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K. POMA
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The second European Ministerial Conference on the Environment was held in Brussels on 23 and 24 March 1976, and it was my privilege to take the Chair on that occasion, which offered a fresh opportunity to review the progress being made on environment questions throughout Europe and, above all, to get a clear idea of what priority the governments represented at the Conference were prepared to give to the defence of the natural environment, i.e. the protection of flora and fauna, an ever-diminishing and increasingly endangered countryside.

Some commentators expressed surprise and even regret that in the difficult economic period we are now traversing (although economic activity is already showing signs of an upturn), emphasis should again be placed on measures for the preservation of the natural environment.

But surely it was just the moment, when everyone was looking for new courses to follow, when so many seemingly sure values were being vehemently disputed, to concentrate more intensely than ever before on the preparation of guidelines for a precautionary ecological policy. Should not the present difficulties really encourage us to look harder at past errors, from which we can certainly learn the most valuable lessons?

It was therefore most heartening to see that the Council of Europe, acting on the judicious recommendations of the European Committee for the Conservation of Nature and Natural Resources and guided by a determination to ensure the continuity of the work put in hand at the previous Conference (Vienna, 1973), had understood the need for this form of action when drawing up the agenda for the second Conference.

From the many documents, reports and conclusions of the Conference I have chosen three points appearing in the recommendations and will confine my comments to them, because

I find them especially pertinent and constructive and because they fit so neatly into the framework of the Council of Europe's characteristic activities.

Following the widespread realisation that many environmental problems could be solved only through closely concerted international and even worldwide action, there has been no want of effort resulting in a series of more or less specialised international conventions. All of them apply to some particular aspect of the natural environment, but there is some overlapping in their application and their complexity is often such as to cause a substantial delay in putting them into practice. I would not contest their merits or the need for them, but I am compelled to observe that the countries which have enacted adequate legal instruments enabling them to accede to and ratify these conventions without reservations are few and far between.

This is why the resolution on the protection of wildlife has instructed the appropriate Council of Europe body to prepare a legal instrument on the conservation of wild-life and natural habitats in Europe which would obviate the difficulties encountered in the implementation of existing conventions. Special attention and encouragement should be accorded to comprehensive protective measures for all migratory, threatened and endemic species and their habitats, through the creation of particularly representative reserves and the enforcement of joint conservation measures designed to eliminate the causes of their scarcity.

Here is a second point which compels attention: I have already mentioned the important role played by parks and nature reserves, which are rightly regarded as genuine instruments for the planning of the natural environment and natural resources.

The interest shown in the preparation of inventories of natural habitats, research into the carrying capacity of natural areas subject to recreational pressure, and the institution in every country of a network of

protected areas, enjoying different degrees of protection depending on their function and aims, give ample proof of the importance attached, at the international level, to this essential aspect of the conservation of the natural heritage.

In this connection it is encouraging to observe that during the course of the Conference itself three countries made a real contribution by designating protected areas in their territories; these are to form part of a network of biogenetic reserves and thus come into the larger context of the world network of biosphere reserves sponsored by Unesco.

Lastly, all these efforts to protect the natural heritage might accomplish little enough if they were not supported by a coherent system of information and education reaching the largest possible audience. A genuine thirst for knowledge about, coupled with a keen interest in everything connected with nature and its protection has been observed in the public, and is growing stronger with passing time. It cannot be said often enough that an enormous amount remains to be done in this field which has too long been left untouched by the overcrowded primary and secondary curricula.

In this respect, a body such as the European Information Centre for Nature Conservation, which publishes the periodical Naturopa, has an essential role to play.

I should like to take this opportunity to congratulate the European Information Centre on the excellent work it has been doing, with the help of national agencies, for nearly ten years now, despite its meagre resources. It is my most fervent wish that it may be strengthened at every level, so that it can intensify its efforts on behalf of nature conservation; for in this field it is unique, both in the Council of Europe and among other international organisations. The importance of the specific mission of the European Centre must be apparent to all, as was indeed confirmed by the conclusions of the Brussels Conference.



The symbol for the Council of Europe's nature conservation activities.

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The Purpose Served by Conferences of Specialist Ministers

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There are at present 9 conferences of specialist ministers*, for which secretarial services are provided by the Council of Europe Secretariat. The task of preparing these conferences is normally assigned to committees of senior officials set up for the purpose, or to committees of experts working within the Council. The ministerial conferences, which are held at the invitation of the government of a member state, enjoy a certain degree of autonomy, the specialist ministers being free to choose the conference agenda; once preparations have reached a sufficiently advanced stage, however, the Committee of Ministers of the Council of Europe discusses the draft agenda and any other aspect of the organisation of such conferences, in particular, the invitations to be addressed to non-member states and to other international organisations.

Conferences of specialist ministers were institutionalised by the Committee of Ministers of the Council of Europe in Resolution (71) 44 of December 1971. What role should these conferences play, particularly vis-à-vis the Council of Europe?

Their function is twofold and is defined in the preamble to the above-mentioned resolution:

- firstly, to facilitate direct contacts between members of governments responsible for specific sectors of government activity
- and, secondly, to produce elements which might facilitate and clarify

* (i) Conference of European Ministers of Education
(ii) Conference of European Ministers of Justice
(iii) European Conference of Ministers responsible for the preservation and rehabilitation of the cultural heritage of monuments and sites
(iv) European Conference of Ministers responsible for Regional Planning
(v) European Ministerial Conference on the Environment
(vi) Conference of European Ministers responsible for Family Affairs
(vii) Conference of European Ministers of Labour
(viii) ad hoc Conference of European Ministers responsible for Sport
(ix) Conference of European Ministers responsible for Local Government

the definition of the concrete objectives of the intergovernmental activities undertaken within the Council of Europe in the various sectors of its Work Programme.

We shall examine this dual function and, with *Naturopea* readers in mind, consider objectively whether the Ministerial Conference on the Environment, which has already met on 2 occasions, has fulfilled the aims assigned to conferences of specialist ministers.

FACILITATING CONTACTS BETWEEN MEMBERS OF GOVERNMENTS

The problems of contemporary society are becoming increasingly complex and difficult to solve. This is true whatever the sector, be it education, planning of the environment (natural or man-made), justice, social affairs and so forth. The solutions sought frequently necessitate numerous, lengthy preparatory studies and the taking of courageous decisions, whose effects are not necessarily always immediately apparent.

Furthermore, each European state has its own personality, established now for a very long time. From the Atlantic to the Urals and from the Arctic to the Mediterranean, there are a great many peoples living according to secular traditions and customs. And as, in everyday life, one is forced to admit that parochialism is still rife, differences in mentality quite naturally engender diverse conceptions of life, and hence working methods, which are sometimes diametrically opposed.

At the risk once again of stating the obvious, let us repeat that states have become more and more interdependent and that, in the majority of spheres of activity, no country can hope to find the proper solution on its own. This is especially true in our old peninsula of Europe, where national unity is still a sacrosanct principle.

It is therefore desirable, indeed essential, that those responsible, at the highest level, for national policies

should be able to meet and state their views, describe experiments conducted under their direction and endeavour to find a common denominator, for only in this way will it be possible to harmonise national legislation on a European scale and coordinate the administrative measures to be applied at national and regional level.

Conferences of specialist ministers are and should remain, for top-level officials, a forum in which to define the main lines of a common European policy designed to serve as a guide for the conduct of national affairs.

PROVIDING ELEMENTS WHICH MAY BE INCLUDED IN THE COUNCIL OF EUROPE WORK PROGRAMME

In Resolution (71) 44, the Committee of Ministers authorised the Secretary General to provide secretarial services for all the conferences with which the Council already had, or would in the future have, special working relations.

Meetings of specialist Ministers should provide the Council of Europe, whose aim is "to achieve greater unity among its members...", with an opportunity of ascertaining the intentions of governments, in order to deal in its Work Programme, with problems of concern to all member states, for which common solutions may be found.

These conferences, which adopt their conclusions in the form of resolutions and recommendations, consequently have a real influence on the Organisation's activities. Their conclusions are brought to the notice of the Committee of Ministers "which shall, as appropriate, transmit them for action to its own competent bodies or to other international organisations. It shall also refer them to the Consultative Assembly of the Council of Europe for information".

While the specialist ministers have the right to examine any problem of particular interest to them, it is also essential that they discuss problems comprised in the Council's Work Pro-



The protection of wildlife and natural habitats was one of the major problems dealt with by the second Ministerial Conference on the Environment at Brussels in March 1976.

gramme, so as to be able to propose guidelines for its activities. In other words, it is of the utmost importance that the specialist ministers' discussions should always be placed in a supra-national context.

THE MINISTERIAL CONFERENCE ON THE ENVIRONMENT

This Conference has already met on two occasions: in Vienna in March 1973 and in Brussels in March 1976. There is every likelihood that a third session will be held in Switzerland in 1979.

What were the results attained at Vienna and Brussels? The Ministers responsible for the Environment discussed all the political problems which appeared to them to be of national and European importance. They also met members of parliament representing the Consultative Assembly of the Council of Europe and directly concerned with problems relating to the natural environment.

For the Council of Europe the results were both numerous and concrete. At Vienna, the Ministers adopted 3 resolutions containing no fewer than 27 recommendations concerning:

- the planning and management of the natural environment, including recreational areas, within the context of an overall planning system
- the conservation of wildlife and areas of scientific value
- information, education and training in the natural environment sector.

By December 1975, 20 of the 27 recommendations had been incorporated into the 1975-76 Intergovernmental Work Programme as permanent activities. Similarly, the medium-term plan (1976-80) comprises the three main themes quoted above and takes account, as far as possible, of the other 7 recommendations as new activities. It was therefore nothing less than a programme of work that the Ministers responsible for the Environment proposed at Vienna.

At Brussels, the second Conference was held in a spirit of continuity. Admittedly, the range of subjects dealt with was less wide than at Vienna, since the Conference had intentionally confined itself to a few major problems such as: reconciling economic development with the protection of the environment; the protection of wildlife and natural habitats and voluntary participation in the conservation of nature and natural resources. The resolutions of this second Conference will also have a direct impact on the Work Programme.

Thus, the Ministerial Conference on the Environment has, so far, performed the twofold function assigned to it by the Committee of Ministers of the Council of Europe. It is to be hoped that it will continue to do so in the future.



The protection of wildlife: AN ABSOLUTE NECESSITY

Dr Willi ZELLER



Since man's appearance on our planet, he has formed an integral part of nature as a major predator. Through various stages — the domestication of fire, stock-rearing, itinerant farming and irrigation — man finally entered the industrial era. As the impact of modern technology on nature became greater and more diversified, the indigenous fauna and flora underwent increasingly rapid changes, for example in the highly industrialised and densely populated areas of Europe. These transformations in wildlife, which on the time-scale of human history were extremely gradual, have become overwhelming under the influence of modern man. Whole populations have suffered cruelly from the merciless destruction of vegetation, the thoughtless extermination of big game and the pollution of water resources, not to mention needless and harmful devastation of nature caused by bush and forest fires.

Mainly out of idealism, nature lovers have long been concerned at the disappearance of wild species as a result of human activities and have formed associations to protect them. It was not until the rapid worsening of the situation over the last decades, however, that international conventions and treaties were drawn up to protect certain sectors of wildlife. Under the auspices of the Council of Europe, for example, two Ministerial Conferences on the Environment have taken place since 1973. It is gratifying to note that, at the Vienna

Conference held in March of that year, the Ministers of numerous European states agreed "... to take appropriate legal, administrative and technical measures at national level to safeguard, with all due care, wild flora and fauna and their habitats and to provide strict reserves for certain natural areas, both terrestrial and aquatic, of scientific interest, and (agreed) that certain matters needed to be dealt with at international level".

