

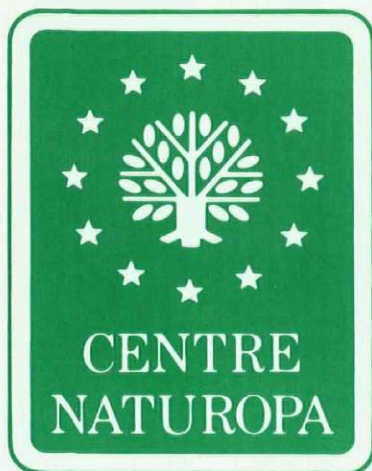


Naturopa

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1995: European Nature Conservation Year

In 1970, the Council of Europe organised the first major campaign on behalf of the natural environment. A quarter of a century later, the Council is again drawing the attention of all Europeans to their natural environment by declaring 1995 European Nature Conservation Year (ENCY).

An International Organising Committee has set out its plans in broad outline, and nearly everywhere in Europe national committees are putting together their countries' contributions to this campaign.

The theme of ENCY is: nature conservation outside protected areas. In other words, the time has come (and none too soon!) to review and reconsider humankind's place in the environment.

We have witnessed a long succession of events, some local and others world-wide. We have read the reports, heard the speeches, noted all the promises, kept all the projects under review, and seen them succeed or fail.

What has changed since 1970? A great deal, and perhaps the most encouraging development is that in Europe the environment is no longer curtailed off or walled out. This gives Europe, the European family, the member countries of the Council of Europe, the continent we inhabit and all of us as individuals a magnificent opportunity to work together to put the environment to rights once again. It will be an immense task, but we can succeed.

Provided we have the determination. ■

H.H.H.



Editorial

Looking at the world from an ecological perspective, what do we see? Magnificent human endeavours to make land and sea productive and attractive, and alongside these, a whole series of appalling calamities: 43% of the earth's total land area lying unproductive or turning into desert; 90% of its fauna has gone; 70% of its forests destroyed; the climate and the composition of the atmosphere altered. Seas and oceans, which cover 70% of the earth's surface, are being robbed of their fish stocks at a rate that exceeds the 100 million tonnes-per-year limit beyond which stocks begin to be consumed and returns diminish. With a steeply rising world population (an increase of 90 million every year) water is in short supply for much of humanity. As the rich become richer, so the poor, underfed and starving become steadily poorer: 25% of the world's population own 85% of capital and 80% of resources (which leaves only 15% of capital and 20% of resources to be shared among 75% of the population).

Major projects aimed at putting society and the environment to rights fail for lack of any global political will.

While men talk, the world is going to waste.

Europe is a continent beset with self-induced diseases needing energetic, co-ordinated and balanced treatment; just what that treatment should be remains to be decided. For this reason, it is essential that all states and their citizens examine their consciences along with all existing organisations and forces, national and international, public and private, cultural, scientific, technical, religious, social, economic and financial; ultimately, the question is a political one.

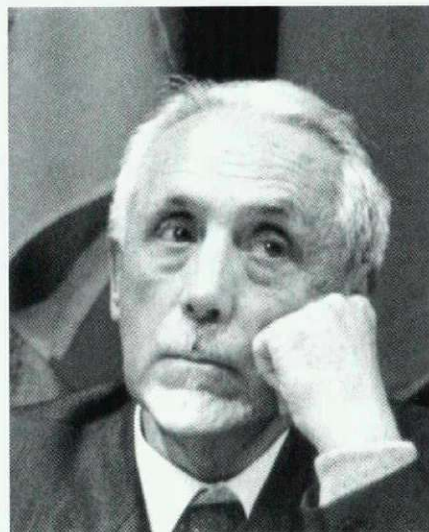
We must get together to examine common problems and come up with common solutions. This is the most logical, economic and efficient method of seeking Europe-wide remedies that bring the peoples of Europe together to defend a common interest: This political union to which all Europeans should aspire will be easier to achieve once the common interest is asserted.

Unity cannot come about by decree if people have no genuinely common interests capable of contributing to peace, justice and equity in a part of the world that has known some of the most troubled periods in the history of humankind.

The ideal of Christianity is the only characteristic shared, if not embraced wholeheartedly, by some 650 million members of Europe's population of 710 million. At present the search for and assertion of common characteristics is being approached in a new way, one that is both practical and realistic,

in order to safeguard the environment and the right of human beings to a healthy environment in which to lead their lives. The right to such an environment is the first human right that every human being acquires at birth, for without it life has no meaning. It is a natural and essential right that the mere fact of existence confers on every one of us. Those who make laws have no alternative but to acknowledge and protect it. It may not be violated, limited or abolished by law. It is, and always will be, the first inviolable right of every living being.

Such, in 1988, were the ideals that guided the governmental meeting in Moscow's Central University and the Academy of Science, where we emphasised that the unification of Europe would not come about until a treaty of ecological peace had been signed among



all peoples of the world on the one hand, and the environment as a whole on the other; we spoke of the need to harmonise the interests, conceptions and ecological culture of the whole continent under the aegis of the Council of Europe, and proposed that, for this purpose, the Council organise a European Nature Conservation Year devoted to the care of the environment, in particular outside protected areas.

We must be grateful to the Council of Europe for upholding this major ideal and deciding to designate 1995 as European Nature Conservation Year (ENCY). This will mark the start of at least a decade of joint activities: the decade of nature conservation in Europe. We must also be grateful to all the states of Europe for undertaking to make the enforcement of this ideal a priority both in

their domestic policy and in their international relations.

The environment is humanity's top priority, the essential issue being the environmental education that young people, the world's future administrators, must be given if we want them to do a better job than we did. The question is one of engendering a valid political will binding on all states. This will not be an expense but a hugely profitable investment.

ENCY will be an occasion for us to mobilise the continent on the theme of ecology, to found the continent's first laboratory for the realisation of three fundamental objectives, or golden rules of ecological practice:

- to rescue what can be rescued;
- to halt degradation where it is occurring and prevent further instances;
- to rehabilitate what has been impaired or destroyed.

To do this, it is essential that appropriate structures be created or strengthened within the Council of Europe member states, sustained by financial resources and staffed by specialists, to which all states contribute. Once again, this is not an expense but an investment that will produce lasting returns.

The type of pan-European ecological action that we are putting in hand will ease the task of those political leaders who are working for the organisation of a united Europe in a practical sense.

It will also make a useful and much needed contribution to Europe's employment situation. ■

Professor Mario Pavan
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Chairman of the International Organising Committee
of European Nature Conservation Year 1995



Prior to a rise in the water level, the reed is burned (black areas) and destroyed by means of rotovation (grey areas).



Aerial photo of the lake's northern sector, showing restricted areas of water, forest belts and the information centre. September 1986.

J. Johansson(3)



The same view. Large areas in the lake and along the shores have been opened up and the rise in water level has started. May 1993.

Rebirth of Lake Hornborga

Torsten Larsson

In 1990, the Swedish Government formally accepted the proposal for a comprehensive restoration plan, put forward by the Swedish Environmental Protection Agency (EPA), in order to save Lake Hornborga in southern Sweden from total habitat degradation. In so doing the government put an end to a long period of investigations, discussions and political deliberations.

Drainage period

Like many other lakes, Lake Hornborga has suffered from human interference, which started as early as the 1800s. In order to reclaim new land, the landowners surrounding the lake decided to lower the water level. In all, five attempts, some more successful than others, were carried out during the following period. What really caused the functioning of the ecosystem to collapse was the fifth and last hydrological intervention, carried out in 1932-33.

The last drainage operation, however, was not accepted without objections being raised.

The Water Rights Court therefore attached certain environmental conditions to the drainage permit in order to reduce the damage to the lake, but unfortunately the most important provision, stating that the northern part of the lake should be maintained as a separate water basin, was ignored for a long period. As a consequence, the whole lake bed was invaded by reed, sedges, willows and birch within a few years and the wetland character was lost except for seasonal flooding. During the summer, water could be found mainly in the numerous drainage canals.

First restoration plan

By the mid-1960s, the concern for nature conservation issues grew stronger and the fate of the famous lake was once again on the agenda. Before the last hydrological interference took place, Lake Hornborga had a reputation for being one of the most outstanding bird lakes in northern Europe. The gradual lowering of the lake, however, brought about a significant impoverishment of the avifauna. Not only local fiery spirits spoke in favour of doing something,

many landowners had begun to realise the problems that were attached to the gradual sinking of the organic soils and the high costs associated with the maintenance of the drainage canals. It was obvious to an increasing number of people that it was impossible to have a sustainable crop production based on recurrent drainage operations. These factors provided good conditions for a reassessment of the hydrological interventions and the predecessor of the Swedish EPA was instructed to study the feasibility of rehabilitating Lake Hornborga as a bird lake.

The results of comprehensive investigations were evaluated in the 1970s. It was concluded that most of the former lake and its natural values could be restored. A rehabilitation plan was outlined, where large-scale reduction of macrophytes and a 1.5-metre rise in water level were important elements. Furthermore, several kilometres of retaining dikes and a great number of pumping stations were proposed, in order to reduce damage to crops. In most quarters this concept was well received, but almost another ten years were needed to have the approval of the government.

The plan is revised

While the administrative mills were grinding, doubts were voiced against important parts of the restoration plan. The long-term operation of the proposed dikes was being questioned, as were the economic aspects of maintaining them. Even more important, increasing knowledge of wetland functions indicated that the ecological design of the project could be improved. Since the main objective for the restoration measures was to produce favourable conditions for birds like ducks, grebes, geese, swans and waders, large areas of shallow water with a mixed vegetation ought to be recreated rather than deep water, which would inhibit the growth of submerged vegetation.

In the light of these aspects, the need to raise the water by almost 1.5 metres was re-examined. In reducing the increase in water level and by the exclusion of as many as possible of the proposed dikes, a more optimal design could be achieved, still within the original restoration concept. By not building the dikes or most of them, the surrounding meadows and other lowland would be flooded regularly, thus becoming part of the wetland area again.

The modified plan first created great controversy. The farmers felt that they had been promised full protection of their land against flooding and therefore saw the dikes as fundamental elements of the plan. Furthermore, a scientific quarrel started, unusually intensive by Swedish standards, about restoration objectives and methods. Time, however, acted in favour of the new ideas. In the end, virtually all authorities and NGOs supported the revised plan. After lengthy negotiations, all landowners reached voluntary agreements with the EPA, thereby accepting the new proposal. The complexity of the project called for comprehensive juridical procedures and it was not until 1991 that the Water Rights Court had approved all the details and the plan could be put into operation.

Implementation

By 1994 virtually the whole restoration plan has been implemented. In terms of size, complexity and economic investment, the project probably has nothing corresponding to it within Europe. The total area encompassed by the restoration measures amounts to about thirty-four square kilometres. These operations have brought about major changes in the lake and surrounding areas. Ecological conditions for flora and fauna similar to those found in early 1900 have been re-created in large parts of the site. About 1 400 hectares of monotonous reed stands have been transformed into a mosaic of open water and macrophyte vegetation. Fire has proved to be a good agency in preparing the lake bed for subsequent treatment by amphibious vehicles, specially designed for the destruction of the root felt. As several hundreds of hectares of deciduous forests and shrubs will be affected by the flooding, extensive areas have been subject to clear-cutting and bush elimination.

