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Two-tailed Pasha (*Charaxes jasius*), detail of lower wing, Mediterranean coast:
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Editorial

The trans-European network

Essential initiative for checking the decline in biological diversity



Human activities are constantly invading or threatening new areas of land and competing with the natural habitats of the various species that live on our planet.

This is one of the major causes of the decline in biological diversity. The development and management of land in a way that respects nature are therefore essential to the survival of many threatened species.

These species need enough space in their natural areas of distribution to allow them to thrive, not some kind of "Indian reservation" that might disappear as soon as disaster strikes.

The preservation of biodiversity therefore depends on a sufficient number of sites being maintained in all those geographical areas where habitats or species need protection and where natural living conditions are safeguarded. By setting up ecological networks, a new dimension can be given to nature conservation policies which, until now, have been based on the notion of separate protected areas. The aim from now on is to create a coherent overall structure which transcends national frontiers.

Such a network can only exist and develop if there is close co-operation between the countries concerned. First of all, they must define and use common concepts and standards, then select appropriate areas and finally, manage the network in a coherent fashion.

Networks may take various forms, depending on their scientific, sociological, territorial and legal characteristics.

To give an example, the European Union established the Natura 2000 network in 1992, basing it on a few important principles to ensure the success of its policy:

- human presence must not, as a general rule, be banned from protected sites; it is governed by the principles of sustainable development which incorporate the environmental aspect into the different policies applied at territorial level;
- any development which is likely to damage the state of conservation of natural habitats or wild species of flora and fauna of interest to the community may only be authorised in exceptional circumstances and on condition that guarantees are given and compensation is provided;
- the conditions required to enable the network to function properly are ensured by a legal system which encourages member States to respect their commitments under the Habitats Directive;
- financial support from the community is essential where sustainable management involves additional cost;
- the support of local people is indispensable if the network is to be successful.

The Natura 2000 network abolishes notions of artificial frontiers in favour of homogeneous biogeographical entities. It is logical that it should not stop at the existing boundaries of the European Union. The current initiative taken under the Bern Convention, the forerunner of European policy on nature conservation, to set up an Emerald Network compatible with the Natura 2000 network therefore receives the European Union's wholehearted encouragement. Every sovereign country is of course free to choose the characteristics of its own network, but close co-operation among Europeans on the goals to be reached and the methods to be used can only be in nature's interests. ■

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Introduction to this issue's theme

Several networks of protected areas, mostly made up of central areas, have gradually been established over the past years, upon the initiative of international and non-governmental organisations. Special care must be exercised to ensure their preservation and the strengthening of the status of the areas concerned. However, nowadays it is advisable to go even further by preventing habitat fragmentation, encouraging ecological links and reinforcing this fragile natural "spider's web" so essential to the survival of many species.

The conservation of wild species often entails the preservation or creation of an ecological network, which can be defined as all the biotopes likely to provide them with a temporary or permanent habitat, respecting their vital requirements and ensuring their long-term survival. This network must be made up of several elements:

- central or core areas, in which active or passive nature conservation has priority over other functions and which are generally surrounded by buffer zones;
- areas of development or restoration of natural values, in which the conservation of species and their habitats is compatible with economic exploitation, given certain precautions or (re)adjustments; and
- liaison corridors, enabling migration and exchange between populations of different habitats.

The Pan-European Ecological Network, a determining element of the Pan-European Biological and Landscape Diversity Strategy approved in 1995 by the Pan-European Ministerial Conference of Sofia, pursues this objective. The Cracow Declaration adopted by the international conference entitled "The green backbone of central and eastern Europe", held in February 1998, particularly

stresses the historic opportunities that still exist in central and eastern Europe to protect this natural heritage.

The aim of this issue, devoted to the networks in all their diversity and multiplicity, is to contribute to further reflection on this new approach.

Eladio Fernández Galiano
Chief Editor

Why ecological networks?

Essential natural elements

Rob H.G. Jongman

Species and their movements

When you see the geese fly south or you suddenly get a glimpse of a badger, you do not always realise that they go somewhere with a target in mind. The geese fly south to migrate from their breeding grounds in the north of Europe to their winter biotope. The badger goes along his usual route for foraging. Common toads migrate in large groups from their hibernation shelter to the water where they have been born to lay eggs in the same place.

You can see dead animals on the road often on the same spot. That is not by accident. Animals often use the same way they have used traditionally to go from one place to the other. Storks return to their nest from Africa just like people return home from their holidays. It sounds very human, but in this behaviour there is not much difference between wild species and mankind. As long as the migration routes are available and without too much danger for the species, we do not notice it, because they come and go. The birds fly over, the badger passes in the night just like the toads and the only thing most people notice are the toad eggs in the water and the stork when it has returned.

Species' needs

Amphibians and mammals are able to disperse over distances from several metres to hundreds of kilometres. For small mammals ecological corridors can be hedgerows, brooks and all kinds of other natural features that offer shelter. For forest birds, small-scale landscapes characterised by a certain density in wooded banks can function as corridors from one forest to another. Birds like geese use northern Europe for breeding and southern Europe for wintering. Swallows and storks use the European continent as part of their migration route to Africa. Salmon and sturgeons move up the rivers. Migratory species are not only dependent on their breeding habitats, but also on the presence of temporary habitats along their migration route.

Structure of an ecological network

These so-called stepping stones and ecological corridors are essential for wild species to survive, as science has taught us, and their existence is no longer obvious in the cultural landscapes so densely populated as in Europe and so highly productive for human purposes. This conclusion brought scientists and plan-

ners in the 1970s in Russia, Czechoslovakia and Lithuania, and in the 1980s in the Netherlands, Denmark and Germany and later in many other countries, to think of nature as coherent networks, as ecological networks.

Ecological networks are thought to be composed of core areas, (usually protected by) buffer zones and (connected through) ecological corridors. If core areas are too small or non-existent, nature restoration projects can be started. If linkages are blocked or are threatened to be blocked by roads or other infrastructures, passages such as tunnels and fly-overs can be constructed for both man and wild animals.

Core areas

Core areas are large areas with good living conditions which are always inhabited. In good reproductive years species will move from these areas into other, more marginal sites. In Europe, most natural and semi-natural habitat sites are remnants of a former natural area. In the time that Europe was covered only by natural and semi-natural vegetation, species within these forests and scrubs - in general the less dynamic habitats - had no problems of dispersal or migration. Their biotopes were large and easily acces-

sible. Dynamic ecosystems were present as well, but these were relatively small and the species were adapted to fast and easy dispersal. Nowadays the situation is the opposite, isolation being an important feature in European agricultural landscapes.

Area reduction will not only cause a reduction of the populations that can survive and in this way increase the risk of extinction, it also will increase the need for species to disperse between sites through a more or less hostile landscape. Migration routes can be manifold, from single wooded banks to small-scale landscapes, and from river shores to whole rivers and coastlines.

Buffer zones

Buffer zones serve the relationship between society and nature; they aim at controlling human activities within the lands adjacent to a protected core area such as a national park by promoting sound management, thus decreasing the potential impacts of man.

Ecological corridors

Ecological corridors are spatial structures which generalise the results of ecological research on population dynamics findings and species dispersal into a landscape structure. In this way they are a landscape planning concept for joining species needs and landscape structure.

Ecological corridors are various landscape structures, other than patches, varying in size and shape, from wide to narrow and from meandering to straight, representing links that permeate the landscape and maintain or re-establish ecological connections. Nature needs different types of ecological corridors and these have a complementary role to play in the interconnected habitat island system that nature has become in modern society.

The spatial scale for species, and in this way the scale of the networks, can differ from local to continental and global. As the distance between suitable sites increases, the number of species that can bridge this distance decreases. Ecological corridors and stepping stones then become even more essential for the long-term survival of species. Corridors encompass the particular landscape features and contribute to the overall character of an area capable of supporting such species, at what has been called in European policy a "favourable conservation status", a situation in which a population can survive as long as possible.

Core areas must inevitably be linked with the wider countryside to allow species' dispersion to smaller sites. On the other hand, species must have the possibility to colonise empty sites within the core areas if available.

Barriers

In present-day landscapes, natural species meet all kind of barriers: increasing traffic and intensifying agriculture as well as the

disappearance of small-scale structures in both agriculture and forestry. Hedgerows have disappeared in intensively used agricultural land, forests have become uniform production forests, streams have been straightened and the road system asphalted, more densely, more intensively used. Last but not least, many large and important wetlands have been drained. Canalisation of waterways and the building of motorways disturbs both the habitats of species as well as their possibility to disperse.

Planning an ecological network also means mitigation and compensation of the man-made infrastructures. Fish ladders have to be built to make it possible for fish to cross weirs and locks. Road crossings can be tunnels or fly-overs. Tunnels are used by small species, fly-overs or ecodecks are meant for larger species. In all cases, the landscape has to be adapted to its function: hedgerows and small forests for guidance and shelter have to be planted. For those animals using water as a corridor, waterway crossings have to be developed. Natural banks must be maintained and where roads cross waterways, tunnels must consist of both a dry and a wet passage possibility for fauna.

Local, national and international networks

Ecological networks have been developed by all kind of institutions and authorities throughout Europe. The Council of Europe was the first to develop a system of biogenetic reserves. The European Union developed an approach for conserving European core areas for nature conservation through its species and habitats directives under the name Natura 2000 and the last international initiative is the Pan-European Ecological Network, part of the Pan-European Biodiversity and Landscape Diversity Strategy.

Many national networks developed from strategies for conservation of core areas to development of ecological networks. Already in the 1970s studies were carried out and plans were made in Lithuania and Estonia. In the beginning of the 1980s planning started in Czechoslovakia. In the same period the idea was introduced as part of the Danish regional plans and in the middle of the 1980s in the Netherlands the concept was translated into a plan. Now plans are under development in over 15 countries varying from local plans (around cities like Lisbon) to regional and national plans. ■

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Endla bog, nature reserve in Estonia



R.H.G. Jongman

Building networks of protected areas

A necessity for the Europe of tomorrow

Jean-Claude Lefeuvre

A historical heritage

The face of the world would have been changed if the human communities migrating from the eastern part of the Mediterranean at the end of the last ice age had chosen to make the forest which was progressively spreading all over Europe their preferred habitat. They could have made this choice, just as many Indian tribes of the Amazonian forest, African pygmies and a number of Indo-Malayan communities had done. The choice they did make was quite the opposite, that of imposing on the land a habitat that favoured grasses at the expense of trees. The struggle against natural ecosystems had begun.

This struggle continued throughout the world in direct relation to the appetite of the Spanish and Portuguese conquistadors who invaded South America, or the French and English colonisers of India, North America and Australia. European know-how in methods of combating forests grew and spread in all these countries, and with it came the conviction that the only way of controlling the land open to human beings was to dominate, destructure and remodel the native ecosystems. A drastic regression of the areas occupied by dominant ecosystems such as forests, fragmentation, a profound transformation of the organisation and structure of subsisting strips of land, the decline of wild animal and plant life and the extinction of certain species are the keywords in a report that shows the human race, and particularly Europeans (though it is true that Far Eastern peoples followed suit), to be the true destroyer of the planet. What other word can be used when we know that, for example, in less than 200 years, Australians of European origin have brought about the extinction of 14 species of marsupials and that dozens of species of arthropods, most of which remain unknown, are destroyed every day by the advancing bulldozers in the Amazonian forest.

National solutions

After the creation of sacred places and woods, followed later by royal forests, the modern method of fighting the regression of natural environments and of calling a halt to the extinction of species has been to "put up defences". Although such a policy was easy to develop in territories that had only recently been occupied on a vast scale - setting up national parks in America, Australia and New Zealand - it was much more difficult to apply it to Europe, where the land has been undergoing profound change and been managed by human beings for thousands of years. Any

nature conservation policy developed in our regions had to be a diversified one. This has been all the more the case as Europe is not yet a federal entity and each country has been free to adapt those measures which it judged most suitable for protecting its natural heritage to suit its own needs. The result of this state of affairs is that there is a multitude of conservation measures which, in France, range from decrees on the biotope, aimed at protecting an area in order to protect a species or a key phase in a species' life cycle (the mating periods and spawning grounds of certain fish, for example) to national parks set up to conserve a diversified series of ecosystems and protect remarkable species, biogenetic reserves, nature reserves, regional natural parks and landscaped gardens, and so on.

