we are quite simple creatures without any very noteworthy anatomical, genetical or developmental features not already foreshadowed by other primates. We are at one with all mammals as regards our waterproof covering, our hairy bodies, in pumping our blood with a four-chambered heart, and being able to make milk for our babies. The main difference is that the human brain is better in responding to environmental challenges with adaptability, initiative, and foresight. However, as relative newcomers to the primate stock we have a precarious hold upon the earth and beginning biology with the theme of 'man and the mammals' can highlight the weakest links in our chain of being. We are as much a part of nature when we visit a supermarket and go the doctor's, as when we fall asleep at night. Studying people apart from nature damages our understanding of both.

- **Environment**

Human features that are special arise from our behaviour in everyday life. Most things we do are confined by our our links with a wide variety of other living things in other habitats, which, for example, limit the disposal of our waste and the production of our food (our dependence on other living things).

Other limits are set by the physical world which we use, on a much greater scale than other mammals, to support systems of mass production with inputs of natural resources. Socio-economic links between a community and its resources defines its natural economy, the ways in which it manages the environment to maximise the production of goods and services.(our use of land air and water).

- **The Combined Theme**

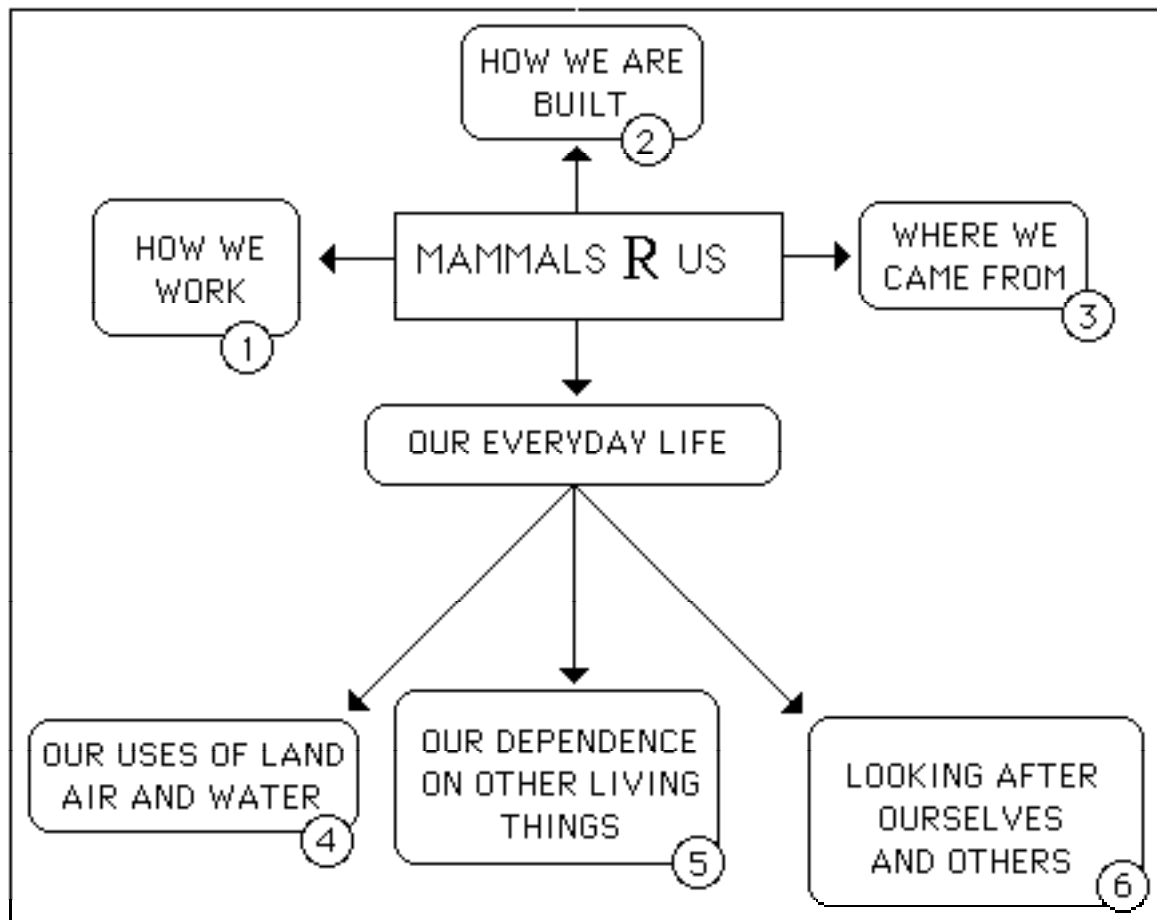
'People and environment' is an important thread running through the biological programmes of the National Curriculum. Elements of programmes of study and statements of attainment which refer to people, present an attitude towards our origins, and evolution, the growth of human populations, and our biological development. It is also a pathway of learning which highlights the human genetical system and the inborn differences between individuals. It illuminates human behaviour and human physiology, and deals with the cellular and molecular systems by which our primeval ancestors have successfully met the challenges of a hostile environment. It also draws attention to the present, and our great demands on natural resources. The message is that the linear processes of economic development, mass production and waste accumulation, must be managed to sustain non-linear ecological cycles of habitats which impinge upon our homes, factories and transport systems.