To allow free circulation of the water again, several kilometres of drainage canals have been filled in. At the outlet, a three kilometer retaining dike has been built, which also provides technical means for regulation of the water level. The two hydrological basins have been transformed into one by a total rise of the water by 0.9 and 1.3 metres respectively. The level will be elevated gradually, the last step being taken in late 1994 or early 1995.

It will take several years before it is possible to have an opinion about the functional success of the restoration measures. The results will be monitored according to a follow-up programme, covering the period 1991-97. Important parameters to be studied include the development of fauna (mainly birds and fish) and flora, as well as changes in water quality and land use. Most of the inventories needed are carried out by the local field station.

As for the birds, several positive changes have already been recorded. Some species, such as the black tern, the dunlin and the great snipe, have returned after decades of absence. Results from yearly counts of breeding and migrating species indicate a significant positive trend since the beginning of the habitat improvements.

The costs for implementing the restoration measures amount to about 5.6 million pounds. Another 3.8 million pounds should be added if all the expenditure from the mid-1960s is included. It is not likely that a wetland-oriented project of similar magnitude and complexity will be carried out in Sweden again. But the rehabilitation of Lake Hornborga has yielded substantial experiences in project organisation, legal procedures as well as ecological design and engineering. This experience has already been applied in other Swedish rehabilitation projects.

For many years, Lake Hornborga has been designated a wetland of international importance and by enhancing the wetland values, Sweden is fulfilling its obligation to the Ramsar Convention. To further strengthen the biological values achieved through the rehabilitation measures, two types of action will be pursued. Firstly, the whole area will be set aside as a nature reserve. The future of the reserve will be influenced by a management council, where all relevant bodies, including the farmers, will be represented. In contrast to days gone by, the situation today is characterised by a spirit of co-operation at the lake. Compensation to more than 100 farmers or others concerned has been paid in terms of new land or money. Secondly, the EPA will continue its policy of buying valuable land at the lake. The present ownership of more than 2 200 hectares makes it the largest single landowner today.

The future

Two important issues will be guiding the future development of the reserve. Few, if any, sites in Sweden will have so much to tell

about wetland degradation and functions as Lake Hornborga. Therefore, great importance will be given to the promotion of public awareness and education. There are two information centres built at the lake shore. The largest one contains a museum, shop, lecture theatre and cafeteria and offers guided tours throughout spring and summer. A second one is designed to facilitate the observation of 5 000-7 000 cranes, which spend a few weeks in April at the lake on their way to the northern breeding grounds.

High priority will also be given to the management of the area, since many of the natural values depend on such measures. These issues are especially important when dealing with the large areas of marshy meadows bordering the lake. In order to provide optimal conditions for, *inter alia*, birds, the farmers are encouraged to practice less intensive land use than before. To demonstrate the importance of grazing, the EPA has established a stock of animals, based on threatened species of cattle and sheep. More than sixty kilometres of cattle fence have been erected around the lake.

It is tempting to pass a quick remark on all those farmers who, throughout many generations, gradually turned a functioning ecosystem out of balance by changing wetlands into cultivated land. But we have to remember that lack of daily bread was frequently an acute problem and that there was no knowledge available about the ecological consequences of the drainage operations. Rather than blaming our ancestors, we should use the Lake Hornborga case as an example of how fragile wetlands are and how important it is to maintain the remaining ones, instead of being forced to spend large sums of money on their rehabilitation. ■

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Watercourse management through the catchment area

Gilles Pinay
Roger Lohou

Whatever the size of a watercourse, an understanding of its functioning or malfunctioning involves taking account of its catchment area. The fact is that watercourses are not only very dependent on the hydrographic networks that feed them but also on their catchment areas, for which they constitute the natural drain. Thus any action by humans either on the watercourse itself or on the catchment area will have repercussions on its functioning.

The example of the Danube basin

The Danube is a striking example in this respect. This river, 2 880 kilometres long, drains a catchment area of 817 000 square kilometres, covering the greater part of central Europe at present shared between twelve countries. The environmental problems affecting the Danube are unfortunately common to most of the world's watercourses. Among them we would cite the local pollution from the conurbations and heavy industries, dams and their erratic management, drainage of the flood plains of the Danube and its affluents and of part of the Danube Delta, the diffuse pollution caused by ill-considered intensive agriculture, etc. However, while scientific knowledge, though incomplete, is now sufficient to understand these problems, it is the web of cumulative effects of all these impacts that has to be unravelled by the policy-makers of the Danube riparian states.

A political and administrative approach to the problem

Many measures have already been taken in different riparian states in recent years, and efforts have been made to implement concerted schemes at the level of the catchment area as a whole, for example the

Environmental Programme for the Danube Basin launched in 1991. However, it is generally found that political and administrative action is difficult to implement at the required level. There are a number of reasons for this; among them the multiplicity of concurrent uses of the water and the land, and the existence of administrative and political boundaries are major problems. In France and in several other western European countries, organisations have been set up to try to make natural units and politi-

vide an inter-state organisation with funding for actions of common interest to the whole basin on the basis of the link of dependence between the upstream and downstream states in the management of the common heritage. While awaiting such a level of management, basin authorities have already been set up in certain riparian states. Let us hope that these experiments will be extended to all the affluents of the Danube. It could encourage the definition of standards matching the characteristics of the Danube-



A. Bouchet/Pluriel

co-administrative areas coincide more fully. Their powers extend over the basins of the major rivers within a given country. Very often they are authorised to collect a fee from users of the water on the basis of the "polluter-pays" principle. This principle, which in no way confers a right to pollute, is dovetailed with the regulations.

It is not Utopian to think that such an experiment could be extended to the Danube basin. A financial system of this type could pro-

pollution standards based not on concentrations but on flow limits, which are more appropriate for eliminating the eutrophication of the Black Sea, the final receptacle for the pollution generated throughout the entire Danube basin. ■

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Development of living marine resources

Sidney Holt

In 1972, the Food and Agriculture Organisation of the United Nations (FAO) published the first authoritative review of the state of the world's marine fisheries resources. While many of these resources had by then been over-fished - including some of the largest among them - sufficient "new" resources were being opened to commercial exploitation to allow global catches to continue to increase faster than the increase in the human population, albeit at a declining rate. The FAO review noted that this increase was being sustained by the deployment of disproportionately more fishing efforts in terms of more ships, more powerful ships, more efficient catching gears, and by the catching of an increasing proportion of species of lower unit value, which were used to produce fish meal for livestock feeds, rather than for direct human consumption.

FAO predicted that the annual global catch might eventually peak at approximately 100 million tonnes; in 1972, it had reached about 60 million tonnes, of which about 40% came from the Atlantic, mainly the North Atlantic. This apparently pessimistic prediction was not accepted seriously by many, other than fisheries scientists, and not even by all of them. "Development" was at that time the rallying call for ever increasing investment in the industry. FAO itself went along with that, driven by the pressures of governments and the laudable aim of narrowing the economic gap between

North and South in this as in other industries. Even the UN Conference on the Human Environment, held that same year in Stockholm, had little to say about the looming fisheries crisis in general, although it did insist - to no avail - that the completely depleted whale resources should be given an immediate ten-year breathing space, world-wide.

Twenty-two years later, world marine fisheries production is hovering at the 80 million tonnes mark, despite further huge increases in the fishing effort. Some shift in the distribution has occurred, away from the North Atlantic towards the Pacific and the South, though most of the increased catch there still finds its way for consumption in the North. There are now no doubts in responsible minds that the resources are severely limited; the questions are how may they be exploited efficiently yet sustainably, and how may those that have been depleted be permitted to recover? Yet when reading the journals and magazines of the fishing industries, one has the impression that this question has still not penetrated the minds of the publishers, editors and writers who produce them. The theme remains: build bigger boats and more of them, replace the old ones by more powerful ones and devise more efficient equipment for them.

Fourteen years after the International Whaling Commission (IWC) had declared a delayed moratorium on commercial whaling, the Government of Norway has even

resumed commercial catching of whales from a depleted stock, while retaining its membership of the IWC, but going contrary to its decisions and regulations.

Governments, including especially those of the European Union, continue to subsidise, directly and/or indirectly, this race for the last fish (and whale). More modest catch quotas are constantly proposed by scientists and just as constantly exceeded by the quantities agreed through political negotiation, and those in turn are exceeded by activities of elements of the fishing industry in evading regulations. Minimal institutional and technical advances in necessary monitoring of catches, at sea, are opposed tooth and nail, on grounds of cost, inconvenience, law and the unwanted interference of authority with traditional freedoms.

Fishermen themselves are not to be blamed for this situation: they are driven by the need to make a living, this year and the next. The corporations controlling the industries at national and regional levels also inevitably have a limited time horizon - determined by discount and interest rates and the volatility of markets - perhaps five years, at most. Politicians in democracies have a similar real time horizon. None has the power or will to force a scaling down of the fishing effort, and in an equitable manner as far as the fishermen are concerned. The general public pays the price, in terms of taxation to pay for subsidies, and ever higher retail prices for fish.

Until recently, the public has been largely unaware of the deteriorating state of the sea fisheries. Among internationally active non-governmental organisations, only Greenpeace has vigorously drawn attention to the problems and the sorry end to which current policies have been leading.

Yet the almost universal failure to bring rational management to fishing and its associated industries brings not only economic distress but diplomatic and even physical conflict in the ocean - breaches a fragile peace between otherwise friendly people and governments. The second so-called "cod war" between Iceland and the United Kingdom began in 1971 and lasted until 1973 triggered by the declaration by Iceland of a eighty-kilometre fisheries limit (the first was in 1858-61, when Iceland declared a nine-teen-kilometre zone), while the third "war" in 1975-76 was triggered by Iceland declaring a 320-kilometre zone, a breadth which is now accepted by all nations. However, in 1994, Iceland and its sister Nordic country, Norway, are accosting each other in a tiny part of the Barents Sea, which happens to lie beyond accepted limits; Norway - as Canada - is seeking to secure national control over just a little bit more of the ocean for the sake of its beleaguered fisheries. Cases of similar conflict among other Europeans over one or other fisheries "problem" get newspaper headlines with increasing frequency; they have referred in recent months to France, Spain, Italy and the United Kingdom.

Present estimates - admittedly very rough ones - suggest that the present world catch could be taken with about half the effort now deployed, and that that might be sustainable. However, the 1992 UN Conference on Environment and Development, in its report "Agenda 21", has added two relevant words to the consensus vocabulary - sustainable (tied to development) and precautionary (in the form of a principle and an approach). A primary task of those who are concerned for the welfare of future human generations, and our responsibilities to that end, is now to find ways of giving practical meaning to these high sounding phrases.