Setting up networks

On top of these national initiatives, European and international schemes have been devised. These are of special merit because they are set up on the basis of a single theme, thereby constituting an extremely clear and consistent network. This is the case, for example, of the Ramsar sites or Unesco's biosphere reserves. The future Natura 2000 network has been designed according to this principle. The federations of national parks or nature reserves also achieve this coherence.

The Council of Europe, aware of the importance of setting up a network of protected areas which, in addition to being more clearly identifiable, enables know-how to be shared, has taken two initiatives to clarify a somewhat confused situation. The first of these is the European Diploma, which unites, under the same banner, areas remarkable both for the quality of their natural heritage and for the management methods that perpetuate their conservation under the same banner. The second is an inventory of protected areas in Europe and an attempt to harmonise criteria for them. The Council of Europe, backed by the European Network of Biogenetic Reserves and the Bern Convention, could take advantage of the fact that most European countries have signed the Convention on Biological Diversity to help clarify the status of numerous nature reserves through its newly created Emerald Network.

Clarification, inventories, network-building and exchanging know-how are all the more important as European countries progressively link up.

Regional planning policy

But the building of such a network, if it is to be realistic and a guarantee for the future, must be accompanied by a new approach to

regional planning. Protected areas in Europe, fragments of nature isolated within an increasingly hostile mould that was created by the agricultural revolution which began in the 1950s, are doomed, little by little, to lose the remarkable species which were their *raison d'être*. If we want to prevent this erosion taking place, we must make use of the progress made in landscape ecology, which shows that extinction phenomena can be compensated for by colonisation phenomena if communication between each fragment can be achieved by creating a network of "corridors". All the countries that are Contracting Parties to the Convention on Biological Diversity now know that in order to maintain the richness of their natural heritage, they must apply a policy based on two key principles:

- first, they must develop networks of protected areas, so that core areas are not cut off from one another, and enlarge them, in particular by giving renewed importance to the notion of buffer zones, a notion which has too often been neglected in Europe despite its success in, for example, the Abruzzi National Park;
- second, they must make it easier to build up connections between protected areas by improving, or even creating, natural infrastructures in order to form as dense a network as possible which will encourage species to disperse and intermingle.

Necessity for the future

The advantage of these measures is that they can be taken at different levels, from the restoration of a functional basic unit such as a catchment basin to the whole of a national territory (including the integration and management of roadside verges) and even at European level (the Pan-European Ecological Network). Without such a policy, which, in our opinion, is the basis for a pan-European strategy for biological and landscape diversity, the species which make up Europe's natural heritage, the rarest of which are confined to cramped protected sites, have no chance of survival in the long term, especially when we consider that significant climatic changes might well cause an upheaval in the present bio-geographical distribution. ■

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Varied profiles

In the European Union

Natura 2000: issues at stake and prospects for this network

Olivier Diana

The Natura 2000 network lies at the very heart of the European Union's nature conservation policy.

The aim of this coherent ecological network of protected natural sites is to maintain biodiversity through the conservation of certain types of habitat (approximately 250) and wild species of fauna (approximately 200) and flora (approximately 430) all over Europe.

It includes the Special Protection Areas (SPAs) classified under EEC Directive 79/409 (also known as the Birds Directive) and will include the future Special Areas of Conservation (SACs) to be designated under EEC Directive 92/43 (also known as the Habitats Directive).

The network will be set up in three distinct stages. The second, crucial, stage involves a list of Important Community Areas (ICAs) being drawn up jointly by the Commission and the member States. Because some of the national lists have not been received in time, for the first stage, it will not be possible to carry out this stage on schedule (June 1998). The Commission has brought proceedings against the states concerned.

However, significant progress has been made: almost 12% of Community territory (6 116 sites) has been proposed for inclusion in the Natura 2000 network by the 15 member States.

The European Union and its member States must nevertheless make a considerable further effort if a really coherent and representative biodiversity network is to be set up in Europe.

Major issues

Natura 2000 already concerns almost 12% (perhaps 15% in the near future) of Community territory and will therefore exert great influence on land development and spatial management policies. Moreover, it will not be limited to core areas of exceptional heritage value, but will include buffer zones and ecological corridors which are necessary for the conservation of migratory species.

In contrast to the sometimes heated debate generated by the Habitats Directive, the success of Natura 2000 relies first and foremost on constant dialogue being maintained with all the partners involved, particularly at

local level, and on clear and accurate information being made available.

Two questions are of particular concern to those operating on the ground. What activities will be authorised or forbidden on Natura 2000 sites? Will financial resources be available in the event of socio-economic activity being affected by environmental objectives?

As regards the first question, it should be emphasised that the aim of the Natura 2000 network is not to create sanctuaries where all human activity is banned. Natura 2000 does not ignore socio-economic reality. The use of land and natural resources is possible on condition that the general objective of preserving the designated sites is met. Site management arrangements are worked out for each ICA under the responsibility of member States who may, if they wish, draw up management plans. Any development plan or scheme within a Natura 2000 site may only be carried out under certain conditions, which are laid down in Article 6 of the Habitats Directive and which member States have to comply with. These are:

- proper assessment must be made of the impact of the project on the site's conservation objectives;
- if the impact of the project appears to be significant, alternative solutions must be sought;
- compensatory measures must be envisaged in cases where the project is of major interest and no alternative solution can be found.

As for the second question, Article 8 of the Habitats Directive requires member States to inform the Commission of the amounts they consider necessary for sites containing priority habitats and/or species. The annual budgetary provision of the LIFE financial instrument for the environment (approximately 50 million Ecus), although highly beneficial to nature conservation, would not be sufficient to run the network. The Commission and the member States have already stressed the need to use existing Community financial arrangements to support Natura 2000 (agro-environmental measures and structural funds).

Prospects

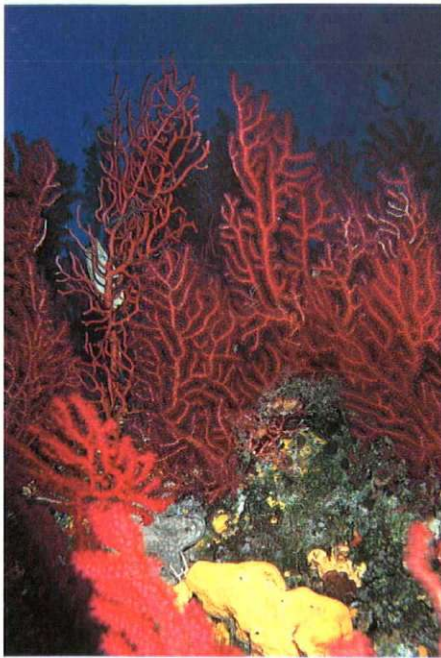
Natura 2000 is a major challenge, not only to the 15 member States but also to those countries which will apply for membership of the Union in the future and which are being prepared thanks to the Emerald Network. It offers real opportunities for:



- significantly increasing the number of nature conservation areas in Europe;
- integrating nature conservation targets into sectoral policies (such as spatial planning and rural development and the Common Agricultural Policy);
- mobilising financial resources at local, national and Community level to enable the network to function properly;
- creating employment in the agricultural, tourist and recreational sectors with prospects for sustainable development.

The Commission is willing to discuss these questions with member States and to encourage the financial arrangements. It will keep a close watch on the development of the Natura 2000 network. It will also make sure that member States honour the obligations set out in the two directives in applying international conventions, particularly the Bern and Bonn Conventions and the Convention on Biological Diversity. ■

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Y. Tavernier



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▲ Wrasse (*Labrus*)
 ▲ Sea fan (*Gorgonacea*)

In the Council of Europe The European Diploma... A permanent review

Eckhart Kuijken

In 1965, the European Diploma was introduced as an award to distinguish prominent conservation areas in the member States of the Council of Europe, placed under its supervision. To date 50 sites covering about 20 000 km² have this specific status. Seven new candidates are being considered.

Diploma areas need to meet stringent selection and evaluation criteria. The areas protected must be of particular importance for the conservation of biological diversity in Europe, remarkable natural phenomena or geological or physiological formations characteristic of the earth's history, or for the conservation of landscape diversity in Europe. In addition they must have an adequate protection status. An annual report has to be prepared giving details of nature management, research, educational functions and environmental policy concerning the site.

The Diploma is characterised by a unique set of review procedures, ensuring the high standard of this label. Recommendations are therefore discussed during on-the-spot visits of experts and evaluated by the Specialists Group, preparing sound advice to the Council of Europe. These recommendations are revised on a five-year basis for the renewal of the Diploma, thus functioning as firm guidelines for the site managers and requiring the commitment of the authorities concerned.

Through the organisation of meetings for the managers of Diploma areas, the Council further advances the development of common conservation strategies and the exchange of

experiences in management techniques of importance for the network as a whole.

Although no financial support is involved, the supervision by the Council of Europe gives this Diploma an eminent moral impact, which can be strongly brought into play when specific threats from surrounding developments arise. When negative evolutions persist, severely affecting the protected area itself, the Council can decide to with-

draw the Diploma. This of course is an ultimate signal that blames national authorities for not having succeeded in saving the natural values of sites that they themselves have proposed to be placed under the prestige of the Council of the Europe. ■

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Specially protected areas in the Mediterranean

Chedly Rais

Developing protected areas is one of the priorities of the Mediterranean Action Plan (MAP), which involves most Mediterranean countries.

These countries have so far registered 132 protected sites on the list of protected marine and coastal areas in the Mediterranean, covering some 1.8 million ha, which is maintained by the Regional Activity Centre for Specially Protected Areas (RAC/SPA) in Tunis. Over half of this area (1.1 million ha) is on dry land, as compared with 550 000 ha at sea and 120 000 ha in wetlands areas.

Before 1995 the MAP had no system for registering protected areas recognised as being of particular importance for the region or for

attributing a "Mediterranean award" to especially important, well-protected or well-managed natural sites. The register, which was drawn up by the RAC/SPA, lists the sites country by country. It is a non-selective inventory and is principally aimed at providing information on sites with protected status in the Mediterranean coastal area.

As part of the revision of the Barcelona Convention and its Protocols, a new concept was introduced into the MAP system, namely the list of Specially Protected Areas of Mediterranean Importance (SPAMI), established under the new Protocol on specially protected areas and biological diversity in the Mediterranean (Barcelona, 1995). Under this new Protocol the States Parties can propose areas under their jurisdiction (or even areas on the open sea outside any state jurisdiction) for inclusion on the SPAMI list.

However, only areas protected in accordance with the criteria set out in the Protocol can be included on the SPAMI list. This list, which is to be drawn up as soon as the new Protocol comes into force, is expected to provide a major incentive for the conservation of the Mediterranean heritage.

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...and biogenetic reserves Study and protection of a valuable heritage

Marc Roekaerts

Gradually, a network of 344 sites in 22 countries has been designated since in 1976 the Committee of Ministers of the Council of Europe decided to set up this European Network of Biogenetic Reserves (Resolution (76) 17). From the Arctic (north-east Svalbard) to the Mediterranean (Samaria, Greece) and from the Atlantic (Ilhas Desertas, Madeira) to central Europe (Brehyne-Pecopala, Czech Republic), from coastal lowlands (De Westhoek, Belgium) to Alpine regions (Gurgler Kamm, Austria: 3 768 m altitude), from very small (Fungus Rock, Malta: 0.7 ha) to very large (Belovezhskaya Pushcha, Belarus: 177 000 ha), they are all characterised by one or more typical, unique, endangered or rare species or habitats, and they enjoy sufficient legal protection for the long-term preservation of the species and habitats for which they are designated.

The Network of Biogenetic Reserves is created with two aims. First, it should contribute in guaranteeing the biological balance and conservation of representative examples of our common European heritage. Different habitats and species groups have been given priority for the framework procedure of the Network (Resolutions 1979 (10), 1981 (8), 1986 (10) and 1992 (19)). Secondly, it should provide a field of research, to act as a living laboratory, for finding out how natural ecosystems function and evolve. This scientific knowledge also allows the public to be instructed and trained

on matters pertaining to the environment. The Council of Europe has published many reports on various habitats and species groups (*Nature and Environment* series) to stimulate this aim and help countries to identify important sites.