- **The Knowledge System**

The problem in developing any educational theme is to present a wide range of opportunities for cross referencing to the wider curriculum. Concepts and principles relevant to the theme of "people and environment" are scattered within the official statements of study programmes and classroom targets. A summary of a knowledge system which links them is presented in Fig 3.



Fig 3 Knowledge map for studying life and living processes starting from the fact that humans are mammals.



The knowledge system links us firmly with other mammals with regard to three kinds of knowledge:- about body plans, and the similarities and differences between mammals and other animals (how we are built); about our physiological attributes (how we work); about our line of descent from reptiles in the wider context of evolution (where we came from).

Everyday social aspects being human, firmly rooted in our biological history, are:- inventiveness directed towards preventing and curing disease; care for domestic pets, concern about the suffering of animals; protection of threatened species, ecosystems, and communities (looking after ourselves and others).

The six doors from 'people and environment' into the national curriculum identified in Fig 3. They are a menu for gathering information about biological concepts and principles at all stages of attainment.

### Focus on "Management of Nature"

SCAN's philosophy is that environmental education is more about facing up to cross-curricular issues of economic development and consumerism, than gaining detailed knowledge in core subjects about how the environment works. It is a practical expression of the UK non-statutory guidance on environmental education, and highlights eight out of the ten areas recommended to develop knowledge with understanding. These areas deal with human impact, the need for environmental legislation, planning and local environmental management.

In stressing the importance of teaching about environmental management, SCAN falls in with government guidelines to create an environmental curriculum. In particular, it encourages teachers to develop knowledge and understanding in the following areas where management impinges on families and communities :-

- local, national and international legislative controls;
- how policies and decisions are made about the environment;
- the environmental inter-dependence of individuals groups, communities and nations.
- how human lives and livelihoods are dependent on the environment;
- the conflicts which can arise about environmental issues;
- how the environment has been affected by past management;
- the importance of planning, design and aesthetic considerations;
- the importance of effective management to protect and manage the environment;
- the impact of human activities on the environment;
- different environments, both past and present.

SCAN follows government guidelines by encouraging pupils to express the following attitudes and personal qualities which are important in taking a personal view on environmental issues:

- appreciation of, and care and concern for, the environment and other living things;
- independence of thought on environmental issues
- a respect for the beliefs and opinions of others;
- a respect for evidence and rational argument;
- tolerance and open-mindedness.

Regarding topic teaching, SCAN stimulates and supports environmental enquiry within all curriculum topics recommended to develop basic knowledge and understanding of the environment, and which are directly related to local issues of economic development.