The right of every creature to life

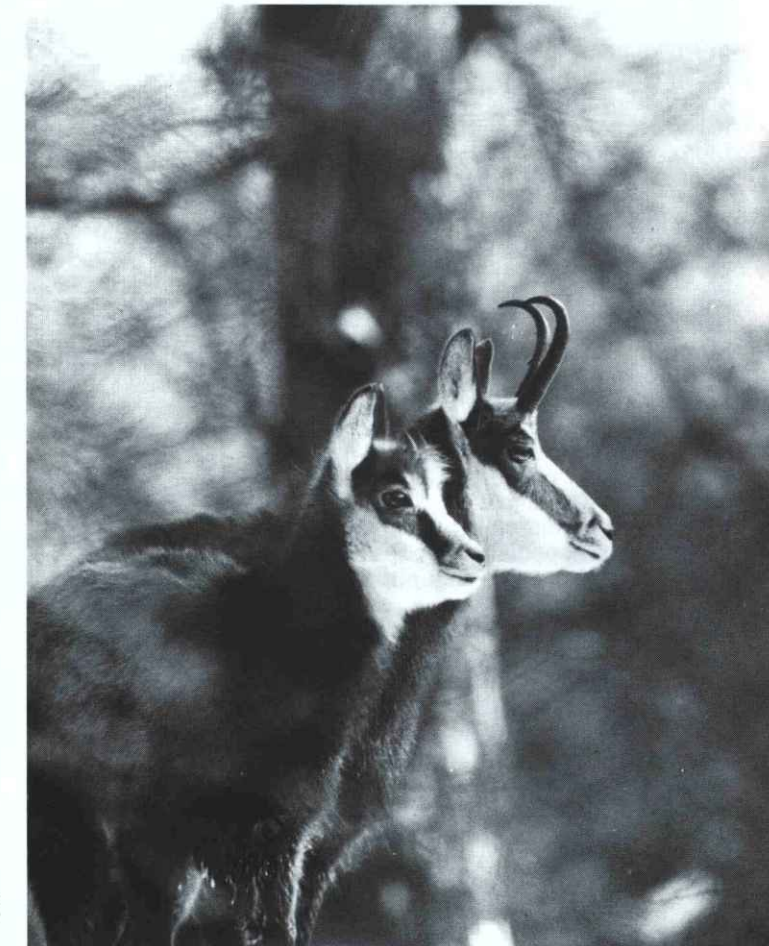
Even if the necessity of preserving the diversity of wildlife and the "utility" of certain species for human life cannot always be proved, it has at last been realised that they can be scientifically demonstrated in a great many cases. But instead of scientifically questioning the "utility" of species, should we not rather accept every creature's right to life, in other words recognise its intrinsic value? This principle is closely bound up with all aspects of man's cultural motivation, whether psychological, philosophical, ideological or artistic. Surely, in the present context, the ecological aspects should take priority over moral considerations where living creatures are concerned. The primary motivation in wildlife ecology is the concern to maintain the diversity of living things and thereby preserve the stability of ecosystems — the vogue term denoting the system of interaction of living creatures

(biocenosis) between themselves and with their inanimate environment (biotope). A biocenosis is generally the more stable the greater the number of species and, consequently, the number of interrelations, for the buffer effect thus created reduces the shock of natural and man-made fluctuations in environmental conditions. In contrast to ecological motivations, the economic reasons for protecting wildlife stem primarily from immediate or short-term considerations, but in the long run both ecological and economic motivations lead to the same result.

The convergencies between cultural, ecological and economic needs

However that may be, the convergencies between cultural, ecological and economic needs are very obvious nowadays, whether it be in the field of research or the identification of indicator species for determining pollution thresholds, not forgetting that

In recent years naturalists have found a great deal of understanding among the public as regards the reintroduction of large herbivorous animals such as ibex, chamoix (opposite) and red deer. By contrast, the rehabilitation of predators such as the lynx (opposite), the bear and particularly the wolf, is often impeded by psychological obstacles. Fine results have nonetheless been achieved with the reintroduction of the lynx and the beaver (opposite) and also of various bird species such as the golden eagle (opposite).





In recent years man has finally realised the harmful consequences of pollution due to industry and urban concentration, as witnessed by this dead and decaying forest in Italy. Technical intervention in the landscape impairs not only the physical environment but also the existing ecosystems.

much remains to be discovered about the medical value of all species. It is enormously important, in this regard, to preserve micro-flora and micro-fauna, which of course implies the conservation of all types of soil.

As the recent European Ministerial Conference on the Environment held in Brussels, the Ministers, after considering the report presented by Switzerland, recommended the governments of the various Council of Europe member states to promote appropriate measures at national level to protect natural habitats, restore those that had been damaged and create new habitats where necessary. The time has now come to remedy deficiencies in the legal machinery, especially at European level, and, where this has not already been done, to draw up a complete inventory of existing national and international legal provisions.

Genetic potential

The various wildlife species differ widely as regards their genetic and ecological sensitivity to human action. Left in its natural habitat, wildlife is not impaired by the aggression of the modern world. Even in "normal" circumstances, however, it is obliged to adjust, according to its ethological

capacity, to human interference. Certain natural habitats, such as peat-bogs, the few remaining stretches of unpolluted fresh, brackish or salt water and their natural banks and shores, represent a last refuge for numerous rare, threatened or endemic species. Where land formerly deforested for cropping or pasturing purposes, but subsequently left fallow, has preserved its original soil profile and most of its genetic potential, it may recover something of its "natural" state. Nevertheless, it would seem impossible, for example, to restore the original forest, with all the biocenoses it once sheltered, in the vast, now treeless, areas around the Mediterranean. On the other hand, "cultivated" biotopes may sometimes be subjected to strong, continuous human influence without the other so-called "natural" environmental factors being dominated by it. This interaction between man and nature produces anthropogenic ecosystems, which do not prevent, and are indeed sometimes dependent on, the parallel development of certain forms of wildlife. There is a whole series of plant and animal species which, as a result of human agency, have spread and multiplied outside their original habitats. They also deserve our attention when it comes to deciding whether they should be protected

or, on the contrary, controlled. But we must not fall into the error of transforming nature into an outdoor museum, often to its own detriment. Even in cities and towns the co-habitation of species is governed by biological rules, as is illustrated by the relationship between the unwelcome but omnipresent rodents and their predators, such as ferrets. As for the surviving green spaces (parks, wooded denes etc.), do they not, while providing a haven for wildlife as varied as it is abundant, also to some extent serve to bring urbanised humanity into contact with nature? Nor should we lose sight of the value of certain wild species as pollution indicators: absences of lichens, for instance, indicates that the tolerance threshold for air pollution has been exceeded.

Maintaining a biological equilibrium

Genetics teaches us that the populations of certain of the higher animals include a large number of genotypes which are constant recombining, at least within geographically limited areas. Human interference with the genetic potential of formerly wild plants and animals cannot leave us indifferent where the safeguarding of wildlife, and, above all, of rare species, is concerned.

Protection can be afforded only by maintaining a biological equilibrium which is favourable to them. Where the natural balance has been destroyed, steps should be taken to re-establish it by introducing or restoring self-regulating biological processes which enable animal or vegetable species to achieve, through their interaction, a balance which, be it stable or dynamic, guarantees an optimum number of individuals for each. It is legitimate to ask why nature, despite our apparent knowledge of its functions, is threatened in so many different ways and places, when most of our needs, such as the growing of crops, urbanisation and leisure activities, can in fact be satisfied without destroying our environment.

The harmful consequences of pollution due to industry and of leisure activities

In recent years man has finally realised the harmful consequences of pollution due to industry and urban concentration, not to mention modern agriculture, although he seems to have underestimated the threat represented by urban sprawl and the fragmentation of once coherent habitats. Technical intervention in the landscape impairs not only the physical environment, but also the existing ecosystems. The conflict of interests as between human life and wildlife is not, however, inevitable, if "homo sapiens" can learn to enjoy the benefits of technology in harmony with nature. This is true of man's leisure activities — a consequence of the Industrial Revolution, which is having as much impact on nature as did the original cause. Downhill skiing does just as much damage to the plant cover as to animals. Overcrowding in seaside resorts and the sprouting of hotels lead to the destruction of dune vegetation and excessive underwater fishing. Hunting, mushroom-gathering and berry-picking, while admittedly of recreative value, constitute a real danger for wildlife when practised to excess.

Reintroduction of species

In recent years naturalists have found a great deal of understanding among the public as regards the reintroduction of large herbivorous animals, such as the ibex, chamois and red deer, exterminated by man. By contrast, the rehabilitation of predators, such as the lynx, the bear and — most efficient of all — the wolf, is often impeded by psychological obstacles. Fine results have nonetheless been obtained with the reintroduction of the lynx and the beaver. As for implanting foreign species or species which have died out naturally in the course of time, great prudence must be observed owing to the risk of their upsetting the present natural balance.

The introduction of rabbits to Australia provides an illustration of the potentially disastrous consequences of the haphazard importation of extraneous species. The subsequent introduction of predators, pathogenic agents or even carriers may sometimes contribute to restoring a certain biological balance, but such measures require thorough prior study of the possible repercussions and call for extreme caution.

The need for specific conservation schemes in order of priority

It goes without saying that specific conservation schemes must be planned in order of priority and their implementation programmed without delay in order to limit the damage to wild fauna and flora. If a rich and highly diversified wildlife is to be preserved, land and water resources must be used in accordance with ecological requirements, with varied crop rotation, diversified cropping and the maintenance of hedgerows. Monoculture in farming and forestry on too large a scale is to be discouraged, as it reduces the variety if not the abundance of wildlife, which is not without danger for the crops themselves. If it were to prove impossible to apply these principles, for political or economic reasons, then it would be urgent to provide, by way of compensation, a network of nature reserves alternating with areas of intensive production. The maximum limits of exploitation for grazing land should also be scrupulously respected. Maintaining a proper balance between trees of different type and age is often an indispensable condition for ensuring both continuous productive and diversified wildlife in forests. Tapping the waters and diverting the course of mountain rivers for hydroelectric schemes should be done in such a way that there is a sufficient quantity of residual water throughout the year for the migration of fish and for the conservation of aquatic life. The intensification of agricultural production is an absolute necessity if the needs of expanding human population are to be satisfied. Unfortunately, intensive farming implies the use of protective chemicals which seriously threaten wildlife. In order to lessen the impact of the secondary effects of these chemical products, only those which are considered indispensable and irreplaceable should be allowed.

The need for adequate information and supervision

Adequate information and appropriate regulations and supervision are becoming more necessary every day and are the responsibility of the community as a whole. Similarly, intelligent reprocessing of human, animal and vegetable waste products would permit a reduction in

chemical fertilisers and thereby promote favourable environmental conditions for wildlife. Hunting should be carefully planned in order to control game populations, for instance the large herds of roe deer. There should be joint management of game which is hunted, captured or fished for commercial or sporting purposes.

The creation of a new legal instrument

If they are to be effective, all the measures proposed obviously call for legal, administrative, economic and financial provisions, together with a policy for the dissemination of information at all levels of education as well as in governmental and international administrations. For this very reason, the Ministers who attended the last European Conference on the Environment in Brussels deserve to be congratulated for declaring their intention of creating a new legal instrument to protect the irreplaceable heritage represented by wildlife.* This is an undertaking which surely concerns us all, if we wish future generations to be able to enjoy this heritage as well.

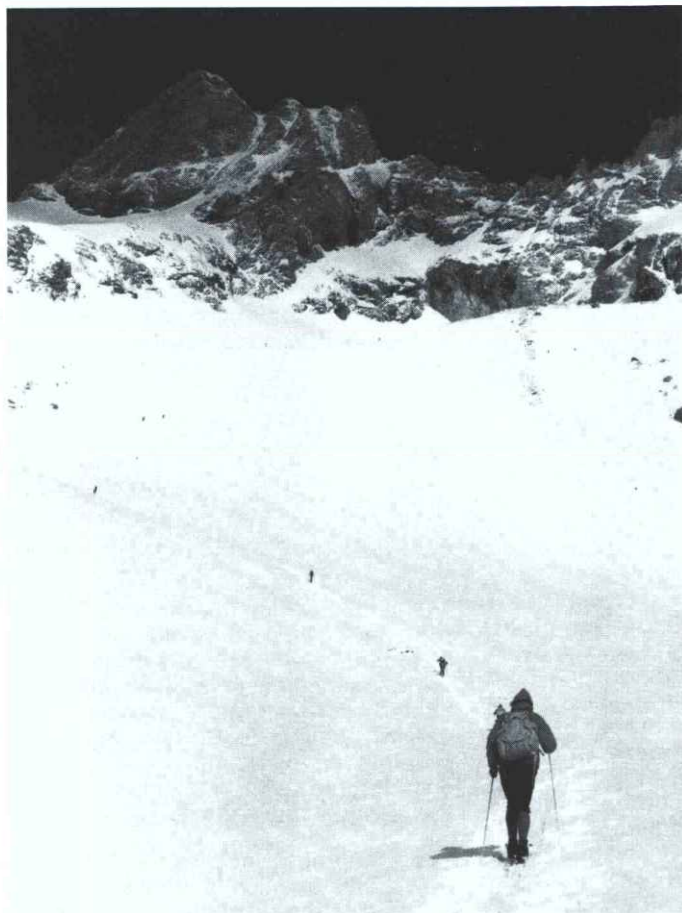
* The Ministers recommended, in Resolution No. 2, that the Committee of Ministers of the Council of Europe should:

— set up, within the Council of Europe, an ad hoc committee of experts to prepare a draft legal instrument on the conservation of wildlife, and particularly of migratory species and natural habitats in Europe, making it possible to overcome the difficulties encountered with implementation of the existing conventions.