For fifty years, fishing nations have, at least in words, pursued unsuccessfully the elusive objective of obtaining maximum sustainable yields (MSY) from fish stocks, having been assured by some of their scientific advisers that this would be feasible. But it is now clear that if an MSY exists at all, it is not a constant but a variable and cannot in practice be reliably estimated. Scientists now say that even in the best of circumstances we must be satisfied with less than a theoretical maximum. But that could in principle be obtained from a stock smaller than the unknown "optimum" using more effort, or from a stock bigger than the optimum with less effort.

Instead of demanding maximum yields from renewable resources, the dynamics of which are poorly understood, and likely to remain so, we need to practice parsimony. Parsimony and a precautionary approach in

the light of continuing uncertainty clearly call for the latter option, which obviously would also be more efficient in terms of net economic returns. But that choice will usually imply a more or less painful decision to take catches for a few years that are much smaller than what might be sustainable at the time, in order to allow depleted stocks to recover fully. Such choices may well be politically very difficult, but they must be made if sustainable development embodying a precautionary approach is ever to be more than a dream and a slogan.

I have just returned from a conference in Istanbul, convened to begin drafting a new convention for the future management and rehabilitation of the fisheries of the Black Sea. Representatives of the six coastal states agreed in principle "to establish a common regime for the conservation, reproduction, rational utilisation, scientific study and management of the living resources of the Black Sea-to provide for the sustainable development of those resources...". They noted that the new commission - the target for the establishment of which is 1995 - will pursue this objective. It will "need to adopt adaptive management measures that take appropriate account of ecological uncertainty... and (implement) the precautionary principle as defined and recommended in UnCED Agenda 21...".

This is encouraging. The context is the near devastation of the Black Sea by a sequence of over-fishing (especially of turbot, anchovy, sturgeon and even dolphins), increasing pollution from the major inflowing rivers - the Danube and the Dnieper, the loss of biological productivity of the coastal lagoons that provide a critical habitat for many fish species and, most recently, by the explosive population growth of an exotic ctenophore ("jellyfish") accidentally introduced by ships from the Pacific and which eats the pelagic eggs and larvae of the main commercial fish species. The IFAW carried out for the Turkish Government, two years ago, a study of the socio-economic implications of such changes and made suggestions for appropriate fiscal and administrative remedial action. More such studies are needed in other parts of the vast region of concern to the Council of Europe if the social pain of reducing the fishing effort is to be minimised.

The task of rehabilitation and restoration of the Black Sea is enormous and complex. There can be no pre-ordained scientific solution to such a problem. Hope lies in science-based adaptive management, and the continuing will of the people inhabiting the coastal zone of the Black Sea to provide for the viability of its future.

The Istanbul meeting was informed that FAO has made good progress in producing a voluntary code for responsible fishing. The necessary changes of attitude to our living marine resources will, I maintain, only be brought about by strong, far-sighted and responsible authorities acting on the advice of competent experts. The financial rules of

the development game have to be changed as far as renewable resources are concerned and that can only be done by government interventions. International law in this sector has to be greatly strengthened and the enforcement of it taken seriously. And the process must be watched closely by non-governmental organisations serving both the present and the future interests of the general public. If European Nature Conservation Year 95 can give a hard push to that process, it will have served what fifty years of post second world war procrastinatory talk about the management of sea fisheries failed to do.

Late news: the Government of Canada announced on 14 October 1994 that it is aiming for a 50% cut in the fishing industry's capacity, and has set up a 300 million dollar fund to buy the licences of thousands of East Coast fishermen left without work because of the collapse of some stocks. Will Europe take the hint and follow the example? ■

S.J. Holt

International Fund for Animal Welfare (IFAW)

Podere Il Falco

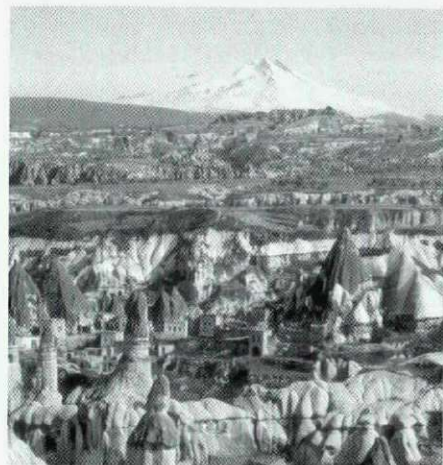
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Turkey's countryside

Turkish Ministry of Tourism

Turkey's unpolluted coastline, mild climate, its treasures from 12 000 years of history, rich culture, natural assets and friendly social environment mean that it is a popular holiday destination.

Its natural attractions include a vast, varied and unspoilt landscape of forests, rivers, lakes, plateaus, caves, beaches, mountains and thermal sources. Cappadocia's fairy chimneys, cave churches, underground cities, together with Pamukkale's limestone hot-



spring are just a few examples of Turkey's unique and miraculous land formations.

Mindful of this great potential - and at the same time taking all necessary measures to protect natural assets - master plans for the tourist regions have been prepared to ensure a balanced and sustainable development of tourism. Protection of natural and cultural assets and ecological balance are the main objectives of these plans. Turkey insists on tourist establishments being in harmony with the environment.

Turkey has endorsed almost all of the international and regional environmental co-operation agreements and has taken an active part in most of the studies related to these agreements.

The increasing demands for unspoilt nature, distinct cultural identities and active holidays have led to a new stage in Turkey's tourist development.

Within this framework, new concepts, such as ecotourism, soft tourism and balanced tourism are carefully taken into account when considering sustainable development.

The policy related to these new concepts aims to spread tourist activities across the country, to develop environmental awareness, to maximise the contribution of tourism to regional socio-economic development and

to diversify tourism in every sense: as regards product, time and clientele. The policy of diversifying tourism is being implemented through multiple projects, including mountaineering, cave tours, canoeing, rafting, trekking, steam-train tours, windsurfing, bird-watching and horseback riding.

Projects such as the International Çoruh Rafting Cross organised on the Çoruh River, Toros mountain trekking, and the steam-train tour on the Ankara-Zonguldak route have attracted a great deal of attention and interest.

Turkey's 8 333 kilometres of coastline, inlets, bays and beaches also have a wonderful potential for yachting. For lovers of the active life, sailing in clear waters provides wonderful opportunities for swimming, fishing, skiing, surfing and diving. ■

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Dutch roadsides

Wim Schippers

Since the 1970s, Dutch roadsides have undergone a metamorphosis due to radical changes in management activities. Once short-cut, monotonous green lawns are now colourful ribbons with a great variety of lifeforms.

Rich flowering herbaceous grassland and its accompanying wildlife is favoured by belated mowing according to suitable management schemes. Nowadays, road verges contain up to 50% of all Dutch plant species. They form a refuge in an overall intensively used landscape.

Specific measures are taken to diminish the amount of animal victims and the effects of isolation. Road construction inevitably means a loss of ecological values. Under the given circumstances, however, infrastructural elements like waterways, dykes, railways and roads form a major contribution in maintain-

ing the variety of nature in the Netherlands, a variety that can be experienced daily by all road travellers. Thus, the necessary concern for long-term nature conservation as a whole is stimulated. ■

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P. Zonderwijk

Northern natural forests

Ivar Haugen

The total forest area in the boreal region has remained the same or even increased during the last few decades. In Finland and Sweden, the forests comprise about two-thirds of the land area, while about one-third of Norway is covered by forest. The majority of the forest in Finland, Sweden and Norway is boreal forest, dominated by coniferous tree species (*Pinus sylvestris* and *Picea abies*). In Denmark the forest area has increased from about 4% in the nineteenth century to today's 11%. Two-thirds of the forest area in Denmark consists of conifer plantations. In Iceland today, natural birch forests cover about 5% of their former size and comprise about 1% of the total land area.

The Nordic forest has been used by man for many centuries. As early as the fourteenth century timber was being exported from Norway and today forestry is one of the main industries in the Nordic countries. Harvesting, agriculture and other human activities have, during this period, reduced the area of natural forest. During the seventeenth, eighteenth and nineteenth centuries the boreal forest was very extensively extended, and locally they were very close to deforestation. At the start of this century, this was a real concern and the Nordic countries soon enacted a modern silviculture law, establishing the principle of balance between growth and harvesting. The obligation to plant or to make sure that natural regeneration is sufficient is still a main principle in law.

The old methods of selective felling were replaced fifty years ago by more economic-ally "rational" clearcutting methods. As a result of this huge areas were laid bare by machinery,

and variegated and diverse forest tracts were often replaced by monocultural forests resembling plantations. Since the introduction of modern forestry, the area of natural forest has decreased rapidly. Today, there is no exact or objective information about the area of natural forest remaining. It is estimated that the area of natural forest today comprises about 10%-20% of the total forest area in the Nordic countries. The area of natural forest is smallest in the southern parts of Fennoscandia and Denmark.

About half of the number of threatened species in the Nordic countries are forest dwelling. Invertebrates, fungi, bryophytes and lichens, in particular, are becoming rare or threatened. The decline and fragmentation of natural forests and the lack of dead and decaying wood, are the most serious threats to the species depending on natural forest qualities. Primary natural forests are most valuable in maintaining the diversity of natural forest species.

In the Nordic countries a number of natural forest types contribute significantly to European and global biodiversity. Thus, every Nordic country has the responsibility of protecting and preserving its natural forests. To preserve the biodiversity of the forests, it is necessary to protect a number of natural forest types, typical of each geographical region, as reserves. At the same time, the methods applied in forestry management should be modified so as to be more in line with the dynamics of natural forests.

During the implementation of different programmes for protected areas, forest areas have been protected. Compared to other nature types though, forests have been protected to a much lesser extent. Today about 3% of the

productive forest in Sweden, 2.1% in Finland, 0.9% in Norway and about 0.1% in Denmark is protected as nature reserves or national parks. Most of the protected forest areas are situated in the northern parts of Fennoscandia. More productive forests in the lowlands have been protected to a lesser extent.

A project group, under the aegis of the Nordic Council of Ministers, has in the report "Naturskogar i Norden" (Nord 1997: 7) presented some recommendations for the management of the boreal forest in the future. Of the recommendations presented, the following are some of those that were emphasised by the group:

- as a general aim for conservation work, at least 5% of the productive forest in the Nordic countries should be protected;
- a network of larger protected natural forest areas should be established;
- protected forest areas in the southern part of Fennoscandia and Denmark should be enlarged, for example by incorporating surrounding managed forest areas;
- data on the areas of natural forest remaining should be clarified;
- in the boreal forest region, the use of fire as a management tool in forest reserves should be increased;
- co-operation between the Nordic countries in future conservation work should be strengthened.

