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## NATURE IN FOCUS

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Director  
of the Water Resources  
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# EDITORIAL

During the last ten years many countries have been taking action to improve water management. New specialised agencies have highlighted the diversity of water interests involved and in particular the special problems which have to be faced in creating an efficient and effective administration. Water resources must be considered in relation to catchment areas which concentrate surplus rainfall into the rivers and into underground storage in aquifers, where the water can be brought under control. The river system not only provides water for agricultural, industrial and domestic use but is necessary for the removal of the resulting wastes, for the support of leisure activities, for navigation, for healthy fish life and for the maintenance of an attractive countryside. It is inefficient and in many cases impossible to operate effective river management except in areas related to complete river catchments. The major, but not the only, issue is whether a downstream supply authority can rely now and in the future on the purity of its supplies if upstream effluent disposal is independently managed.

When river basin management becomes effective, water supplies will be more easily provided and the re-use of water throughout the catchment will become possible. Moreover, the co-ordinated management of underground water with surface water supplies becomes a possibility and not only are the rivers maintained throughout their length in a healthier condition, but economies can be made in the cost of providing water facilities. The most important respect in which this problem of administrative boundaries arises is in the disposal of sewage and industrial wastes. There is little incentive for an upstream urban community to spend large sums of money on the improvement of its effluents if the benefit is felt to be gained only by other urban communities downstream. However, if the population within a catchment is regarded as a single community with an administrative system which enables it to contribute equally to the cost of river management, not only is the incentive provided to carry out the necessary works, but by careful planning the total cost of works needed

can be considerably reduced. This important advantage results from the ability of rivers to recover from a pollution provided they are not called upon to absorb more noxious matter than they can naturally deal with. Once a river has deteriorated beyond the point at which it can deal with the effluents discharged into it, the destruction of biological and fish life is rapid. On the other hand, in the case of a river already grossly polluted, if it can be managed overall in such a way as to bring it back to a condition where its own selfpurifying activities can be restarted, recovery should be swift and spectacular.

There are dangers when tackling the problems of water supply, re-use and pollution, of concentrating excessively on supposed technological difficulties. In many cases it may be found that there is already adequate knowledge of how to deal with the problem provided the administrative system, based on appropriate river catchments, is available. Water management is interdisciplinary and a problem of government. If it fails in any individual respect it will fail as a whole. The first objective must be to create a system in which water management can flourish — a system based on catchments.

It is difficult enough in a country such as the United Kingdom to introduce river basin management into a system of local government based on other administrative boundaries. It will be even more difficult to deal administratively with the big international rivers of Europe, but a wonderful opportunity for international collaboration arises in this field which could be a model for other forms of collaboration between countries. It is thus encouraging to note that the Council of Europe has already recognised the possibilities opened by such collaboration, in the first instance through the European Water Charter of 1968 which stressed the need for an economical use of our limited fresh water supplies and secondly through the more ambitious European Convention on the Protection of Fresh Waters against Pollution currently being elaborated with the Organisation. The need is urgent and the work of the Council of Europe is to be commended for striving for these broad objectives.



# THE RHINE AND THE DANUBE

## A SECRETARIAT COMMENT

The international efforts to abate existing fresh water pollution in Europe might best be illustrated by the example of two of Europe's most important international rivers, i.e. the Rhine and the Danube. The anti-pollution measures applied in connection with the Rhine have so far been insufficient, bearing in mind the demographic and industrial development in its catchment area. The first measures were taken in 1869 on the initiative of the Central Commission for Navigation on the River Rhine. As from 1950, the International Commission for the Protection of the Rhine against Pollution has been studying the nature, extent and origin of pollution, presenting recommendations to the member States regarding possible measures and preparing the bases for future multilateral agreements. The results so far obtained have not been adequate and the Ministerial Conference of the International Commission which was held in The Hague from 25-26 October 1972 was only partly successful. In fact, only the first of the three main problems referred to hereafter, and which were discussed at the Ministerial Conference, seems to be on its way to a settlement:

- a) increased salinity of the Rhine, mainly caused by the potassium mines in Alsace;
- b) the thermal pollution of the Rhine;
- c) extension of the powers of the International Commission and reinforcement of its Secretariat.

Although considerable efforts have been made by the different countries concerned in connection with reducing water pollution originating on their territory, the States are reluctant to commit themselves by international agreement in this field in view of the important economic repercussions of an international water management policy. For this reason, it appears uncertain whether the recent proposal by the EEC Commission in Brussels to establish a special executive Rhine authority under the Treaty of Rome, with Swiss participation as a non-member of the EEC, will bear fruit. The Danube, connecting eight States but receiving effluents from twelve States, flows through nine towns of more than 100 000 inhabitants and through dense industrial areas. No international commission has been set up to control its pollution, and although the water quality of the Danube has not deteriorated as much as

that of the Rhine, the situation is still quite unsatisfactory. Its water, moreover, is utilised by agriculture, fisheries, navigation and power plants and is also used as drinking water for many towns and areas. Urgent measures should therefore be taken to improve the water quality of the Danube as well, throughout its whole course.

The above examples may illustrate the need for co-ordinated European action to protect international fresh waters against pollution.

The Committee of Ministers of the Council of Europe is aware of this need and has set up a committee of experts to prepare a convention on this subject. It goes without saying that it is not an easy task to work out a legal instrument which would cover all international fresh water rivers in Europe, defining uniform minimum standards of quality for these rivers and containing provisions concerning settlement of disputes, giving at the same time proper consideration to often conflicting State interests.

Water pollution is no longer a national problem, and every effort which might prevent the situation from getting worse should therefore receive full support.

*The irony of reality: a huge sewer in the Rhine near to Strasbourg itself*



# INDICATOR

## SPECIES

Dr. N. W. MOORE,  
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### A NEW ROLE FOR WILDLIFE

Wild plants and animals are valuable to man for many reasons. As well as being wholly dependent upon green plants and bacteria, even the most technologically advanced nations still require fish and other wild animals for food. Also, their farmers rely on parasitic and predatory insects to control crop pests to a very large extent, and on other insects to fertilise many kinds of vegetable and fruit.

Civilised man has always delighted in nature, yet as he becomes more industrialised, and as fewer people have anything to do with farming, he becomes conscious of losing contact with nature. Therefore more and more people feel the need to consciously reestablish that contact in their spare time. The success of European Conservation Year and the growth of conservation organisations and societies throughout the world emphasise this point.

While wildlife becomes increasingly valuable for economic, scientific and aesthetic reasons, it is also developing a new value; technological change today is so extensive and rapid that we require pointers to show us what we are doing and to help us predict.

Increasingly, it is realised that wild plants and animals have yet another role to play in the modern world — that of biological indicators of unforeseen problems.

### Biological indicators

The idea that an organism can be used as an indicator of some special situation is an ancient one. The barking of dogs has warned countless generations of men of the approach of potential enemies. For many years canaries were kept in mines and their distress or death gave warning of deterioration of the atmosphere. Nat-

uralists have consciously or sub-consciously used plants and animals as clues in their search for types of habitat or for the presence of localised species. If heather (*Calluna vulgaris*) is present, a botanist does not need a pH meter to tell him that he is on acid soil; conversely, if he finds shrubs such as dogwood (*Thelycrania sanguinea*), spindle (*Euonymus europaeus*) and wayfaring tree (*Viburnum*



*A high sea bird, the Guillemot - victim of PBC poisoning*



*lantana*), he can be sure he is on a lime-rich soil. Some organisms indicate the ecological stability of a system. An abundance of cowslips (*Primula veris*) is proof that the meadow has not been treated extensively with fertilisers; rushes (*Juncus* sp.) that a field is poorly drained. My colleagues at Monk's Wood, Drs. Hooper and Pollard, have shown that bluebells (*Endymion non-scriptus*) and dogs mercury (*Mercurialis perennis*) in a hedge indicate that it is an ancient one. The late Captain Cyril Diver who was the first Director General of the British Nature Conservancy, maintained that the presence of the snail *Ena montana* in a wood indicated that it was an ancient one. These are examples of species indicating different situations under relatively static conditions; however, naturalists can also use species as indicators of change. The sudden appearance of green algae in a pond or stream is evidence of an increase in nutrients, and hence possibly of pollution. Poppies (*Papaver* sp.) in a field indicate disturbance of its soil. Can observations of these kinds be used to alert us to major ecological changes resulting from new technologies? There is increasing evidence that they can.

### Indicators of change

Species differ in the extent to which their population numbers and distributions vary. Long before man became a dominant species, populations fluctuated for "natural" causes, such as colonisation and invasion by other species, climatic and geographical changes, and changes in competitive and prey/predator relations. These types of factor still operate, and it is often difficult to distinguish between the effects of "natural" and man-made causes.

Frequently they combine to produce an effect. Nevertheless, a sudden change in animal numbers or range should always be investigated since it can often indicate an important new situation. When it occurs in a species which is known to have had a stable population hitherto, the change is more likely to be due to a man-made cause than a "natural" one. However, in every instance further studies are needed to establish the cause of the population change. As yet, there are no national or international schemes involving extensive surveillance of biological indicators, although several have been proposed. Nonetheless animals already have been very useful in alerting us to important new problems.

### Recent examples of the use of animals as biological indicators

In 1961 Dr. D.A. Ratcliffe of the British Nature Conservancy organised a study of the Peregrine (*Falco peregrinus*) on behalf of the British Trust of Ornithology in order to determine whether this species was harming racing pigeons as had been alleged. The observations made by Dr. Ratcliffe and his helpers showed that the species had disappeared from many of its traditional breeding sites in England and Wales. This species was known to be one with a very stable population and to be catholic in its feeding requirements. The decline was most marked in or near agricultural districts, and when it was found that Peregrines contained dieldrin and DDT, the hypothesis that the Peregrine had declined as the result of insecticide poisoning seemed reasonable. Much research has been done since to test that hypothesis, and it has shown that the Peregrine and some other predators have been affected by organochlorine insecticides. Thus, a study of the Peregrine undertaken for quite a different reason indicated to us the problem of the contamination of the environment by persistent insecticides and the dangers of extensive secondary poisoning.

Some years later abnormal numbers of dead Guillemots (*Uria aalge*) a fish-feeding seabird, were washed up on the shores of the Irish Sea. Chemical analysis of these birds showed us that they contained unusually large amounts of Polychlorinated Biphenyls (PCBs) in their livers, thus indicating a widespread contamination of coastal waters by industrial contamination. Work on the toxicological and ecological significance of PCBs in marine organisms is still in progress; the extent to which PCBs has caused the deaths of Guillemots in the Irish Sea is still not certain. Nevertheless, this work promoted a new concern for the marine environment and caused a reappraisal of the use of the sea as receptacle for industrial waste.

In both cases enough was known about the species concerned to affirm that something unusual had occurred. In both cases we were alerted to new problems which are so extensive, that if they are not solved, they are likely to cause serious damage to our living resources, including fish of economic importance.

When the effects of a pollutant on an organism are well known, that organism may be used to monitor the effectiveness of measures to control



An increasingly rare sight in the European skies is the White Tailed Eagle, *Haliaeetus albicilla*, which, like all the other birds of prey, is at the end of a food chain



the pollutant. Predatory birds are already being studied to monitor the effectiveness of restrictions on the use of certain organochlorine insecticides; both changes in the levels of pesticide residues and of populations are measured. Lichens are well known to be very sensitive to sulphur dioxide pollution and, as Dr. Cabot and Mr. Goodwillie show in the accompanying article, they are being used to describe and monitor SO<sub>2</sub> pollution round towns and factories.