The level of information accumulated in the biogenetic reserves data base also illustrates this aim and highlights many aspects of the network. More than 18 000 species records of 6 177 different species have been accumulated together with their status in the reserve (characteristic, dominant, threatened, endemic, migratory or not native). Some sites indicate more than 1 000 species (Thursley Common, UK and Mongan Bog, Ireland). Almost all reserves contain threatened species, of which some are threatened endemics such as the Glénan narcissus (*Narcissus triandrus capax*) on the little island of St. Nicolas des Glénan, France. The number of lower plant, amphibian, reptile and invertebrate records is significant: more than 17% of all records, which illustrates the special attention given to those species groups, normally less attractive.

The Network provides Council of Europe member States and European states non-members of the Council of Europe with a framework for international co-operation in a policy for establishing protected areas to complement and strengthen each other in safeguarding the biological diversity of Europe.



Heathlands and butterflies, a habitat and species group which are given priority in the framework of the European Network of Biogenetic Reserves

The data collected for the sites is a source of information which could also be explored in the field of other environmental issues. ■

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Biosphere reserves (MAB)

Original all-round strategies

Catherine Cibien

Over the past 20 years or so, 352 areas in 87 countries, including 137 in Europe, have been designated "biosphere reserves" by Unesco under its Programme on Man and the Biosphere (MAB). They are managed on the basis of a common concept detailed in the Seville Strategy (1995), which aims to carry out original strategies combining conservation of natural and cultural diversity with ecologically, economically and socially viable development.

Preserving "ordinary nature"

One original feature of biosphere reserves is that alongside the statutory protection of areas of outstanding ecological value, they assign great importance to the conservation of "ordinary nature". Despite growing awareness of their importance, ordinary natural areas all too often bear the brunt of destructive forms of exploitation such as intensive agriculture, which uses pesticides that have eradicated many plant and invertebrate species, and forestry development which eliminates the older stages essential to biodiversity.

So biosphere reserves are built around a zoning system: strictly protected central areas are surrounded by buffer zones designed to strengthen the protection of the central areas by creating the corridors that research now considers so important. The central area and buffer zone are included in a co-operation area where the accent is placed on rational resource management methods. This involves seeking to actively involve the local population in management of their area, with the aid of educational projects and information campaigns. The purpose of a biosphere reserve is to achieve more rational management of its resources in the co-operation area by bringing together and co-ordinating various players, relying on negotiation and setting up contractual arrangements as part of consistent policies involving the local partners. Clearly, biosphere reserves operate chiefly in the long term.

Another original feature of biosphere reserves is the role of research and environmental monitoring, which helps managers base their decisions on objective knowledge of the ecological, economic and social situation, with these areas serving as testing grounds.

A real basis for exchange

The common concept of biosphere reserve affords a real basis for exchange via interlocking networks. Various countries operate national networks: for example, the network of nine French biosphere reserves is gradually being organised; the reserve managers

meet regularly and are adopting joint management tools. Thematic or geographical meetings are arranged at international level: the co-ordinators of the European and North American reserves meet regularly and discuss issues such as the economic aspects of sustainable tourism, local community involvement, the consistency of fauna and flora databases and research programmes. These exchanges are now backed up by forums on the Internet.

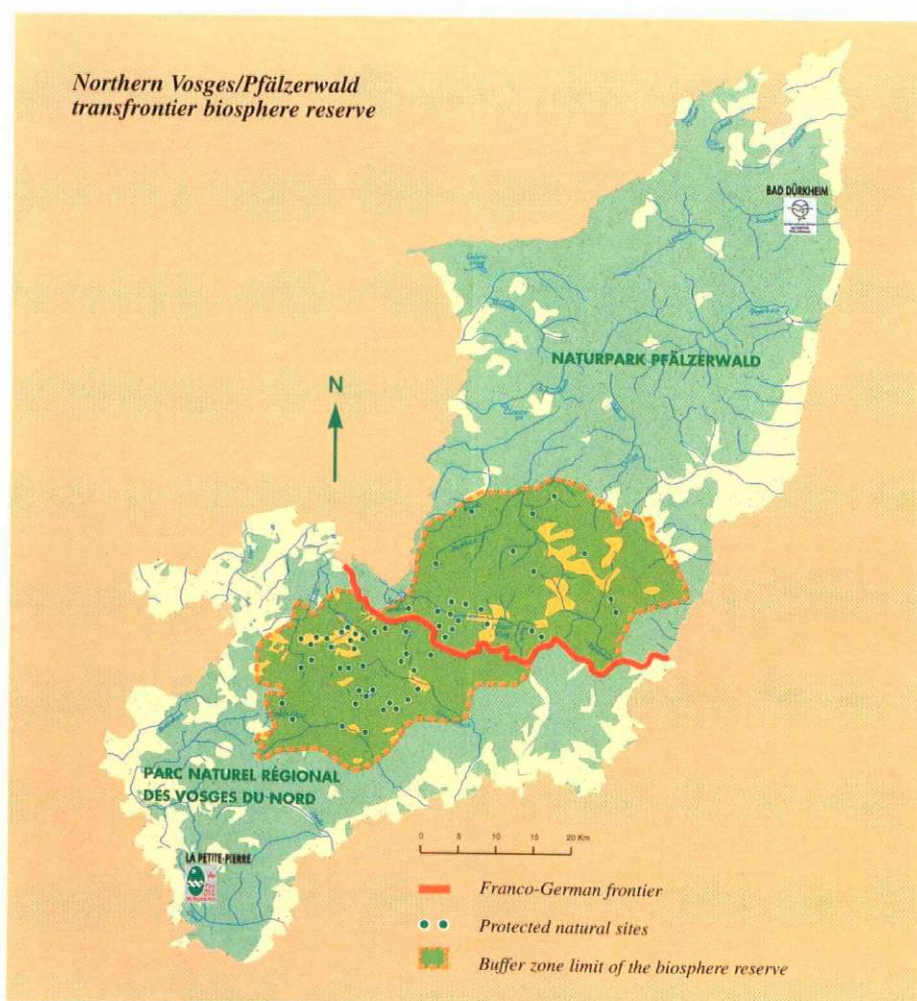
The shared concept also leads to fruitful twinings and transfrontier co-operation: for example, the Vosges du Nord and the Pfälzerwald, two biosphere reserves on either side of the Franco-German border, are setting up a common zoning system and are going to fix management objectives for this new territorial unit.

A concept for the future

More than 20 years after they were introduced, the biosphere reserves are reaching

maturity. This clear and comprehensive concept is shared by many countries, which adopted a statutory framework for the network in 1995. It has proved its ability to adapt to a wide range of ecological and political contexts. Although it is a long-term undertaking, many countries have results to show, including conservation and research projects, jointly devised management plans and the development of agricultural products whose survival is crucial to particular forms of biodiversity or landscape. It is an ambitious concept, so there is still a long way to go, of course, but it will be made easier by the many fruitful exchanges of skills and experience now provided by the network. ■

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World Heritage Sites

A global network for biodiversity

Bernd von Droste

Unesco's Convention concerning the Protection of the World Cultural and Natural Heritage, often abbreviated as the World Heritage Convention, is built on an important principle: that there is a unique set of cultural and natural sites in the world which constitute humankind's common heritage and whose conservation should be a primary concern of international diplomacy.

Since its adoption in 1972, 153 states have ratified the World Heritage Convention and the unique set of World Heritage sites has grown to 552, of which 418 are cultural and 114 are natural, respectively. The rest of the 20 sites are "mixed", i.e. they comprise cultural as well as natural values of "outstanding universal significance".

The sub-set of 114 natural and 20 "mixed" sites, distributed in 68 States Parties to the Convention, are being increasingly seen as important areas for building a range of

networks critical for exchange of information and experience and for building capacity for conservation at the level of ecosystems, species and gene-pools. For example, the 27 sites distributed throughout the tropical humid forests of the world protect approximately 1.25% of the world coverage of that ecosystem. If this number of World Heritage forests in the tropics could be increased to about 50, with the new sites strategically located in important "mega-diversity" countries such as Brazil, Indonesia and Malaysia, then the resulting network could offer the most cost-effective option for conserving global tropical forest biodiversity.

Networks between natural and mixed World Heritage sites are also being developed as operational instruments for building capacity for managing protected areas such as national parks and equivalent reserves. Such a Regional Network for the Management of World Heritage is already functional and links designated and potential sites in South-east Asia, West Pacific, Australia and New

Zealand. Efforts are underway to enable the establishment of similar networks in other parts of the world.

Cultural landscapes constitute a new category of cultural heritage whose ecological significance lies in the harmonious relationship between traditional resource use practices and environmental conservation. Their numbers, particularly in Europe, are growing and are likely to provide interesting opportunities for networking for sharing information and experience on sustainable development practices. ■

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Reconciling fishing and sustainable development

The case of the Třeboň Basin Biosphere Reserve

Miroslav Hátle

The Třeboň Basin Protected Landscape Area, established in 1977, is one of six Biosphere Reserves in the Czech Republic. The most important parts are EECONET core areas. The Třeboň region has been intensively cultivated since the 12th century and a unique harmonious landscape with a high biodiversity has resulted from this human intervention. Specific and important landscape elements are fish ponds - shallow artificial lakes used for traditional fish-farming - with carp (*Cyprinus carpio*) as a main commercial fish. More than 500 ponds of different sizes (0.1-500 ha) connected by a network of ditches and canals originated during the busiest period of landscape alterations (14th-16th century). Littoral zones (reed and sedge belts) and other types of wetlands surrounding the ponds (marshes, wet meadows) provide excellent habitat for endangered species of flora and fauna (particularly birds). The most valuable ponds and neighbouring wetlands were declared a Ramsar site (10 165 ha) in 1990.

Multiple roles

The multiple role of fish ponds (fish-farming, water management, nature conservation) is unique and there are probably few other EECONET core areas with such intensive commercial use and cultural aspects. This co-existence is not without problems. For many centuries, the intensity of fish-farming was very low and entirely based on the natural production of a pond ecosystem (30-50 kg of fish per ha). The gradual intensifica-

tion of fish farming was accompanied by increased liming, use of non-organic and organic fertilisers and additional fodder, very high fish stock and destruction of littoral zones. The production of fish per hectare has considerably increased in the last decades, with many negative impacts on pond ecosystems, water chemistry (eutrophication, algal blooms) and biodiversity.

An example to follow

Nevertheless, the Třeboň fish-farming as an example of sustainable use of local natural resources that has existed for centuries is still a great challenge and an inspiration for the future. Both legal and economic tools must be used to

maintain the equilibrium between the commercial and public interests on privately owned fish ponds. Research and monitoring are important and a project on this has been carried out by IUCN.

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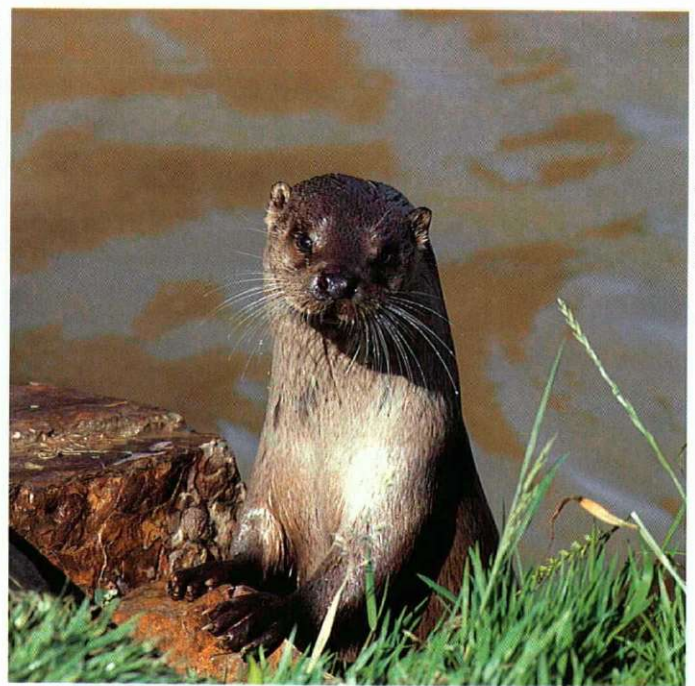
J. Seveček

Pond fishing (Třeboň)



C. Fredriksson/Bruce Coleman Ltd

Cranes, Hornborga Lake, Sweden



M.N. Boulton/Bruce Coleman Ltd

Otter, Cornwall, United Kingdom

The Emerald Network

An opportunity for the European continent

Liri Kopaçi

The Standing Committee to the Convention on the Conservation of European Wildlife and Natural Habitats, otherwise known as the Bern Convention, has long ago recognised the need to fully implement its Article 4 and take further action in the area of habitat protection for species under the convention.