These topics are:-

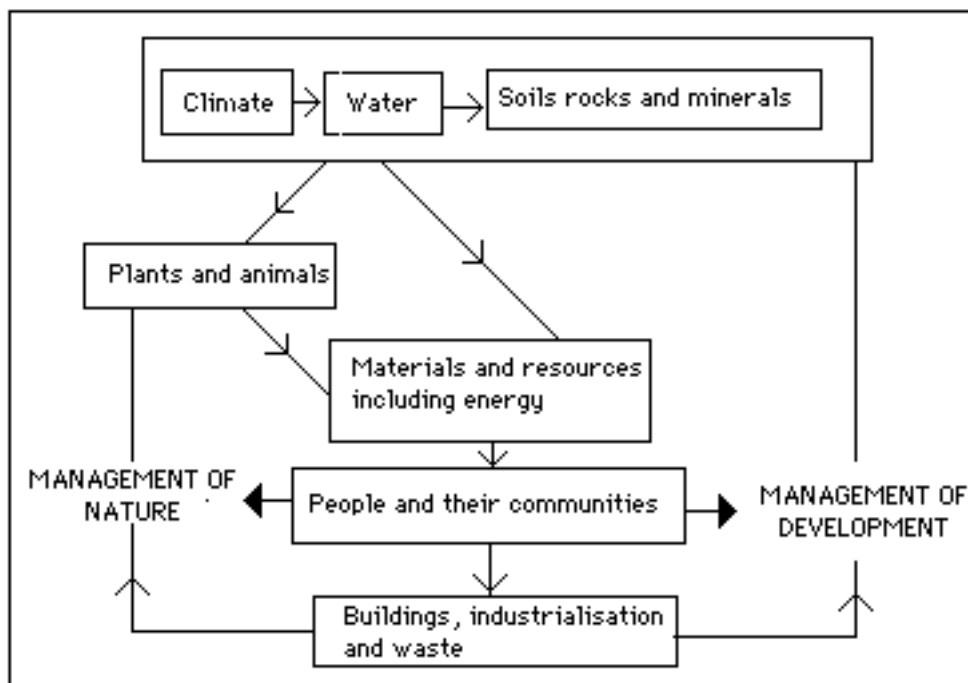
- people and their communities;
- materials and resources including energy;
- buildings, industrialisation and waste;
- water;

- plants and animals;
- soils rocks and minerals;
- climate.

### Economic Dimension

By focusing on the local Agenda 21, SCAN links these topics to form a web for a cross-curricular environmental curriculum exemplified in the local natural economy. This structure defines the flows of natural resources into developing communities, and the adverse impact of unchecked development on the availability of these resources. The knowledge navigation system (Fig 4) recognises that local educators have a dual responsibility to integrate environmental and economic aims.

Fig 4 SCAN knowledge map for an environmental education curriculum centred on integration of economic and environmental aims of management to protect materials and resources.



In relation to this scheme, SCAN encourages direct involvement with local management of 'development' and 'nature', to conserve and improve landscape and habitats, to protection land and sea from destructive developments, and to reduce the impact of consumerism on the global climate.

At a practical level SCAN is a vehicle to implement long-standing national curriculum recommendations that the neighbourhood should used as a resource for the development of skills through direct experience, enquiry and investigation

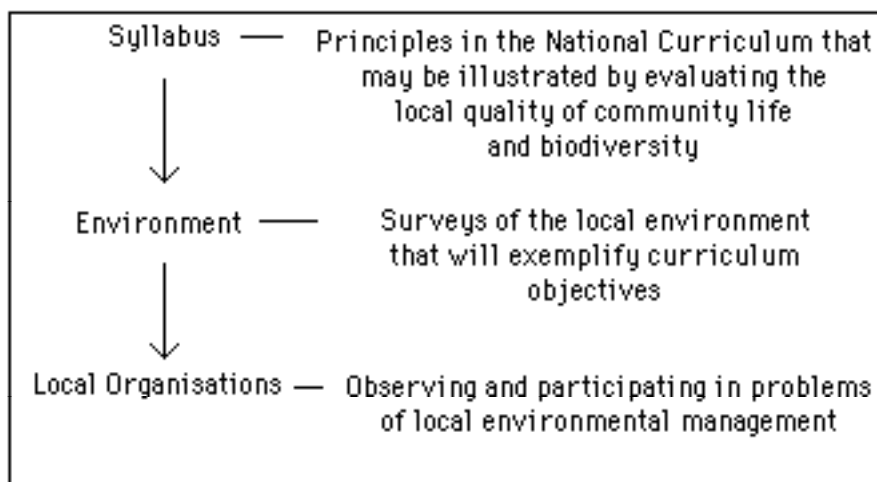
SCAN's practical methods encourage values, attitudes and positive management concerned with:-

- finding ways of ensuring caring use of the environment, now and in the future;
- finding solutions to environmental problems, taking into account the fact that there are conflicting interests and different cultural perspectives;
- informing the choices which have to be made.

SCAN's emphasis on the production and operation of local environmental management plans is a unifying practical thread to follow curriculum guidelines for environmental education. The school's Agenda 21 methods for backing action provide routes from classroom to environmental management, which have been mapped successfully by teachers. These methods can lead to concerted management to tackle the problems, issues and challenges of local development, and improve the local quality of life. School-produced environmental management plans, demonstrate the problems, state what should be done, 'projectise' what the school can manage, and tell the local elected representatives, and their Agenda 21 planners, what they should do. Repeat surveys incorporated into a school's long-term teaching plan check things get done.