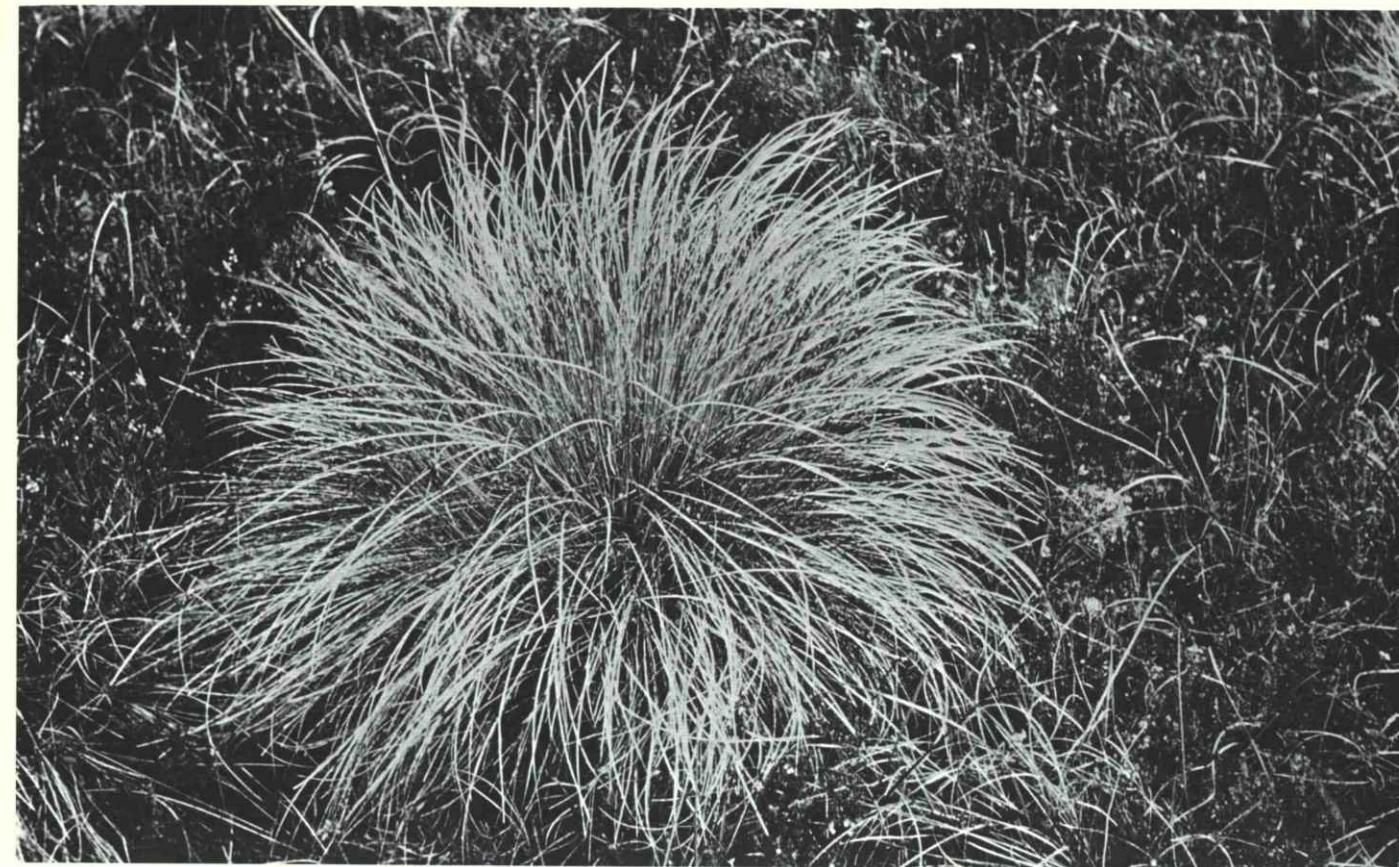
### The Future

Wild plants and animals have already proved valuable as indicators of new pollution problems, even though there have been no systematic attempts to use wildlife as indicators. It is unlikely that one can predict in advance the value of a particular species as an indicator, therefore we should not restrict work to a few species. What is needed is a continuing surveillance of existing ecological information in such a way that population changes are noted, considered, and studied more deeply in order to see whether they indicate important unforeseen dangers arising from new technological developments. It is interesting to note that as science and technology increase the need for scientific natural history becomes greater; this is because species can only be used effectively as indicators if much is known about their ecological requirements.



*Birds of prey have captured man's interest since the earliest of times. In the twentieth century an almost world-wide decline of nearly all species has been recorded, generally believed to have resulted from increasing environmental changes often adverse to their normal conditions of survival. The most important changes are: loss of habitat, the accumulation of toxic substances in their prey and increased pursuit by ignorant hunters.*

*Fortunately a better understanding of the fundamentals of nature and its rules is gradually restoring these birds to their rightful place in the ecosystem. Increased knowledge of pesticides is likewise helping them regain lost ground. Hunters and game-keepers are also changing their methods of 'solving' the complex predator/prey relationship (systematic shooting of birds of prey) and are following the enlightened legislation in this respect. Falconry, still a highly controversial subject, is believed by some conservationists to be threatening wild populations through continuous depletion of young birds. It is a fact that the exploitation of birds of prey is still widespread in certain countries. The above photograph shows a Peregrine Falcon on the hand of a falconer.*



*The appearance or disappearance of certain plant species, such as deer sedge, can indicate various changes in the environment.*

# PLANTS AS INDICATORS OF ENVIRONMENTAL CHANGE

**ROGER GOODWILLIE**  
and Dr. **DAVID CABOT**,  
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and Construction Research, Dublin

Modern man causes change in any environment. By eating, he induces agricultural pressures towards drainage, fire pest control and fertilisation, and by keeping warm, he contributes a large volume of pollutants to the air. By living in towns, he concentrates organic wastes beyond the capacity of any natural degrading system, by manufacturing he produces a variety of toxic substances and in his recreation he exaggerates a factor (trampling) to which vegetation is only partially adapted.

Some plant species are susceptible to

these impacts and disappear, while others take advantage of the gaps and multiply. Community structure varies under any pressure and it is up to the ecologist to separate such changes from the purely natural fluctuations of size and numbers. Generally speaking, an adverse influence results in simplification of the community and this implies that some species increase in quantity, while a greater number disappear. Five major environmental impacts produce positive and negative responses by indicator species.

### Drainage

Lowering the water table of a river basin affects all the marshland in that area. Since many plants are adapted to very specific water level changes, such drainage has led to a decline of *Lathyrus palustris* (marsh pea), *Stellaria palustris* (marsh stitchwort) and *Epipactis palustris* (marsh helleborine). The large areas of Irish raised and blanket bogs are also affected by this process as well as being exploited for peat. *Scheuchzeria palustris* has become extinct in its only locality while



*Rhynchospora fusca* (brown beak-sedge) and *Carex limosa* (mud sedge) are somewhat reduced.

### Fire

Ireland has a dwarf shrub community that is partly produced by fire in the *Calluna* (heather) moorland. Recurrent fires prevent tree colonisation and aids the extension of *Pteridium* (bracken). On raised bogs burning increases the proportion of *Erica tetralix* (cross-leaved heath) while on parts of the south-western blanket peat, stands of *Trichophorum cespitosum* (deer sedge) are encouraged.

### Agriculture

Herbicide use and fertilisation are two of the modern treatments that have great influence on the flora of a region. The early herbicides caused a relative increase of grasses and such semi-resistant broad-leaved species as *Stellaria* (chickweed), *Polygonum aviculare* (knot grass) and *Chrysanthemum segetum* (corn marigold) and today the flora remains characteristic for each chemical used. Fertilising a permanent grassland encourages grasses at the expense of other herbs and in some of the species rich limestone grasslands of western Ireland such changes are taking place. The low growing alpine species such as *Gentiana verna* (spring gentian) and *Helianthemum canum* (rock rose) are the first to disappear whilst *Dactylis glomerata* (cocksfoot) is the first to increase.

### Pollution

Lower plants absorb their nutrients and water over the whole plant body, they are usually small and therefore with a relatively large surface area and they are limited to one zone of a habitat, either water, soil or air. Thus they are peculiarly suited to act as indicator species for pollution. Small algae are used to assess water pollution by toxic substances or nutrients. With enrichment (or a temperature increase caused by thermal pollution) blue-green algae gain a competitive advantage and multiply. This may lead to an algal bloom reducing light penetration and oxygen levels (at night). Many species of green algae and diatoms disappear under these conditions. Higher plants can respond positively to these new conditions in the same way and *Ceratophyllum demersum* (horn wort) is now spreading in Dublin canals and in the Killarney lakes. Oligotrophic species like *Myrio-*

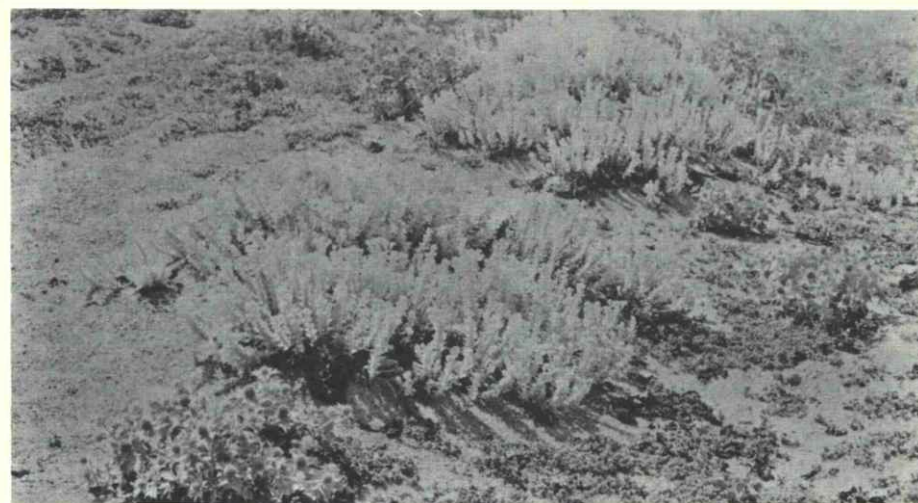
*phyllum alterniflorum* (water milfoil) and *Lobelia dortmanna* (water lobelia) are reduced by nutrient enrichment.

In marine conditions, green algae such as *Ulva* and *Enteromorpha* respond to enrichment of tidal mudflats or rocky shores and can produce anaerolism beneath dense stands. The algal fraction of lichens is particularly sensitive to air pollution and 'lichen deserts' in cities are widely reported. Sulphur dioxide is a main cause, for it disrupts the chloroplasts in the cells. Larger lichens are most sensitive and crustaceous types such as *Lecidea granulosa* and *Lecanora canizaeoides* are quite resistant. They can cover surfaces in pure stand, replacing a community of about ten species.

Fungi are also sensitive to air pollution, and *Rhytisma*, the tar-spot fungus of sycamore leaves seldom occurs in industrial regions.

### Recreation

Trampling pressure on alkaline grassland causes *Thymus drucei* (thyme) and *Asperula cynanchica* (squintwort) to disappear and encourages the rosette type of plant, e.g. *Bellis* (daisy) and *Plantago* (plantain). Grass species also increase and *Lolium* (rye grass) has been correlated to the slight nutrient enrichment which occurs. On sand dunes mosses are important as sand stabilisers, especially if rabbit grazing occurs, and they are among the first species to be killed by trampling. Erosion then is very likely to follow. A sensitive species of this habitat is *Othanthus maritimus* (cottonweed) which effectively indicates an absence of trampling.