In 1989, the Standing Committee adopted an interpretative resolution (Resolution No. 1 (1989)) on the provisions relating to the conservation of habitats and three operative recommendations (Recommendations Nos. 14, 15 and 16 (1989)) aimed at the development of a network of areas under the convention followed by Recommendation No. 25 (1991) on the conservation of natural areas outside protected areas proper adopted at a later meeting of the Committee. The adoption of the resolution and the recommendations marked the start of the process for the establishment of a Network of Areas of Special Conservation Interest - currently known as the Emerald Network.

The conditions to designate Areas of Special Conservation Interest (Recommendation No. 16 (1989)) point clearly towards areas of a great ecological value for both the threatened and endemic species listed in the Appendices of the Bern Convention and for the endangered habitat types to be identified by the Standing Committee as "requiring specific conservation measures".

State of progress

At the moment, work is being carried out to draw up:

- the criteria for listing species that require special habitat protection;
- the rules for establishing the Emerald Network;
- the software for entering the data for the network.

The practical arrangements and other technical details related to the database and software for the establishment of the Emerald Network, its relationship with other initiatives, particularly the CORINE Biotopes and the Natura 2000 network of the European Union, will be the focus of a seminar that will take place in Ljubljana, Slovenia, in September 1998. The seminar will mark the start of the practical development and implementation of the Emerald Network. Other technical issues such as rules for the Emerald Network, list of species requiring specific habitat protection and integration of the Emerald Network into the Pan-European Ecological Network (PEEN) are being examined by the group of experts for the Emerald Network.

Two crucial elements

There are basically two crucial elements that condition the success of setting up the Emerald Network:

- co-operation with all other existing and on-going initiatives in the field of networks, particularly the Pan-European Ecological Network and Natura 2000;
- essential decentralisation and co-ordination of different sectors.

Vital co-operation

The Emerald Network is one of the elements in the process of developing and imple-

menting the Pan-European Ecological Network. One of the key areas where the Emerald Network can provide a valuable contribution is defining the core areas to be included in the PEEN.

The Emerald Network represents an extension of Natura 2000 to a larger geographical area which includes central and eastern European countries. The member States of the European Union will satisfy the habitat requirements of the Bern Convention mostly through the designation of sites to the Natura 2000 network. The originality of the Emerald Network is that it covers the whole of Europe, thus expanding the principles of nature protection and habitat conservation of the Habitats Directive and the Bern Convention beyond the traditional boundaries of the 15 EU member States. A total of 45 European states can participate in setting up the Emerald Network and this gives it a pan-European character.

For those central and eastern European countries that aim or are in the preparation process to join the EU, the establishment of the Emerald Network provides an opportunity to put in place the necessary structures that will be required to deal with approximation of their environmental standards with EU environmental standards. These countries could also benefit from the legal and financial support available within the EU for such approximation initiatives.

For those states not likely to join the EU soon, the Emerald Network offers a common scheme for collaboration for the whole of Europe, including the EU.

Decentralisation and co-ordination

A key issue in the process remains decentralisation. Very frequently the process is centralised, limited to policy-makers and experts, which could result in hostility on the side of the parties directly affected by the process of establishing the Network (farmers, fishermen, foresters etc.). It is important to involve them in the undertaking and ensure their backing. An important aspect in this respect is the provision of incentives in order to ensure co-operation and avoid confrontation with them. Therefore, it is most useful to start now to establish certain structures that will work on such issues.

There are different dimensions to the process of setting up the Emerald Network, i.e., political, agricultural, economic and ecological, and success depends on coping with the challenge of bringing together and interlinking all these issues. ■

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Management planning for Ramsar sites

More knowledge means better management

Jean-Marc Sinnassamy

Wetlands are now widely acknowledged as being of significant value for a variety of uses and activities, particularly for developing countries. In order to promote the wise use of wetlands, the Ramsar Convention adopted a resolution on management planning together with a number of guidelines. Nevertheless, for a variety of reasons, drawing up and implementing management plans is no easy task for sites covering vast areas (580 000 ha for the Danube Delta in Romania, 59 000 ha for Lake Bardawil in Egypt).

The vital need for preliminary studies

In the majority of cases, the state authorities responsible for managing these sites want practical action, not studies. Admittedly, scientific studies might seem out of place in countries which have other priorities. But the task assigned by these countries, backed up by international initiatives (bilateral co-operation, European Union, United Nations, World Wide Fund for Nature, etc), implies a significant amount of preparatory work. More often than not, a study phase is essential, otherwise proposals will be based on preconceived ideas and not on accurate knowledge of how the site in question actually operates.

The aim behind drawing up management plans for Ramsar sites is to find a balance between the wise use of wetlands and maintaining the ecosystem's natural properties. This involves not only understanding exploitation systems through social and economic approaches, but also understanding the functioning of the ecosystem. In the majority of cases, this functional data is either non-existent or incomplete. Monitoring procedures must be put in place in order to gain a better understanding of the site (water flows and levels, water quality, ecological indicators, etc) and to identify the site's priorities as quickly as possible.

By collecting and analysing such environmental data, improvements to the quality of the site and use of resources can be proposed. As part of an EU-funded PHARE programme on the Karavasta lagoon in Albania, geomorphologic studies revealed the hydrobiological importance of interaction with the sea and led to the suggestion that the dimensions of canals be modified to promote fishing. In addition, an analysis of fishing statistics, together with monitoring of fish stocks and a study of the lagoon's trophic state, helped identify the causes of fluctuations in stocks and instances of large numbers of fish dying in recent years. It also revealed the origins of the pollution which were not what had originally been suspected. Practical action can now be set in motion.

Time constraints

All the same, these studies do not always provide clear operational solutions. They have to be carried out within a short period, whereas understanding ecological phenomena requires time. The monitoring of the bird populations on the Karavasta lagoon has confirmed the international importance of the site with over 45 000 aquatic birds spending the winter months there, including a population of some 50 pairs of Dalmatian pelicans, a globally endangered species. However, there has been little success in encouraging mating in the colonies of terns, gulls and pratincoles. Given the short duration of the programme, it was not possible to do anything other than pinpoint the problem and put forward suggestions. Only by monitoring the situation over several years was it possible to identify and analyse the phenomenon. Research carried out by a doctorate student over two complete annual cycles showed the link between the pattern of movements of the colonies on the site and disturbances, predation and hydrological changes, and explained why the birds did not use the sites which on the face of it seemed more favourable. As a result, it was possible to suggest a number of changes and better habitat management to improve breeding conditions. This work required long and difficult field studies, something which is not always possible in programmes which are

limited in terms of time and resources. Nevertheless, this example shows the importance of applied research and long-term monitoring and of using the results to further the conservation of habitats and species.

Definition and implementation of the plan

Once the scientific, social and economic groundwork has been completed, the management plan itself must be drawn up. It is first of all necessary to identify the main issues and problems before suggesting possible objectives for the conservation of the ecological characteristics of the site which are compatible with improving the living conditions of the populations exploiting the natural resources. Setting these objectives necessarily entails consulting all interested parties. Since it is often difficult - through lack of resources, data or time - to reconcile all the interests at stake in a given site and to measure the impact of human activity, a compromise solution is proposed by means of zoning where objectives are prioritised. Certain zones are earmarked for development, others placed under protective measures where there is no other immediate solution. Subsequently, in initiating the plan, utilisation contracts incorporating precise specifications may be drawn up to enable certain resources to be exploited while ensuring any damage to the system is kept to a minimum.

The next stage is to implement the management plan. In certain cases one authority is responsible for at least part of the territory (eg the Danube Delta reserve management authority). In the case of the Karavasta lagoon, however, there was no suitable site



J.M. Sinnassamy

management structure or text, which is typical of the situation in the Mediterranean. Following an analysis of the legal context, it was suggested that a decree be issued setting up a public corporation which would be given powers currently shared between municipalities, the district and central government. ■

Traditional fishing

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A common data base for listed sites

Juan M. de Benito

Following several years discussing the matter, the European Environment Agency (through its European Topic Centre on Nature Conservation), the Council of Europe and the World Conservation Monitoring Centre (WCMC) took practical action in 1997-98 by developing a common data base on listed sites in Europe.

Each of the above organisations had been compiling its own data, with the assistance of different information networks, on sites afforded protection in accordance with national legislation. Updating took place without any co-ordination with the result that there were three different and occasionally conflicting versions of the situation of protected sites in Europe.

In 1996 the three partners agreed in principle to define common parameters, while ensuring their

different information needs, and to adopt a single database structure. In addition, the information networks and updating procedures were put on a uniform basis. Via the EIONET network (European Environment Information and Observation Network), the Agency gathers data on its 18 member States and on Switzerland which wished to join in the venture despite not being a member. The recent setting up of the Phare Topic Link on Nature Conservation, financed by DG I of the European Commission, means that the Agency will also be able to collect data on the 13 Phare member countries. Data on other European countries will be collected by the WCMC.

This joint database, to which the public will soon have access, will also help the three partners in their activities on protected areas: drawing up the United Nations global List (under the responsibility of the WCMC on behalf of the World Conservation Union (IUCN)), drafting reports on

the State of the Environment in Europe (an Agency responsibility), etc.

For the immediate future, the European Environment Agency is also planning to develop computer applications to enable countries to input their data directly in a pre-defined form. This should make regular updating of the database that much easier.

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J.-L. Klein & M.-L. Hubert

A skills network

The Eurosite experiment

Joan Mayol

For centuries naturalists have been impressing upon us that nature is a source of human inspiration: from Aesop's fables to biotechnology, through medieval bestiaries and natural history classics, the idea that we must learn from all living beings has been the constant guiding strand in this area.

If we apply this rule to protected species, two constants emerge from the organisation of ecosystems: the links between sites, even geographically distant ones, and their complex variation.

Eurosite has taken these two principles on board. First of all, nature parks and reserves are forging links right across Europe, and secondly, diversity is one of the foremost organisational criteria. Major governmental agencies such as the Conservatoire du Littoral and English Nature are co-operating

with NGOs and regional reserves, whether public or private.

The network emerged in embryonic form in 1987 during European Year of the Environment organised by the European Community, when European sites were twinned up and working groups established. In 1989, the officials responsible for these sites noted that this co-operation was yielding positive results and decided to establish it on a permanent basis. Eurosite has been booming ever since. It currently includes 60 members from 12 different countries, offering enormous biodiversity: from the Danube Delta to the Estremadura reserves in Spain, which are managed by a very dynamic regional NGO, and from the Hungarian national parks to a wetland area in England, which simultaneously serves as a reservoir for a nearby town.

Eurosite conducts a wide variety of activities: twinning agreements; technical seminars on various themes (some 30 have been held so

far and 10 are scheduled for 1998) attended by 20 to 35 participants so that they can all make an active contribution; the Eurosite Prize; and an information programme which is about to be disseminated on Internet aimed at maintaining three permanent forums (Species, Habitats, Site Management) through the European Union's Leonardo Programme.