The project group also presented some recommendations for forestry management methods that are more in keeping with the dynamics of natural forests. The following are some of the recommendations that were emphasised by the group:

- the use of natural regeneration should be increased;
- key habitats in the forest landscape should be preserved or even recreated;
- habitats for endangered species should be left;
- much more dead and dying wood in the forests should be left;
- a more varied forest with a "mix" of trees should be encouraged, particularly deciduous trees;
- the use of exotic tree species should be stopped;
- draining of "wet" forest and marshlands should be stopped;
- the use of controlled forest fire as a management tool should be increased;
- forest management should be such as to give landscape planning an ecological basis. ■

I. Haugen



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Forest environment: southern Europe

Jaume Terradas

Southern European forests are highly varied, ranging from Mediterranean-type sclerophyllous woodlands, including species not found in central or northern Europe, to boreal-type coniferous forests and temperate deciduous forests. This variety may be explained by the presence of mountain ranges, which create sharp contrasts in climate over relatively short distances.

Each forest type has its own specific problems, but some of these problems have a very wide impact in southern European regions. We shall consider only the main ones here.

Low productivity

Productive value is low in Mediterranean and semi-arid forests because of the environmental conditions prevailing there - notably the shortage of water. Forest management has consequently been less important for rural landowners than farming and livestock rearing, and little effort has been put into improving forest production by means of appropriate forestry techniques. Timber has been seen as a reserve commodity, while firewood, cork and game have been exploited commercially to a greater extent. The exceptions to this rule are the temperate upland or boreal types of forest, together with a few Mediterranean forests, where commercial production is of greater economic importance.

Environmental erosion

The landscape of southern Europe is the result of centuries of human activity in a physical and biological setting characterised by the scarcity and irregular distribution of water supplies. Over the centuries the various civilisations have left deep scars on the land, as a result of extensive farming and livestock rearing, leading in many cases to soil erosion and depletion. The landscapes of Greece, Turkey, the Iberian Peninsula, southern Italy and many Mediterranean islands provide many examples of over-cultivated and over-grazed land. There has been a slow process of decline, too gradual for each generation of inhabitants to notice.

Rural depopulation

Rural populations are declining in much of southern Europe as jobs in the countryside become scarcer and life in towns and cities seems more appealing. Where the soil of abandoned fields and pastures is sufficiently fertile, plant cover is regenerated and forests expand. The European Union's Common Agricultural Policy will add to this with its incentives for re-afforestation. Initially, at least, this forest spread reduces environmental diversity.

Forest fires

The increase in the amount of brushwood and the decrease in woodland profitability, con-

flicts over forest use (hunters and developers versus foresters), and more visits to the countryside by town-dwellers have all led to an alarming increase in forest fires. The natural ecological effects of forest fires in Mediterranean areas and the natural ability of plants to cope with them are arguments often wielded to play down the importance of their increased frequency. However, such arguments do not stand up to close examination. It is true that forest fires are nothing new, but we do not know whether their recurrence has had an effect on the evolution of plant and animal species. Furthermore, the patterns of disruption caused by fires are changing significantly. It is an established fact that fires can cause individual losses among fire-resistant species. Following a series of forest fires near Barcelona, researchers found that a number of fire-resistant tree and shrub varieties suffered moderate losses of around 25% (Castell y López Soria, 1992). Repeated fires could severely deplete stocks if not devastate them. The situation is far worse if the burned area is exposed to uncontrolled grazing as is often the case. The young shoots and the internal resources of the tree-stumps may not be sufficient to sustain regrowth. In the case of plants that rely on seed dispersal, such as many pine varieties, if fresh fires break out before the seedlings generated by a previous blaze can reach sexual maturity virtually all the seed stock may be destroyed. This shows that Mediterranean ecosystems are more sensitive to the new patterns of disruption than was previously thought. Proper management methods must therefore be found to tackle this problem.

Tourism and leisure

Mass tourism's implications for forests are many and varied. First, new uses of forests (tree-felling for urban development or road-building, dam-building to supply larger populations with water, etc.) affect not only the typically Mediterranean areas but upland

forests too. Other problems are brought about by leisure activities, such as the already-mentioned increased risk of forest fires; the construction of ski resorts also causes damage. There is a positive side to this: alternative uses of woodland can increase landowners' incomes and boost the number of forestry businesses.

The overall size of forests in southern Europe is not declining but is actually on the increase. Nevertheless, they are clearly faced with a number of quite complex problems that are affecting both their quality and their biodiversity. The authorities usually pay little attention to a sector that, although significant in terms of the area covered, is unimportant in terms of production. People are less motivated

to preserve nature than they are in central and northern Europe and the level of research is also relatively low in spite of recent progress. Southern Europe therefore faces serious difficulties when competing for European Union funds. There is much to be done, but the priority must be given to developing the right forestry methods and protection measures for ecosystems that are still not fully understood, even though much of Europe's biological wealth is stored there. Further recommendations should include calls for:

- more research into basic aspects of the problem as well as into forestry techniques, materials and forest economics;
- new fiscal policies to give priority to forestry over other land uses;

- an overall forest fire prevention strategy;
- encouragement for alternative land uses that benefit landowners without jeopardising biodiversity;
- restrictions on planting exotic varieties on abandoned farmland. ■

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“Wildlife” fallows

Jean-Pierre Arnauduc

When fallow land began to be talked about again in the context of the Common Agricultural Policy (CAP), French game shooting circles immediately saw this as a chance for wild fauna, though they were well aware that fallows are not desirable from the farmer's standpoint.

Was land farmed by extensive methods finally going to better satisfy the needs of wild animals at the mercy of agricultural systems?

Unfortunately, French legislation governing fallow land gradually evolved in a direction unfavourable to fauna, culminating, in 1993, in the obligation to harrow fallow land in May and June, just when animals are breeding. Instead of being an opportunity for wild animals, fallows were becoming a death trap.

As a result of this disappointment, the French game shooting organisations (Union nationale des fédérations départementales des chasseurs (UNFDC), and Office national de la chasse (ONC)) suggested to the government that it should create a special category of fallow land, with its own regulations: “wildlife” fallows. For small animals this would provide places for breeding, food,

shelter and rest, while in the case of larger animals the provision of browsing ground would help to prevent damage to crops.

Implementation

This proposal was welcomed by farming circles, and the national game shooting organisations (UNDFDC and ONC) as well as the farmers' association (Assemblée permanente des chambres d'agriculture (APCA)) got together to put it into practice.

Finally, the Ministry of Agriculture and Fisheries officially instituted the “wildlife fallows” in France through two circulars, one for “rotating” fallows (16 September 1993), the other for “fixed” fallows (13 January 1994).

The scheme was implemented at departmental level (France is divided into ninety-five *départements*) by:

- the signature of a departmental agreement between the Prefect, the Departmental Chamber of Agriculture and the Departmental Game Shooters' Federation;

Risks to fauna from harrowing and mowing

	FEB	MAR	APRIL	MAY	JUN	JUL	AUG	SEPT
Animal cycle	Start of laying for: pheasant partridge		1/5	Presence of fawns Brooding time for birds	15/7	Raising of young		
Risk	Very low		Average	High		Average		V.low
Recommended action	Chemical treatment Harrowing as early as possible Scaring		No harrowing between 1/5 and 15/7 Chemical treatment possible		Scaring High cut (15cm) Maintain a cover			



- the compilation of departmental technical specifications;

- the conclusion of individual "wildlife fallow" contracts between volunteer farmers and local game shooting associations.

The planting of cover is obligatory in the case of wildlife fallows (hence no bare soil or spontaneous growth as in the case of other fallow land) and, an essential point, the farmer receives financial compensation from the game shooters (400 French francs/hectare on average) corresponding to the extra costs of the management required, which comes on top of the European set-aside premium (approximately 2 600 French francs or 371 ecus).

The technical specifications cover the action desired on the areas of land concerned, in particular:

- choice of plant cover to favour the fauna (type of plants, height, structure);
- dates for harrowing (or mowing), exclusively outside the reproduction periods;
- appropriate densities of sowing (excessively dense cover is unsuitable);
- ban on the use of plant health products that are toxic to fauna among those authorised for "normal" fallows (for example, Paraquat);
- size and location of appropriate areas of land ("fringe" effects, agricultural environment, etc.);
- dates for sowing: autumn rather than spring (presence of winter cover).

It should be noted that, for "fixed" wildlife fallows, the government circular allows departures from the limitative list of plants

authorised for cover on fallow land (in France). Thus straw cereals, maize, buckwheat and feed clover, very favourable to fauna but normally prohibited on fallows in France, can be used.

In addition rules are imposed on game shooters in order to prevent abuses.

Quite apart from their ecological value, wildlife fallows also have advantages from the agricultural standpoint, connected with the cover planted: green manure, soil structure amelioration, nitrogen fixation, erosion prevention, stifling of weeds, break in crop rotation, etc.

Present situation and prospects

Just a few months after the promulgation of the ministerial circulars, thirty-nine *départements* have already concluded agreements.

At national level the objective is to have 75 000 hectares of wildlife fallows, or a financial flow of 30 million French francs a year (approximately 4 286 000 ecus) from game shooting to agriculture.

Considerable interest has been aroused by this form of fallow land, including among farming circles, with a favourable response on the part of departmental chambers of agriculture, numerous articles in the farming press, ongoing contacts with agricultural suppliers, etc.

Game shooters and farmers have got together to do something useful with this set-aside farmland in the general interests of wild fauna, whether game or not. Wildlife fallow land is the first ecological fallow, and with it farmers are better able to accept having to

take land out of use. Fallow land will thus not become wasteland.

Let us hope that, in time, the "wildlife fallow" model will be able to prove itself from both the agronomic and the faunal standpoint, and can then be introduced on a general scale by the public authorities, including at European level. ■

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Nature protection in towns

Jean-François Noblet

It used to be common practice to draw a distinction between towns and nature: towns were for man, nature for wildlife; town had their concrete and tarmac, nature had its national parks. In fact, modern ecology urges us to reject this dichotomy, which is harmful to both man and nature.

Towns were often built in areas where nature was rich, quite simply to ensure that the first town-dwellers had ready sources of food. Hence the presence of towns by the sea, at the confluence of rivers, on the shores of large lakes or on the sunny slopes of the mountains, where it was easy to farm, fish and hunt.

The first town-dwellers also wanted to build on transit routes - mountain passes and the intersections of valleys - like all migratory species.

It is thus obvious that the majority of conurbations have been built in biotopes origi-

"Nature in towns": Ephesus, Turkey



M. Günther/Bios

nally favourable to fauna and flora. But human colonisation has very often completely destroyed the natural environment, simplified and polluted the existing ecosystems and chased away the animals, creating what is pompously known as "the urban environment". Here we increasingly find human beings assailed by noise and surrounded by waste in a barren area deserted by wildlife, those who cannot avoid being condemned to misery, stress and the search for an artificial paradise to replace what they have lost.

Fortunately, however, modern ecology teaches us that we can easily reconcile town-dwellers and nature for the pleasure of the former and the right to existence of the latter.

Since our towns were built in natural environments of great biodiversity, it needs only a little imagination and political will to permit recolonisation by wildlife.