Cottonweed.

### The future

Plant species respond to changes in any community. We should be aware of their value as indicators of impacts which we may not at first appreciate. Regular monitoring of selected indicator species on a European network could be encouraged by the Council of Europe. A biological records centre in each member country is an essential prerequisite of any monitoring scheme. The British Biological Records Centre at Monks Wood Experimental Station has already set a high standard of recording and could act as a foundation link in a European chain. The recently established biological records centre in the National Institute for Physical Planning and Construction Research is anxious to cooperate in any European network which may be recorded. The selection of a list of plant indicator species and methodology for recording quantitative change are now a priority.

# NORDEN AND ITS NATURAL ENVIRONMENT

Professor REINO KALLIOLA,  
Finland

The small North-European countries, Denmark, Finland, Iceland, Norway and Sweden, form a geographical and cultural entity, which they themselves call Norden (= the North). They would like this name to be adopted by other countries as well; the expression "the Scandinavian countries", which is often employed, is inexact, being particularly unsuitable with reference to Finland.

The unity of Norden is based on the proximity of the component States and the common features of their natural environment, which will be discussed in more detail presently. In addition, these countries are united by similarities in their social structure, their democratic attitudes, similar legal systems, their level of development, their religion and affinities in their national characters and ways of life.

A major unifying influence is also the Scandinavian languages, Swedish, Danish, Norwegian and Icelandic are all descended from the same North Germanic tongue, and Swedish is recognised as one of the two official languages in Finland. These many bonds have provided the foundation for vigorous Nordic collaboration in the cultural, social and economic fields. The practical significance of State boundaries is being gradually reduced, and citizens of the Norden States now need no passports for inter-Norden travel. The most important organ of co-operation is the Nordic Council, which was founded in the 1950's and acts as the official link between the Nordic parliaments and governments.

The combined area of the Nordic countries is considerable, about 1.3

million km<sup>2</sup>, which is slightly more than that of France, both Germanies and the United Kingdom together. But their inhabitants number only about 22 million, or one tenth of the total population of the above-mentioned countries. Thus Norden still has space and unsettled land on a scale unknown further south. Yet in view of the conditions of life in this part of the world, Norden can be regarded as densely, even too densely, populated. Evidence of this is provided by the disproportionately high emigration rate to America and other countries. Life at the northernmost limit of the inhabited world involves a struggle with unfavourable natural conditions. Economic and social activity is affected by the long hard winter, and the considerable length of the summer days and the dark winter nights. The soil



Long-tailed ducks skimming the icy waters of the Baltic.





*The existence of open spaces and even vast wild areas in a very industrialised civilisation, is an existence which becomes more necessary each day. It creates the possibility of a form of leisure whereby we can re-establish an authentic contact with that very nature from which we are descended and to which, whether we like it or not, we have ceased to belong. Furthermore, the presence of space and nature constitutes for everyone, without exception, the material certitude of being able to refresh oneself, or even simply a symbol, a reference.*

*'L'environnement sans frontières'  
Jean-Philippe Barde and Christian Garnier.  
Published by Seghers, 1971.  
Collection 'La Suède en question'.*

is unproductive and difficult to cultivate, especially further north. The beech and oak flourish only on the southern margin of Norden; elsewhere the dominant trees are the pine and spruce, and resistant, small-leaved, hardwood trees, such as the birch, aspen and willow. Woodlands are never far away. As one passes northwards, the climate becomes more rigorous, the forest grows less vigorously and the more southern plant and animal species vanish one after the other. The comparatively northern elements that appear are not sufficient to replace them, and the flora and fauna become perceptibly impoverished. Similarly, the cultivation of wheat is the first to be abandoned, then that of oats, and finally that of barley and potatoes. Treeless low-arctic tundra prevails along the coast of the Polar Sea, except in the sheltered upper ends of the fjords, and elsewhere in Lapland the fjelds rise above the limit of the coniferous forest. The arctic-alpine fjeld vegetation continues along the Scandinavian mountain range down to South Norway. Iceland is entirely treeless, and large parts of its land area are more or less bare.

As a consequence of these natural conditions, settlement, cultivation, industry and traffic is concentrated in the southern parts of Norden. Sweden, Norway and Finland each have a «southern trio» made up by their most important towns: Stockholm-Malmö-Gothenburg, Oslo-Bergen-Trondheim, Helsinki-Turku-Tampere. The drift to the southern population centres is very pronounced and the northern regions are becoming increasingly depopulated. This process would be even more marked if the remoter regions did not receive economic support from the State.

Finland, Norway and Sweden are closely connected by their geological structure and natural environment, forming the region known as Fennoscandia. The greater part of this region is distinguished sharply from the rest of Europe, consisting of a great block of Precambrian rock composed of granites and gneisses. In Finland forest, lakes and peatlands predominate; Norway has the greatest proportion of mountainous and coastal regions, while Sweden is more evenly endowed with all these topographic features. Denmark, which does not belong to Fennoscandia, is more similar to Central Europe, with its intensive cultivation and dense population. Iceland, far in the west, that misty, legendary, volcanic island, has large areas that are desert, or semi-desert, and possesses a character all of its own.

The natural resources have been rather unevenly divided between the Norden States, so that the main basis of the economic life changes from one country to the other. Denmark has arable land, market gardens and orchards; it is Norden's model farm. Finland has forests and forest industries; Iceland has cod fisheries and sheep farming; Norway has hydro-electric power, fisheries and shipping; Sweden has metal mines and forests.

## Nature Conservation

In the Nordic countries, nature conservation in the modern meaning of the word began at the beginning of the 20th century. Voluntary bodies undertook the work of rousing and educating the public and at the same time a legal framework was created and conservation authorities appointed. Sweden's National Park Law was enacted in 1909; Norway's first Nature Conservation Law dates from 1910, that of Denmark from 1917, and that of Finland (which first became independent in 1917) from 1923. At first, nature conservation was primarily concerned with tracts of virgin country. Nature reserves were created, in which the flora and fauna are kept as untouched as possible, or in which land use is limited in accordance with the purpose of the reserve. These reserves are partly used for scientific presearch, and partly intended as national parks, or similar recreational areas, in which the public can admire the natural beauties of the countryside.

Natural objects of particular scientific or scenic importance were protected as natural monuments, e.g. certain trees, boulders, caves and springs. Protection was also given to various species of wild animals and plants threatened with extinction as a result of hunting or over-zealous collection.

The development of this science-inspired type of nature conservation was accompanied by the growth of the concept of landscape management, i.e. the preservation and creation of aesthetically pleasing man-influenced landscapes, in connection with settlement, road-building, gravel quarrying, timber felling, hydro-electric schemes and other activities that can change the face of the countryside. It was realised that conservation must be supplemented by positive measures and new regulations for the care of the countryside. One example of the protection of the landscape is the prevention of unsightly open-air advertising.

The science-orientated nature conservation in extremely important and is growing in significance, as the tracts of untouched countryside are continually reduced by man's activities. The increasingly effective use of mechanical power in the exploitation of natural resources is now accelerating this process.

In 1970 the numbers and land areas of the nature reserves possessed by Norden were as follows:

	Number	area (km <sup>2</sup> )	% of the land area of the country
Denmark	147	1100	2.6
Finland	48	2338	0.7
Iceland	4	546	0.5
Norway	13	2081	0.7
Sweden	95	7223	1.7
Total	307	13 288	1.1

One per cent of the total land area of a country cannot be considered sufficient to preserve representative samples of all the different types of countryside. Far more nature reserves are still required.

Owing to the denser population of the country, nature conservation in Denmark has always had a slightly different character from that of the other Nordic States. In the first paragraph of the Nature Conservation Law (1917) as much importance was attached to the access of the public to untouched countryside as to the protection of natural monuments. In this connection particular attention was paid to preserving the coast from over-development and keeping it as a natural recreational area open to the general public.

In the other Norden countries this social aspect of nature conservation did not come to the fore until after the Second World War. Nowadays the various forms of open-air recreation, such as hiking, camping and holiday settlements, must be accorded an important position in all regional plans and regulations for the use of the countryside.

In the last few decades pollution has become a problem in the Nordic countries too. In many districts the pollution of inland waters by the wastes of industries and population centres has assumed alarming proportions. This is particularly true of Finland, where many cellulose factories are situated beside the water-courses and where lakes, though numerous, are generally shallow—'Finland has many waters, but little wa-



ter". Other factors that make the Finnish lakes particularly susceptible to pollution are their slow water renewal and a high humus content resulting from the proximity of extensive peatlands. Throughout Norden, the long, cold winter also contributes to the pollution of the inland waters, since self-purification is arrested during the period when they are covered with ice. It should also be remembered that in the marginal regions of the north, the flora and fauna are particularly vulnerable to deleterious influences, since their capacities for growth, production and regeneration are weaker than further south.

Air pollution and harmful noise levels are also locally troublesome in the Nordic countries, and damage has been caused by the increase in the use of biocides and other chemicals. The vigorous growth of tourism has also created problems. The "virgin" country and peace of the north are being sold — as they say in advertising language — to the more densely populated countries of Central Europe. But if the flood of tourists cannot be carefully directed from the point of view of nature conservation, this sale is in danger of becoming a clearance sale.

### Management of the environment

The programme of nature conservation has thus extended continuously. From its original preoccupation with the cultural values of the environment, it has expanded to embrace questions of social and economic importance. The traditional aspect of nature conservation is now only part of a wide complex of activities, which, in fact, deserves a new name, such as the management of the environment. This development is the result of the present, universally manifest, anthropocentric attitudes, and of the scientific ecological concept of the complex unity of the world and its natural ecosystems.

The change from nature conservation to the management of the environment has necessitated alterations in the legislature of the Nordic countries. Amendments of the general nature conservation laws have been accompanied by the enactment of laws relating to water and air protection and the prevention of the deleterious effects of undue noise and biocides. The activities of the various industries are now subject to the permission of the environmental management authorities and to their conditions regarding the treatment of waste water



*The awe-inspiring splendour of rapids in Sarek, Sweden, one of the European national parks awarded the European Diploma for Nature Conservation by the Council of Europe.*

and other pollutants. At the same time, administration has been centralised and made more effective. This has been achieved in slightly different ways in the different Norden States. In Sweden the administrative body is a central bureau, Statens Naturvårdsverk, under the Ministry of Agriculture. In Denmark the traditional body, Naturfredning, continues to function under the Ministry of Culture, but a new body, Ministeriet for Forureningsbekæmpelse, has been created to deal with the problems of pollution. In Finland an attempt has been made to centralise the care of the environment under the Ministry of the Interior, which is also responsible for regional planning. Centralisation has been carried farthest in Norway, where the new Miljøverndepartementet came into operation this year.