Eurosite is a professional organisation for site managers, promoting nature in Europe. ■

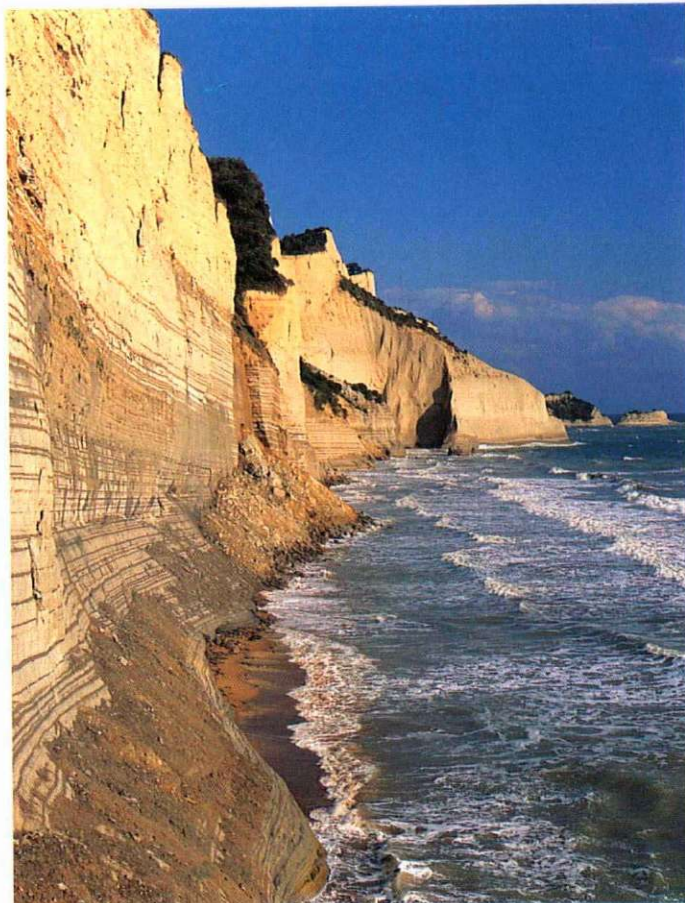
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North Sea
Mer du Nord

Baltic Sea
Mer Baltique

Black Sea
Mer Noire

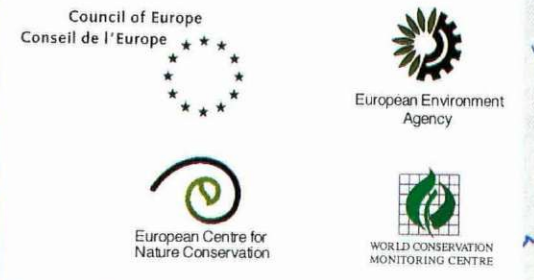
Extract of the map of nature conservation sites designated in application of international instruments at pan-European level

- Unesco
 - World Heritage sites
 - ⓑ Biosphere Reserves
- Convention on wetlands (Ramsar, Iran, 1971)
 - Ⓜ R Ramsar sites
- Council of Europe
 - Biogenetic Reserves
 - ★ European Diploma
- UNEP/Mediterranean Action Plan (MAP)
 - ▲ Mediterranean Specially Protected Areas (SPA)
- HELCOM (Helsinki Commission)
 - ▽ Baltic Sea Protected Areas (BSPA)

The map does not include sites designated under European Community or national legislation.

Approximate scale 1 : 8 000 000
Final version, 21 April 1998

If you wish to receive the map and its explanatory report, please contact the Centre Naturopa of the Council of Europe (see address page 2).



Taking ecological networks into account in sectorial policies



B. Boisson

The ecological corridor of the Vistula valley

Ewa Gacka-Grzesikiewicz

River valleys are considered to be the most universal forms of ecological corridors, which may significantly alleviate the negative consequences of landscape fragmentation resulting from increasing spatial transformation due to urbanisation and development of communication systems.

The Vistula river valley is an example of a relatively well preserved natural river valley in central Europe. In the Vistula valley, the longest of the Polish rivers stretching for 1 164 km from its source at Barania Góra in the Beskidy Śląskie mountains to its mouth at the Baltic Sea, an alternating system can be distinguished of several basins and gates which alternately cumulate water and organic debris or waterborne mineral material.

The valley's potential

The width of the Vistula valley varies from 20 km in the basins of Sandomierz, Warsaw, Płock, Toruń, Grudziądz or Kwidzyn and in Żuławy to some 2-4 km in its narrow sections.

The Vistula valley provides shelter and resting and breeding sites to numerous mammals, birds and to many other smaller

animal species, playing an ordinating role in the landscape by providing spatial continuity associated with the water table and a variety of vegetation types arranged in parallel on floodplain terraces.

Rich natural values

The rich natural values of the least transformed river corridors, illustrated by an abundance of life forms, decrease distinctly within sections of intensively managed and regulated rivers. Hence in the 1990s, the least transformed portions of Polish river valleys have been successively covered by legal protection as landscape parks (some 15 parks have been established) and national parks, including Narwiański (1990), Drawieński (1990) and Biebrzański (1993).

The Vistula valley's natural values have so far been only partially protected as several landscape parks, as an additional element associated with the main aim of protection activities. The Vistula valley is protected in its entirety only within the Complex of Vistula Landscape Parks, established in 1993 over the more than 100 km section of the valley between the towns of Bydgoszcz and Nowe. Several new parks have been planned in the middle and lower Vistula.

Within the Complex of Vistula Landscape Parks, the riverbank slope zone has been protected in two macroregions: the Lower Vistula Valley and the Toruń-Eberswalde Proglacial Stream Valley. The sites have an unusual diversity of geomorphological forms expressed as a variety of relief forms and in the biodiversity of plant and animal life.

Slopes of the proglacial stream valley are intersected with numerous gullies and landslips. The isolated slopes are overgrown with xerothermic vegetation or by a close to natural mixed oak-hornbeam wood represented by its slope-type communities. In the floodplains and gullies there are floodplain forests and alder woodlands. Mire and sedge communities are to be found in seepage areas at the foot of slopes. All types of local environments abound in rare plant and animal species.

Vital ecological corridor

The ecological corridor of the entire Vistula valley plays a major role for many plant and animal species, being of particular importance for waterfowl, especially for such endangered species as the ringed plover (*Charadrius hiaticula*), the common gull (*Larus canus*) and the little tern (*Sterna*



E. Gacka-Grzesikiewicz

of sustainable development will require comprehensive legal, organisational and technical activities. Necessary educational activity also needs to be undertaken to enhance public understanding of the conservation of the ecological corridor of the Vistula valley. ■

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albifrons). The bird refuges situated within the middle and lower Vistula valley are of international importance for south-north bird migration, fulfilling the Ramsar Convention criteria. No less important is the role of this ecological corridor for ichthyofauna. However, as far as migrating fish species are concerned such as trout (*Salmo trutta*), the Vistula river corridor has been broken by a dam at Włocławek.

Protected species encountered in the Vistula valley include such mammals as the beaver (*Castor fiber*) and the otter (*Lutra lutra*), as well as numerous reptiles, amphibians and insects, though the latter are locally much less recognised.

Two priorities: planning and education

The Vistula valley's natural values need special protection measures since the management of river beds (levees and regulation) and floodplain terraces (urbanisation), together with some infrastructure elements, create ecological barriers to species dispersal, thus contributing to the simplification and impoverishment of the valley's ecological structure. These needs have been fully taken into account in a recently developed concept of spatial management for the valley and regulation of the Middle Vistula. However, its implementation in line with the principle

A European network for the otter

Claus Reuther

The common otter (*Lutra lutra*) population in central Europe has fallen considerably since the beginning of the 20th century. This decline is characterised by fragmentation of the areas of distribution of the species, which were once all continuous, with the result that the ever shrinking and frequently isolated populations have little chance of long-term survival. This development can be clearly seen on the map of the otter's distribution in Europe: dense, thriving, even sometimes expanding populations are now only to be found in the south-west and east of Europe. Today, otters have disappeared from vast areas of central Europe or struggle to survive in isolated colonies.

This development is not due to excessive hunting, as was the case with bears, wolves and lynxes, but rather to a change in the mustelid's biotope. The canalisation and often over-intensive development of watercourses, the destruction of riparian flora, the spread of buildings or the pushing of agriculture or forestry right up to the very banks of rivers, the draining of wetlands and the pollution

of watercourses are among the main factors reducing the species' chances of survival.

These observations have given rise to a plan to reverse the trend: an attempt to link up the isolated otter colonies once again by suitable management of their habitat. An operation started up in 1987 by the association Fischotterschutz e.V. as part of a project covering 250 km of the River Ise's hydrographic network shows that the idea is by no means unrealistic. Once the area had been regenerated and links had been re-established between the colonies of Lower Saxony and Saxony-Anhalt, otters returned to this region after an absence of almost 30 years.

From this kind of experiment there has emerged the idea of setting up the European Network of Otter Habitats (Otter Habitat Netzwerk Europa - OHNE), which gives priority to viable otter populations. Not only do they form the heart of the network: if the attempt to produce a population surplus is successful, the individuals that are forced to move away can be the starting point for a natural recolonisation of neighbouring areas. For this to be achieved, habitats have to be managed

in such a way as to restore the migration corridors which link up the isolated areas or sites frequented by the otters.

The first steps in carrying out this project were taken under the European Union's Neue Hanse Interregio programme. A similar network is to be set up throughout central Europe by the year 2000. The otter will then have a far better chance of surviving and naturally recolonising its biotopes than it would through isolated projects involving the release of animals.

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P. Thébault

The role of hedges in agriculture

Jean-Pierre Biber

On the whole, hedges are a component of the agricultural landscape generated by human activity; they may be remnants of forest vegetation or constructed from bushes of the surrounding forest. Some hedges have evolved from spontaneous colonisation by bushes on the edges of fields or on heaps of stones. Originally, hedges were planted mainly along the edges of fields and served as barriers to cattle and game. More recently, they have been planted as windbreaks.

A regularly pruned hedge may be no more than one or two metres high and wide. The other extreme – the arborescent hedge 10 to 20 metres wide, consisting of trees, shrubs and bushes – is built like the edge of a forest.

A biological asset

Most hedge plants – sometimes 500 to 600 species – come from the edge of forests or are ruderal species. As they were originally used as barriers for cattle and game, thorny components predominate. Trees were often planted or encouraged for timber production. The floristic composition of a hedge depends largely on its upkeep; a hedge which is not maintained starts evolving into forest.

Forest animals are well represented in hedges, but some species which live in the open also use them. For animals, hedges are of vital importance as a substitute for the natural ecotone constituted by the forest edge, which is all too often destroyed in modern landscapes. The diversity of fauna in a hedge increases with its wealth of flora; it also depends on the animals' surrounding habitats: woods, fields and meadows. Hedges link up all these environments with each other, so a bocage landscape should have a network of hedges rather than a single hedge.

Several hundred species of invertebrates and many amphibians, reptiles, birds and mammals shelter, feed or breed in hedges. In a hedgerow area of the Swiss Jura, 68 species of birds, 22 of them nesting species, were recorded in hedges. In the autumn, species with the most varied ecological needs – migratory and non-migrant, insectivorous and seed-eating – gather there and live side by side, all equally attracted by the abundance of food (insects and fruits of all sorts) and safe shelter.

An economic asset

Windbreak hedges restrict wind damage such as the beating down of cereals, problems with pollination in orchards, the falling of fruit and damage to leaves. In coastal areas they reduce the range of salt spray, which can prevent proper crop growth across tens of



J.-P. Biber

Recent recognition

Now that the value of hedges has begun to be recognised again, some states subsidise their planting and maintenance to a greater or lesser extent. When any decision is made about land use, equal account must be taken of the needs of agriculture and the protection of nature and landscape, including bocage. The impact studies which precede the consolidation of farmland or urban land give planners a picture of the original state of the landscape and allow the people and organisations involved to take appropriate steps to preserve items of value. The protection of hedges must be based on legislation and that legislation must be applied.