Work must start with the rehabilitation of hydrographic networks, from the treatment of effluents and the cleaning of riverbanks to the

management of rainwater. A fear of water and flooding long induced planners to evacuate as much rainwater as possible as quickly as possible, frequently causing disasters downstream. We now know how to manage rainwater precisely where it falls: roofs that retain water, permeable parking areas and pavements, temporary storage in treated infiltration basins in natural wetlands, open storm drains planted with local species. These are the instruments that can be used by the staff of a town's technical services; this is how to avoid flooding and the pollution due to the leaching of road surfaces; and this is how to bring back to our towns the sound of water and attract anglers, ducks and herons.

A chance should then be given to spontaneous vegetation, even on quite small areas - on flat roofs, in green spaces and around motorways, in cemeteries and areas subject to flooding. And, of course, in private gardens and open spaces.

Here there remains much to be done to make citizens, landscape designers and park staff understand that the aim is not simply to have a little splash of greenery in our melancholy towns but to give some space back to natural vegetation, a source of food and shelter for our fauna.

Everyone can participate: park staff can choose to replace the sinister single-species lawns by natural flowering meadows or the exotic trees in school yards and the foyers of old people's homes by ancient varieties of fruit tree. The owner of a garden can plant a fine diversified country hedge rather than the traditional sterile and uniform thuya, and can refrain from cutting down the hollow tree that may house nuthatches and dormice.

Even in houses, in buildings and on bridges, it is possible to provide breeding places for fauna. An expansion joint in a viaduct can house thousands of bats, the loft of a factory a marten, and the roof space of the town hall swifts or redstarts.

Our conurbations, once more places filled with birdsong, the scent of honeysuckle and the fluttering of butterflies, will become useful to nature again as well as agreeable to live in. Successful cohabitation could even restore some of the lost enjoyment of life and thus reduce stress, solitude and disenchantment. ■

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Soil

Winfried Blum

The 1972 European Soil Charter describes soil as a complex and dynamic milieu consisting of solid, liquid and gaseous phases and containing mineral and organic elements, as well as a multitude of living organisms. Unlike other elements such as water and air, soil types are conditioned by local topography and can therefore vary hugely within a very small area (see *Naturoopa* 57, 1987). Furthermore, the charter points out that soil is only a limited resource as well as being extremely sensitive to different types of interference.

Accordingly, the Council of Europe's Group of Specialists on Soil Conservation has paid close attention to the problem of soil protection over recent years. The first question in this connection was what functions does soil perform and what are the effects of using these functions?

Major soil functions

Soils essentially fulfil six different functions, three of them ecological and three that may be described as technical/industrial and socio-economic. The three ecological functions are:

- the production of biomass in agriculture and forestry, whereby the soil serves as a nutritive substrate providing air, water, nutrients and the physical environment for plants. As a

result, foodstuffs, fodder and renewable raw materials are produced, which was until recently held to be its sole and most basic function;

- the buffer, filter and conversion function whereby soil is seen as a filter, buffer and convertor between the atmosphere and groundwater on the one hand, and between the atmosphere, groundwater and plants on the other.

An important physical buffer function is performed by the soil's pore system, its ability to absorb rainwater and in due course pass it on to the groundwater or to plants or the atmosphere. This property is of paramount importance, especially in the mountains, since it regulates the water balance and protects the landscape as well as human settlement areas from destruction.

One of soil's important physico-chemical filter and buffer reactions is that it binds organic and inorganic pollutants, for example, heavy metals, that is, it can precipitate or absorb them in a mass of internal pore spaces and consequently prevent them from getting into the groundwater through eluviation or into the food chain through plant absorption. This vital feature of soil in protecting and preserving human life has only recently been thoroughly investigated.

Moreover, a range of soil organisms (up to 25 tonnes/hectare and 30 centimetres deep) is capable of decomposing and converting bio-

chemical and biological organic pollutants and thereby helping to maintain the purity of drinking water and food.

To sum up then, filter, buffer and conversion functions preserve and maintain life.

- in addition, soil is home to large numbers of organisms that may be viewed as the soil's genetic reserve. Soil protection thus means gene protection at the same time. Gene conservation in general is a vital task for preserving the conditions for human life, because not only plants and animals living on the surface of the earth but also those inside the soil must be protected. Above and beyond this, numerous soil genes are vital for human survival, as attested to, for example, by the isolation of the penicillin antibiotic in the ubiquitous penicillium fungus.

In addition, soil has three technical-industrial and socio-economic functions:

- the infrastructure function, that is to say the provision of land or space for human settlement, industrial sites, transport and traffic infrastructure, leisure, sports and recreation facilities, and for the disposal of domestic and industrial waste. In so doing, soil is often sealed or irreversibly destroyed;

- soil also serves as a raw material in providing many materials, for example, building materials in the form of gravel, sand and clay or other minerals as well as water;

**Look to the future,
look after nature**





- not least, soil is an essential part of the landscape and at the same time protects archaeological and palaeontological remains, which are of vital importance for understanding the evolution of the plant and animal kingdom as well as the development of human civilisation.

To sum up, we may say that each of the six soil functions is important in itself, although it is not directly used to the same extent in all areas.

Competition between soil functions

Soil damage and erosion are caused by individual functions being over-used or being put under extreme one-sided strain. This leads to a variety of competitive situations, such as:

- eliminative competition between technical/industrial and socio-economic uses on the one hand and ecological functions on the other, as neither foodstuffs nor animal feedstuffs can be produced, nor can the buffer, filter and conversion functions or the gene protection function of soil be preserved where a road is built for example;

- in addition, the ecological functions of soil, such as agriculture and forestry, and the buffer, filter and conversion functions as well as gene conservation face a variety of threats from housing and industrial estates and the areas of land needed for transport, whose pollutants get into the soil through the air, water transport (bank infiltration, flooding, etc.) and land transport (refuse and waste disposal);

- finally, there are also considerable problems among ecological soil functions, as there is also competition between, say, agricultural biomass production on the one hand and the soil's buffer, filter and conversion capacity on the other. Farmers produce foodstuffs and fodder and renewable raw materials on their land. At the same time, however, they are producing groundwater under their land as

every drop of rain that falls has to pass through that land to become groundwater. The way farmers use their land therefore influences not only the amount but also the quality of groundwater. There is similar competition, albeit less marked, between the soil's agricultural and forestry production functions and its gene conservation and reserve functions.

soil resources", which is to be published some time later this year. We can only hope that these efforts bear fruit. ■

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Use of soil functions

In view of this competition between individual soil functions and their use, sustainable land cultivation and soil protection can only take place if the use of these individual functions is harmonised in terms of space and time, namely, if they are made to fit in with each other so as to ensure that none of them causes long-term damage to soil.

In doing so, particular attention should be paid to the question of irreversible uses, their frequency in infrastructure and raw material functions, for example, as soils here are put to just one use in the long term (road, residential block, factory, gravel pit, etc.) and all further potential for use is excluded. The question of whether individual processes are reversible or irreversible is therefore a major factor in soil protection. Irreversible land use means anything that cannot be reversed in the space of three human generations (around 100 years). With regard to possible land use by future generations, these kinds of irreversible uses should be minimised as far as possible.

The question arises here as to who is responsible for such harmonisation. It is certainly government rather than science that is called upon to steer the decisive new course.

Over the last few years the Council of Europe has done a great deal to help bring the issue of sustainable land use and soil protection in Europe to the attention of the public and has produced a basic survey entitled "European

Ploughless farming

André Maillard

Ploughing is normally the first stage in the planting of crops. Tilling the soil with a plough is a way of incorporating organic inputs, killing weeds, preventing disease, controlling pests and preparing a seed-bed. But it is work that requires much time and energy.

The techniques of soil preparation can now be simplified as a result of extensive research into mechanical tillage methods and agricultural chemicals. The plough may be replaced by other implements that do not invert the soil, and biocides may be applied to control weeds, diseases and pests. Ploughless farming can take many different forms: the way in which the soil is loosened varies; so do the depth and area of tillage and the amount of machine manipulation. The most radical technique is that of direct drilling. This is completed in a single lap with a special drill, and the surface of the soil is disturbed only where the drill discs or blades pass through it.

At Changins Federal Agronomic Research Station in Switzerland, research into ways of minimising tillage in crop rotation farming started in the mid-1960s. A long-term trial has been in progress since 1969, and the purpose of this short report is to present the main observations and conclusions. By comparison with methods involving extensive tillage, the ploughless farming technique employed continuously for over twenty years:

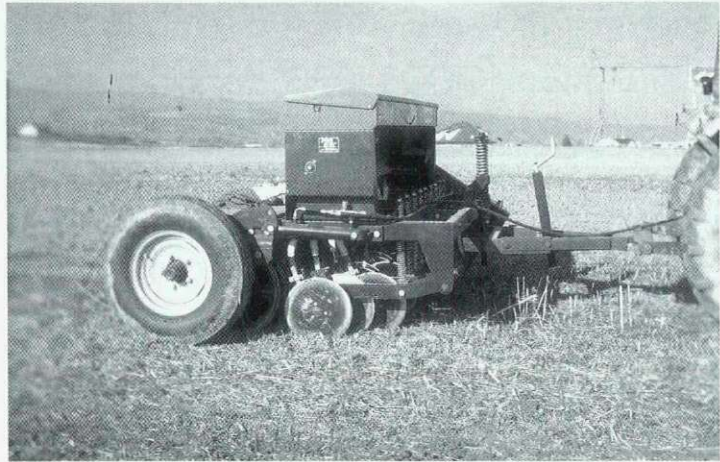
- requires the use of a disc drill to eliminate clogging problems due to the presence of crop residues on the soil surface;
- reduces the depth of tillage, thus cutting soil preparation costs;
- improves the consistency and physical properties of the soil (better water intake and a more stable aggregate structure);
- affords better protection against water erosion;
- concentrates phosphorus, potassium and organic matter in the upper soil layers;
- increases the acidity of those layers slightly;
- stimulates the biological activity of the soil (measurable release of carbon dioxide and adenosine triphosphate);
- encourage the number of earthworms;
- tends to require larger applications of chemical protectants for weed, disease and pest control;
- has had no adverse affect on the grain yield of autumn wheat, rape and maize crops. ■

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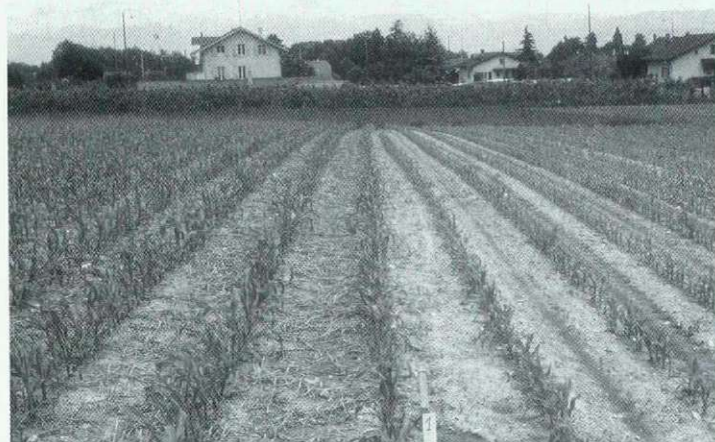


A. Maillard (3)

Of all the ploughless farming techniques, direct drilling is the most successful at eliminating tillage. With a special disc drill, the crop is sown in a single row without any prior preparation of the seed-bed.