### Nordic co-operation

In the last few years Nordic co-operation has been extended to the management of the environment. On the initiative of the Nordic Council, the Nordic Contact Organisation for Environmental Management (nordisk kontaktorgan for miljøvårdsfrågor) was founded in 1970. Its sphere of activity comprises all matters relating to nature conservation and the management of the environment, but it is primarily concerned with questions of water, soil and air pollution and undue noise. The organisation has recommended the Nordic governments to make every effort to co-ordinate and increase the stringency of the regulations regarding the disposal of solid refuse and the control of pollution by vehicle exhaust fumes. The ministries



*The wolverine, Gulo gulo, is a typical example of Nordic fauna and is indispensable to the delicate balance of Nature in the North.*

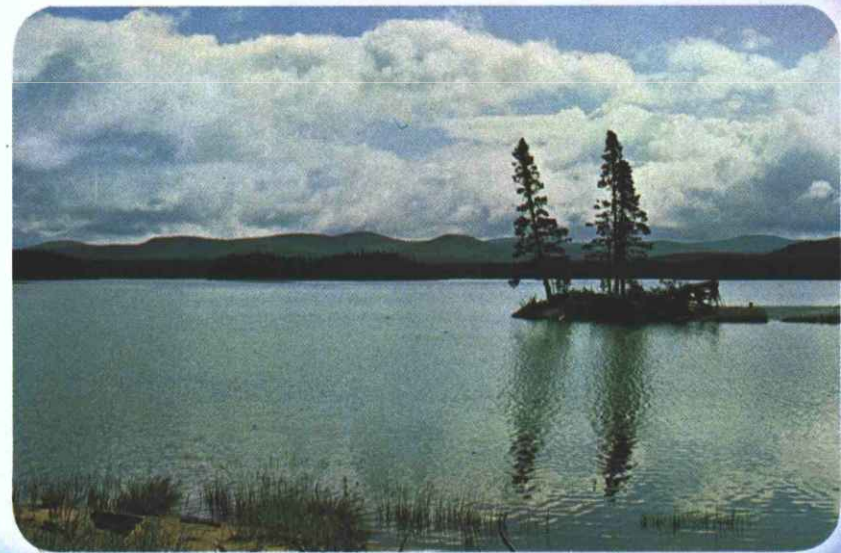
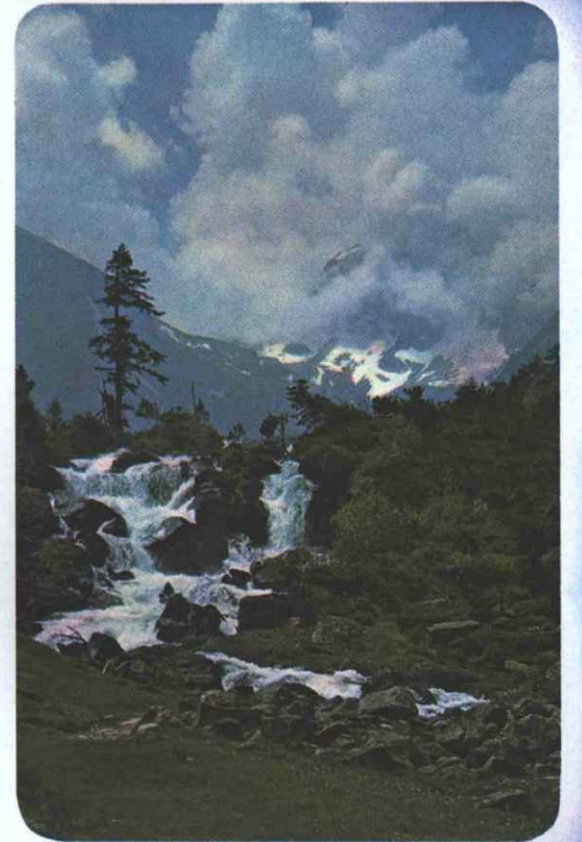
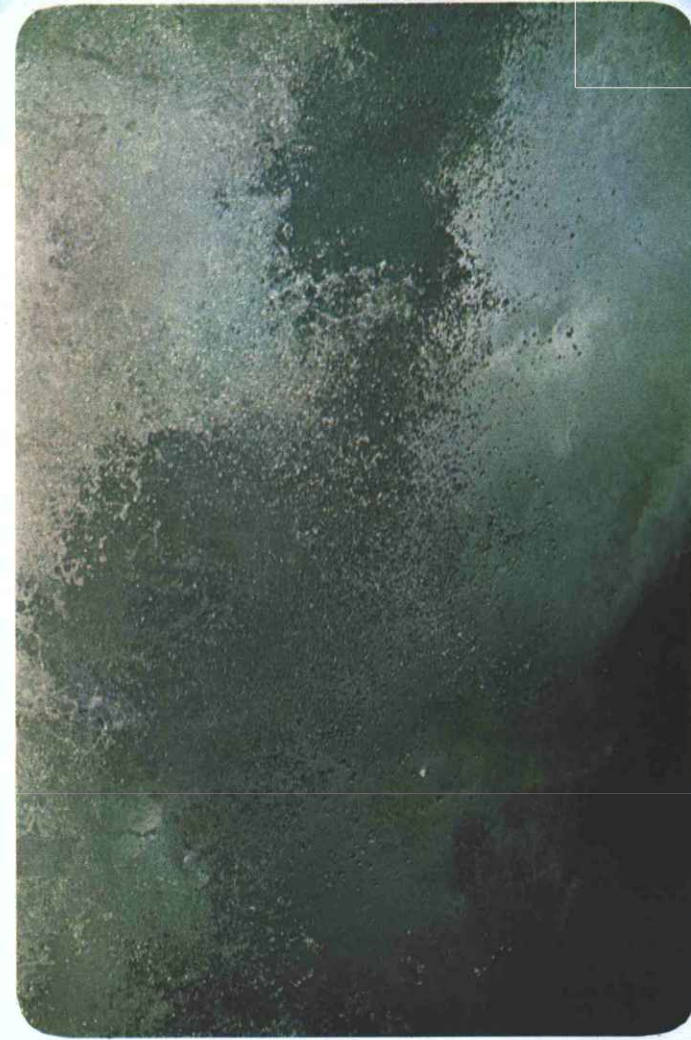
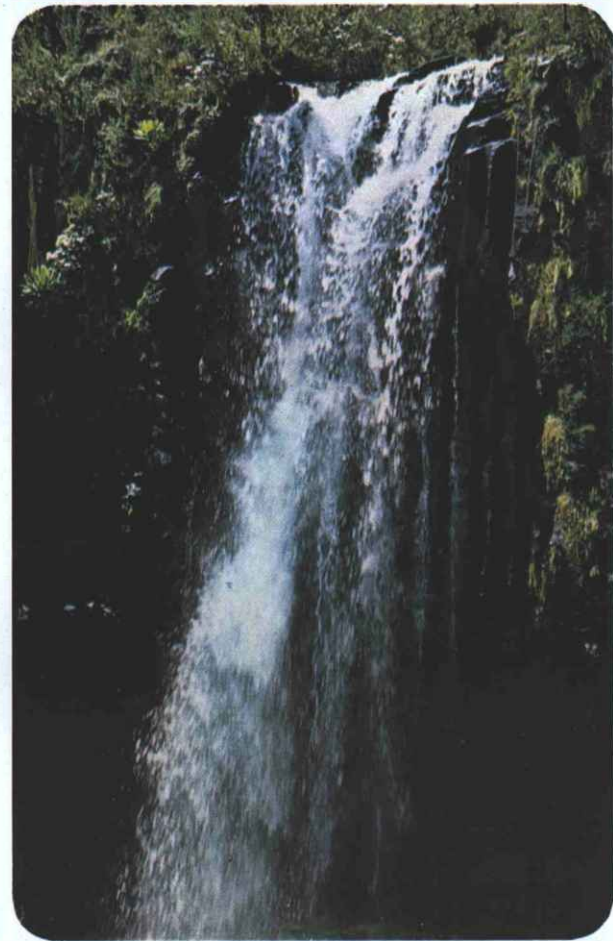
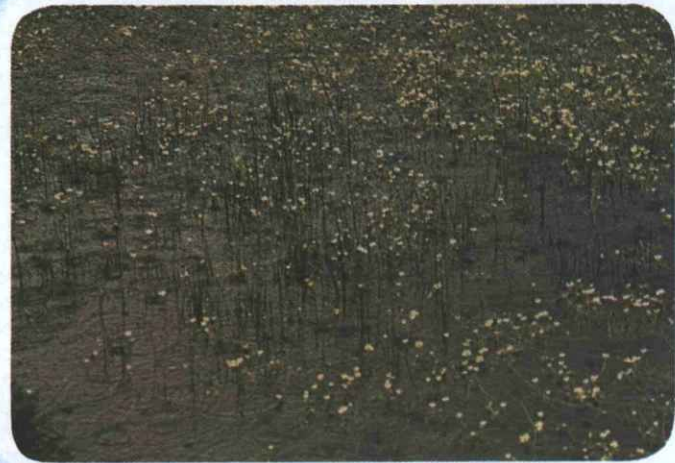
of transport of the Nordic countries have agreed to the suggestion of the contact organisation that supersonic speeds should be forbidden for civil air traffic over Nordic territory. Measures are being taken to achieve agreement between the Norden countries regarding the establishment of norms of purity for air and water used for various purposes. Other questions under consideration are the degree of pollution of the Baltic and the Danish sounds, the prevention of undue noise, the sulphur dioxide emitted with exhaust gases, and the promotion of research and education in respect of the protection of the environment.

The agenda also comprises the co-ordination of policies for nature protection and the provision of facilities for open-air recreation. Several unofficial conferences held by the various authorities of the Nordic countries since 1966 have facilitated the treatment of these traditional aspects of nature conservation.

The threat of the pollution of the Baltic may be considered to deserve immediate and serious attention. An expansion has recently been noted in the areas of oxygen depletion existing in the deeper basins of this shallow land-locked sea. This phenomenon is at least partly ascribable to the increase in the load of waste waters discharged into the sea. The narrow navigation channels and treacherous submerged rocks greatly increase the risk of oil damage in the northern parts of the Baltic. Extensive investigations have been begun to elucidate the condition of the Baltic. However, this problem does not belong only to Norden; it is the responsibility of all the States adjoining the Baltic, the USSR, Poland and both Germanies.

Co-operation in the field of nature protection and environmental management cannot be restricted to the countries around the Baltic, or even to the whole of Europe, whose tasks were outlined in 1970, proclaimed European Conservation year by the Council of Europe. The problems of pollution are global, and concern the whole world. The Nordic countries are endeavouring, with all the means at their disposal, to participate in the struggle against the dangers now threatening the living world and the existence of the human race. They have also made attempts to encourage international co-operation towards this end, of which the most important was the United Nations Conference on the Human Environment held in Stockholm in June 1972.







# NATURE CONSERVATION IN CYPRUS

Dr ODYSSEUS IOANNIDES,  
Minister of Agriculture and Natural  
Resources

Cyprus is the most easterly of the Mediterranean islands and the third largest in area after Sicily and Sardinia. It has an area of 3,572 square miles and its coastal perimeter measures 486 miles.

Historical records and plant and animal fossils in geological deposits provide evidence that Cyprus in ancient times was covered by a denser and more extensive vegetation than today. However, human influence on Cyprus environment started at an early age and has altered the Cyprus landscape considerably. Large extents of forest land were cleared of its vegetative

cover, to be cultivated. Also in the past considerable areas of forests were burned each year either as a result of the carelessness on the part of man, or in order to produce fuel, or to have timber for the construction of houses or building of ships. Furthermore, the ecological succession of the natural vegetation was interfered with because of intensive grazing. As a result of this interference through the centuries, the land use was developed in accordance with the economic and population pressures existing from time to time and is now as follows:

- 46.8 % Agricultural land
- 18.7 % Forest land
- 16.7 % Bare, uncultivated land
- 9.3 % Hali or Government land  
(marginal state land and communal lands)
- 8.5 % Built up areas

The Cyprus Government has taken measures for the conservation of the soil and water resources of the country and their rational utilization for increased food production. Through legislation, subsidies and extensive campaigns, the agricultural services of the country are promoting sound land use practices and effecting rural reforms. As for forestry the basic philosophy of Government's forest policy is that the forests of the country should be managed within the principle of "sustained yield". Through legislation, strict protection measures and better management practices, efforts are made to protect and manage game and wildlife in the forests. Other measures aim for the rational management of both inland and marine fisheries, proper use of water resources and generally for rational resource utilization.