The general principles and special provisions of such a convention are outlined in the resolution. This recommendation was favourably received by the Committee of Ministers, which decided to establish an ad hoc committee of experts in 1976 to prepare a draft on these lines.



The mountain regions of Europe and their ecological and human potential —



as exemplified by the Alps

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Human activity in the Alps has been very intense down through history and the mark which it has left there, more than in other mountain regions, is what gives the Alpine landscape its original character. The Alpine settlers conquered the heights, drove back the forest and employed all their ingenuity in coming to terms with nature and deriving a livelihood from it. The result of this long and intimate association is a socio-economic organisation sensitive to change. Several mutations over the last hundred years have led to profound upheavals in the distribution of population and to structural alterations in the various settlements and types of activity. A surplus of manpower soon resulted in initially temporary and ultimately permanent emigration, once the narrow confines of the formerly self-sufficient communities had yielded under the strain of industrial, urban and commercial civilisation. Sometimes new settlements would spring up attracted by new ventures: industrialisation and tourism. But frequently such reconstructions were accompanied by irreversible damage to the most sensitive areas (Mediterranean and higher Alpine regions etc.). Evolution has not been synchronous throughout the whole range. While some regions have adapted successfully to change (Switzerland, Austria...), others, situated in different national contexts, have undergone rapid and uncontrolled transformation (French Alps). Nevertheless, the general constraints and characteristics of socio-economic development have a uniformizing tendency in Europe as a whole. Efforts must be made to anticipate their impact, which is likely to affect all sectors of mountain life, and to introduce protective measures and work out international policies to prevent any aggravation of the imbalances observed at present. The Ecological Charter for Alpine Regions is but one attempt to arouse general awareness of the threat which our civilisation represents for the entire Alpine ecosystem.

LIFE IN THE ALPS: AN INTIMATE ASSOCIATION BETWEEN MAN AND HIS MILIEU

The situation of the Alpine range encouraged early settlement. It stretches for 1,500 km from Vienna to the Mediterranean and is neither very wide at any point (200–300 km), nor particularly impenetrable, being broken up longitudinally and transversely by long depressions connected by passes. It occupies a central position between several densely populated areas (the Po valley, the Rhineland, the Rhone valley and the banks of the Danube) and was crossed by major routes used for migration and trade. The result is a civilisation which, while possessing certain distinctive characteristics (dialects, customs, habitat, physiological traits...), has

also common features which are to be explained by probable descent from a common stock which developed in isolation, by the environmental difficulties that had to be battled with, as well as by the extraordinary mobility of the various groups and the frequent exchanges between them. There are also remarkable examples of syncretism (Romanisch).

The Alps were therefore rapidly and densely colonised, and in the middle of the last century were even seriously over-populated (demographic peak). The subsequent evolution was all the more harsh for that reason. Human presence has nonetheless left an indelible mark upon the mountain landscapes which show massive evidence of man's perseverance in the struggle against great odds and his skill in mastering his surroundings. Social groups were welded together by the need for common protection and from the outset they tended to adopt communal systems of life and work. They have preserved a sense of democracy and the qualities of obstinacy and ingenuity. Alpine life is characterised by a tier-arrangement of men and activities and also by a symbiosis of resources. Altitude and the shortage of land imposed restrictions on agriculture. Supplementary resources were provided by trees and livestock, while the mountain's natural wealth in its manifold forms gave rise to intense handicraft production (metal, stone, wood, textiles...). Life was therefore regulated by the farming calendar and followed the rhythm of the seasonal movements up or down the mountain slopes. Isolation strongly influenced environmental organisation and individual units left their imprint on it, each community having its own particular habits and customs and degree of dependence on the nearest town, small though it often was. This system has proved particularly vulnerable to recent changes.

THE ALPS: AN EXPLOITED REGION

Historically, a dual tendency towards withdrawal and reconquest may be observed, the two sometimes coinciding. From 1850 to 1930 a period of decline set in, although the Swiss and Austrian Alps and certain areas of the Italian Alps remained relatively untouched. The causes were multiple and, when combined, aggravated the situation in high-risk areas. The effect was nearly always the same. The inhabitants were forced to abandon their homes and change their jobs, while at the same time their behaviour altered owing to ageing. The high slopes were the first to be affected, while the mountain valleys and plains became more thickly populated and urbanised. The main contributory factor was the opening up of the Alps, whose effects have grown in intensity up to the present day (motorway tunnels). Admittedly, lines of com-

munication have always been an essential feature of mountains, but they belonged to the natural cycle of activities (carrier services along routes and over passes). As a result of road and railway building control slipped completely from the hands of the local inhabitants. The sudden arrival of cheap outside commodities in this closed economy destroyed the traditional balance of trade, essentially based on food products. Simultaneously, the harnessing of hydroelectric power boosted industrial and urban development. An irreversible drift of population away from the mountains was triggered off, causing the disappearance of the most outlying settlements.

From 1930 onwards the balance began to be restored. The overall population increased, especially in towns which exerted a powerful draw as the seat of numerous facilities, advanced technological industries, decision-making bodies and services. On the other hand, the decline of industries situated in mountain areas was accelerated as a result of their remoteness from supply sources and outlets. The tourist industry began to have a more and more massive impact, but in such a selective way that it caused enormous disparities and accentuated existing contrasts. A redistribution of population took place and new relationships were gradually established between man and nature.

The local inhabitants lost mastery of their surroundings, and powerful outside influences became dominant, engendering a process of degradation which affected the entire environment. This aggression was felt all the more acutely as it affected communities living according to different laws and philosophies of life. Land planning and development, formerly based on complementarity in the use of resources, deteriorated (spoiling of sites, increase in natural hazards...). New areas were opened up as the result of competitive practices bewildering to mountain-dwellers, who were ill-prepared to participate in these novel forms of activity (competition in the financial, real estate, technical and cultural spheres), which were increasingly concentrated in one sector or geographical area. There was no place now for farming, which subsisted only in the most favourable districts or in remote areas. After centuries of intense development, the end-result of present-day activities in mountain regions has often been total disorganisation and increased vulnerability. In extreme cases, mountain regions were reduced to a state of subservience to new needs (those of city-dwellers, tourism etc.), a situation which is hardly calculated to promote the self-fulfilment of the local population. It is therefore urgent to take stock of the effects of recent social and economic changes and to define the place which mountain re-



gions and their inhabitants should occupy in our civilisation.

THE ALPS: A REGION SATISFYING CONTEMPORARY NEEDS?

The depopulation of mountain regions means the disappearance of a whole civilisation. In less than a century, the Alps have been the theatre of an extraordinary reversal of population trends. The formerly densely populated upper reaches were abandoned in favour of low-lying areas. It is perhaps no longer correct to speak of mountain-dwellers, for the majority of the inhabitants of the Alps now live in towns... It is landscapes which present the most striking evidence of abandonment. They may be seen by an observer in different ways: either as the expression of an actual experience, in which case they reflect the close links forged between man and his milieu, or as a mere element in the environment, to be either endured or exploited. In the former case, landscapes were patiently fashioned until a perfectly balanced relationship was achieved (organisation of activities at the various altitudes, integration of the habitat, disposition of volumes and lines, maintenance...). In the second case, the relation between man and environment is not the outcome of reflection; it is frequently sporadic, centripetal, accidental or utilitarian (pylons, forestry roads, urbanisation for tourist purposes...).

There is a contradiction, indeed a conflict, between the (historical) landscape deeply marked by human life and the (present-day) landscape scarred by exploitation. The same paradox is to be found in social organisation. The mountain-dweller is rejected by our contemporary economic society.

On the one hand, he is relegated to a position of inferiority which crushes his will or deprives him of his freedom, while, on the other, it is through him that urban civilisation expects to re-establish contact with nature!

These contradictions can be resolved only if the public is alerted to the problem, if human and ecological parameters are taken into account in the management of mountain regions and if legislation and planning policies are harmonised. This is the purpose behind the Ecological Charter for Alpine Regions in Europe. Destruction of the rich resources of mountain areas (water, flora, fauna, forests, landscapes...) is more than the loss of a common heritage, it is a defeat for mankind. From time immemorial man has been guided in his work by the principle of respect for nature and must continue to be if human activity is to have any meaning.

The basic principles of the charter referred to above are given on the following page.

Council of Europe Ecological Charter for Alpine Regions in Europe

The basic principles of the Ecological Charter for Alpine Regions in Europe (Resolution (76) 34), adopted by the Committee of Ministers on 21 May 1976, are as follows:

Mountain regions in Europe are a common natural heritage whose value must be recognised by all. Everyone has a duty to see that it is preserved. Mountain environments are delicate ecosystems and are among the biological systems most threatened in Europe.

Mountain biotopes and their ecosystems must as a matter of principle be given general protection.

All mountain regions must be the subject of a proper policy of planning, development and mountain population promotion.

Effective preventive measures must be taken against natural disasters such as avalanches, torrents in spate, landslides and falling rocks.

Rural mountain life is indispensable for conserving the living mountain environment; efficient measures shall be taken to preserve its originality.

Human, ecological and economic problems arising in various mountain regions have the same basic characteristics irrespective of the country. Therefore legislation designed to solve them should be harmonised at the European level.



Towards the setting up of a European Network of Biogenetic Reserves

Dr. Peter W. BAUM
Division of the Environment and Natural Resources, Council of Europe

"It is no doubt not yet too late for mankind to realise the dangers that threaten it. Far be it from us to propose going back to the Neanderthal age and once again living off what can be gathered or hunted in the forests. But twentieth century man, and soon twenty-first century man, must understand that his future will not be ensured by a complete transformation of the surface of the globe and by simple eradication of the animals and plants which form the biotic elements of natural habitats.

The first and most urgent need is to conserve the root stock of all species still in existence now, together with a complete sample of all types of habitat."

More than ten years after the publication of the book by Prof. Jean Dorst "Avant que Nature meure" in which the thoughts and suggestions quoted above are to be found, these remarks are still highly topical, and the Council of Europe has attempted to put them into practice through its Resolution (76) 17, on the European network of biogenetic reserves, adopted on 15 March 1976 by the Committee of Ministers. The Council of Europe considers that the establishment of the principles drawn up by an inter-disciplinary group of experts and appearing in that resolution, marks a notable step forward for the preservation and long-term maintenance of the integrity of the biological systems which serve as a basis for the existence of mankind and of nature itself. Up to date, that is, four months after the adoption of Resolution (76) 17, a number of protected areas have been designated for inclusion in the European network (Italy: 13, Netherlands: 2 and Norway: 1). We have every reason to believe that the list cannot fail to become longer. Action has therefore gone on from theory to practice, thus enabling one to envisage in the near future the establishment of a number of regional networks of specific habitats, biocenoses and

ecosystems at a European level. The final stage will be the setting up and appropriate management of the *European network of biogenetic reserves*, thus forming a representative sample of European habitats, biocenoses and ecosystems.

The dominant themes underlying this specific and priority action undertaken by the European Committee for the Conservation of Nature and Natural Resources, which is the Council of Europe body responsible for the natural environment programme, are as follows:

1. To guarantee the biological balance, and hence the conservation, potential, genetic diversity and representativeness of the various types of habitat biocenosis and ecosystem as being essential to:
 - ensuring their survival and evolution for the benefit of future generations;
 - the new genetic combinations upon which biological evolution depends;
 - maintaining our life-support systems;
 - serve as reproduction stocks available for transport to degraded areas which it is hoped to restore by their reintroduction.
2. To make the ecosystems of the biogenetic reserves available for biological research with a view to:
 - defining ecological interactions more accurately;
 - enabling scientific plans to be prepared for the proper protection and management of ecosystems;
 - enabling specialists to be trained and kept informed;
 - enabling the public to be instructed and as fully informed as possible.



The establishment of a network of heathlands such as shown here, together with networks of wetlands and mediterranean forests, represent three important activities of the European Committee for the Conservation of Nature and Natural Resources of the Council of Europe, towards the setting up of a European network of biogenetic reserves.

In order to provide for a better understanding of the problem as a whole, certain concepts need to be defined:

Habitat: a biological and physico-chemical site constituting the environment of the individuals of one or more species in a given place and permitting their proper development;

Biocenosis: a balanced community of plants and animals inhabiting a given environment and their interaction;

Ecosystem: a characteristic whole comprising a number of biocenoses; and, finally:

Biogenetic Reserve: a protected area enjoying legal status and characterised by one or more typical, unique, endangered or rare habitats, biocenoses or ecosystems.