Teachers who are already participating in Community SCAN have delineated routes from principles of subjects within the syllabus to their expression in the neighbourhood. The use of the environment as a curriculum resource may be directed to study the environmental relationships of local organisations, such as businesses and conservation bodies, as examples of environmental management in action (Fig 5). Here the professional model is the UK Countryside Management System (CMS), which is widely used by government agencies and voluntary organisations for managing nature sites. Guidance in the form of a 'school CMS', is available for the production of plans to manage school projects such as litter clearance, or establishing a small playground nature site. This management action planner (MAP) is a simple relational database for setting out the objectives, routes to the objectives and the work that has to be done, in a systematic way.

Fig 5 Connecting the 'syllabus' with 'environmental management'



## 5.2 Economic and Industrial Understanding

### Focus on 'producers and consumers'

Education for sustainability should, as a minimum, provide answers to the following four questions which deal with basic ideas of choice, values and decisions

What is the role of markets?

What is the role of producers?

What is the role of consumers?

What are the social impacts of producing and consuming?

### Role of Markets

- Exchange

(a) Infant level:

- know that buying, selling, and giving, are ways of exchanging goods and services; e.g. not all transactions are governed by price.

(b) Junior level:

- understand how money is used in some exchanges of goods and services, and know some of the factors that affect prices.

### Role of Producers

- Limited resources

(a) Infant level:

- identify and make decisions about resources e.g. what resources are needed for an activity, which are best, what we mean by best.

(b) Junior level:

- understand some of the implications of limited resources; e.g. know that decisions have to be made, that this will have consequences for other people now, and in the future;
- know that all decisions involve 'opportunity cost'; e.g. understand that when one course of action is decided upon, the cost is what cannot now be done instead.

## Role of Consumers

- **Needs and wants**

- (a) Infant level:

- understand that people have needs; e.g. realise the basic necessities for life - food, warmth, shelter, security.

- (b) Junior level:

- appreciate that human needs, unlike wants, are universal, and that for many people their needs are not met; e.g. distinguish between goods and services that may be desirable but not essential, and genuine necessities; and be aware of global inequalities in the distribution of necessities.

- **Costs and benefits**

- (a) Infant level:

- understand some of the costs and benefits in situations they encounter; e.g. discuss making decisions, including what they will gain, and lose in taking alternative courses of action.

- (b) Junior level:

- understand costs and benefits in everyday economic choices, recognising that people can have different, and conflicting interests.

- **Relationships**

- (a) Infant level:

- be aware that they are consumers, which links them to people who produce goods and provide services.

- (b) Junior level:

- understand what it means to be a consumer and how consumers and producers relate to each other.

- **Work and jobs**

- (a) Infant level:

- know that there are different kinds of work and that these involve different skills; e.g. look at the jobs around them, the people who do them, and some of the skills and complexities of the tasks involved;
    - know that people work in different kinds of workplaces. and do different jobs e.g. visit some local workplaces such as shops and the school kitchen, and discuss the differences among themselves, and with the workers.

- (b) Junior level:

- understand that workplaces are organised in different ways; e.g. begin to look at differing roles of managers, supervisors, and workers, look at forms of ownership and control;
    - develop their understanding of the nature of work, and of its place in people's lives; e.g. talk about why people work, and the forms of satisfaction and dissatisfaction that it brings.

- **Production, distribution and sale**

- (a) Infant level,:

- understand how some things are produced, using different resources.

- (b) Junior level:

- have some understanding of how goods are produced, distributed and sold; e.g. follow through goods from their origin to point of sale.

- **Local workplaces**

- (a) Junior level:

- know about public services, shops, offices and industries in their local community, and understand the importance of these to local people.

### Social Impacts of Producing and Consuming

- **Technological change**

- (a) Infant level:

- understand how tools and technology contribute to their lives at home and at school.

(b) Junior level:

- develop an awareness of the part played by design and technology in industrial production;
- be aware of some of the effects of the new technologies and their implications for people and places.

- **Environmental issues**

(a) Junior level:

- appreciate some of the environmental and social issues associated with economic and industrial activity.

- **Global issues**

(a) Junior level:

- recognise similarities and differences between economic and industrial activities in different parts of the world.