During the recent years environmental concern has become a public issue on a global scale, especially in highly industrialised societies and developed countries. It has long been recognized that industry and development have a strong relationship with problems of the environment.

Cyprus faces such a problem, but for the time being to a lesser extent. Due to the rapid industrial and touristic development of Cyprus during the recent years the need of a Town and Country Plan became necessary in order to indicate the Government's intentions relating to the use of immovable property, distribution of population, industry and commerce, the pattern of transportation and public services, the definition of areas of special, historic, architectural or cultural interest or natural beauty or other matters of local interest. For the touristic development of the Island the Government also takes into account the proposals of foreign expert advisers. But, as it is natural in such cases, "minor misuses" have already occurred in developing the natural resources for touristic purposes especially in some coastal areas, whereby beautiful sites have been used for the construction of hotels, restaurants, bungalows or flats. Such a practice whittles away the distinctive features of the most beautiful parts of the natural Cyprus. Instead, the sites could be preserved in their natural form and

the buildings erected at some distance but with reasonable access to the area and so not to affect it visually. To this end and in order to make the best use of the potential of the various regions without spoiling its natural character and beauty, zoning areas have been declared and development and building is allowed only under certain conditions in those areas, as regards site coverage, number of storeys, purpose of development etc. With these measures, structures are no longer haphazardly erected on clifftops and on sandy beaches often out of place with the environment.

As it is known, development in industry affects the natural environment in a number of ways, as for example in the case of manufacturing industrial establishments located along main roads or on mountain slopes, mining and quarrying industry and petrol and gas installations. With a view to alleviate these adverse effects, industrial zones and estates have been established by Government in the vicinity of the main towns in order to concentrate industrial establishments in certain areas.

The fact that this problem is not so acute at present in Cyprus, does not leave us indifferent but it stimulates our concern for taking measures in time against the oncoming danger. If we succeed in our efforts, then we and the coming generations will live in a pleasant and harmonious environment. If, however, we fail, then it would be a real catastrophe for Cyprus for we may not have the means which other countries have to combat this evil if it expands and becomes out of proportion.

For this reason Cyprus has taken an active part and participates on both a national and international level against the danger of environmental destruction by having established the following Bodies for Nature Conservation and by carrying out various nature conservation activities.

## Bodies established for Nature Conservation

- Cyprus Council for Nature Conservation consisting of both official members and representatives of private organisations under the Chairmanship of the Minister of Agriculture and Natural Resources. This Council was set up to consider and decide on important Nature Conservation matters and define the policy to be followed.



Aerial view of Kyrenia, where substantial efforts are being made to prevent coastal pollution.

- Executive Committee of the above Council for achieving rapid action in carrying out the work of the Council.
- Such technical Committees of the Executive Committee as required dealing with special problems. For the time being Sub Committees have been established for air pollution, water pollution, legislation, nature reserves, and for selection and preservation of old typical houses and villages of local architecture.

The most important activities carried out so far in Cyprus in relation to Nature Conservation included publicity using all mass media, representation at various international Conferences, the most important ones being the European Conservation Conference held in Strasbourg in 1970 and the

U.N. Conference on Human Environment held in Stockholm in 1972, close contact with International Organisations dealing with nature conservation and especially with the Council of Europe, anti-litter campaigns, selection and declaration of nature reserves and National Forest Parks. At present environmental conservation falls between too many activities of the Cyprus Government machinery, and legal provisions for conservation are scattered in a number of Laws and hence responsibilities are dissipated between a number of authorities. It is felt that this gap will be remedied, and that it will not be long before a Nature Conservation Authority or Service will be set up as a statutory body, with powers to coordinate and promote environmental conservation.



Ancient monuments are carefully preserved, such as the Salamis Gymnasium. The Salamis Kingdom, one of the strongest in Cyprus, was established in 1184 B.C. after the Trojan War.



# ...NEWS...NEWS...NEWS...NEWS...NEWS... FROM STRASBOURG

## CONSULTATIVE ASSEMBLY AND THE ENVIRONMENT

Several recommendations concerning environmental problems were among those adopted at the second part of the 24th session of the Consultative Assembly of the Council of Europe, held from 17 to 24 October 1972 in Strasbourg. The first of these concerned birth control and family planning (Recommendation 675 [1972]). Despite the population explosion of the world as a whole, the population of the developed countries does not appear to be such as to require coercive policies. Furthermore, the profound socio-cultural changes that have taken place in West European society over the last fifty years have led to couples claiming the right to decide upon the number and spacing of their children, a right considered fundamental by the Second European Population Conference ('71). In view of this and the still frequent use of induced abortion as a means of family planning in the member States (this method is the most common form of birth control in the world as a whole), the Assembly asked the Committee of Ministers to invite member Governments:

- To authorise, under certain conditions, the sale of contraceptives (by which method the number of abortions might be limited and couples would be allowed more facility to exercise their family planning right);
- to create family planning bureaux in both rural and urban areas;
- to promote and provide suitable sex education;
- to include teaching on family planning in medical, para-medical and social welfare schools;
- to adopt certain social measures in order to improve the welfare of families with children.

The Assembly rejected a draft resolution calling for the liberalising in certain cases of national abortion laws.

Commenting on the conclusions of the Third Parliamentary and Scientific

Conference (Lausanne, 11-14 April 1972 — see *Nature in Focus* No. 12 page 23) Recommendation 678 (1972) proposes among other things that the Committee of Ministers invite governments of member States to ensure that the creation of new industrial products or processes be compatible with the need to protect the social and physical environment.

One of the proposals of Recommendation 683 (1972), on action to be taken on the conclusions of the Parliamentary Conference on Human Rights (Vienna, 18-20 October 1971) requests the Committee of Ministers to consider, in the light of the conclusions reached at the United Nations conference at Stockholm and the Council of Europe Conference in Vienna on the environment, whether the right to an adequate environment should be raised to the level of a human right, and devise an appropriate legal instrument to protect this new right.

Finally, concern about recent accidents at sea in which ships carrying highly dangerous cargoes were involved, and the resulting damage to the environment due to the presence of dangerous materials in the sea, led to the adoption of Recommendation 687 (1972). Here it is recommended that the Committee of Ministers invite governments of member States:

- to implement, as soon as possible, the Resolution on reports on incidents involving dangerous goods, adopted by the IMCO (Intergovernmental Marine Consultative Organisation) Marine Safety Committee, and to deal with this problem at the International Conference on Marine Pollution to be convened in 1973.

In his report to the Assembly on the carriage of dangerous goods at sea (Doc. 3191) upon which this Recommendation is based, Mr. Grieve referred in particular to the now well-known sinking of the small Spanish motor vessel, the "Germania" in the English Channel. A month later, drums containing highly dangerous substances were washed up on the Cornish coast.

At the time of the accident, however, both the British and French authorities were not informed of the nature of the ship's cargo, so it was some time before the drums were identified as having belonged to the "Germania". Subsequently it appeared highly difficult to determine the contents of each of the drums as they do not contain adequate identification marks. The report therefore proposed that full information should be available to the authorities concerned as soon as accidents on the high seas, concerning dangerous cargoes, take place and that casks, canisters, drums etc. containing dangerous materials, when transmitted by ship, contain clearly embossed, waterproof identification of the contents, and the name of the firm of origin.



# ...NEWS...NEWS...NEWS...NEWS...NEWS... FROM STRASBOURG

## FLORA, FAUNA AND LANDSCAPES

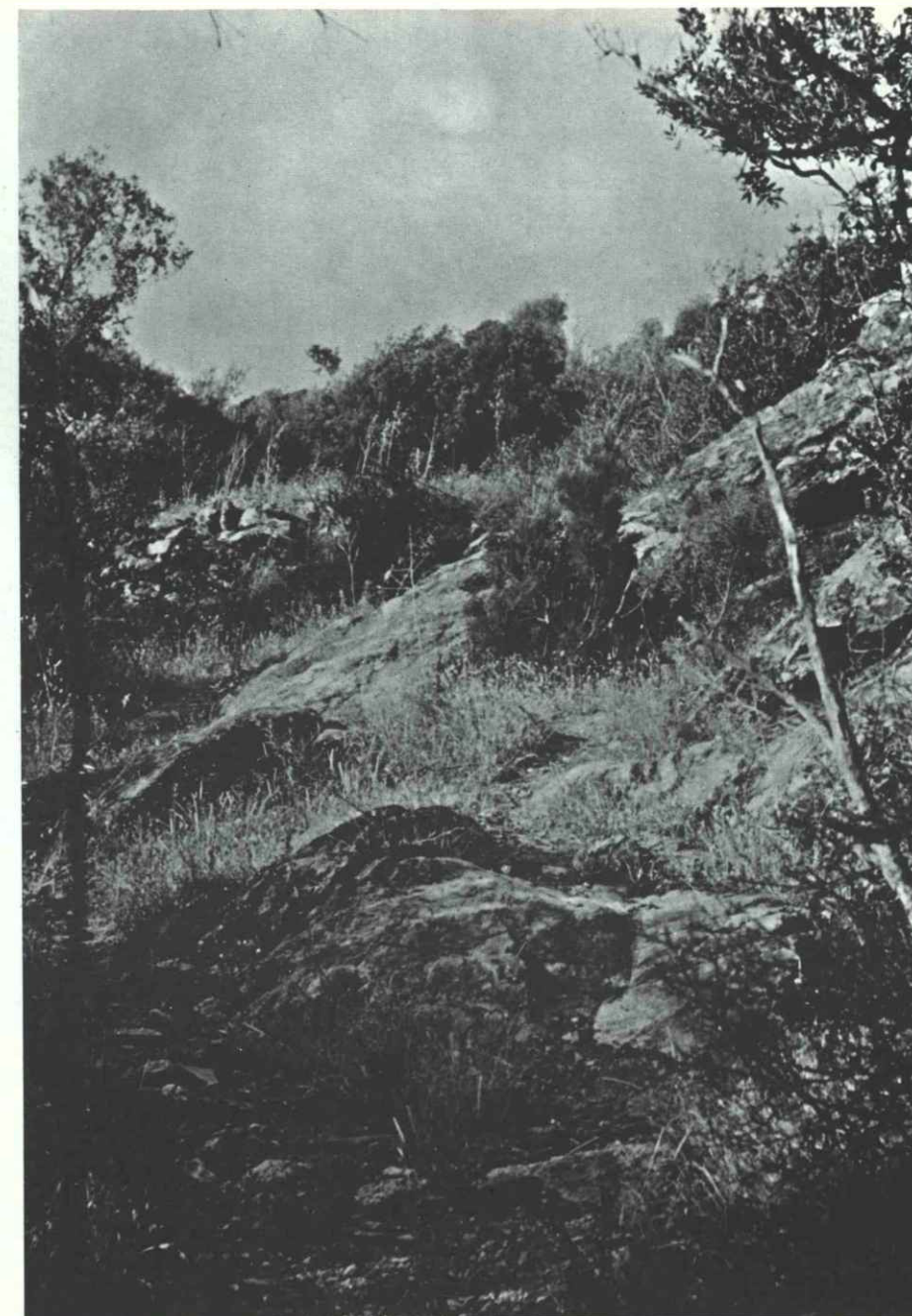
The Working Party on Flora, Fauna and Landscape, set up by the European Committee for Nature Conservation and Natural Resources met in November at Strasbourg. Among the subjects under discussion was, places particularly threatened or important for nature conservation in Europe (CE/Nat [72] 46, point 5.4) whereupon it was decided to undertake a study on the Mediterranean maquis, to be started beginning of 1973 by Professor Tomaselli of the University of Pavia. Two other studies on heath and grasslands on chalk and limestone will be begun in 1974.