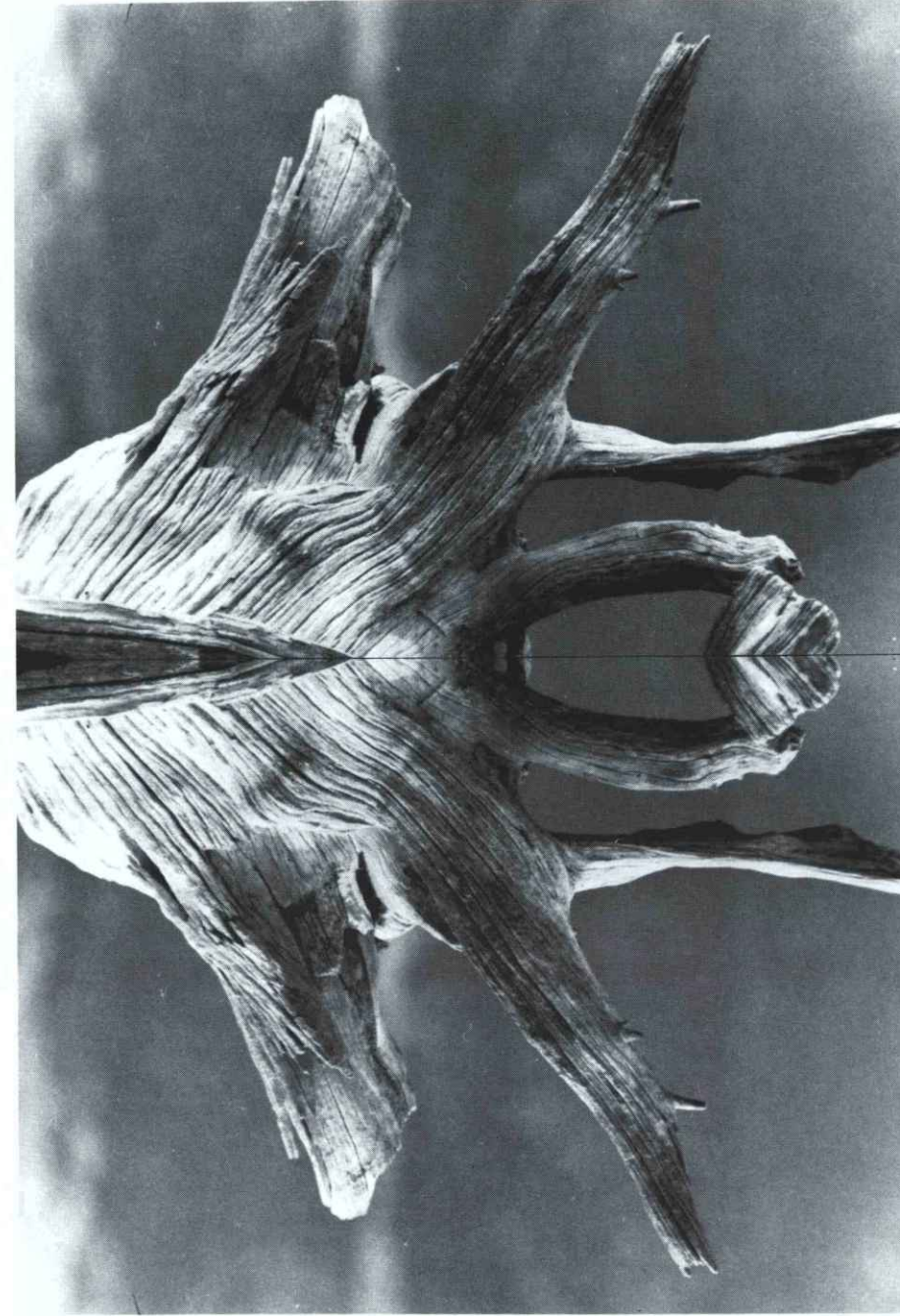
In order to satisfy the above objectives, areas which are or may be designated by states and registered by the European Committee must satisfy strict criteria corresponding in part to the protective measures laid down for the zones in question. With regard to the categories of protected

areas, reference should be made to Resolution (73) 30 of the Committee of Ministers. This resolution proposes a classification of protected areas in Europe based not upon the nomenclature at present used in the various countries, which might lead to confusion, but laying down four categories. For the biogenetic network, categories A and B would be the most suitable, prescribing, as they do, the strictest rules for protection.

It is clear that biogenetic reserves should enjoy a legal status providing for the effective long-term protection of both terrestrial and aquatic habitats, biocenoses or ecosystems. This in no way excludes protected areas belonging to or managed by private bodies or individuals, provided that they are officially recognised as protected areas. Since Europe has a very dense population and is characterised by intensive land use, it would be an illusion to try to place under protection only very extensive areas. Furthermore, "unspoiled" habitats are becoming ever more rare in our continent. With this in mind and in order to be able to save what still can be saved so as to maintain a biological balance, no limit is set to the

area of a biogenetic reserve. Nevertheless, these areas should enable the habitats, biocenoses or ecosystems composing such a reserve to remain viable in the long term. With regard to the state of the environment, it may have been modified to a greater or lesser extent by human activities without however having suffered any notable degradation. Consequently, one should allow the environment to evolve naturally, but one cannot exclude the possibility of human intervention in this evolution, in order to conserve it in its characteristic state or even to ensure its restoration towards optimum stability. This implies management based upon ecological principles. With this in mind and notwithstanding the knowledge that has been acquired, it is essential to intensify research programmes in this field and to provide for the circulation and exchange of information on the results achieved.

In view of the great variety and diversity of habitats, biocenoses and ecosystems in Europe, and in order to achieve the final objective, that is, the setting up of a **European network of biogenetic reserves**, it must be ensured that all typical, unique, rare or



"It is no doubt not yet too late for mankind to realise the dangers that threaten it... The first and most urgent need is to conserve the root stock of all species still in existence now, together with a complete sample of all types of habitat."

endangered environments are represented.

To increase the chances of success in this work and in order to ensure its development to an optimum level, it is essential that the public should be kept informed about its aims, and about its progress and results. Success is achieved through the awareness, understanding and support of public opinion.

Obviously if we wish to maintain the biological balance in our "space-ship" as represented by the "blue planet", a worldwide network must be set up, and this is the objective of Project 8 of the UNESCO MAB Pro-

gramme: biosphere reserves. The first aim of this project is to establish for each of the 169 biotic provinces (IUCN 1974) one or two biosphere reserves, which would mean in the case of Europe 20 to 30 for the 14 biotic provinces. Since the criteria for the European network of biogenetic reserves were laid down on the basis of the environmental situation in Europe, most of the biosphere reserves may be biogenetic reserves. On the other hand, many biogenetic reserves cannot be included in Project 8, for these may well consist of a limited habitat or very small area which is unique, rare or endangered (not merely from the botanical point of view), either at national or European

level. This does not prevent close and active co-operation and co-ordination between the two organisations in this field. On the contrary, a "guideline" for other continents might well result, from this, a regional organisation becoming the regional agent for a world-wide organisation.

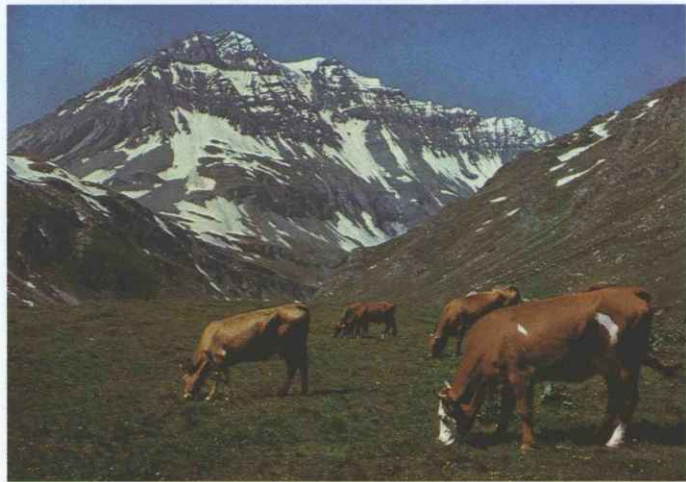
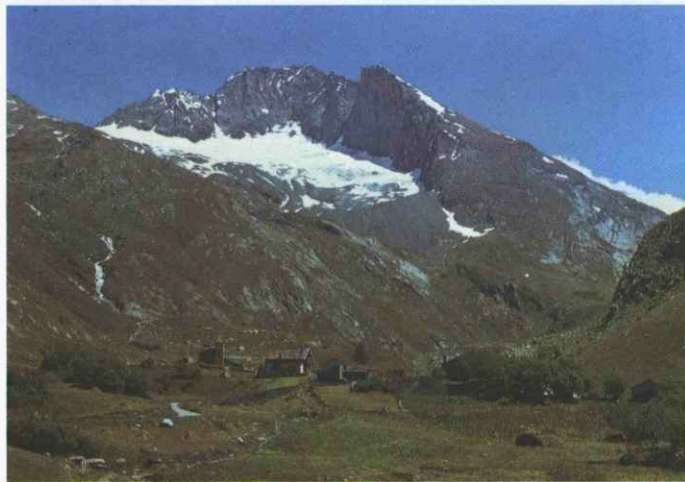
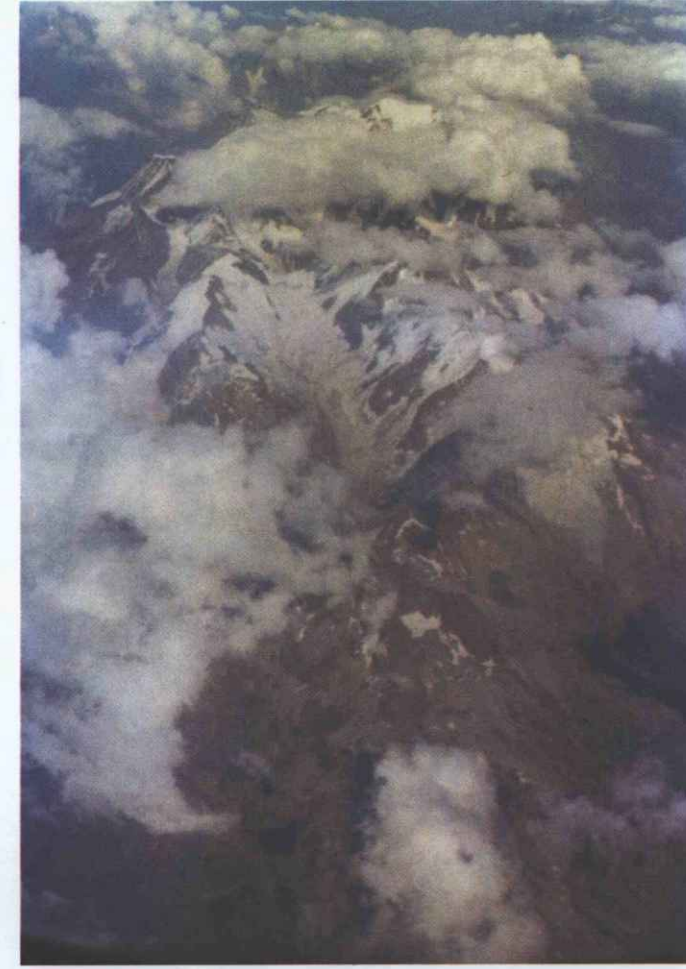
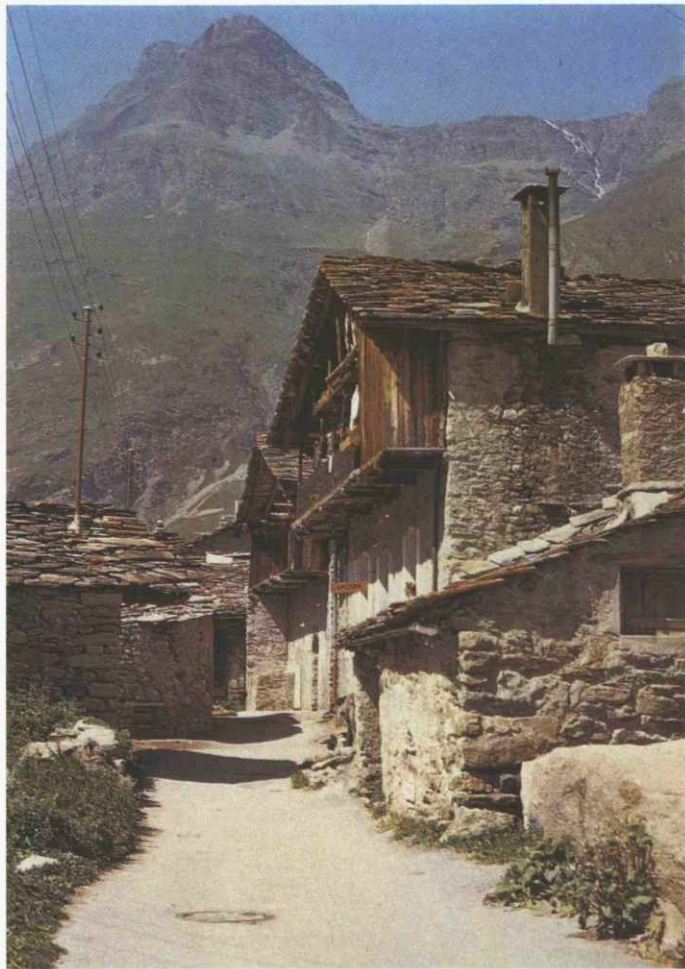
Can the European Committee for the Conservation of Nature and Natural Resources now file away the whole affair and forget about it? Far from it! According to Resolution (76) 17, it now has the task of defining the procedural and institutional principles governing the setting up of the network. It would be premature to try to give detailed indications on this point. Nevertheless the guiding principles could be as follows:

- the drawing up of regulations for biogenetic reserves;
- the establishment of a list of priority environments to be allocated to the network, taking into account the results of the various other activities of the European Committee in the field of wildlife, endangered environments, the planning of natural areas, and the work accomplished by other organisations. Three concrete proposals have already been put forward: the creation of a specific network of wetlands; a network of moors and heathlands; a network of Mediterranean forests;
- the mapping and classification of vegetation in Europe, with a view to recommending member states to establish one or more biogenetic reserves for each type of vegetation.