## 5.3 Education for Citizenship

### Focus on the Individual and Society

- **Main Strands**

The basic framework of knowledge suggested for this cross-curricular theme in the National Curriculum Council's Curriculum Guidance 8 (1990) develops four main strands:

(a) The nature of community

- the variety of communities to which people simultaneously belong - family, school, local, national, European and world-wide;

(b) How communities work to produce and maintain well-being

- how communities combine stability with change;
- how communities are organised and the importance of rules and laws;
- how communities reconcile the needs of individuals with those of society.

(c) Roles and relationships in a democratic society

- the nature of co-operation and competition between individuals, groups and communities;
- similarities and differences between individuals, groups and communities - diversity and interdependence;
- the experience and opportunities of people in different roles and communities.

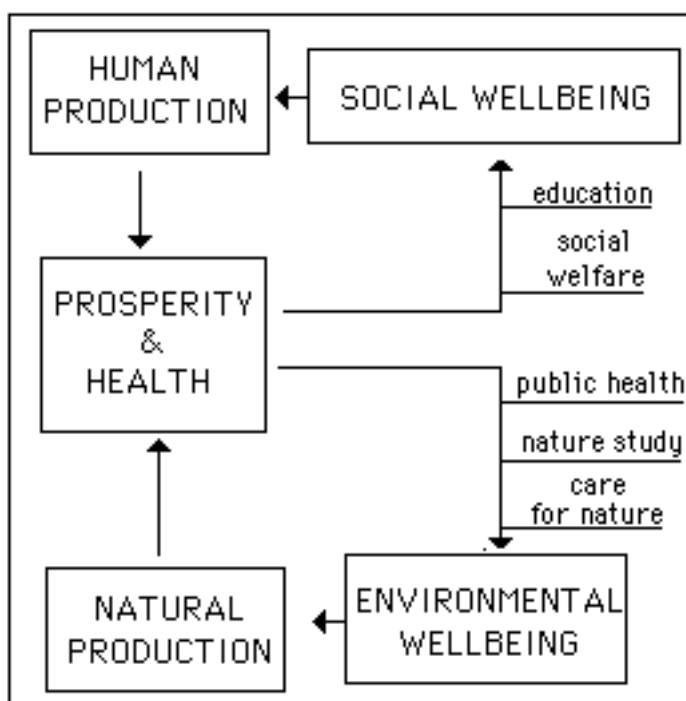


(d) The nature and basis of duties, responsibilities and rights

- the role of custom and law in prescribing duties, responsibilities and rights;
- fairness, justice and moral responsibility.

This social system in which citizenship works democratically to maintain prosperity and health through the organisation of human resources and natural resources to sustain social and environmental well-being is set out diagrammatically in Fig 5.

Fig 5 Knowledge map of the social system of 'citizenship'



• **Broad Areas of Knowledge**

There are three broad areas of knowledge that cover the field of citizenship:

- the nature of a community;
- roles and relationships within a pluralist society;
- the rights and duties of a citizen.

These broad areas can be seen in five everyday contexts for citizenship:

- the family;
- democracy;
- law and the citizen
- work, employment, leisure;
- public services.

- **Questions about the Nature of the Community**

To understand the relationship between an individual and society at large requires getting answers to questions about the nature of a community, and defining the roles and relationships between individuals and groups within the community.

How do communities combine stability with change?

How are communities organised, and what is the importance of rules and laws?

How do communities reconcile the needs of individuals with those of society?

There are also important enquiries about the roles and relationships of individuals and groups

When should people diversify and when should they be interdependent?

Find examples of co-operation and competition between individuals groups and communities

Ask people in different roles and communities about their experience, and opportunities.

Find examples of duties, responsibilities, and rights

What are the roles of custom and law in prescribing duties, responsibilities, and rights?

With respect to developing skills to handle knowledge about citizenship most of the categories of cross-curricular skills listed in the National Curriculum Council's Curriculum Guidance 3: The Whole Curriculum (1990) are suitable:

- **Skills to be Developed**

(a) Communication skills :

- arguing a case clearly and concisely;
- detecting opinion, bias and omission in evidence.

(b) Numeracy skills:

- collecting, classifying and evaluating data;
- interpreting statistics and working out probabilities.

(c) Problem solving skills

- recognising and defining the nature of a problem;
- making choices in the light of available evidence.

(d) Personal and social skills

- working with others;
- exercising democratic responsibilities and rights; e.g. participating in class councils or school elections.