The Working Party was unanimous in recognising the importance of conserving and protecting plant and animal species, a study of which will certainly be one of its principal tasks. These studies correspond perfectly to the activities to be envisaged by the Council of Europe. These concern first of all a harmonisation of knowledge of all the member States on rare and threatened species (plants, insects, vertebrates, invertebrates) followed by a recommendation on protective measures.

A study on rare plant species in the process of disappearing, undertaken by S. Max Walters of Cambridge and F. Perring of the Nature Conservancy for "Flora Europea" has almost reached completion.

The Working Party hopes to examine the possibility of collaboration between the Council of Europe and Flora Europea, such as the joint publication of the study.

The need for precise information on the rare plant and animal situation is making itself felt more and more. It would therefore be appropriate to record such data according to a practical system which could be used in all European countries. Such a system already exists on a computerised basis in the United Kingdom at Monk's Wood Experimental Station, under the direction of Mr. Perring and Mr. Heath. It would be worthwhile enlarging this



A typical example of the brush-covered heath which makes up the Mediterranean 'maquis'.



# ...NEWS...NEWS...NEWS...NEWS...NEWS... **FROM STRASBOURG**

system and applying it to a European level.

The Working Party also reviewed a study carried out by the Secretariat on the terminology adopted in various European countries with regard to protected areas. It had previously been agreed to classify the areas concerned according to degree of protection (CE/Nat [71] 57) and the study concerns the definition of four categories of protected areas on that basis, and draws up a comparative table of such areas. The experts concluded that the two main points emerging from the study were:

- that it is extremely difficult to define the categories specified on a legislative basis;
- the relevant vocabulary varies widely between one country and another although in fact the conceptions conform more or less to several fundamental types.

The Working Party approved the four categories — the first two being strictly protected areas and the other two being less strictly protected (see Doc. CE/Nat [72] 54) proposed by the Secretariat whose definitions are based on the following factors:

- a) scientific, cultural, aesthetic or recreational values;
- b) traditional human activities;
- c) more recent human activities;
- d) recreational amenities;
- e) public access.

The comparative table is to be further reviewed at the next meeting after addition of the necessary corrections by all the national delegations based on the four categories.

## ECOLOGY APPLIED TO LAND USE

Many of the individuals concerned indirectly or even directly with the planning, development and management of the natural environment are not sufficiently acquainted with the ecological problems in this context. For this reason, an international course on ecology applied to land use will take place from 7 to 13 May, 1973, at Monk's Wood Experimental Station, U.K. organised by the Nature Conservancy under the auspices of the Council of Europe's European Committee for the Conservation of Nature and Natural Resources. The course will take as its main themes:

- countryside planning,
- management and conservation techniques,
- ecological research in relation to water management and its importance for landscape planning,
- rehabilitation and reclamation, especially of biologically ruined areas.

The speakers will be invited according to a certain geographic distribution in order to allow a maximum exchange of ideas on the problems of those member States relative to the subjects discussed. The participants will include not only foresters, agronomists biologists etc. but also those whose responsibilities towards the natural environment are less obvious and direct, and for whom the discussions with the various experts present will be of the most importance. It is hoped that this course will be the first of a regular series in this field: a proposal by Italy at the 11th session of the European Committee, to organise a subsequent course on the Isle of Monte Cristo, is already a positive step in this direction.

## EUROPEAN DIPLOMAS FOR NATURE CONSERVATION RENEWED

The Committee of Ministers, meeting at Deputy level last October, authorised the renewal for 5 years of the diplomas awarded to the National Parks of Sarek and Padjelanta (Sweden), the Abruzzi (Italy); to the Lüneburg Heath (Federal Republic); to the Muddus National Park (Sweden), the Swiss National Park and to the Krimml Waterfalls (Austria).



# ...NEWS...NEWS...NEWS...NEWS...NEWS... **FROM STRASBOURG**



The Council of Europe will shortly publish a study on European birds needing special protection, drawn up by the International Council for Bird Preservation (ICBP). The Gréat White Egret, *Egretta alba*, shown here is one of the 10 species considered as 'endangered' in the study; 23 others are said to be 'rare' and 61 'local' (generally a species whose occurrence in Europe is at the very edge of its natural range). European ornithologists meeting at Strasbourg last December urgently recommended that governments and the general public be informed of the dangers threatening flora and fauna, particularly birds.



# MISCELLANEOUS NOTES

## THE VAUD JURA PARK

D. AUBERT,  
Vaud Nature Conservation League

The Jura owes its reputation for dullness to the hasty traveller and the casual visitor, but if you take the trouble to ramble through it, preferably on foot, and with your eyes well open, you will find the landscape both various and pleasing. Nature's charms are not on the surface in the Jura. They lie hidden in secluded dells and silent woods. Here at last you can discover them in their full splendour. You have to thread its vast forests of pine and spruce, ramble over its rich pastures and trudge over its stony tracks and lapiés\*.

Conservation has not been neglected here and, in the part of the Jura in the Canton of Vaud alone a score of nature reserves have been established, including a recent and rather different scheme.

The Jura Park is a strip about two miles wide and ten miles long. It includes a secondary ridge, the Mont-Tendre range, between the Marchairuz road and the Grivrine Pass, south of the Joux Valley. Isolated as it is and close to the French frontier, it has remained practically unspoiled, and you can walk for hours through its woods and vales without meeting a soul. The Great Grouse still lurks in its most remote pine groves, and its grasslands are richly carpeted with an



abundance of alpine flora; even the rare *Daphne (D. cneorum)* is still abundant in the dells round Amburnex.

Quite apart from its intrinsic value, the Jura Park is of general interest because of its novel statute. The State had nothing to do with its creation and all that the Vaud Nature Conservation League had to do was merely to promote it and act more or less as a letter box. It was actually the landowners themselves who created it by an agreement binding on themselves and the League; it was not registered in the Land Register.

Under the agreement there are no restrictions on forestry and pasturage

or on the buildings attached to them, such as chalets, paths, fences and the like. On the other hand, the owners pledged themselves to refrain from building anything else, such as holiday homes or tourist amenities. The protection may seem slight and yet it is enough to ensure that this region is conserved in its present state.

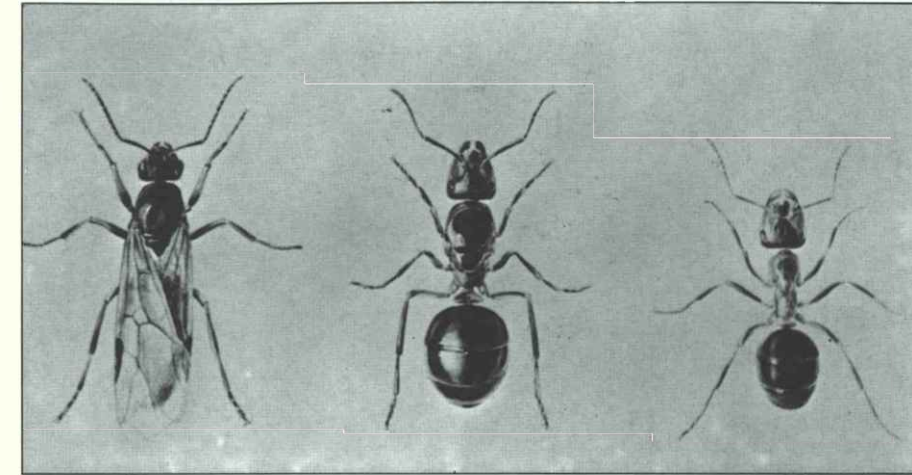
The advantage of this procedure is that it is both simple and inexpensive, and it gives the Jura Park a special value. Far from being imposed, it was an almost spontaneous collective achievement, freely approved by three landowners and thirteen communes (three in the Joux Valley, nine in the Jura foothills and the city of Lausanne). They own it and they are responsible for it.

As far as we know, this is the first time that landowners have entered into an association to conserve their land intact. This unselfish gesture reveals their attachment to their heritage as a natural asset, without any financial considerations. We should be grateful to them, and we hope that many others will follow suit.

\*Lapiés — a local word to describe grooves and ridges formed on a rock surface by solution of limestone.



## THE FOREST ANTS



Many years of study and research have shown that ants of the *Formica rufa* group perform a very useful function in protecting coniferous and sometimes deciduous forests against the destructive activities of many harmful insects which form the greater part of their diet. In the Italian Alps alone it has been estimated that in an active period of 200 days, these ants may destroy at least 14 million kilograms of insects, and at least 700 thousand tons per year throughout Europe as a whole\*. Many insect pests, particularly at the caterpillar stage, feed on tree foliage and can be a serious menace.

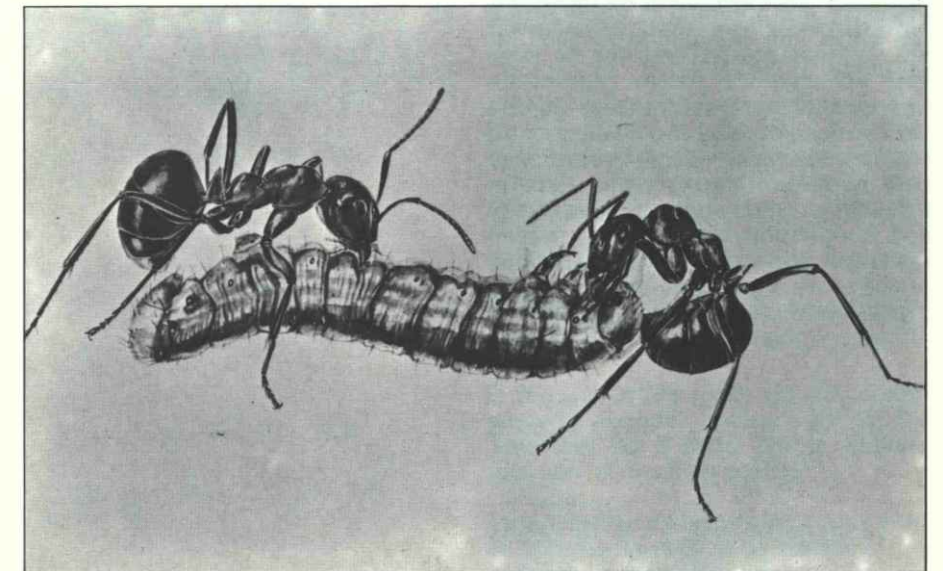
But in addition to protecting the trees themselves, these ants also have another role beneficial to man. When, at certain periods of the year, their normal food of insects is scarce they resort to feeding upon the honey dew excreted by aphids which they also protect from their enemies. The aphids feed upon the lymph of plants which suffer no real damage as a result. Bees also exploit the honey dew of the aphids for use in the production of honey, which is subsequently consumed by man.