I should like to conclude by again quoting from Jean Dorst's book "Avant que Nature meure": "We must still wage battle in order to save the last traces of the wild, but it is still more important to preserve all natural resources throughout the world and to ensure that man has an income that will enable him to survive. Thus while helping to save humanity, we shall ensure the preservation of the living creatures which constitute the whole biosphere upon which man depends so closely. Man and nature will be saved together in harmonious co-operation, failing which our species will disappear together with the remaining vestiges of a balance which was in no way intended to impede the development of mankind".

There still remains a great deal to be done; let us get down to work.





Biogenetic reserves in the Netherlands

Drs Jan-Piet DOETS
Environmental Councillor to the Secretary
of State of the Ministry of Culture,
Recreation and Social Welfare,
the Netherlands

The Research Institute for Nature Management believes there may be two nature reserves in the Netherlands, the Boschplaat and the Weerribben, eligible for consideration as part of a European network of biogenetic reserves in accordance with a resolution of the European Ministerial Conference on the environment in Vienna in 1973 and in keeping with the criteria which have been drawn up and approved by the European Committee for the Conservation of Nature and Natural Resources.

Both areas have been proposed by the Netherlands Government for designation as protected areas in accordance with the Wetlands Convention.

The following descriptions are taken from the proposal:

DE BOSCHPLAAT

De Boschplaat comprises the entire eastern end of the island of Terschelling and because of its size and variety and the minimum human activity it supports, it can be considered to be practically the only example of a coastal area of this type in Western Europe, with a characteristically large variety of ecosystems.

The nature reserve belongs to the Terschelling Warden Service which is a property of the State Forest Service (Ministry of Agriculture and Fisheries). The position of the Boschplaat is 53°27' lat. N. and 5°30' long. E. and can be found on the topographical map 1:25,000, sheet 1G. The North Sea beach and the row of dunes nearest the sea is managed by the Public Works Department, the rest by the State Forest Service in consultation with the Research Institute for Nature Management which owns the "Schellingerland" Biological Station immediately to the west of the Boschplaat. The reserve is open to the public except for some dune areas which are closed during the breeding season. Some places are used for cattle grazing, for example in the

30 ha of mud flats known as De Groede, as part of a scientific research project.

Wardens supervise the public who visit the area. Motorised vehicles are not permitted.

The area comprises beaches, dunes, salt marshes and tidal channels with their characteristic flora and fauna. The Boschplaat is uninhabited and is the largest nature reserve in the Netherlands. The reserve covers approximately one third of the island and comprises approximately 4,400 ha at low tide. At flood tide almost half of the reserve is submerged by water from the Waddenzee. If there is an east wind the area submerged may be considerably less, and during a northwesterly storm the whole reserve, apart from the dunes, is sometimes flooded.

Originally the Boschplaat was only one of the many sandbars off the dune coast of the Dutch Wadden islands. Gradually the bar expanded and became higher, until it ceased to be completely flooded by each tide and to the south five small groups of dunes, forming the first piece of dry land, developed. At the beginning of this century the sand bar became joined to the east end of Terschelling. The situation changed radically after a dike made of wind-blown sand had been erected along the North Sea coast in 1931-1936. Afterwards the land was only flooded by spring tides and silt was deposited on the southern part of the sandbar, while the sand dike gradually came to look more like a natural ridge of dunes.

As a result of the gradual desalination of the larger dune areas and the adjoining land and the continuing effects of the sea on the beach and the salt marshes, together with differences in soil and soil development in terms of exposure, and between extremely dry and extremely wet conditions, arising more or less independently of this fresh/salt water gradient, a great variety of environ-

ments were created which made the growth of a whole range of different ecosystems possible.

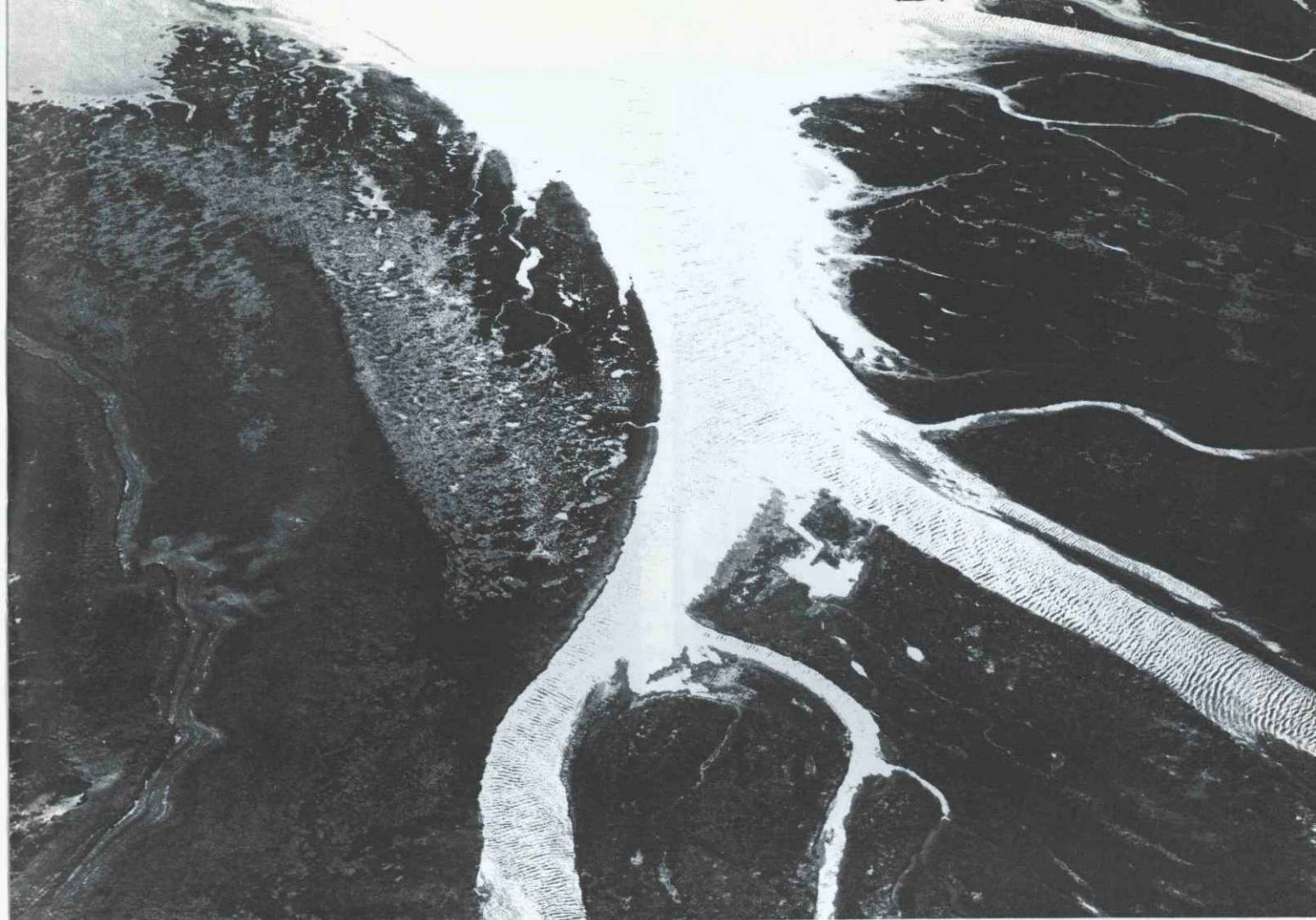
The extreme west of the Boschplaat comprises what are known as the fixed dunes, the eastern extremities of the older dunes of Terschelling which are poor in lime. The area of the Boschplaat proper comprises a broad sandy beach along the North Sea coast, bordered on the southern edge by the drifting sands, while on the Wadden side there are scattered groups of dunes, tidal channels and gulleys, until the land becomes salt marsh and eventually mud.

De Boschplaat is of great national and international importance because of its flora and because of its fauna, particularly birds.

Its botanical significance arises from the complexity and variety in environment which is reflected in a remarkable diversity of plant ecosystems. In the salt environment on the mud side, the successive plant ecosystems, working inland from the sea, are first the pioneer Glasswork association (*Salicornietum strictae*), then the Salt-marsh Grass association (*Puccinellietum/Limonietum*) which covers large areas, is often very variable and supports a large number of herbaceous plants, and the Sea Plantain and Sea Lavender association (*Plantagini/Limonietum*).

On higher ground, and further away from the mud, there is the Rush and Sedge association (*Junco-Caricetum extensae*), followed by the Salt-mud Rush (*Juncetum gerardii*). These and other associations create a fascinating and ever-changing mosaic under the influence of the seasons, the water and the wind.

In the non-saline environment of the dry sandy dunes the communities determining the general appearance are the Sand Twitch and Lyme Grass association (*Elymo-Ammophiletum*). On the older dunes, partly dispersed by the wind and rejuvenated to form



De Boschplaat comprises the entire Eastern end of the island of Terschelling and because of its size and variety and the minimum activity it supports, it may be considered to be practically the only example of a coastal area of this type in Western Europe, with a characteristically large variety of ecosystems.





De Weerribben comprises a considerable part of the extensive "valley bog" area of North West Overijssel, which because of its size and variety can be considered the most important wetland area of Western and Central Europe. All the characteristic ecosystems of this type of landscape are to be found there including a number of rare types of plants and animals — the breeding colony of Purple Herons (see above) is of international importance.



dome and sickle-shaped dunes, there are thickets of Sea Buckthorn and privet (*Hippophae-Ligustrum*) on the relatively calcareous summits; the Grey Hair Grass association (*Viola-Corynephorum*) is found on the decalcified south-facing slopes and the Polypody and Crowberry association (*Polypodium-Empetrum*) is encountered on the north-facing slopes.

These vegetations alternate with extensive beds of lichens containing more than twenty species growing on the ground, some of them rare and some growing elsewhere only on trees, and with open communities containing mosses and small annual higher plants (*Tortula-Phleum arenarii*). Humid valleys, very interesting botanically, are found in the fixed dunes, containing the Black Bog-rush association (*Junco baltici-Schoenium nigricantis*), the Wood Small-reed and Adder's Tongue association (*Ophioglossum-Calamagrostium epigeji*), the Wintergreen-Creeping Willow heathland (*Pyrola-Salicetum*), the Crowberry and Cross-leaved Heath association (*Empetrum-Ericetum*), the Ling-Hairy Greenweed association (*Genista pilosae-Callunetum*) and savannas with Brown Birch. These are in order of succession, and merge into brackish low-lying land containing the Grass of Parnassus and Dune Rush community (*Parnassus-Juncetum atricappilli*), the Sea Centaury and Pearlwort association (*Centaurea-Saginetum moniliformis*) and the Sea Purslane association (*Halo-Scirpetum maritimi*). These lowlands especially are exceptionally rich in plant species rare in the Netherlands and some of them outside it, including a large number of species of orchid. The botanical importance of the Boschplaat, from a geographical point of view, derives from the fact that northern arctic/alpine species at the southern limit of their distribution, such as Bear Berry (*Arctostaphylos uva-ursi*), Bog Whortleberry (*Vaccinium uliginosum*), Chickweed Wintergreen (*Trientalis europaea*) and a species of Clubmoss (*Lycopodium annotinum*), and southern species at the northern limit of their distribution, such as Prickly Restharrow (*Ononis spinosa*) and Sea Spurge (*Euphorbia paralias*) are found there side by side.