Ploughless farming (right improves water intake, protects the soil against heavy precipitation and makes it more resistant to erosion).



A maize crop sown without tillage (left in the presence of wheat straw residue from the previous crop. Right: a crop sown after ploughing).



Hedges

Jan Stevens

A hedge is a line of trees or bushes separating one piece of land from another. To Europeans, this definition will evoke dozens of different images, as hedges are extremely dissimilar, each region having its own particular type.

Functions

The presence of a hedge is usually the direct or indirect result of territory being marked out, a primeval habit, which even modern man has not shaken off. In our times, hedges still confer a degree of intimacy on gardens in residential neighbourhoods. In farming regions, they have served since the earliest times to keep the cattle from straying, act as wind-breaks and create a micro-climate in which plants can thrive, offer game birds and animals refuge and prevent erosion of arable land on steep slopes. These are only the primary functions. In addition, hedges are of immense intrinsic value.

Importance

Many hedges started life as relics of original woodland: when a plot of land was cleared, the boundary strip was preserved. Hedges which show how the land was divided in medieval, Roman or even prehistoric times are regarded as genuine historic cultural assets. But a hedge planted by our great-grandfathers is also of inestimable value to all their descendants.

In the landscape, too, hedges assume an importance that must not be underrated: there is no comparison between an open landscape and a landscape of fields surrounded by hedges.

In addition, hedges clearly have considerable value for the natural sciences. They may be constituted in very different ways, some of a single species from one end to the other, others of mixed species. The mixture may be very uneven: for example, a few metres of one species followed by a few metres of another;

or it may be intricate, with a change of species after every bush. Some species may be deciduous and others not (hawthorn, hornbeam, dogwood/privet, yew, etc.). A hedge may be tended in very different ways: close-cropped or allowed to grow tall. The varieties most commonly employed are hawthorn, hornbeam and dogwood, but other less obvious varieties occur in hedges too: blackthorn, ash, elder, ivy and lime. Ancient country hedges may have a very varied, random appearance.

A hedge will give shelter to a whole community of wild plants and animals whose composition will depend mainly on its situation, its size (mainly height and width), its age and the manner of its upkeep. In many typically agrarian regions, the local flora and fauna consist very largely of forms of life harboured by hedgerows.

But a hedge's importance is not confined to one locality. Hedges also constitute a network of appropriate habitats or links between one habitat and another. The network benefits many passers-by: badgers, bats, butterflies and many others besides keep to the hedgerow as they travel from place to place, avoiding the open spaces.

Threats

Despite their numerous uses and the considerable asset that they represent in other ways, hedges are under threat in many places. Their value is underrated and many people have lost their feeling for the quality of their immediate environment. This causes hedges to be neglected and, after a spate of unruly growth, uprooted. To keep their cattle together, farmers then use barbed wire and electric fences instead.

The trend towards larger farms has been largely responsible for the disappearance of many hedges, often as a result of an organised campaign as holdings are re-parcelled. And because now the scale of the loss is gradually beginning to strike home, more and more pressure groups are being founded in order to safeguard and restore the hedgerow heritage.

Conservation campaigns

The first stage in any effective conservation strategy is to persuade local people of the value of their hedges. In the province of Limbourg in Belgium, for example, a large-scale campaign has been conducted for this purpose with posters and leaflets.

The education of specific categories of people is also important. Children of school age can learn much from hedges about the history, geography, biology and ecology of their own regions. In addition, a form of specialised training must be dispensed to all those - landowners and farmers for example - who are actually involved in planting and maintaining hedges. Considering the state of many hedges, as much attention must be given to routine maintenance as to repairing the damage caused by neglect. Planting new hedges of a traditional kind characteristic of the region is a dying art in many places: deciding what species to choose, how to prepare the land, what space to leave between one bush and the next plants and how to protect them against cattle are all important aspects. Attention must also be given to the modernisation of maintenance techniques (and how to make them viable): machines have recently been designed that cut back sprawling hedges quickly and cheaply.

Besides this, it is desirable that the authorities take steps to see that the hedgerow heritage is well managed. In Flanders, for example, may local authorities offer subsidies for the planting of new hedges and/or the upkeep of old ones. In deciding on the precise criteria for awarding such subsidies, it is possible to guide choices and in time influence the whole appearance of the landscape. This is one way of ensuring the preservation of a region's specific character. Other local authorities and associations organise sales of seedlings of typical local species. Others set up intercommunal syndicates that keep small landscape features in good condition with teams of specialised-workers.

The state of the hedgerow heritage is determined by the local population, private individuals as well as official bodies. Travelling through Europe, one can deduce from the hedgerows how much

importance each local population attaches to the quality of its own environment. To that extent, hedges are for every one of us a visible element of Europe's rich cultural diversity. ■

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Industrial wasteland

Anthony Bradshaw

There has just been an interesting article (*Naturoopa* 73, p.7) on the value of industrial land in providing evidence for the power of evolution and natural selection. But these lands also have an important value for conservation. Just at the moment there is great concern for the reclamation of all derelict land. In many places this is very necessary - the British viewpoint is given in a government publication *Transforming our Wasteland - The Way Forward* (HMSO, 1986). But before reclamation goes too far, we should stop and save some areas for nature conservation and as ecological show cases.

In most of Europe the vegetation and soil have been there since the last glacial period or longer. There has been ample opportunity for soils and ecosystems to develop to their fullest extent. It is only in some mountainous areas, river valleys and coasts that natural disturbance occurs, sufficient to rejuvenate the landscape and provide open conditions and skeletal soils in which succession takes place and species of open habitats can escape from competition.

Open habitats

Derelict land, in which the soils and the vegetation have been destroyed, is therefore very important. Not only are the habitats skeletal and open, but they often have special characteristics favouring particular species. Old limestone quarries are wonderful habitats for calcicole species intolerant of competition such as the bee orchid (*Ophrys apifera*), the carline thistle (*Carlina vulgaris*) and purging flax (*Linum catharticum*). In the United Kingdom, many limestone quarries have been registered as Sites of Special Scientific Importance.

But industrial wastes can be equally exciting. Some very calcareous chemical wastes such as those produced by the old Leblanc process are so alkaline and low in other nutrients that after 100 years they still have only 50%



"Valuable conservation areas".

plant cover. It is very easy for them to be classified as wasteland needing reclamation treatment. Yet they are home to a range of species such as the fragrant orchid (*Gymnadenia conopsea*) and the marsh helleborine (*Epipactis palustris*), which are not found in the surrounding areas. Where did these species come from? The evidence is that they were brought 40 kilometres by wind from coastal areas where they are native. This is only possible for species like orchids with light seed, able to be carried by the wind. Recent introduction experiments reported in the *Journal of Applied Ecology* 31 (74-84, 1994) shows that there are a lot of other species that are too heavy-seeded to be carried that distance, but which are very successful once introduced. So these habitats are really ecological islands and provide wonderful models to test what happens (or does not happen) to species on islands. The experiments also show how biodiversity can be increased in industrial habitats, if this is wanted, by simple species introduction.

Natural succession

Some industrial habitats are less extreme and isolated so that natural succession occurs more rapidly. Nevertheless, these can provide quite remarkable floras, such as the orchid meadows, which occurred on the fuel-ash waste tips round the coal burning power station near Wigan in Lancashire. Sadly, natural succession on this site has taken place so rapidly that they have now disappeared under a dense scrub of willow (*Salix cinerea*).

But this succession can be of great ecological interest in itself, especially because there are few places in Europe where natural processes of succession can be seen. Urban clearance sites, disused railway lines and other industrial habitats can provide perfect examples of succession, easily accessible for educational purposes as well as being areas of great beauty and interest. In the poorer sites, nitrogen-fixing species such as white clover (*Trifolium repens*) can be shown to

A. Bradshaw

The underlying problems of derelict land and their treatment (from Bradshaw, 1983)

Category	Problem	Immediate treatment	Long-term treatment
Physical Structure	Too compact Too open	Rip or scarify Compact or cover with fine material Stabiliser/mulch	Vegetation Vegetation
Stability	Unstable		Regrade or vegetation
Moisture	Too wet Too dry	Drain Organic mulch	Drain Vegetation
Nutrition Macronutrients	Nitrogen Others	Fertiliser Fertiliser + lime	Legume Fertiliser + lime
Micronutrients		Fertiliser	
Toxicity pH	Too high Too low	Pyritic waste or organic matter Lime or leaching	Weathering Lime or weathering
Heavy metals	Too high	Organic mulch or metal-tolerant cultivars	Inert covering or metal-tolerant cultivars
Salinity	Too high	Weathering or irrigation	Tolerant species or cultivars
Plants and animals Wild plants	Absent or slow colonisation	Collect seed and sow or spread soil containing propagules or plants	Ensure appropriate conditions
Cultivated plants Animals	Absent Slow colonisation	Sow normally or hydroseed Introduce	Appropriate aftercare Ensure appropriate habitat

play a critical role; on the disused railway marshalling yards of Berlin the nitrogen-fixing species is black locust (*Robinia pseudo-acacia*). What is conspicuous in these areas, however, is how different the communities which develop can be, because of the effects of chance on immigration. The fundamental principles determining primary succession are all there to be studied.

Difficult sites

There remain, then, other sites in which plant colonisation is very slow, because of soil problems or lack of suitable species. Coal-waste heaps and disused limestone quarries can remain bare, for instance, for fifty years. But the species that do occur will often provide the key to the ecological problems occurring. Wavy hair grass (*Deschampsia flexuosa*) is often found on old uncolonised coal wastes; it indicates extreme acidity. Such sites can be left for the painstakingly slow effects of natural processes such as weathering to remove the problems. Meanwhile they are sources of interest and education. But the species present can be the clue to how the land could be treated to hasten colonisation.

For each problem a simple treatment is available.

What is difficult is to know how far to carry out the treatment process. To re-create agricultural land substantial treatment may be necessary. But to help natural conservation

and the development of more natural plant communities, very limited treatments may be all that is required. Extreme acidity may require the application of lime (CaCO_3), poverty of nitrogen and other nutrients the application of fertiliser and the use of nitrogen-fixing species, physical problems such as extreme compaction the use of machinery to cultivate the ground.

Introduction of species

But then, unless one is to wait for the slow natural immigration of species, some seeding is necessary. Seed of wild species likely to be adapted to the conditions can be chosen. Great success has been achieved recently in recreating heathland by sowing litter of heathland species harvested by machine when the seeds are ripe. It may be necessary to sow a short-lived "nurse" species, a pasture grass such as Italian ryegrass (*Lolium italicum*) or a cereal such as rye (*Secale cereale*), to protect the desired species, but its density must be kept low. In other situations such as quarry faces, the seed can be suspended in a mulch of soil or sewage sludge and poured or sprayed over the rock face. The results can be remarkable.