For those reasons, wood ants are invariably protected from any damage and destruction and are specially transplanted to forests which lack them.

\* M. Pavan, 1971, Biological Balance.

From left to right, the male, female and worker of the ant *Formica polyctena*.

Wood ants attacking the caterpillar of a butterfly.



The "Working Party *Formica rufa*" of the International Committee for Biological Control of plant enemies (I.C.B.C.), which met at Würzburg in 1963, also noted that in many regions these ants were in danger of becoming extinct. In 1964 the Council of Europe subsequently agreed to a policy of encouraging its member countries to adopt a law proposed by the "Working Party" to protect wood ants against anything which might damage or destroy them, with the aim of helping to maintain a biological balance of value to forests and to human economy (EXP/Nat/WP 2/64 7).

Many countries have not yet adopted this legislation, although wood ants have been officially protected in the Federal Republic of Germany for well over 35 years, where they are recognised as an important natural element in the prevention of insect damage to their forests. Now it has recently come to notice that a case for the application of this law in the United Kingdom is being drawn up.

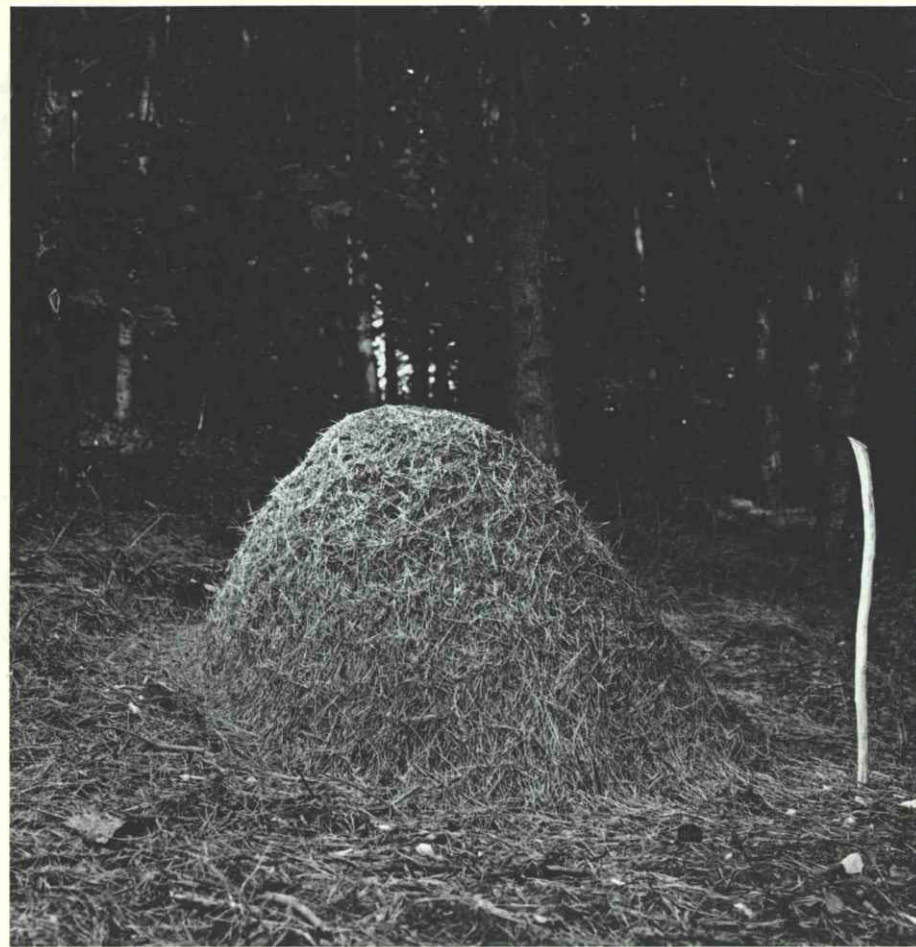
A research project has been started by Dr. John Sudd at Hull University, UK, where the feeding and hunting habits of these ants are being given particular attention. One part of the project, supported by the National Environment Research Council, concerns a survey of the distribution of wood ants, and parallels the work of Professor Pavan at the University of Pavia, Italy. The census taken by M. Pavan on the Italian Alps between 1949 and 1955, with the help of 1500 forest wardens, has shown evidence of the existence of 1 million nests and 300 billion worker ants. The possibility of increasing existing ant colonies by dividing and transplanting them to var-



ious forests, particularly threatened by insect pests is also being investigated, with the view to natural control of pests instead of spraying. Transfers of this kind are now a regular feature in Italy, where each year the Institute of Agrarian Entomology at the University of Pavia, in collaboration with the Ministry of Agriculture and forests, sends about ten lorries loaded with barrels full of these ants from the Italian Alps to the Appenines and the Iles, with a view to acclimatising these insects in forests where they are lacking. It is thereby hoped to set new "dispersal" centres in this free, permanent, non-polluting, natural and biological means of controlling pests. In 1971 some of these ants were likewise sent by plane from Pavia to Canada for the forests of Quebec where they have become well-established after two years of acclimatisation and have also reproduced. In Spring 1973 another important consignment of ants will be sent to Canada from Pavia.

Another important centre which performs intensive research on the natural relations between the ants of the *Formica rufa* group and the forests, is at the Institut für Angewandte Zoologie of the University of Würzburg, which also publishes a review "Waldhygiene" of which a large part is devoted to these problems. At this Centre experiments transplanting parts of ant heaps, each with its own queen, to establish new colonies, are in progress with the co-operation of Italy. Their most important studies, concerning the breeding of ants by the establishment of new ant nests and their protection during this process by specially devised nest covers, are currently being undertaken by Professor Gösswald and his colleagues. Intensive ant breeding is also carried out under the instruction of the Department of Forests.

The legal protection of ants in Europe varies considerably from country to country, for which specific plans have only been considered in the Federal Republic, USSR, and partially in Italy and now in the UK. However, active research and practical applications are also taking place in Spain, Rumania and Turkey.



The nest of *Formica lugubris* built by ants transplanted from the Italian Alps to the Appennines, 250 km south of their origin. The nest is 1 m high and 1.5 m in diameter.

## THE NATURE WARDENS IN AUSTRIA

Dr. C. Fossel

Even the best laws are of little use when they are either not understood or respected or when they are insufficiently enforced. The same can equally be applied to nature conservation. With this in mind, laws concerning the duties of nature wardens were made in all Länder of Austria where as early as 1927 Tirol set the example followed by Kärnten in 1935.

There is little difference as far as the tasks of the nature wardens are concerned within the various Länder, (except that in three Länder their title is "mountain warden"). Generally they all have the following main tasks:

- to explain to the general public the basic ecological principles and man's role, especially his responsibility within the environment;
- to protect the environment and survey tourist facilities such as shelter cabins, footpaths and picnic spots;
- to ensure that laws, rules and regulations are obeyed and to prevent their violation by timely appearances, warnings or legal steps against persons who have committed a punishable act.

In Austria there are now 7,200 nature wardens acting in a voluntary and honorary capacity; they have been sworn in as representatives of public control bodies by the nature conservation authorities.

The nature wardens are of all ages and come from all walks of life. Mostly they are members of Alpine associations or hunters, anglers and foresters; representation ranges from high ranking civil servants to young apprentices so that the ageing "Hofrat" may make his rounds with a young trainee. There is no concern for new recruits because youth is highly interested.

In nearly all Länder the nature wardens are organised as follows:

- at the local level, into emergency squads responsible for one or several communities;
- at the regional level, into regional groups responsible for an administrative area;
- at the supra-regional level, into one Federal Inspectorate responsible for the whole of one Länder.

The appropriate section of the Nature Conservation Authorities supervises each level.

The activities of the wardens vary according to season. In winter, when the weather prevents most outdoor

work, discussion evenings are organised at local and regional levels, to allow both the administration and the public to become acquainted with new legal and professional developments.

Throughout the rest of the year priority is given to field activities.

The nature wardens discuss with tourists, families out for walks, school-classes etc. the "do's" and "don't's" in the natural environment. They stress the need for protection as well as conservation and new beneficial developments, illustrating this by showing how recreation areas should be tidied up after use, how the banks of streams and lakes should be maintained in good condition, and how derelict areas can be reclaimed.

In view of the good experience with these voluntary assistants working in the interest of conservation and the protection of the environment, it is to be hoped that similar "conservation ambassadors" will follow the Austrian example in other countries.

## Lead poisoning in wildfowl

Each shot by a wildfowler leaves a scattering of lead pellets on the shores or in the shallows over which he stoots. Dabbling ducks, mistaking them for the grit essential to the digestive processes, ingest them and thereby poison themselves.

Although this deadly form of pollution may be of little importance elsewhere in Europe, it has reached alarming proportions in the famous Camargue in the Rhône delta. Here the grit required by hundreds of thousands of migrating and wintering waterfowl is not available in the Rhône sediment. This combined with a heavy hunting pressure has not surprisingly attracted the attention of the Biological Station of La Tour du Valat in the heart of the delta. Over the past fourteen years, ducks have been trapped X-rayed, ringed and released, with the emergence of some staggering results:

56% of the pintails (*Anas acuta*),  
22% of the pochards (*Aythya ferina*), and  
17.6% of the mallards (*Anas platyrhynchos*) are affected by this form of poisoning.

Of the ten duck species studied, only the wigeon (*Anas penelope*) seems unaffected\*.

The reason why these lead pellets are so dangerous is that they are highly toxic and virtually indestructible. Poisoning occurs when the pellets, after erosion by the mechanic action of the gizzard, and transformation into salt form by the digestive juices, pass into the bloodstream. Recent research by manufacturers of ammunition has however produced a steel substitute which is not only non-toxic but is also rapidly destroyed by oxidation.

Although no final answers have yet been found to problems such as the wear on gun barrels by steel shot, the advantages should outweigh the benefit of reducing this poisoning. The United States Department of the Interior are at present carrying out tests with the steel substitutes and if they are successful it is hoped to ban the use of lead shot completely by the 1974/5 season. Millions of birds die by this way of poisoning on the North American flyways each year, where wildfowl hunting is a major recreation activity.

In the Camargue plans are now under study to provide "natural" grit for the waterfowl as a short cut to prevent this sort of lead poisoning.

\*These figures are taken from 6 years study by Christian Hovette, to be submitted as a doctorate to Marseilles University.





## IUCN Revises Red Data Book on Mammals

Volume 1, *Mammalia*, of the Red Data Book, a scientific guide to threatened taxa published by the International Union for Conservation of Nature and Natural Resources, has been extensively revised and may be ordered now from IUCN in Morges, Switzerland.

The revision and reorganisation was made with the advice and guidance of the IUCN's Survival Service Commission. Data on each listing was carefully reviewed. New information was added. New sheets were also added for vulnerable species believed likely to move into the endangered category in the near future.

Information is presented in short reports under uniform headings. Fundamental background data are provided, where known, on which conservation or rehabilitation programmes can be based.

As a guide to the status of the taxa included, the data sheets are printed on coloured sheets as follows:

1. Red Sheets — Endangered (Taxa in danger of extinction);
2. Amber Sheets — Vulnerable (Taxa believed likely to move into the endangered category in the near future);
3. White Sheets — Rare (Taxa with small world populations which are at risk);
4. Green Sheets — Out of danger (Taxa formerly included in one of the above categories);
5. Grey Sheets — Inadequately known (Taxa which are suspected of belonging to one of the first three categories but for which insufficient information is available on which to base a decision).