Poor management of hedges is often due to poor information of the people responsible, whether owners, farmers or planners. So a great deal of information work must be done, starting in schools. Many nature conservation organisations have launched hedge protection campaigns, which are usually well received by the public and have helped preserve or plant many hedges. ■

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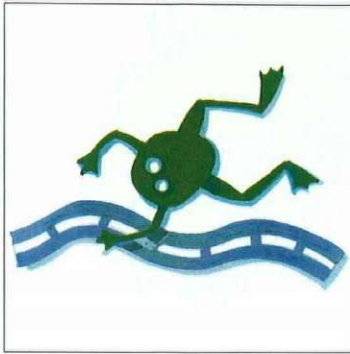
kilometres. They allow cattle to shelter against the wind and sun. They prevent drifts of snow or sand from forming on roads and paths. They retain some of the run-off water and allow it to penetrate gradually into the soil and be available for crops. The roots of bushes and trees hold the soil in place and prevent progressive erosion due to the action of water and wind. Trees and shrubs along the banks of watercourses reduce heating of the water, which is good for the fish and prevents excessive eutrophication. Hedges have many other economic advantages, often neglected nowadays: they can provide firewood, stakes, poles, tool handles, timber, berries, nuts and other edible fruits, medicinal herbs and mushrooms.

Bocage landscape

The value of a landscape depends on a whole series of criteria which are fairly difficult to quantify and largely subjective. This makes it hard to assess the value of a wooded landscape. The bocage is the original form of agricultural landscape in our latitudes. People have been accustomed to it for centuries and they are attached to it. For many farmers, it has an ethical value: it is part of the rural heritage, as are orchards, arable fields and pastures. Also, the bocage has now become a recreational environment which is highly valued by the rural population and by townspeople in search of nature. Rural tourism is inconceivable in a deforested landscape.

A man-made corridor

Road and rail sides



F. Pillot

Marc Clignez

It is now generally accepted that rational management can promote both safety on the roads and implementation of a number of environmental functions along their edges.

Interesting as it might be in many respects, this concept should not mask the fact that the extremely dense network of roads and railways in Europe, especially those carrying high-speed trains, also destroys, fragments and/or pollutes the habitats in question.

Diversity of contexts

The environmental, landscape, educational and even economic values of this man-made ecological network must be compared and contrasted with the original contexts and the pressure on and width of the roads, which can often limit physico-chemical damage.

The wide range of environmental deterioration is caused, for instance, by urbanisation, deforestation, or abandonment of farming accompanied by reforestation, which has the effect of eliminating open habitats, or intensification of agriculture, which damages bocage areas. Such simplifications of the environment and landscape are particularly common in certain land regrouping methods, destructuring the whole ecological network and seriously threatening corridors, narrow structures which are often monopolised and deformed by the users of neighbouring plots of land. In such situations, roadside green belts serve as an important connecting corridor, a role which often transcends their local ecological significance.

Roadside green networks can either be incorporated into an overall ecological network, or else remain independent if they are liable to channel batrachians, hedgehogs, badgers, cervidae, etc, towards major roads lacking specific crossings for such animals.

Fencing along motorways and dual carriageways frequently causes fragmentation, while the use of backfill differing from local soil types can alter the nature of green areas,

regardless of road width. Continuous networks can encourage the naturalisation of certain taxa such as Japanese knotgrass and Caucasian hogweed, xenophytes which are frequently associated with railway embankments.

Management example in Wallonia

Even though the use of weed-killers has been almost completely prohibited in the public domain, over-intensive mowing of green areas along the motorways has been damaging biodiversity throughout most of the 20 000 ha in question in Wallonia (Belgium).

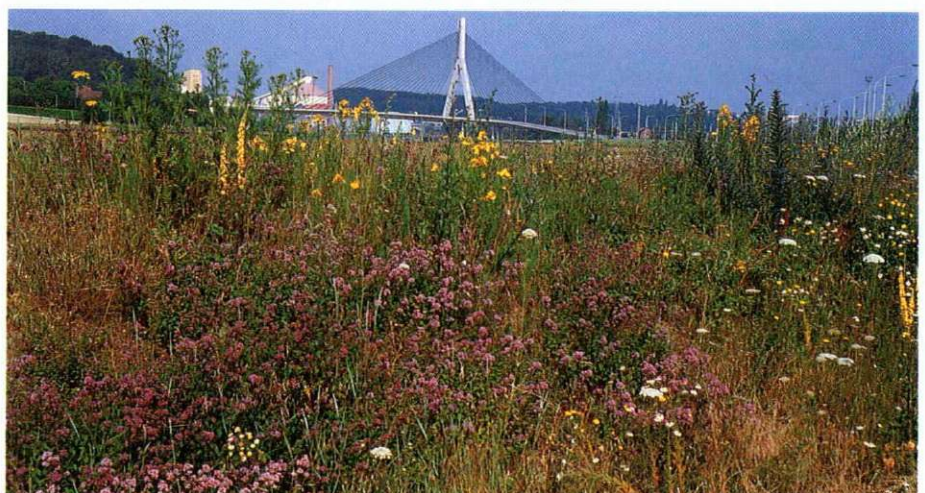
An agreement was drawn up for the municipalities on the occasion of European Nature Conservation Year 1995, based on methods tested in the Burdinale and Méhaigne Valleys Natural Park. It provides for intensive mowing of the area immediately adjacent to the roadway, crossroads and other areas where safety is the priority. Other areas, on the other hand, particularly those outside residential areas, are exploited in an extensive manner. In most cases, late mowing after 1 August has been advocated so that the many floral species can bear fruit. This approach also encourages the large number of animal taxa using these areas for feeding, resting, sheltering, migrating, and indeed mating, with subsequent dispersal. Various plots of land have been left fallow. Now that systematic intensive mowing has been abandoned, grass cutting plans are now based on

scientific inventories, monitoring of experimental plots and analysis of local constraints. Early, or indeed recurrent, grass cutting, ideally accompanied by hay gathering, is recommended in some areas to promote herpetofauna and/or other animal, vegetable or even fungal species. Lines of shrubs are planted to limit snowdrift formation and/or to force birds to fly higher. Development and restoration work must be based on local ecotypes and native species.

Even though the management method proposed is not wholly satisfactory, at least it does address the problem of roadside corridors, taking account of road width and the local and regional environmental issues at stake. It tallies with an approach to ecological network management that confronts scientists and elected representatives with the need to develop research in the field, train public environment managers and inform the general public.

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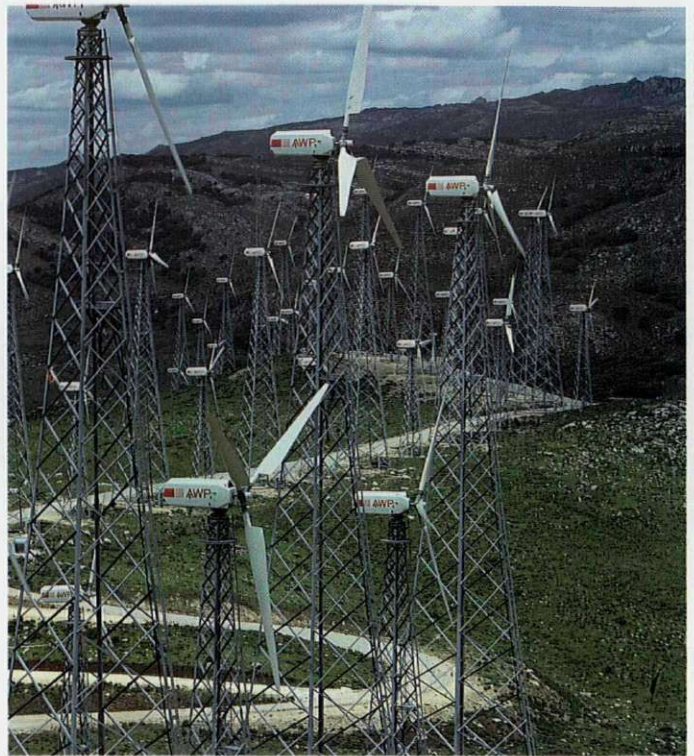
Diversification of flora following the use of late mowing, Meuse valley, Belgium



M. Clignez



Fries-Irmann



SEO/BirdLife

Flight of bar-tailed godwits

Field of windmills

Migration routes Invisible but vital corridors

Juan Criado

Bird migration is one of the most amazing spectacles offered by wildlife. Twice a year hundreds of thousands of birds fly over the Straits of Gibraltar (southern tip of Cádiz province, Spain), the most important "bottle-neck" for western migratory birds crossing the Mediterranean Sea, when travelling to and from their wintering quarters in the African continent. This strait is the closest point between Europe and Africa, where appropriate winds blow and a high variety of ecosystems are represented, allowing birds to feed and roost while awaiting favourable conditions to cross over the sea. Its outstanding natural value has earned it different protection statuses, such as special protection area, natural park, natural landscape and, obviously, globally important bird area.

Windmill energy called into question

However, the former wilderness of this migratory bird corridor has recently been altered by ongoing massive windfarm development, increase in tourism and recreation activities, fires, powerlines, road development.

370 windmills (70 Mw) have been installed, there are 100 more (30 Mw) under construction and up to 1 719 are proposed (856 Mw). Already in 1990, the Spanish Ornithological

Society/BirdLife (SEO/BirdLife) alerted the environmental authorities on the fragility and potential sensitivity of the Tarifa area regarding windfarm development. In 1993, SEO/BirdLife launched a conservation campaign to ensure that windfarm development would be carried out respecting wildlife conservation. A study contracted by the Andalusia Environmental Agency to SEO/BirdLife found that the main factors determining the impact of windfarms on birds in the extremely important bird area of the Straits of Gibraltar are appropriate site selection and the wind relief interaction. These factors led to significant avian mortality differences, not just between windfarms but among windmills within a same windfarm (ie the 60% mortality rate of Griffon vultures was caused by 28 windmills, but no corrective measures have been applied).

What future for the Straits of Gibraltar?

There is a proposal by the Andalusian government for a global plan for environmental planning of windpower development in the areas of Campo de Gibraltar and La Janda, but it does not have legal entailment, it is not statutory and has no corrective character over existing hazardous windmills. Because of international pressure from the European Union and the Council of Europe, most windfarm projects have remained "frozen" since late 1995, but can go ahead at

any time. Both biodiversity conservation and climate change need preventive, delicate and careful integrated planning in the Tarifa area. Otherwise conservationists and the natural heritage will suffer irremediable losses. ■

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Danube delta: successful restoration

Erika Schneider

The natural paradise of the Danube delta (4 178 km²) and its outstanding range of biotopes remained intact for many years. However, things changed in the early 1960s when a plan for the intensive use of the lower Danube and delta region was put in place. This was followed in 1983 by a further, more complex programme for the use of the delta, involving the dyking and draining of vast areas of wetlands. The habitats of many species were thus reduced in size or destroyed.

Babina and Cernovca: two islands with destroyed environments

Following the changes in Romania at the start of 1990, the work on the delta was stopped. By then, a total of 104 371 ha had been dyked in, including 41 600 for agriculture, in particular rice-growing. This included the islands of Babina and Cernovca, in the north-west of the delta, on the border with Ukraine. The two islands were cut off from the Danube flood plain by a circular dyke. They were then partially levelled and artificial waterways were built. However, the planned intensive farming came to nothing. The absence of floodwater radically altered the water reserves, leading to increased salinity levels and the transformation of the areas concerned into barren steppes. The result was the disappearance of the biotopes and ecological functions typical of wetlands and marshes. The loss of fish stocks had serious consequences for the population in the surrounding region.

Aquatic vegetation at Babina two years after the opening of the dyke



E. Schneider - WWF-Auen-Institut

A new direction in 1990

In Romania as elsewhere, the political changes in eastern Europe also provided an opportunity to set out in a new direction in nature conservation and efforts to protect the delta resumed. As early as 1990, steps were taken at national and international level to have the Danube delta declared a biosphere reserve. This led to Unesco including it in the International Network of Biosphere Reserves on 15 February 1993.

Before that, it had already been added to the list of wetlands of international importance (Ramsar Convention) on 13 May 1991.

In February 1990, immediately after the change in the political situation, the Flood Plains Institute of WWF-Germany contacted the Danube Delta Institute in Tulcea (Romania) and began discussions on possible measures for restoring the delta to its natural state. Work on the restoration of the Babina and Cernovca polders (2 100 ha and 1 580 ha respectively) in the delta biosphere reserve then began in 1993, under the joint direction of the Danube Delta Institute in Tulcea and the Flood Plains Institute of WWF-Germany, as part of WWF's "Green Danube" international programme. The local population welcomed the measures, which they hoped above all would restore the spawning grounds and fish reserves, as well as the grassland, which was too dry and covered in halophytes.