The Boschplaat is ornithologically of national and international importance as a breeding ground and a foraging and resting place for birds. There are some 50 species of birds breeding in this reserve. Breeding birds are: Hen Harrier, Montagu's Harrier, Marsh Harrier, Kestrel, Short-eared Owl, Eider, Shelduck, Curlew, Redshank,

Black-tailed Godwit, Lapwing, Oyster Catcher, Wheatear, Grasshopper Warbler, Reed Bunting, Avocet, Spoonbill, Herring Gull, Lesser Black-backed Gull, Common Gull, Common Tern, Arctic Tern, Little Tern, Kentish Plover, Ringed Plover and occasionally the Sandwich Tern.

Since 1900 more than 270 species of migrating birds have been observed on Terschelling, many of them on the Boschplaat. In the autumn there are sometimes 30,000 and even more birds observed along the coast of the Boschplaat. In particular there are numerous:

Wigeon, Shelduck, Dunlin, Knot, Bar-tailed Godwit, Curlew, Oyster Catcher and in the sea along the coast the Common Scoter.

Less numerous but migrating or wintering in groups of 1,000 or more are: Grey-lag Goose, Bean Goose, Eider, Grey Plover, Great Black-backed Gull, Herring Gull, Common Gull, Black-headed Gull, Turnstone; and in groups of several hundreds: Spoonbill, Mallard, Pintail, Shoveler, White-fronted Goose, Lapwing, Kentish Plover, Ringed Plover, Redshank, Greenshank, Little Stint, Curlew Sandpiper, Sanderling, Ruff, Avocet.

There are various kinds of birds of prey among the migrant birds which visit the Boschplaat in small numbers, such as: Osprey, White-tailed Eagle, Peregrine Falcon, Merlin.

The Boschplaat also has a rich variety of species of vertebrates and invertebrates and is important in this respect, too.

Priority should be attached to the conservation of the Boschplaat because it is the most characteristic and extensive example of the network of ecosystems in the eastern part of the Wadden islands where numerous complex and variable environments give rise to a great variety of ecosystems with many rare plant and animal species. The breeding colony of spoonbills and the Boschplaat's use as a foraging and resting ground for migrant birds such as waders, geese and ducks is of international importance.

DE WEERRIBBEN

De Weerribben comprises a considerable part of the extensive "valley bog" area of North West Overijssel, which because of its size and variety can be considered the most important wetland area of Western and Central Europe. It is partially dug-out peatland with channels, narrow strips of

land on which the peat was piled and dried, wild grass land, reed beds and quagmires.

The Weerribben is located in the north west of Overijssel province, roughly between the higher pleistocene sandy soil of the Drenthe plateau and high ground of Vollenhoven and the former Zuyder Zee.

It has for centuries been the drainage basin of south west Drenthe receiving surface water and subterranean oligotrophic seepage. The Weerribben is located in the municipality of Ysselham, at 52°37' N, 5°59' E on the topographical map scale 1:25,000, sheet 16 D and C.

The total wetland comprises about 17,000 ha of which 6,100 ha have been secured as a nature reserve. The Weerribben State Nature Reserve, property of the Ministry of Cultural Affairs, Recreation and Social Work comprises approximately 2,300 ha of this, and this reserve is managed by the State Forest Service. The landscape comprises a partially dug-out peat bog. Excavated peat workings are interspersed with narrow strips of land on which the peat was dried, which vary in width.

Here and there the land is not peat, for example a river bed or where land was used for grazing. The valley bog extends in a wedge-shape westwards as far as the clay area of the former Zuyder Zee.

The 1½ metre thick clay layer has developed on two sand ridges running north west/south east. The ridges slope gradually away to the south west. The ground is between 0.2 and 0.7 metres above sea-level. There is still a fair amount of reed cut in this area. Management policy includes mowing the wild grassland. Some parts are used for grazing cattle.

Some shooting takes place and in the Kloosterkooi (a duck decoy) birds are caught for ringing. Some facilities are provided for water sports. There is a visitors' centre, a biological station, some old peat cutters' huts and a primitive type of windmill made of wood in or in the immediate vicinity of the reserve.

Weerribben is very important both in terms of its type of landscape and botanically and ornithologically. Its botanical significance is determined to a large extent by the effect man has had as a result of centuries of peat digging. As a result apart from the wild grass lands, reed beds and quagmires all the different stages whereby land is formed by plant

De Weerribben is extremely important because of its fauna, in particular birds, because of the numbers of breeding birds and migrant birds that winter there. It is a breeding ground for the Purple Heron (70 pairs) Bittern, Great Crested Grebe (shown here), Marsh Harrier and Hen Harrier, Long-eared Owl, Shoveler, Savi's warbler, Curlew Snipe, Black-headed Gull, Black Tern and many species of ducks and other wading birds which frequent valley bog areas.



growth following deposition in still waters are important. The following types of vegetation are characteristic of this valley bog area: The Cowbane-Cyperus Sedge association (*Cicuto-Caricetum pseudocyperi*), 30 ha; Fen Sowthistle and Spurge (*Soncho-Euphorbion palustris*), 40 ha; the Marsh Fern and Tussock Sedge association (*Thelypterido-phragmitetum-Carecetum paniculatae*), 100 ha; the Kingcup community (*Calthion palustris*), about 1 ha; the Meadow Thistle and Purple Moor Grass association (*Cirsio-Molinietum*), 10 ha; the Pale Sedge and Common Sedge community (*Caricion curto-nigrae*), 40 ha; and the Sphagnum association (*Sphagnetum palustri-papillosum*), 10 ha.

All these types of vegetation are of national importance. Of international importance are the Marsh Fern and Tussock Sedge association, 200 ha and the Frog-bit community (*Hydrocharition*), 40 ha. (N.B. the areas quoted were determined on the basis of a mapped area of 1,500 ha). There are many other vegetations typical of valley bog areas in addition to these.

Among the specific flora are many plants rare in the Netherlands such as a species of Bladderwort (*Utricularia intermedia*), Narrow Small-reed (*Calamagrostis neglecta*) and Fen Orchid (*Liparis loeselii*).

The area is also extremely important because of its fauna, in particular birds, both because of the numbers of breeding birds and because of the migrant birds and species which

winter there. It is a breeding ground for the Purple Heron (70 pairs), Bittern, Great Crested Grebe, Marsh Harrier and Hen Harrier, Long-eared Owl, Shoveler, Savi's Warbler, Curlew, Snipe, Black-headed Gull, Black Tern and many species of ducks and other wading birds which frequent valley bog areas. Next to the reserve there is a fairly large unofficial bird reserve with many meadow birds.

The otter is one of the mammals which frequent the area. Of the very many characteristic insects of this type of ecosystem the extremely rare butterfly (*Thersamonia dispar var. batava*) should be mentioned, the West European variety of which at the moment has found its last refuge in the wetlands of the Netherlands.

To sum up, the Weerribben area ought to be conserved because it is one of the most important valley bog areas of Western and Central Europe containing all the characteristic ecosystems of this type of landscape, including a number of rare types of vegetation and plants and animals (the breeding colony of Purple Herons is of international importance).



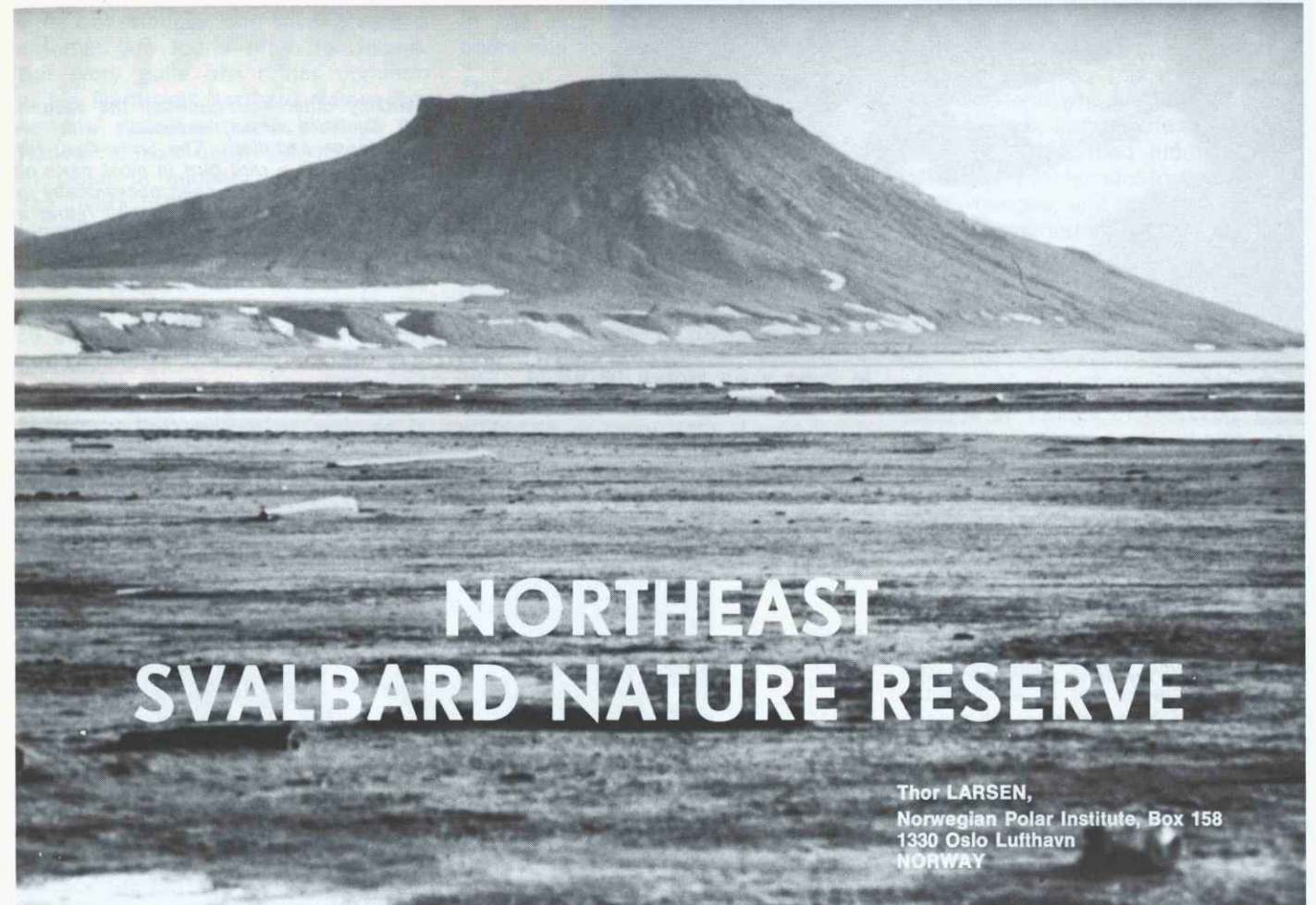
OBITUARY

It is with great regret that we announce the recent death of our friend and colleague, Drs Jan-Piet Doets, the author of this article.

Drs Doets was born on 11 July 1919 in Amsterdam and when in 1966 he became Head of the Nature Conservation Division of the Ministry of Culture, Recreation and Social Welfare, he had already lived a full and varied life. He studied tropical agriculture and served in the former Dutch East Indies, first as an officer in active service and later with the Geographical Institute of the Topographical Services. After a few years in the management of a private enterprise, he returned to public service and, via the Division of Archeology — his life-long hobby — he turned his interests to nature conservation.

In what were to be the last years of his life, Jan-Piet Doets was International Advisor to his Minister for Culture, Recreation and Social Welfare, as well as, for a second term, Chairman of the European Committee for the Conservation of Nature and Natural Resources. With his many other important functions in national and international organisations and committees, Doets was near the height of his career.

Problems only existed for him so that he and his friends and colleagues could solve them. He did so with immense charm, tact and enthusiasm for which he became widely known. He died on his 57th birthday in his modest house in the midst of the old volcano country in the heart of France where he had hoped to spend the rest of his days after retirement.



NORTHEAST SVALBARD NATURE RESERVE

Thor LARSEN,
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NORWAY

Northeast Svalbard Nature Reserve, Southeast Svalbard Nature Reserve, three national parks and fifteen bird sanctuaries were established in the Norwegian arctic archipelago of Svalbard by Royal decree of June 1 1973. The protected areas cover about 27 000 sq. km, or almost half the total area of Svalbard. Northeast Svalbard Nature Reserve is the largest of the protected areas, covering about 15 550 sq. km. It consists of the north-eastern part of Spitsbergen, Nordaustlandet, Kvitøya and Kong Karls Land, and several other smaller islands. The reserve also includes the Hinlopen strait between Nordaustlandet and Spitsbergen and waters adjacent to the islands. The reserve has a geographical location between 78° 30' and 80° 50' northern latitude, and 16° 48' and 30° 40' eastern longitude.