It is time that we looked on industrial habitats and derelict not as wasteland to be covered up and totally reclaimed, but as valuable conservation areas in their own right, either to be left completely to the natural processes of succession, or to be given limited improvements to aid colonisation of desired species. ■

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The ordinary city-dweller and wildlife

Marco Dinetti

Nature conservation is something more than the simple setting up and managing of nature reserves. Migratory birds, seeds spread by the wind, or fish going up stream do not recognise either parks or state boundaries.

Conservation has to be considered at a wider level; one which encompasses the whole territory. Personal commitment has to aim at a better future for every one.

In cities too, often considered as the exclusive property of humans, nature finds room to impose itself in different forms, allowing us to have a daily relationship with it. But what can an ordinary citizen do in order to contribute concretely to wild plant and animal conservation in town?

If you live in a block of flats and only have a balcony available: it is possible to plant aromatic plants and flowers in pots, so as to attract butterflies and other insects; set climbing plants such as ivy and honeysuckle against a wall; erect nesting-boxes under the eaves for swifts, house-martins and bats, and in barns or on chimney pots for little owl and barn owl.

During winter, a bird-table on the windowsill rich in seeds, peanuts, apples, dried fruits, or sweet crumbs will attract and help sparrows, greenfinches, blackcaps and robins.

If you live in a house with a garden: add some regional shrub producing berries. Not only will these be nice to look at, but they will attract various animals. Let a corner of the garden become wild, where grasses and flowers can grow freely. Here, build a nesting-box covered with dry leaves, where hedgehog can find a shelter. During summer provide a drinking trough and make some pools so that swallows can find mud for their nest. On trees, erect nesting-boxes of different shapes for great tits, redstarts, wryneck, tawny owl and dormouse. They will not only fill your garden with pleasant songs, but will also control the quantity of insects that are noxious to plants.

If you are lucky and live in a house with a large garden in the suburbs: you can even re-create small habitats according to the ecological evolution. Ponds are a great life reservoir, rich in beauty and discoveries for adults and children. Amphibians will be attracted and many plant species will grow there. Meadows can be split into zones and managed in different ways: mowed for relaxation and turned into playgrounds near home and left wild in the quieter areas. A thick edge of hawthorn, rowan, blackthorn, wayfaring tree, laurel, privet and other plants chosen from among the local flora could surround the ground. In another area a grove could be

planted with oaks, ashes, limes, maples, hornbeams and pines.

If you are a teacher you can use the school garden and the urban habitat in general as a large workshop for environmental education. The daily contact with nature will be fundamental in developing in children a responsible attitude. As the majority of children live in town, it is important to make the most of urban wildlife. Both in the case of practical efforts (tree planting in the school garden, clearing stream-beds of rubbish, setting up nesting-boxes, etc.) and research work (for example, a survey on the use of green areas, bird census in a park, research on air pollution using lichens as biological indicators, etc.) it will be useful to finish with an exhibition, meeting, newsletter or video in order to present the results and thus involve citizens and local authorities.

Furthermore, you should investigate the opportunities, through a local environmental association, to co-operate in education and public-awareness activities on urban wildlife, or in volunteer activities in public gardens or other green areas. If you have some experience in wildlife you can collaborate in ecological research such as a survey of biotopes, the compilation of an ornithological atlas, and monitoring by means of biological indicators carried out by natural science societies, ornithological groups, universities, natural history museums, botanical gardens, public bodies and environmental associations. ■

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A swift - an example of a bird we could encourage to nest in our gardens.



J.-F. Noblet

Freiss-Irmann



S. Umar

A welcome initiative

Süha Umar

For the last thirty years in Turkey, state agencies such as the State Hydraulic Works, the General Directorate of Village Affairs and the Road Department have been destroying large areas of wildlife habitats. Quick urbanisation and enormous population increases were damaging prime habitats. Agricultural practices, the utilisation of highly poisonous pesticides, treated seeds, the demolition of forests, and stubble fires following the harvest were all destroying wildlife at an alarming rate and in a wholesale fashion.

Hunting had gone wild. In addition to the national production of sophisticated, large capacity semi-automatic shotguns, new import regulations made it possible to obtain the most destructive weapons and ammunition.

Hunting ethics on the other hand have disappeared. The "Lonca" system, where the elderly used to teach hunting to the young who were allowed to carry a shotgun only when they proved themselves able to understand and comply with the written and unwritten rules of hunting, had been forgotten. The result was millions of gun-toters (estimated at four million), ready to shoot at anything that moves and at any time. Modern four-wheel drive vehicles and paved motorways made even the most remote parts of the country easy to reach.

Lack of personnel and equipment to enforce game laws and a lack of interest on the part of law enforcement agencies, on the wrong assumption that poaching was not a serious offence, turned the country into a poachers' paradise. It was time for something to be done.

This is why the Game and Wildlife Conservation, Development and Promotion Foundation of Turkey was founded in 1992 by a handful of hunter-conservationists. They chose Anatolian sheep (*Ovis amon anatolica*) as their symbol. The aims of the foundation are:

- to protect, improve and develop game and wildlife together with their habitats;

- to regulate hunting activities and ensure that hunting is done in accordance with the rules and regulations;

- to co-operate to this end with official and voluntary organisations and to support them in their activities;

- to promote, both at home and abroad, the game and wildlife potential of Turkey.

The Foundation decided that in the first place, the negative tide should be halted; two battles against arms importers and producers were fought in the Central Hunting Commission (CHC), which meets once a year and regulates hunting for that year. As a result, during the last two years, the hunting days per week were limited to three, bag limits (daily and "in possession") were reduced, illegal hunting methods were reformulated and the use of motor boats in wetlands, estuaries and dam lakes was forbidden. CHC decisions were published by the foundation in large numbers and distributed to all interested organisations, including hunters' associations. Public prosecutors and judges were informed of the commission's decisions.

The results of these initiatives were spectacular and public awareness of hunting and conservation has increased enormously. In approximately two years, twenty thousand poachers were brought to court and condemned.

The Foundation devotes a large amount of resources and energy to habitat protection. In the course of the last two years, a systematic battle against wetland drainage and other interventions that destroy marshlands has been launched. The Foundation was able to stop the sale of a lake in Çanakkale to a real estate agency, and was also successful in stopping the building of an industrial complex by the shores of Lake Burdur - the last stronghold of the white-headed duck (*Oxyura leucocephala*) in Asia.

New laws

The medium- and long-term objectives of the Foundation are the education of hunters and the promulgation of a new hunting law,

which will replace the existing one, which dates back to 1937. The new draft is expected to become law this year.

It will make it possible to introduce a hunting examination and will provide for the appropriate financial resources for game and wildlife conservation and management.

The Foundation has greatly contributed to the education of hunters. In 1992 and 1993, around 100 000 colour posters on hunting regulations were prepared, published and distributed all over the country. Periodical newsletters were issued for hunters' associations to inform them of the developments and issues relating to hunting and conservation. A hunters' handbook has also been prepared and is ready for publishing if necessary financial support can be raised.

The Foundation today has representatives in forty of the seventy-six cities in Turkey determined to win for game, wildlife and the eternal right of ethical, conscious hunting. ■

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Ecosystem Europe

Peder Agger

All too often we have a tendency to perceive nature as something that can be found in specific places - within protected areas. But nature, with its wildlife, is not something that is or should be confined to what can be found within the borders of nature reserves. Nature in its various forms is, or can be, something all around us, an aspect of every landscape.

Nature in Europe is in need. The main reason for this is that our wildlife is losing its habitat. Large expanses of natural areas and thousands of small habitats are being lost because of agricultural intensification and the growth of cities.

Everything is connected; each landscape with another and each country with another. Development in Europe is heading in the same direction in every country, so neither development nor nature knows boundaries. For that matter, all of Europe can be regarded as a coherent ecosystem.

Much has been done in recent years to develop societal communication for people and goods. But it is development like this that contains a threat to biological communication in "Ecosystem Europe" as landscapes are split up and intersected by motorways, cities and intensely exploited agricultural areas.

All plant and animal life needs to be able to disperse in the landscape - some more than others. Animals need daily movement in order to forage for food or to rest. Many animals also make periodic migrations to, for example, breeding and winter locations. Finally, both animals and plants need to be able to colonise new areas. When the environment changes, either because of natural causes or human activity, this can decide whether a species can survive in the longer term.

The Island theory

Modern nature management has learned much by studying the biodiversity on oceanic islands. It has been found here that the diversity of species is decided by the size of the island (and thereby the population) and its distance from the mainland. The smaller and more isolated an island is, the more frequent the catastrophe, for example, events that wipe out one or more species on the island. But sooner or later, the eradicated species or new species return, and the closer the island is to the mainland, the faster this will occur.

In principle, many habitats on land can be looked upon as islands in the sea: They are more or less isolated from neighbouring areas, and the wealth of species is also dependent on the size of the habitat. Hence the expression habitat islands. With the destruc-

tion of many habitats and the ever-increasing intensive land utilisation, the distance between the remaining habitat islands has increased and "the sea" that separates them has become more perilous. The catastrophes are therefore more frequent and migration decreases. The net result is a decreasing wealth of species on the individual habitat islands.

The Landscape network

Ideally, on all geographical levels of scale it is possible to distinguish a network comprising expansive habitat islands connected with linear habitats. The size, proximity and quality of the network, together with the living conditions in the "sea" it is embedded in, is decisive for the landscape's biological conductivity. The greater the reduction of the conditions in the "sea" the greater the importance for the network.

In this respect, we talk about dispersal corridors and stepping stones as structures that can ease dispersal through the barriers that an otherwise hostile landscape can present. Preservation, improvement and establishment of dispersal corridors have therefore become one of the most important elements in nature management on all geographical levels of scale.

On the higher national level, the most expedient action would often be to start with the existing fundamental structures such as the coastline, waterways and watersheds. These will already make up a more or less interconnected part of a greater network that can be built upon.

By using the coastline, waterways and watersheds as the greater structure, we thereby give priority to the efforts being made around three of the habitat and landscape types that have the greatest need. The great attraction of the coastline for production and recreation has resulted in violent fragmentation and intensification in the use of coastal landscapes. A manifestation of this is that half the threatened species in Europe can be found in the coastal zone. The wetlands in and around waterways are equally as exploited and further encumbered with obstructions and heavy pollution. A considerable problem in certain areas of the more intensely cultivated parts of Europe, is the deterioration of moorland and dry grassland, which is often found in watersheds.

On the lower scale levels, down to the individual landscape, there is an equal need to plan with a view to the habitat network. In certain areas property conditions could form the basic structure, in that property borders and other administrative borders often more or less already comprise parts of an existing network. Furthermore, there is a need for an evaluation of the barriers that are estimat-

ed to cause problems for dispersal and how these could possibly be remedied. Certain areas could warrant the construction of a fauna passage under a road. Other areas could need repair to the network in the form of replanting a gap in a hedge. In yet other areas could a change in the care of, for example, roadside vegetation be what is needed?