The measures designed to improve the ecological situation, in other words to restore the delta's typical habitats and their func-

tions, were based on an environmental assessment and a comparison of the situation on the islands before and after the building of the dykes.

Promising results

By April 1994, everything was ready. The circular dyke around Babina was opened in four places, linking the island to the Danube flood system again. In April 1996, the dyke around the Cernovca polder was also opened.

Regeneration took place relatively quickly. Immediately after the dykes were opened, large schools of fish entered the area and spawned. Pelicans and other fish-eating birds soon followed in search of food. Many other species of birds typical of wetlands also returned to the area. Two years after the dyke was opened, white and yellow water-lilies were to be seen on the new expanses of water at Babina island. Water chestnuts and other aquatic plants soon also reappeared.

Reeds grew back rapidly and began performing their filter function again. As the biotopes redeveloped, a whole range of small animals moved back into the area. The situation is still evolving and the habitats are becoming increasingly firmly established. An environmental monitoring programme is currently being carried out to measure the progress in restoring the biotopes and their functions.

International awards

The linking of Babina and Cernovca islands with the Danube (Chilia arm) was the first time a project had led to such a vast area (3 680 ha) being restored to its natural state. The project was thus not only unique in Romania but has also generated - and is still generating - much interest at international level.

This has been amply demonstrated by the award to our Romanian partners of the Eurosite prize, the WWF Award for Conservation Merit and the Romanian Hydraulic Engineers' Association prize.

With the two islands restored to their natural state, the conservation of nature by - and for - humankind has made significant progress in the Danube delta biosphere reserve. The project was the first in a series which WWF will carry out in co-operation with the Danube Delta Institute in Tulcea. ■

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A workable experiment

An ecological network in Wallonia

Jacques Stein

The concept of an ecological network is no doubt one of the main means, and potentially the most effective means, of prompting the authorities to take account of nature and landscapes systematically before taking the principal decisions affecting the whole of a given area.

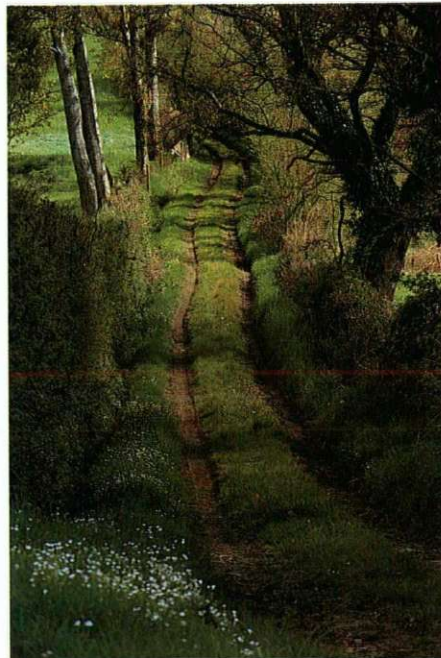
Ecological networks are intended for both areas in which biodiversity is the main concern (central zones) and areas in which this concern must be combined with a range of socio-economic issues (buffer zones, development areas, restoration areas in farming, forestry and industrial environments, etc). Ecological networks are a perfect means of dealing with the large cross-section of themes inherent in nature and landscapes and of decompartmentalising the vertical structures which are currently "managing" the territory. However, an ecological network is also a network of interconnected sites (corridors, link zones, etc) and can cover a variety of levels, which are often nested like Russian dolls, from the local to the pan-European level.

Even though this concept is highly attractive and scientific, there have so far been very few examples of its actual implementation. Nor is it sufficient simply to draw up inventories and maps of actual or potential components of the network. Practical arrangements must be worked out for managing these components and integrating them into a context not yet fully explored by experts in biodiversity, ie into complex systems with a wide variety of functions and roles whose overall management involves combining many different individual or collective, and sometimes contradictory, types of management.

Implementing the concept: MNDPs

During European Nature Conservation Year 1995 the Walloon Region of Belgium launched the first Municipal Nature Development Plans (MNDPs) in order to apply the concept of ecological networks to realities on the ground.

In each municipality a specialised consultancy carries out a field survey to identify the various components of the landscape and the ecological network and highlight their strengths and weaknesses. Pending the result of this survey, the operators representing the relevant milieus in the municipality join to form a diversified and open partnership, before splitting up into working groups



F. Gilson/Bios

Securing efficient partnerships

The rules of modern community life require us to discuss and negotiate and we should accept the validity and relevance of every individual citizen's opinion on the various issues. We must therefore set up the appropriate structures to meet these expectations. A partnership is one such structure and the preconditions for its smooth operation are listed below.

- Partnerships must be spontaneous, diversified and open; they must reinforce the identities of the various operators involved.

- Partnerships must facilitate expert appraisals of the situation by the various operators involved, whether they take a scientific, academic, political, administrative, economic, pragmatic or other stance.

- Serious thought must be given to organising the activities under the partnership. Diversified partnerships create a real culture shock. Great caution is needed in bringing together operators dealing directly with the natural heritage, nature and landscape "suppliers" such as farmers, anglers and nature reserve managers and indirect operators such as teachers, judges and journalists, as well as nature "demanders" such as naturalists or the general public.

- Partnerships necessitate clear negotiating procedures and common terminology, because the semantic content of the words used are often disputed by some of the partners. This applies to words like "biodiversity", "nature" and "landscape".

- Partnerships must deal "globally" with biodiversity and the landscape. They must not concentrate on each of these elements separately, but must also address the relationships between each operator and the landscape or nature, and between each operator and the other operators in connection with the landscape and nature. Effective action exclusively directed at nature or the landscape may have disastrous long-term effects on the environment if it is counterproductive in human terms.

- Partnerships must treat nature as a heritage. The natural heritage concept must be promoted in order to make the operators aware of their responsibilities. The heritage in the broad sense of the term is a conglomeration of physical or other property items (eg monuments, buildings, works of art, concertos, etc) maintained by an owner with a view to transmitting them to future generations. An ownerless heritage is a condemned heritage. One way of guaranteeing effective

responsible for the various topics emerging from the plenary meetings (forests, nature, tourism, water, public awareness campaigns, etc). The partners are expected to negotiate guidelines for a municipal strategy in these fields to be implemented once the ecological network is firmly established. Details of each short-, medium- or long-term project conducted in individual fields are listed in separate files, comprising the names of the partners involved, the estimated budget, sources of funding, schedule of activities, etc.

Strategic evaluation

While the underlying ideas, philosophy and organisation of MNDPs can ensure some degree of success for the operation, this is apparently insufficient to justify automatically extending this approach to all the Walloon municipalities. A "strategic evaluation of the municipal biodiversity management project in Wallonia" was accordingly launched in order to verify and, if necessary, improve the organisation of operations.

Since the pan-European components of the ecological network also have to be locally managed by the states in question, we felt that we should inform readers of the outcome of the strategic evaluation of Walloon MNDPs aimed at establishing the requisite partnerships for such management.

action in the area of biological and landscape diversity is therefore to treat nature as a heritage, ie to transform butterflies, dragonflies, titmice, watercourses, etc, into a heritage maintained and managed by a proprietorial body made up of a variety of operators answerable to future generations. This ownership body might comprise the partners, who would intervene as a single operator. This obviously requires the partners to negotiate a consensus on the means of managing this natural heritage and also necessitates genuine involvement. This is the only way to transform biological and landscape diversity from *res nullius* into *res communis*.

- Partnerships must include clear, precise and detailed contracts. The "project files" must provide for the automatic initiation of the projects.

- Partnerships must establish "easily disconnectable" systems, so that they can be evaluated and then updated, enabling new partners to come in.

- Lastly, partnerships must be organised. Each partner must clearly identify with his or her group and understand the interrelations among the various groups. The partnership must be a veritable heritage institution, ideally made up of three different bodies:

- a decision-making body comprising elected representatives;
- a consultative body made up of elected representatives, local community representatives and experts, providing opinions to guide the decision-making body;
- lastly, a management body facilitating the institution's operations.

This set-up will obviously have to be reproduced at the various levels responsible for implementing the ecological networks.

The requisite deciphering

Some might feel that we have strayed far away from the concept of ecological networks. But what we are attempting here is not so much to identify technical approaches or administrative or statutory management methods, but rather to use and activate all the forces of sociology, systems analysis, organisational psycho-sociology and communication, etc. We must therefore boldly move on from the traditional naturalistic approach to biological and landscape diversity into highly complex areas where the only way to guarantee a chance of success for nature conservation strategies is to decipher operational modes.

If we deny this fact today, whether at local or national level, we are doomed to initiating

strategies liable to become totally ineffective in the medium term. ■

J. Stein

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¹ This study was conducted by the Institute of Heritage Studies of the National Agronomic Institute, Paris-Grignon (INAPG) under the supervision of Prof. H. Ollagnon.



I. Arndt/Bruce Coleman Ltd

Walloon landscape



J. Stein



P. Buckley

The new platform under construction in 1991, prior to landscaping work



M. Griggs

Aerial view of the platform, showing successful revegetation of the surface and lagoon areas

Development of a site in the United Kingdom

The case of spoil from the Channel Tunnel

Jonathan Mitchley and Peter Buckley

During the construction of the Channel Tunnel 4 million cubic metres of chalk marl spoil was excavated from beneath the ocean bed and used to create an artificial platform of 35 ha below the chalk cliffs near Dover. Wye College was employed by Euro-tunnel to carry out research to devise a specification for the establishment of vegetation of amenity and wildlife value on this new addition to East Kent.

Five development phases

Research was carried out in five stages:

Selecting the habitat stereotype

Reconnaissance of the surrounding coastal vegetation allowed us to draw up a long list of the 100 or so herbaceous plant species naturally occurring in the area which might establish and grow on the spoil platform.

Ecological sieving

Based on those species establishing successfully in our experiments and trials, about 50 were eventually chosen from the original list. The experiments showed that the chalk marl spoil contained very low levels of available nutrients (particularly nitrogen and phosphorus), but that it was possible to grow a wide range of plants if initial fertiliser applications were given. Because nutrient-demanding grasses such as perennial ryegrass (*Lolium perenne*) declined rapidly if no extra fertiliser was applied, this enabled us to specify ryegrass as a temporary green cover to stabilise the surface, allowing the slower-germinating wild flowers to persist and spread in subsequent seasons.

Horticultural production

The final short list included five native grasses and 21 broad-leaved herbs (wild flowers). Seed was collected from local plant populations growing on the cliffs adjacent to the spoil platform and bulked up in a conven-

tional nursery bed operation. Four different seed mixtures were specified - a coastal "cliff crevice" mix of halophytic species (including rock samphire, *Crithmum maritimum*) for the margins of the platform exposed to sea spray, cliff grassland and chalk grassland mixtures for the less exposed, inland slopes, and finally an amenity mix containing a higher proportion of species with attractive flowers for areas around the car park and information centre.

Sowing

The technique of hydroseeding was chosen to avoid compaction of the substrate - compacted chalk marl sets like concrete! Seed was combined with water, slow-release fertiliser and appropriate mulches as well as specific rhizobial inoculum to encourage early nodulation of the legume species, and sprayed on to the spoil surface.

Vegetation monitoring

Ten months after sowing, the cliff grassland areas had a mean cover of 55% ryegrass with negligible wild flower cover, but by the third growing season the positions had reversed, the wild flowers occupying nearly 60% of the surface. Legumes such as restharrow (*Ononis repens*) contributed significantly to this wildflower cover and, with their ability to fix atmospheric nitrogen, are clearly at a competitive advantage on this nitrogen-poor substrate.

Although the vegetation introductions were essential to achieve early stability of the spoil and to prevent erosion, it is important to note that restoration has not prevented the natural processes of colonisation taking place, and that a wide range of native species (plants and animals) have spontaneously dispersed on to the platform, some establishing large populations. For example common glasswort (*Salicornia* spp.), a salt marsh species, has appeared at the exposed, western end of the platform where the original sown species failed to establish and there is now a thriving colony, some 20 km removed from the

nearest natural population. Such natural additions to the site are not restricted to coastal species and in 1996 a healthy flowering plant of the early spider orchid (*Ophrys sphegodes*) was found, a rare and protected UK species, probably originating from plants growing on chalk grassland at the top of the cliffs.