Svalbard, and particularly the western and southern part of the archipelago, is influenced by the West Spitsbergen Current, which branches off from the Norwegian Current and flows north across the Barents Sea and along Spitsbergen, until it submerges underneath the lighter water north of the island. This current explains to some extent why the northern coast of

Nordaustlandet is not permanently covered with ice, but partly open even during winter. But prevailing winds from the east, and cold water and ice which come with the East Spitsbergen Current from the Polar Ocean account for the fact that almost all of Kvitøya and about 80 % of Nordaustlandet are covered by icecaps. The southeastern coast of Nordaustlandet consists of one continuous glacier front of 200 km, interrupted only by three small capes in the north. Several glaciers run into the sea from valleys in the north and west. In normal years, the sea adjacent to the reserve is covered by broken drift ice with small floes in summer. In winter the ice becomes more consolidated, with few leads and heavy floes with pressure ridges.

Thus there are striking differences between the eastern and western Svalbard areas. The west has a relatively mild climate, and little or no sea ice in the summer. The flora and fauna are surprisingly rich. The east is more barren, with considerably lower summer and winter temperatures, a sparse vegetation, and generally fewer birds and mammals. Northeast Svalbard Nature Reserve is truly representative of the high Arctic, with extreme living conditions for plants

and animals. 83 vascular plants have been found in Nordaustlandet, which is about half the total number of species described in Svalbard. Several bird species are found within the reserve, but only 16 species are regular breeders. Among the more common ones are colony breeding seabirds as Kittiwake (*Rissa tridactyla*), Brünnich's Guillemot (*Uria lomvia*), Fulmar (*Fulmarus glacialis*) and Black Guillemot (*Cepphus grylle*). Large colonies of these birds can be found along the north coast of Nordaustlandet and on Kong Karls Land. There are many colonies of the Little Auk (*Plautus alle*) in the reserve, although they are never as numerous as in the west where millions of these birds breed together in some fjords. Other common birds are Arctic Tern (*Sterna macrura*), Purple Sandpiper (*Calidris maritima*), Svalbard Ptarmigan (*Lagopus mutus hyperboreus*), Arctic Skua (*Stercorarius parasiticus*), Red Throated Diver (*Gavia stellata*), Pink-footed Goose (*Anser fabalis brachyrhynchus*) and Snow Bunting (*Plectrophenax nivalis*). Eiders (*Somateria molissima*) are often common on small islands in the fjords. The Ivory Gull (*Pagophila eburnea*) is considered as a rare bird in most parts of the Arctic. In western Svalbard, ivory gulls are only



There are striking differences between the eastern and western Svalbard areas, especially with respect to their fauna and flora. The Ivory Gull, for example, is considered a rare bird in most parts of the Arctic. Such birds are only seen occasionally in western Svalbard whereas they tend to be rather a common site in the Northeast Svalbard Nature Reserve.



There are only a few species of mammals in the overall area, such as the Svalbard reindeer which is well adapted to the harsh Arctic conditions.



One of the major reasons for the establishment of the reserve was the need for an effective protection of the Polar Bear and in particular its denning areas.

With regards to the flora, 83 vascular plants have been found in Nordaustlandet, which is about half the total number of species described in Svalbard. The Svalbard poppy, shown here, is a typical example.



seen occasionally, and small breeding colonies are found often far inland. But ivory gulls are rather common within Northeast Svalbard Nature Reserve. A visitor who sails through the Hinlopen Strait or in the drift ice in the east in summer will frequently see ivory gulls, which are easily identified through their shining white plumage and very characteristic call. On the major islands in the reserve one may find colonies with up to 50 breeding pairs of this high Arctic gull species.

Ravens, birds of prey and owls are absent in the reserve as well as in the rest of Svalbard, due to the lack of lemmings and other rodents. The Snowy Owl (*Nyctea scandiaca*) and Greenland Falcon (*Falco rusticolus candicans*) are occasional visitors, but do not breed. It is the Glacuous Gull (*Larus hyperboreus*) which acts as the major predatory bird. This gull species is common all over Svalbard, and also in the reserve. It often breeds close to eider colonies and cliffs where many other species breed.

There are only a few species of mammals in Svalbard and in Northeast Svalbard Nature Reserve. The Svalbard reindeer (*Rangifer tarandus spetsbergensis*) are to be found in the valleys and on the islands and peninsulas along the north coast of Nordaustlandet and in Wahlenbergfjord in the west. The total reindeer population in Nordaustlandet probably amounts to less than 200 animals. This is not much compared to a population of about 6000 reindeer on Nordenskiöld Land in the west, which has a comparable land area. The Svalbard reindeer is well adapted to the harsh Arctic conditions. It is small, with short legs, and thick, long-haired fur. But even if the animal is fit to survive in a region where most other mammals would die from cold and starvation, the living conditions on Nordaustlandet are nevertheless so marginal that a viable reindeer population cannot be much bigger than the number mentioned above. The reindeer in the west sometimes suffer from ice-covering of the vegetation in winter and consequent starvation and heavy mortality. This rarely, if ever, happens in Nordaustlandet, where average winter temperatures are much lower.

There is only one terrestrial carnivore species in Svalbard, namely the Arctic Fox (*Alopex lagopus*). It is found close to the cliff colonies during summer, where it feeds on eggs, chicks and adult birds whenever it gets an opportunity to catch them. In the winter, the fox is often found out

in the ice, where it follows polar bears and scavenges upon their prey.

The most common seal species in Svalbard, and in Northeast Svalbard Nature Reserve, are Ringed Seals (*Phoca hispida*) and Bearded Seals (*Erignathus barbatus*). The Walrus (*Odobenus rosmarus*) was almost extinct in Svalbard, due to a very heavy harvest up to the beginning of this century. Between 1960 and 1969, an average of only three to four walrus were seen annually. But in 1970, about 50 walrus were seen at Kvitøya, and in 1973, more than 300 animals were observed between Nordaustlandet and Kvitøya. Several islands and shores within Northeast Svalbard Nature Reserve are old hauling-out grounds for walrus, and it is a fair hope that a viable walrus population may once again build up in the reserve.

One of the major reasons for the establishment of the reserve was the need for an effective protection of the Polar Bear (*Ursus maritimus*) and in particular its denning areas. Polar bears are commonly seen in the summer drift ice in the eastern and northern Svalbard waters throughout the summer. As the ice freezes up in the fall, single bears and females with yearlings will move with the ice edge south and west. But pregnant females will seek the shores, mainly on Kong Karls Land and Nordaustlandet, where they will dig their dens and have their cubs. Probably 90% or more of the polar bear dens in Svalbard are found within the Northeast Svalbard Nature Reserve. Kong Karls Land is of particular importance, with a den density of 0.4 per square km of suitable denning habitat.

In Northeast Svalbard Nature Reserve, as well as in other parts of the Svalbard archipelago, terrestrial ecosystems depend heavily upon the production of the sea. Marine and terrestrial ecosystems are perhaps more integrated here than in most other parts of the world. Bird species generally depend upon food from the sea. 90% of the polar bears' diet consists of seals, and bears also eat seaweed, eggs and dead birds. Arctic foxes feed almost exclusively upon seabirds' eggs and chicks, or seal carcasses. Guano from the many birdcliffs fertilise the vegetation, so that seabird colonies can be discovered over a wide area because of the lush vegetation beneath them. This vegetation is an important food source for reindeer summer and winter.

The landscape in the reserve is very different from that in the west, where

mountains are often rugged and more than 1000 metres high, and valleys are often narrow. This makes it easy to understand why the Dutch explorer Barent once named the archipelago Spitsbergen "pointed mountains". In the east, the terrain formations are more rounded, and the mountains are rarely more than 500 metres high. The valleys are wider and more open. The geology of Nordaustlandet is dominated by gneisses, migmatites and mixed metasediments, and there are dolerites, limestones, dolomites, sandstones, shales and others. Kong Karls Land is dominated by Mesozoic sandstones, siltstones and shales, and dolerites. Mountain plateaus are typical for Kong Karls Land.

Svalbard does not have any indigenous people. Wintering trappers from the mainland have concentrated their activities on southern and western Svalbard, and few have wintered in the northeast. There have been few expeditions to the area. Thus Nordaustlandet and Kong Karls Land are relatively undisturbed high Arctic areas. Apart from interesting landscapes and fascinating scenery, Northeast Svalbard Nature Reserve is an important study area for scientists. Biologists can study viable and undisturbed populations of plants and animals which live under extreme conditions. Together with the other protected areas it is large enough to support marine as well as terrestrial ecosystems. The establishment of the nature reserves and other protected areas in Svalbard must be regarded as important steps towards meeting the requirements of the Svalbard Treaty's Article 2, which states that Norway shall protect and if necessary restore plant and animal life in the archipelago.





Italian contribution to the Council of Europe network of biogenetic reserves

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1. TERRITORIES COMING UNDER THE ECOLOGICAL PROTECTION OF THE STATE IN ITALY

The Italian authorities extend ecological protection, as required and duly supervised, in the following forms:

- a) **4 national parks**, which are more or less operational, whose total area is 193,966 hectares (of which only 46,003 belong to the State and the regions, and 30,517 of those forming part of the national forests);

1 national park in the process of being established, with a proposed area of 18,000 hectares (15,000 hectares forming part of the national forests)*

- b) **68 nature reserves, covering 41,067 hectares**. 53 of these, covering 34,082 hectares, have been set up on the territory of the State agency for national forests; 7, with an area of 2,584 hectares, have been set up on the territory of the

agency for regional forests; one, with an area of 11 hectares, is situated on territory belonging to the University of Pavia; 7, with a total area of 4,390 hectares, are managed by the Trieste Karst Protection Society.

- c) **Other territories forming part of the national forests (State or regional), covering 518,858 hectares**. A considerable proportion of these territories has been made over or is currently being made over to the regions, but the signs are that the previous protection system will be retained to a large extent.

In this way the authorities have placed 771,891 hectares under ecological protection, albeit partial and not entirely satisfactory in all cases. This represents 1/39th or 2.56% of the national territory (301,224 km²).

It should further be recalled that the "hydrogeological system" is in force

* It is recalled that 1/6th (about 50,000 km²) of the national territory is exposed to or threatened by erosion. The estimate of mountain territory no longer bearing farm crops, and in need of afforestation in the interests of a sound ecology that is in keeping with its natural vocation, is 3,000,000 hectares, while that of deteriorating and ineffective brushwood that should be converted into woods of timber trees is 3,600,000 hectares.

in some 13 million hectares, that an area of 2,210,700 hectares (1968 figure) comes under the "public use" system which establishes restrictions on use that are in the interests of conservation, and lastly that the **landscaping system**, which is applied to thousands of localities, makes for the protection of the landscape.

In the past, the national forests have always been regarded as important for, principally, reasons of production (timber products) and hydrogeological protection. The concept of nature conservation only recently made its entry into regional planning; in fact, the establishment of the nature reserves in the State-owned national forests has marked a favourable turning, setting aside the institutional aspect, in the policy of managing the national heritage.

Given this de facto situation, the realisation that the natural environment is being rapidly undermined and destroyed by man, and the consequent need to ensure that it is protected, the proposal has been made that 365 new nature reserves (561,389 hectares), 13 inland national parks (452,500 hectares) and 15 coastal national parks (for which no complete figures can yet be provided) should be established (see paragraph 2).

2. ITALIAN NATURE RESERVES IN THE COUNCIL OF EUROPE NETWORK OF BIOGENETIC RESERVES

Italy made the suggestion to the Council of Europe that a European network of nature reserves (which later became the "European network of biogenetic reserves" should be created, and initially participated in the scheme with three nature reserves; a further 10 nature reserves have now been added. Italy is therefore placing 13 nature reserves, extending over 17,951 hectares, under the aegis of the Council of Europe. More additions will be made when the other Council of Europe member states make their proper contribution to the scheme.

The Italian nature reserves described below, to form a part of the Council of Europe network of biogenetic reserves, were set up by the State agency for national forests on the territory of the Italian national forests. The terminology employed in connection with Italian nature reserves is indicated briefly in the following table.



The Isola di Montecristo directed nature reserve in the Tuscany archipelago. Thanks to its natural milieu, its characteristic plant cover, the island of Montecristo is a particularly important biotope acting as a shelter for both fauna and flora. Opposite is the Schiara occidentale nature reserve.

TABLE I

Brief outline of the sub-division of nature reserves into forms, categories and forms
Nature reserves divided into two forms:

I) General nature reserves divided into 3 categories	II) Special nature reserves divided into 2 categories
A) Integral nature reserves	D) Partial reserves divided into 5 types:
B) Directed nature reserves	1) Geological reserves
C) National parks	2) Botanical reserves
	3) Zoological reserves
	4) Biological reserves
	5) Anthropological reserves
	E) Special reserves divided into 4 types:
	6) Reserves of natural localities
	7) Reserves of natural monuments
	8) Protected forest reserves
	9) Reserves for animal and plant repopulation

1. **Valle Scura nature reserve**, in the municipality of S. Giustina Bellunese, mean altitude 1,200 m, 220 hectares.