The new volume contains 271 sheets, of which 131 are for species or subspecies considered to be in danger of extinction.

Price is US \$ 12. for the sheets alone and US \$ 16. for the sheets and standard looseleaf binder.

## Northern Ireland attacks water pollution

Northern Ireland, unlike other areas of the United Kingdom, does not have a severe or widespread problem of pollution in inland waterways and estuaries. However, there is no room for complacency about the future and the Ministry of Development has now taken steps to ensure that there will be no deterioration in the quality of the Province's water and, in addition, that any pollution problems which already exist will be eliminated. Thus from 1 January 1973 anyone discharging trade or sewage effluent or any polluting matter into inland waterways or tidal waters must obtain the consent of the Ministry.

*One of Ireland's calm and peaceful inland waters still unspoiled by pollution.*



The whole emphasis of the pollution control programme is on prevention through education rather than prosecution so the Ministry is offering an advisory service to anyone affected by the new controls.

But for the deliberate and persistent polluter prosecution may be inevitable. The Water Act of 1972, under which this procedure is being introduced, gives the Ministry of Development very wide powers and the courts may impose fines of up to £400. Every effort will be made to prevent any spoilation of the waterways by wilful or careless polluters.

# NATURE IN FOCUS LOOKS AT BOOKS

## THE PLANT ENVIRONMENT

Here is a remarkable work, conceived in the same spirit and according to the same system as "Avant que Nature Meure" (Before Nature Dies) by J. Dorst. Plant ecology is all too often the concern of several specialists, and this publication very rightly does its best to interest the general public in this subject. The text is easy to read, offering over all a wealth of information, reference tables and diagrams; there are also many good-quality illustrations.

The only criticism to be made is that many of the examples refer to France, whereas the book would have gained much more in interest if it had extended more often beyond the limits of the author's country.

*L'ENVIRONNEMENT VÉGÉTAL: FLORE, VÉGÉTATION ET CIVILISATION (The Plant Environment: Flora, Vegetation and Civilisation)*  
by Pierre Lieutaghi  
Délachaux et Niestlé, Neuchâtel, Suisse, 1972  
317 pages. Price 64 FF.  
[Text in French]

## 50 MILLION VOLUNTEERS

This is a report by one of the four Working Parties set up in 1971 by the Secretary of State for the Environment (U.K.) in preparation for the United Nations Conference on the Human Environment in Stockholm last June. It concerns public opinion on the role of voluntary movements and youth in the environment and outlines the surveys undertaken, the written and verbal evidence collected and the organisation of six local studies of voluntary movements in the United Kingdom. Voluntary activities in the environment are described in fair detail under 16 different headings, although naturally there is an overlap between various headings. Other sections in the book cover the changing role of the volunteer, the financing of voluntary movements, co-ordinating the problems of voluntary movements, political and pressure group activities, education in environment and the demands of youth and pop festivals. The report also makes several recommen-

dations specific to the Department of the Environment as well as general recommendations about the voluntary movements, and the activities and demands of youth.

*50 MILLION VOLUNTEERS*  
A Report on the Role of Voluntary Organisations and Youth in the Environment.  
Department of the Environment,  
Her Majesty's Stationery Office, 1972. 102 pages.  
[Text in English]

## ECOLOGY FILMS

What film cover air pollution? Automobile emissions? Are they new, old? Adequate? By whom are they sponsored? These are some of the questions answered by the Environment Film Review, a comprehensive selection of films covering all major aspects of environmental affairs. It is primarily a user-orientated publication, which identifies films according to broad and very specific subject terms, and ecological objectivity. The subjects, treatments and styles of the films reviewed range from cartoons to TV documentaries to surrealist and impressionist pieces, to droning lecture-type fare. Most films are First Generation, pin-pointing environmental problems, for example showing traffic jams, polluted waters etc. The next issue of the Review hopes to include more Second Generation films illustrating the causes of pollution and exploring the alternatives and examining the solutions.

*THE ENVIRONMENTAL FILM REVIEW*  
Environment Information Center Inc.  
New York, 1972. 155 pages. Price: \$ 20.  
[Text in English]

## WE HAVE ONLY ONE EARTH

In May 1971, the Secretariat General of the United Nations Conference on the Human Environment commissioned Dr. René Dubos to preside over a group of experts charged with the role of advisers for the establishment of a report, the essential value of which would derive precisely from the fact that it would show the state of knowledge and the opinions of the biggest experts and greatest thinkers in the whole world, with respect to relations between man and his natural habitat, at a time when the activities of man are exerting an important influence on the environment.

The present work was drawn up in an extremely short period of time, with the help of sixty-six comments from forty countries on a first draft elaborated by Barbara Ward and René Dubos. Whereas the report resulting from this work is not an official document of the United Nations, it can be considered as an integral part of the most important preparatory material of the United Nations Conference on the environment. The importance of this report lies in the fact that one single preliminary condition was imposed on the collaborators: that they should not be prejudiced by activities carried out by representatives of the various governments at the time of the Stockholm Conference; that their objective should essentially be to provide fundamental information necessary to allow official political decision to be taken afterwards. Thus originated an objective introduction, very varied and very sincere on the multitude of problems arising from the evolution of the human race in a limited environment, an introduction above all destined for the information of those who would participate in the first world conference dedicated to these problems, but indeed also towards making public opinion aware of the fact that effectively, we have only one earth.

*NOUS N'AVONS QU'UNE TERRE (We have only one Earth)*  
by Barbara Ward and René Dubos.  
Translated from English under the direction of Paul Alexandre.  
Editions Denoël, Paris, 1972.  
357 pages, price FF. 35.00.  
[Text in French]

This work has been issued simultaneously by the following publishers:

United States	W.W. Norton & Co.
Great Britain	Andre Deutsch Ltd.
Italy	Arnoldo Mondadori Editore
Japan	Kankyo Kagaku Kenkyu Jo
Netherlands	Uitgeverij Contact, N.V.
México	Fondo de Cultura Economica (Spanish edition)
Denmark	Samlerens Forlag A/S
Sweden	Bokforlaget Forum AB





# ZUSAMMENFASSUNGEN

## BIOLOGISCHE MESSFÜHLER — S 3

Dr. N. Moore,

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Neben den üblichen Aufgaben von Pflanzen und Tieren auf unserem Planeten hat unser technisches Zeitalter ihnen eine neue und recht ungewöhnliche Aufgabe als «biologische Messfühler» bei Umweltproblemen zuerkannt. Im Grunde ist die Rolle von lebenden Organismen als «biologische Anzeigegeräte» nicht neu, wie die Anwendung von Gänsen als Indikatoren von Gas in Kohlengruben zeigt.

Die plötzliche Abnahme einer normalen Tierpopulation kann oft wichtige, vom Menschen verursachte, bisher aber nicht deutlich erkannte Ursachen aufzeigen. Eine Populationsverminderung des Wanderfalken zeigt die Kontaminierung der Umwelt mit schwer abbaubaren Insektiziden an und damit die Gefahren einer Sekundärvergiftung.

Sind die Auswirkungen eines polluierenden Stoffes auf den Organismus bekannt, so kann dieser auch als Messskala für die Wirksamkeit vorgenommener Schutzmassnahmen dienen. So reagieren z.B. Flechten sehr empfindlich auf das Ansteigen bzw. die Abnahme des Schwefeldioxidgehaltes.

Es wäre sicherlich von Nutzen, systematische Versuche mit Pflanzen und Tieren durchzuführen, die als «biologische Messfühler» eingesetzt werden könnten.

## PFLANZEN ALS INDIKATOREN FÜR UMWELTVERÄNDERUNGEN

S 7

Roger Goodwillie und Dr. David Cabot,  
National Institute for Physical Planning  
and Construction Research,  
Dublin

Negative Eingriffe des Menschen in seine natürliche Umwelt bewirken im allgemeinen die Vereinfachung eines komplexen Systems, d.h. einige Arten vermehren sich zu Lasten einer grösseren Anzahl von Arten die völlig untergehen.

Besonders fünf Eingriffe in die Umwelt können positive oder negative Rückwirkungen auf Pflanzenarten mit Indikatorwirkung haben:

- *Drainage - Arbeiten:* Entwässerungsarbeiten in der Marschlandschaft bewirken z.B. das Verschwinden der Marscherbse («Lathyrus palustris»).
- *Feuer:* häufiges Feuer verhindert z. B. Aufstufungen.
- *Landwirtschaft:* Pflanzenvernichtungsmittel können die Entstehung von resistenten Unkrautarten, wie z.B. der «Stellaria» bewirken.
- *Verschmutzung:* grüne Algen verschwinden in verunreinigten Gewässern.
- *Tourismus:* das Zertrampeln von Sanddünen bewirkt das Verschwinden des Dünen-Mooses, welches die Funktion eines Stabilisators des Dünen-Sandes hat, und trägt somit zur Erosion bei.

## DIE NORDISCHEN LÄNDER UND DER NATURSCHUTZ — S 9

Dr. Reino Kalliola

Dänemark, Finnland, Island, Norwegen und Schweden bilden die geographische und kulturelle Einheit des Nordens: Naturschutz im Norden Europas begann schon in den zwanziger Jahren unseres Jahrhunderts und schliesst den herkömmlichen Naturschutz, die Landschaftsplanung, den sozialen Naturschutz verbunden mit den Problemen der Erholung, Luft- und Wasserverschmutzung, Lärm, Schadwirkungen der Biozide usw. ein. Die Flora und Fauna der nördlichen Randregionen sind besonders leicht schon durch unbedeutende Einflüsse angreifbar, da Wachstum, Vermehrung und Regeneration schwächer ausgeprägt sind als in südlicheren Gebieten.

Die legislative Verwaltung des Naturschutzes ist inzwischen für diese Länder zentralisiert worden und hat damit an Wirksamkeit gewonnen. Im Jahre 1970 wurde eine offizielle nordische Bezugsorganisation für Umweltfragen auf Regierungsebene gegründet. Unter den behandelten Problemen ist die Bedrohung der Pollution der Ostsee an erster Stelle zu nennen. Ebenso stellt der bedeutende Touristenanstieg ein wichtiges Thema für diesen Organismus dar.

## NATURSCHUTZ IN ZYPERN — S 16

Dr. Odysseas Ioannides,  
Ministerium für Landwirtschaft  
und natürliche Hilfsquellen

Die Insel Zypern liegt im östlichen Mittelmeer, mit einer Oberfläche von fast 10 000 km<sup>2</sup>. Die Vegetation, die einst die Insel bedeckte, war dichter und verbreiteter als heute. Auch hier führen die menschlichen Einwirkungen auf die Umwelt zu einer Landschaftsveränderung.

Die Regierung hat inzwischen Massnahmen ergriffen, um die natürlichen Hilfsquellen des Bodens und des Wassers zu erhalten, den Boden in einer vernünftigen Weise zu benutzen, das Wild und die ursprüngliche Fauna zu schützen.

Ausserdem ist sich die Regierung der inhärenten Probleme eines schnellen Wachstums bewusst und hat Gesetze in bezug auf die Verstärkung und Bandnutzung erlassen. Zypern arbeitet aktiv an diesen Problemen und nimmt auf nationaler und internationaler Ebene am Kampf gegen die Bedrohung und Zerstörung einer natürlichen Umwelt teil.

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