A site open to the public

Following landscaping and vegetation establishment, the area was opened for the first time to the public in the summer of 1997. Named "Samphire Hoe", a reference to an incident described in Shakespeare's play "King Lear", it is fitting that the plant itself, rock samphire, is establishing well on the more exposed parts of platform. In future we can expect many varied additions to the flora and fauna of this recent extension to the UK, providing an attractive and interesting site for many visitors and ecologists. ■

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Tools to go further

What steps can be taken to conserve nature outside protected areas?

Cyrille de Klemm

Recommendation No. 25 (1991) of the Bern Convention

The Bern Convention on the Conservation of European Wildlife and Natural Habitats lays down an obligation to conserve natural habitats, particularly those in danger of extinction. The traditional method of conserving habitats by establishing protected areas such as national parks and nature reserves does not suffice, however, to conserve all deserving areas and the constraints arising from such strict protection often meet with an unfavourable response. The setting-up of networks of protected areas also requires the maintenance in their natural state of corridors and stopping-places in between protected areas, so as to enable animals to travel and thereby avoid a genetic isolation that could prove fatal. In 1991, the Standing Committee of the Bern Convention accordingly adopted a recommendation providing the Contracting Parties to the convention with a very comprehensive list of proven conservation measures that may be used outside protected areas as such, from which they can select those best suited to their specific circumstances.

The recommendation makes a distinction between areas of special conservation interest - owing to the presence of typical, rare or endangered natural habitats or endangered species - and other areas and landscape features.

Legislative measures

Legislation can facilitate the state's acquisition of areas of special interest by giving it a right of pre-emption or by authorising their donation in lieu of inheritance tax, as is often the case for works of art. The state can also facilitate the acquisition, conservation and management of natural areas by other public bodies or private individuals by encouraging the setting-up of voluntary reserves, authorising the imposition by contract of land use conservation restrictions and granting tax concessions to owners who agree to certain restrictions or give or bequeath natural areas to public bodies or nature conservation associations.

Urban planning legislation can be used to protect sensitive areas by including them in land use planning zones in which building is prohibited and requiring that any development or activity likely to affect their ecological features be subject to authorisation. Another method consists of protecting specific habitat types, such as wetlands, dry grasslands and heathlands, making any change to those habitats subject to prior authorisation.

Contract-based measures

Outside the most important areas, conservation of landscape features such as ponds, hedges, individual trees, copses and natural grasslands may be promoted by means of management agreements with farmers or voluntary conservation plans, specifying the results to be achieved and the activities to be undertaken in exchange for payment for services rendered to the community.

Ecological corridors may be established on public land through agreements with the authorities concerned, providing for conservation of the natural vegetation found on grass verges along roads, railway embankments and the banks of water courses and lakes.

Some specific rules for other habitats

Special rules may be applicable to vulnerable regions such as coastlines, mountains, flood plains and natural forests. They may prohibit new development and the building of new roads and other structures in remaining natural areas, or regulate certain activities such as the opening of quarries, use of cross-country vehicles and clearance of natural vegetation. The typical biotopes of such areas (for example, dunes, cliffs and salt marshes in the case of coastlines; peat bogs, scree and dry grasslands in the case of mountains; and riparian forests, water meadows and oxbow lakes in the case of flood plains) could be protected in this way. In forests, ancient forests, clearings and edges may be protected by the forestry authorities or by means of management agreements with the owners.

"Nature parks" as a conservation instrument

Lastly, the establishment of nature parks is another useful instrument in conserving landscapes and their natural features. Unlike national parks, these are not protected areas in which almost all human activity is prohibited, but areas with a particular focus on nature and the landscape where there is no prohibition against activities that are not detrimental to the qualities warranting their creation. ■

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F. Gibson/Bios



J.-L. Klein & M.-L. Hubert

The Pan-European Ecological Network

Putting synergies into play

Mart Külvik

The concept of ecological networks is gradually becoming more and more important both in policies and practices of nature conservation throughout Europe. The proposal to establish a Pan-European Ecological Network - PEEN - by 2005 has been endorsed by ministers from 54 countries in the UNECE region. The Network will be one of the principal means through which the Pan-European Biological and Landscape Diversity Strategy is to maintain and enhance the nature's diversity of the continent.

Existing set of tools

This is the third year after the political agreement setting the Action Plan with a series of priority actions to ensure that the PEEN is established within 10 years. The tools with the help of which the Network is developed and implemented and then subsequently evaluated and improved, include a selection of facilities existing already and those which have been set within the Strategy process.

The formal implementation mechanism is now in place as an integral part of the implementation mechanism for the Strategy. It consists of four bodies. The Council and the Executive Bureau for the Pan-European Strategy co-ordinate the actions on the whole Strategy level and the Committee of Experts and its Bureau for the Pan-European Ecological Network carry out the work programme on the specific PEEN level.

As a first step in the broader PEEN development programme, a work programme has been adopted and it comprises the prioritised list of project descriptions as well as giving indications on the co-ordinating organisations. One of the main elements for the starting-up of the pan-continental process has been the preparation of the guidelines on the actions that will be necessary to establish the PEEN. A reference document for all the actors involved in establishing and managing

the Network is being prepared through a wide consultation process and is available for all the stakeholders for final comments.

The ecological network model has been under development in Europe as a practical conservation tool for more than a decade. During that time, a range of initiatives has been developed and several are now being implemented as the preceding articles have shown. The work programme for developing the PEEN - the first attempt to apply the network model at the continental scale - provides the vehicle for pooling experience of existing networks at international, regional and national levels. Although the PEEN model differs from the other programmes in terms of approach, the experience accumulated provides an extremely valuable body of knowledge with respect to criteria for selecting and identifying the network components, the design methodologies and the data necessary for this work.

The various ecological network initiatives differ not only in scale, but also in design methodology and criteria for selection of elements included in each network. However, the initiatives all aim at the same spatial conservation net ideology and therefore provide common philosophical grounds for improving coherence of pan-European conservation actions.

Main principles

The way in which the specific actions to establish the PEEN are developed is guided by three of the principles on which the Pan-European Strategy is based:

Building on existing agreements and initiatives

This aims at using all other existing international and national legislation and policy as well as facilitating, supporting and promoting the implementation of existing international agreements and treaties. The primary pool

could include the Biosphere Reserves, the Bern Convention with the Emerald Network, the EU Birds and Habitat Directives forming the Natura 2000 network, the Large Carnivore Initiative, for example. Building on existing experience means *inter alia* that criteria and methods used by other agreements and initiatives will as far as possible be utilised by approaching the goals of the PEEN. The relevant project on formulating the criteria and methods for developing the PEEN is currently underway. The project on guidelines for application of existing agreements and initiatives is another high priority project being implemented.

Developing an integrated policy

As ecological networks do not aim to provide total conservation, the conservation measures can often meet, at times, unexpected synergic response in sectors like land-use planning, regional development, agriculture, forestry, fisheries, transport and tourism. The development of an integrated policy for establishing the PEEN is the subject of a separate project foreseen in the work programme.

Creating synergies

The co-operative process will involve a wide range of actors including government authorities, donors, private organisations, the research community, landowners, NGOs, civic groups etc. Successful communication between actual and potential stakeholders of the process should be one of the main tasks when synergies among actors and capacities are aimed at. In addition to the efforts paid by the Strategy Action Theme 3 "Raising awareness and support with policy makers and the public" to the subject, a special project within the PEEN process will be initiated.

Implementation

The Action Plan of the Strategy foresees *i. a.* priority action to develop the first phase of the PEEN implementation programme as

well as to stimulate the development of national ecological networks and their linkage with the PEEN. Elaboration of the implementation programme will be an immediate task after having completed the first priority projects. The results of these projects enable us to identify the components the PEEN, *i.a.* the selection of ecosystems, habitat types, species and landscapes of European importance or the provision of information for identifying specific sites and corridors.

The fast-growing experience in Europe of realising ecological networks in practice can make an important contribution to the establishment of the PEEN. Existing and forthcoming national and sub-national ecological network initiatives could explicitly aim at realising the relevant parts of the PEEN and the development and implementation programmes of the PEEN should make full

use of the broad European experience in this area.

An important element of the implementation mechanism should become the reporting procedure through which the countries participating in establishing the PEEN will provide information to monitor and evaluate the progress. It allows appropriate supplementary actions to be developed where unexpected problems are encountered, where actions do not achieve the results intended and where is a need to improve and expand the Network.

The political commitment to the goal of establishing a Pan-European Ecological Network, and the necessary associated actions, was made at the Ministerial Conference in Sofia. Our primary task for the coming years is to commit ourselves to meeting these promises and adapt, adopt and use new perspectives which arise in this

process. The primary challenge is still to conserve and restore landscape and biological diversity in Europe. ■

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A future for the PEEN

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The process of establishing a pan-European ecological network is becoming more and more accepted in Europe. This results from the belief that accomplishment of the network will help to restrain mass extinction of species and habitat loss and also promote wilderness recovery, a belief gained from the fruitful interaction between science and policy.

It will enable the creation of a simple - in terms of structure - and co-ordinated system of nature protection in all European countries, in which special attention will be paid to functional relationships among its elements (areas of cumulated biodiversity resources or migration routes). It is also crucial that the network can integrate the great diversity of national systems of nature protection, which are usually very complex in terms of structure of protected areas and at the moment certainly incompatible.

In order to establish the Pan-European Ecological Network, the following are required:

- develop a common idea/concept of the pan-European network;
- make progress in knowledge of theoretical bases and ways of implementation of the network;
- promote legal and economic tools for efficient establishment of the network in all European countries.

The concept of the Pan-European Ecological Network

The concept of the network is permanently under development. Various networks of protected areas, e.g. Natura 2000 and Emerald, are concentrated on the delimitation of a network of core areas and as a consequence they constitute a set of dispersed spots on a map of Europe. However, these areas are only small parts of geographical space, lacking natural connections, and are restricted to the most valuable natural areas. The problem of counteracting fragmentation leading to the need for ensuring connectivity among protected areas is usually disregarded.

The realisation of the Pan-European Ecological Network will depend on encouragement of existing national and international initiatives, recognising the complexity of assumptions on one hand and the common framework of the network on the other.

Development of ecological networks

Assumptions on the development of ecological networks are dominated by a species approach, of which the main criterion is a representative selection of sites where endangered species occur in Europe. Although it is a modern approach in comparison to hitherto applied conservation practices, it is based on non-spatial premises and thus recommendations resulting from varied geographical

scales, complexity of abiotic conditions and principles of delimitation of borders are not sufficiently taken into account. Therefore, the questions of precise scientific premises, elaboration of common methodological assumptions and specification of planning procedures for designation of core areas and ecological corridors are of crucial importance for accomplishment of the enterprise. Delimitation of the Pan-European Ecological Network has to consist in integration of various planning concepts to make the process, although complex, as coherent as possible. Only then there is a chance to combine spatial planning and the idea of the Pan-European Ecological Network in a way enabling creation of an effective tool for the policy of biodiversity conservation.

Implementation of the Pan-European Ecological Network

The future of the Pan-European Ecological Network means not only to care for consistency and complexity of its concept, but first of all to gain public and political support for its implementation. However, the basis of the Pan-European Ecological Network has still to be reinforced. ■

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At the Council of Europe



Naturopa has been the Council of Europe's environment magazine since 1968. Between 1968 and 1978, each issue dealt with several topics. Since 1978 each issue of this magazine has a single theme.

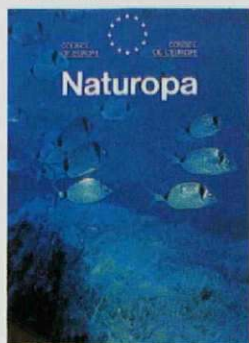
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		87 European ecological networks
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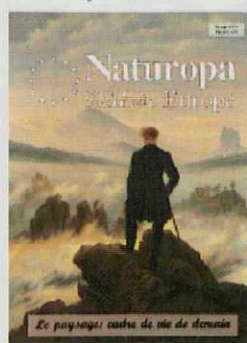
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