2. **Monte Pavione nature reserve**, in the municipality of Sovramonte, mean altitude 1,700 m, 491 hectares.

3. **Valle Imperina nature reserve**, in the municipality of Rivamonte, mean altitude 1,250 m, 237 hectares.

4. **Monti del Sole nature reserve**, in the municipality of Sedico e Sospirole, mean altitude 1,250 m, 3,032 hectares.

5. **Schiara occidentale nature reserve**, in the municipality of Sedico, mean altitude 1,450 m, 3,172 hectares.

6. **Piani Eterni-Errera-Val Falcina nature reserve**, in the municipalities of Cesiomaggiore, S. Giustina,

Gosaldo, Sospirole, mean altitude 1,300 m, 546 hectares.

7. **Vette Feltrine nature reserve**, in the municipalities of Sovramonte, Cesiomaggiore, Feltre, Pedavena, mean altitude 1,350 m, 2,764 hectares.

8. **Piazza del diavolo integral nature reserve**, in the municipalities of Feltre and Cesiomaggiore, mean altitude 1,600 m, 606 hectares.

The nature reserves listed above, 1 to 8, all in the province of Belluno, form a coherent whole which may virtually be regarded as a full-scale national park of 15,985 hectares in all. It includes a vast range of natural environments, extending from the level or the plain (altitude 400 m) to a maximum altitude of 2,563 m. It contains numerous endemic and rare plant species and the fauna is rich and varied with rare and endemic species of considerable scientific interest.

9. **Vincheto di Cellarda nature reserve for animal repopulation**, in the national forest of the same name, municipality of Feltre (Belluno), mean altitude 300 m, 92 hectares.

Situated low in the valley, on the right orographical bank of the Piave river, where the presence of streams, canals and springwater, wooded areas alternating with glades cultivated as meadows, provides the ideal setting for a rich and varied aquatic ornithological fauna to find cover and build nests. Alterations are currently being made so as to extend the surface of the stretches of water to accommodate aquatic birds and enable them to build nests. Camouflaged paths and observation posts for watching the fauna for scientific and educational purposes are being provided, as part of the scheme launched by the Council of Europe for the protection and conservation of wetlands.

10. **Sasso Fratino integral nature reserve**, in the Casentino (Forlì) national forests, altitude 900 to 1,500 m, 261 hectares.

This reserve contains one of the few examples of a natural forest in the Apennines, from which valuable scientific and practical lessons may be derived for the restoration of the forest in part of the mountainous chain of the peninsula, gradually being abandoned by man.

11. **Poggio Tre Cancelli integral nature reserve**, in the Follonica (Grosseto) national forest, altitude 160–280 m, 50 hectares, conservation belt 50 hectares.



Here is to be found an example of a kind of "Mediterranean maquis", an interesting plant formation which is a feature of our coastal regions, and currently being destroyed.

12. **Duna Feniglia protected forest reserve**, in the national forest of the same name (Grosseto), altitude sea level, 474 hectares.

The Duna Feniglia has been gradually afforested since 1911, through the forestry administration. The whole area is at present covered with Mediterranean pines, principally domestic pines, and may be regarded as a fine example of reforestation designed to stabilise mobile sand, producing considerable alterations in soil conditions and having beneficial effects in the hinterland against prevailing winds from the sea.

13. **Isola di Montecristo directed nature reserve**, in the Tuscany archipelago, municipality of Portoferraio (Leghorn), altitude between 0 and 645 m, 1,039 hectares.

The island of Montecristo, formed of granite rock, is divided into two main faces — east and west — of a relief whose highest point is the Monte della Fortezza (645 m).

The predominant form of vegetation is the Mediterranean maquis, the main feature of which is the Erica arborea. Another feature of the Montecristo vegetation is the holm-oak (Quercus ilex), as is the wild goat (Capra aegagrus), which here finds its only biotope in Italy. The monk seal (Monachus monachus), which is currently disappearing, is to be found

The Sasso Fratino integral nature reserve was set up by the State agency for national forests on the territory of the Italian national forests to form part of the Council of Europe network of biogenetic reserves. It contains one of the few examples of a natural forest in the Apennines, from which valuable scientific and practical lessons may be derived for the restoration of the forest in part of the mountainous chain of the peninsula gradually being abandoned by man.

on the coast. The area provides an important shelter and rest place for migratory wildlife. Its scientific management is carried out in conjunction with the National Research Council.

Thanks to its natural milieu, its characteristic plant cover, the island of Montecristo is a particularly important biotope acting as a shelter for both flora and fauna. A plan is to be devised for its ecological development, in which the main objectives will be the elimination of the ailanthus, an Asiatic plant which is invading the island and threatening the Mediterranean vegetation, and also the demarcation of zones where goats shall not be allowed to graze, so that the holm-oak vegetation, currently disappearing, may be restored.

CONCLUSION

This is Italy's first contribution to the Council of Europe network of biogenetic reserves.

In choosing the nature reserves mentioned above, the intention was to include the most varied and interesting natural phenomena from the point of view of the landscape, vegetation and fauna.

Italy hopes that a joint policy will be devised within the Council of Europe for the co-ordinated management of the network of biogenetic reserves, and that a scheme for registration, verification, supervision and international co-operation will be set up for this purpose.

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EUROPEAN HEDGEROW LANDSCAPES

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Travelling across Europe, one may suddenly happen to find oneself in a green, patchwork landscape composed of fields enclosed on all sides by quickset hedges. Such landscapes represent a particular style of countryside planning which is now largely out of favour with agronomists. And yet, a survey of available ecological data on the hedgerow system would suggest that it deserves consideration as a means of improving production.

Ecology is concerned with the relationships of organisms among themselves and with their environment. In hedgerow landscapes these relationships are highly complex, and an objective judgment is possible only in the light of a comprehensive study.

The first aspect concerns climatology. Numerous experiments, some of which were conducted long ago, have revealed the favourable climatic conditions for production which prevail in hedgerow landscapes. This is most frequently explained by the regulation of potential evapo-transpiration or PET (amount of water lost through transpiration and evaporation by plants and the soil supporting them). In open country, the PET rate frequently exceeds the limit beyond which the stomata also give off CO₂ during photosynthesis, this ultimately leads to a cessation or decline in photosynthetic activity, which means less absorption of solar energy by the plant and thus less growth.

Despite variations according to crops, localities and experimental conditions, all available statistics indicate a general tendency for yields to be greater in the case of fields screened by hedges, allowance being made for the loss usually occurring along a hedge. Here are some random examples:

Windbreaks in Jutland (Denmark)
+ 5 to 10 % for crops
+ 20 % for pasture
+ 25 % for orchards

Beauce (France)
+ 15 % for wheat

Brittany (France)
+ 4 % for maize cobs
+ 11 % for maize stalks.

To make a detailed survey of these findings and to qualify them as appropriate would be to go beyond the scope of this article. It is obvious however that such data put to question the commonly accepted techniques of countryside planning.

Certain recent experiments show that the factors involved are highly complex and that the final result is a synthesis of opposing tendencies. For example, the reverberation of light by a hedge may cause an increase in PET in the vicinity of the hedge. This does not, however, prevent the yield from the field as a whole from increasing, which is probably due to both an overall reduction in PET and an increase in temperature. Another important point is that growth occurs much earlier.

At all events, certain precise conditions have to be respected if agronomic benefits are to be achieved:

- A prevailing wind does not in fact blow all year round. Moreover, it is often diverted by a wood, a rise in the ground etc. It is not enough, therefore, to plant a hedge in the path of the prevailing wind; a field must be hedged all round.
- If openings 30–60 feet wide are made in hedgerows, if hedges are overpruned and as a result become holed or if rows of trees are planted without any intervening bushes there is likely to be air turbulence which will increase PET instead of reducing it.

Other climatic and micro-climatic factors may be mentioned, but a detailed description is impossible. Suffice it to say that the disappearance of hedgerow landscapes is generally considered to cause a drop in average temperatures of 1°. More specifically, there is an increase in daytime temperatures during clear weather, although this latter finding is a subject of controversy. Generally speaking, it may be said that, by raising the average temperature, reducing evaporation, limiting the mechanical effects of the wind and allowing snow to accumulate and thereby provide frost protection, hedgerows have a beneficial effect on agricultural production. The technical criteria to be respected

in the management of hedgerow landscapes (enclosure of fields, limitation of turbulence) provide a basis for defining an "ideal type" of hedgerow system by reference to which all European hedgerow landscapes may be classified.

Such classification cannot be founded exclusively on climatic criteria. Account must also be taken of the role of hedgerow landscapes in regulating water circulation. Hedges can act as dams, thereby limiting the scale of both floods and droughts. Conversely, the pumping action of trees can also prove useful in cases of excessive humidity. This moisture-retaining function has implications for erosion. The increased run-off that is one result of the large-scale up-rooting of hedges which accompanies land consolidation schemes not only causes a serious loss of top-soil but at the same time washes away fertilisers. In certain cases, considerable wind erosion also takes place. These physical factors interact with the biological component of the environment, namely the entire range of fauna and flora.

Let us take one of the best known examples: the disappearance of hedgerows means a reduction in the number of the birds of prey which normally find shelter there and hence a proliferation of field voles, which are no longer controlled by their natural predators.

Other breaks in food chains may be discerned throughout the scale of species. Insectivorous birds (robins, warblers, tits) keep down the populations of pests which are proving more and more resistant to insecticides. Even granivorous birds, which may otherwise be considered harmful, make a contribution in this respect because their diet often includes insects (when they are feeding their young). This brings us to a general fact of ecology: no species is useful or harmful "per se", even though either aspect may be more marked. What decides whether or not a given species has a negative impact is its population trend. A useful species may prove noxious if allowed to proliferate. A troublesome species may prove very useful in certain features of its activity.



A hedge forms a continuous boundary offering shelter for both shade- and sun-loving species, thus acting as a sort of "machine" for maintaining biocenotic variety and hence the equilibrium which is a guarantee of good production conditions.

The lesson to be drawn is that perfectionism should be avoided. A pest-free agriculture will probably never exist. What matters is to keep the population of undesirable species below the level where they become a problem. This task is usually already performed by natural predators, which need certain biotopes for their survival.

This is particularly striking in the case of insects which control one another through predatory or parasitic behaviour. The tiny parasitic hymenoptera are one outstanding group in this respect, as they attack almost all insects of their kind.

Mention should also be made of carnivorous insects such as carabids, boverflies (Syrphidae), robberflies (Asilidae) and preying hymenoptera, as well as ladybirds which consume great quantities of greenfly.

Generally speaking it may be said that, by raising the average temperature, reducing evaporation, limiting the mechanical effects of the wind and allowing frost protection, hedgerows have a beneficial effect on agricultural production.



limit the population of bee-eating voles.

These interrelationships within hyper-complex ecosystems also involve soil organisms — mites and ticks (Acarina), earthworms (Lumbrici), threadworms (Nematodes), mushrooms and toadstools, Collembola — which often prove highly sensitive to soil desiccation caused by the razing of hedgerows.

It is also necessary to bear in mind the influence of man himself, with the crops he grows and the animals he rears. Veterinary opinion is unanimous that the latter are at greater risk in open countryside, as they extend more calories to maintain their body temperature and are more prone to bronchitis, pneumonia, sunstroke etc.

Taking account of all these factors, then, the hedgerow landscape may be described as a finely balanced system safeguarding against extremes. A wide variety of species is the key to this equilibrium, for the more species there are, the more likely is a link which disappears from a food chain to be replaced by another. The system is also a safeguard against the proliferation of individual species, and an endeavour should be made to spread it as widely as possible while using up a bare minimum of arable land. As we have seen, a sound way to achieve this is to divide up the countryside into an even pattern of hedgerows. A hedge forms a continuous boundary offering shelter for both shade and sun-loving species, thus acting as a sort of "machine" for maintaining biocenotic variety and, hence, the equilibrium which is a guarantee of good production conditions.

The resolution adopted by the Committee of Ministers of the Council of Europe is thus of cardinal importance not only from the nature conservation point of view but also in economic terms, if indeed the two aspects can be separated.

Its application should be modulated according to the different types of hedgerow landscape indicated earlier. These types cover areas which in no case coincide with national frontiers. However, they have not all yet been charted, and a general biogeography of hedgerow landscapes has still to be compiled. This could lead to a new method of planning the countryside, whose survival depends on the thorough application of ecological data. Any economic system which disregarded this fact by upsetting the biological foundations of production would in the long run result in population exodus accompanied by major social upheavals.



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