- **Attitudes**

The attitudes to be encouraged in education for citizenship are less easy to define because any list of attitudes needs to include only those which allow respect for, justice and respect for others, and not those which define particular courses of action. A list might include:

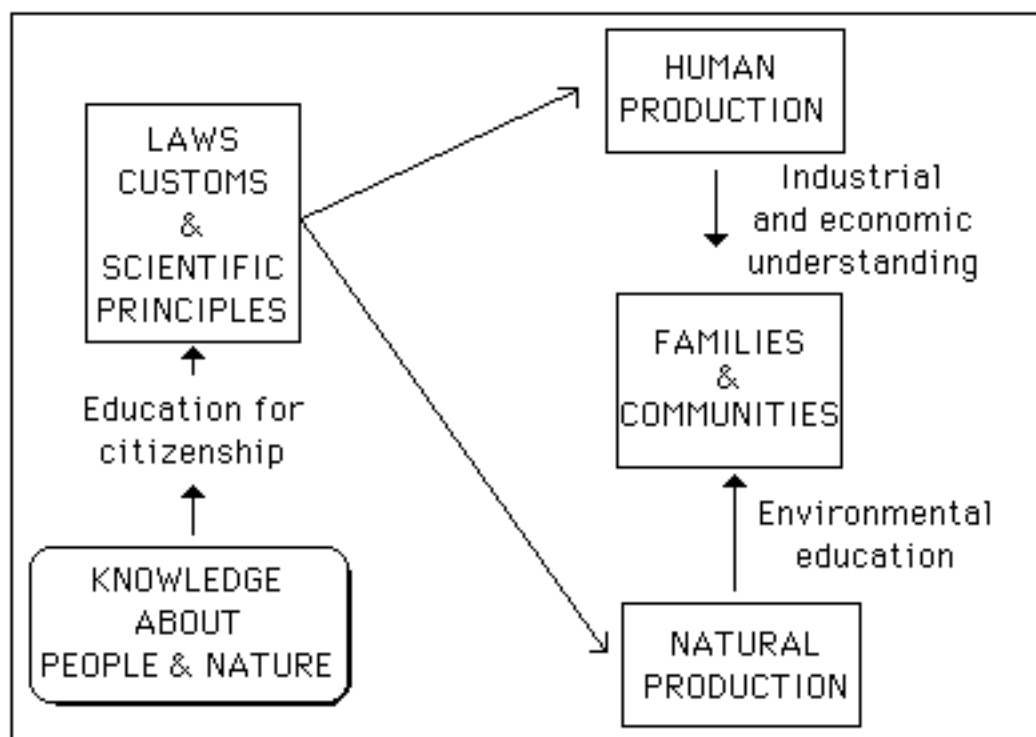
- independence of thought on social and moral issues;
- an enterprising and persistent approach to tasks and challenges;
- a sense of fair play, including respect for the processes of law and the rights of others;
- respect for different ways of life, beliefs, opinions and ideas;
- a willingness to respect the legitimate interests of others;
- a respect for rational argument and non-violent ways of resolving conflict;
- a constructive interest in community affairs;
- an active concern for human rights;
- appreciation of the paramount importance of democratic decision-making.

### Education for Sustainability

- **Total Knowledge System.**

Education for sustainability is a combination of the three cross-curricular themes outlined above. They are linked to form a total knowledge system in Fig 6. The diagram summarises education for sustainability as a process not a fixed goal. It is a process relevant to all people. Everyone can be an educator and a learner because the practical work is centred on backing local economic development, avoiding poverty, over consumption, and environmental degradation.

Fig 6 Education for sustainability: a knowledge map of the process



Detailed pathways of knowledge connect each theme to the core and foundation subjects of the national curriculum. These linkages enable people to understand the interdependence of all life on this planet, and the repercussions that their actions and decisions may have, both now and in the future, on resources, on the global community as well as their local one, and on the total environment.

- **Practical Outcomes**

Being in a cross-curricular arena increases people's awareness of the economic, political, social, cultural, technological, and environmental forces which foster or impede sustainable development.

The practical focus on community action develops people's awareness, competence, attitudes, and values. Education for sustainability enables them to be effectively involved in sustainable development at local, national and international levels, and helps them work towards a more equitable and sustainable future. In particular, it enables them to integrate environmental, and economic decision making. Nothing is black and white in the relationship between caring for the environment and using it to generate jobs. Often, conclusions are drawn and judgements are made in the context of the majority backing the lesser of two evils.