Dispersal for better or worse

Understanding of dispersal problems and the necessity to take action to solve them is beginning to gain favour the world over. However, this ought not to result in a totally mechanical construction of dispersal corridors just anywhere. It has also quite rightly been suggested that the corridor that could benefit the dispersal of a particular species, could also be used by unwanted species such as predators and disease.

The collective network must consider species that belong to several different habitat types: forest, dry and wet vegetation, waterways and coastlines. There must also be a concrete evaluation and local adjustment to the efforts, if, for example, there are threatened species to be considered.

Establishment of biological pathways is, nevertheless, a good rule of thumb to follow, unless otherwise shown to be the case. Seen from a nature management point of view, what we are witnessing is continual, mindless fragmentation of the European ecosystems to the detriment of nature and our successors.

If we are to secure a Europe that functions well ecologically, it is not enough to intervene in individual habitats, the connection between them must also be included. And in greater measure it is not enough for every country to solve its own problems and secure the connection between them. It is time, also in this area, to look at Europe as a whole. ■

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Moscow's natural environment

Alexander Ishkov

The system of governmental bodies for environmental management set up in the early 1980s at a time when new economic relations were being established in Russia, had neither the practical capability nor the operative legal machinery to guarantee ecological security. There was no ecological security strategy in the political and legal sense and no single governmental body with the ability to co-ordinate the activity of all the agencies responsible for monitoring the state of the natural environment. It is this situation, combined with the city's worsening ecological crisis, that has made it indispensable to reform the structure of the nature conservation bodies.

The reform of the competent bodies of the Russian Federation and its components (including the city of Moscow) is being carried out in conformity with the country's new Constitution and with the Decree of the Government of the Russian Federation "concerning the governmental bodies of the Federation of Russia responsible for the protection of the natural environment".

Moscow City Conservation Committee (Moscompriroda) is the body responsible for co-ordinating the activity of the whole system of environmental protection bodies of the Federation of Russia and its territorial subdivisions operating within the territory of the city of Moscow. Also included in that system are other organs whose mandate covers the use that is made of the natural environment.

One criterion for assessing the ecological situation is Moscow's greenery: green spaces have an extremely important role in the protection and stabilisation of the environment, in nature conservation and for recreation, all vital functions whose disappearance would be an irreparable loss.

Despite the prevalence of built-up areas in Moscow and their constant expansion at the expense of parks, natural greenery and plantations, there, nevertheless, subsists within the city itself not only woodlands but also dry and wet meadows, fens, marshes, rivers and natural reservoirs; and the diversity of the plant and animal life they harbour is still quite well preserved.

In 1993 natural vegetation of all kinds covered over 14 000 hectares and urban plantations approximately 20 000 hectares. Ecologically viable land - that is to say land occupied by vegetation - continues to be eaten away, shrinking from 16,3 square metres per person in 1992 to 16,0 in 1993; the norm is 24 square metres for every inhabitant. Over 11 000 hectares of woodland within the territory of Moscow constitute the town's forest heritage and are specially protected woods of the first group. Where categories of protection are concerned, they are classed either as urban woodlands or as natural woodlands under special protection, and the land they occupy is subject to the legislation on conservation areas or nature reserves. Other wooded areas within the city's territory, although not officially part of the forest heritage, fulfil a very important ecological-land social function and should definitely be preserved. They are for the most part comparatively small plots alongside rivers, inside the grounds of major hospital complexes, summer residences and other such estates.

Moscow's woodlands are composed, as they were in the past, of birch (2,9%), pine (21%) lime (17,9%) and oak (10,5%). The present trend is towards an increase in the amount of tree cover provided by lime and other broadleaved species.

The state of the town's woodlands has changed little in recent years: many of them retain the principal characteristics and features of natural forests, including regeneration potential and plant succession. This is true chiefly of areas where recreation demand exerts little or no pressure, and more particularly where exploitation is kept to a minimum. Technology-induced degradation has remained at a constant level. Recreation-induced degradation levelled off in the early 1980s at about 30% or 35% of the total woodland area, but this figure is likely to rise now that the new economic situation is making it impossible for numerous sections of the population to relax outside town.

The state of the urban plantations is largely determined by technological pressures, the disturbance caused to the local hydrological regime and the state of the soil: the vegetation has suffered badly from the practice of salting roads and pavements in winter. Its

condition depends very much on the care it receives, which, in Moscow's case, can hardly be judged satisfactory. In an inventory of Moscow's flora, over 1 000 species were recorded, including at least 130 local ones that were either rare or vulnerable in urban conditions. The local flora is becoming discernibly impoverished and there is a tendency for non-indigenous species to invade the natural communities, chiefly because the habitats have become degraded by human activity or - in the case of many species - purely and simply destroyed by environmental pollution and by picking. Although the picking of wild plants is prohibited throughout the territory of Moscow, the practice continues as in the past: in fact it has been markedly increasing, the chief victims being pretty flowers and medicinal plants. This is due to the authorities' almost total failure to inform the public that the picking and sale in Moscow of any wild plants whatsoever is prohibited, to enforce this ban at all times and to devise penalties which ensure that offenders compensate financially for the damage they cause.

The ecological situation in Moscow shows how urgent it is to introduce an effective mechanism for the use and protection of the natural environment and to put in hand a purposeful town-planning policy that would make it compulsory to preserve the diversity of the local natural ecosystems.

Since 1990, Moscow's local authorities have introduced economic mechanisms to regulate the use made of the natural environment; the idea is to prompt the users themselves to practise conservation and to create an additional source of revenue so that conservation measures can be applied to Moscow's natural environment. To achieve this, a system of regular payments for pollution of the natural environment has been introduced and an urban ecology fund set up to receive such contributions. In addition, there have been changes to the law on the imposition of fines and the methods for collecting the amounts payable in respect of damage resulting from environmental offences committed by persons and corporations in the course of their business.

All users of the natural environment in Moscow are required to effect regular pay-

ments to the Ecofund for pollutant discharges and the dumping of waste.

In calculating the amounts payable in respect of environmental pollution and in drawing up the documents regulating the collection of those amounts in Moscow, account is taken of the ecological situation, the special features of the town's industrial and non-industrial infrastructures, the extent to which the users of the natural environment are prepared to pay out additional sums, and the depreciation of the capital of many enterprises, including municipal water supply and sewage disposal companies.

The contributions of users who infringe the regulations are multiplied by an agreed amount and may be levied without formality. The rates are set for each substance introduced into the environment depending on its toxicity and on whether the amounts discharged are within or above the admissible limits. In the case of dumping, the rules concerning payment differ according to whether the preset limits are

observed or exceeded, and also take account of the type and toxicity of the waste product and the manner of its disposal.

Collecting the financial resources provided by the users in the form of pollution charges and the subsequent use of those resources to finance nature conservation measures in the urban district of Moscow are the responsibility of the town's ecological fund (Mosecofund). The fund's structures are ramified and comprise agencies, which specialise in the handling of specific conservation problems within the context of the local economy and territorial agencies for the organisation of conservation activities in the administrative subdivisions.

According to the legislation on nature conservation, all payments in respect of pollution of the environment, including regular administrative fines, compensation for damage caused by ecological offences and payments ordered by a court, are channelled to Mosecofund. The fund's resources serve to finance the measures taken by the Moscow

City Council to improve the environment, including the creation an effective surveillance system, scientific research work, etc.

It is certain that the implementation of the system of pollution charges by Moscow City Council has had beneficial results.

Thus designed and put in place, the economic mechanism does no more than provide the city with additional revenue for putting nature conservation measures into effect; without a massive injection of state funding it will be difficult to find the way out of the ecological crisis. ■

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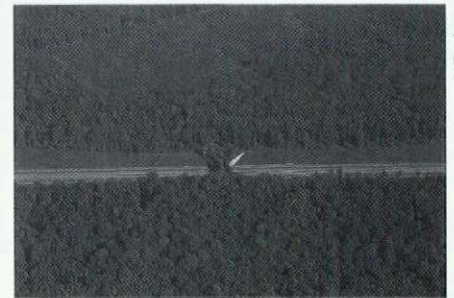
Wildlife crossings

Sylvie Müller

There is much movement in the countryside: flows of water, movements of wildlife and human traffic of all kinds, etc. In order to limit conflict between wildlife and traffic, traffic routes should wherever possible avoid areas with a high density of wildlife. In cases where routing requirements prevent this, some kind of barrier has to be provided on either side of the route concerned so as to keep out animals. This makes a break in the landscape that is harmful to wildlife. The best way of overcoming this problem is to provide an adequate number of structures to enable animals to cross under or over the route that hinders their movement. Such structures should preferably be reserved specifically for wildlife, but any type of crossing (footbridges, farm or forestry bridges, waterway crossings, etc.) may be adapted at little cost to allow use by wildlife. The location of the crossings and their shape, dimensions and layout as well as the layout of the immediate surroundings all have a crucial impact on their effectiveness. Proper management of the crossings and of

access to them after they have been built is essential to the maintenance of their long-term effectiveness. ■

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Demilitarised zones

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A milestone in the political transformation of former socialist countries occurred in the summer of 1989 when the iron curtain was demolished in Hungary. It was a double wire fence that enclosed a border lane up to a kilometre in width, with interruptions only at particular sections, for example, the Hungarian side of the present Hungarian-Austrian Fertő-Neusiedler National Park with its vast reed-beds and adjoining meadows. Except for the border guard, entrance was allowed only with special permission. This ensured undisturbed conditions for habitats including reeds, mountainous mixed beech groves, natural river sections and traditional rural scenery. Since then, the scientific botanical survey of the former zone has been completed, except in those parts with difficult access. The natural flora is less diverse compared to the similar, protected inner areas. Although biodiversity as a whole is apparently greater, as indicated by the formation of complex food chains and the abundance of predatory and parasitic organisms, for example, mushrooms and dragonflies. Four mushroom species have been identified that are new to Hungary despite the prevalence of droughts over the last few years. Valuable areas have remained within the frontier zones of the former Czechoslovakia (for example, the Czech forest and the Sumava mountains) and in the territory of the former German Democratic Republic (Harz and Thuringia).

Even more important are the shooting ranges and the airfields used by the Soviet military. Despite the disturbances (artillery, heavy vehicles, fires, pollution and illegal hunting), these are good wildlife habitats due to their natural regeneration capacity resulting from their large size (several hundred hectares each). Thus, the wounds caused by military activity have resulted in the formation of pioneer associations serving as refuges for several valuable species.

In addition to the flora, there are invertebrates and avifauna of various meadow types; these are also the most secure habitats of the European suslik (*Citellus citellus*), a typical fauna element of the arctic steppe region. The largest population of the lesser mole rat (*Spalax leucodon*) also lives on military ground. The most important habitats of the meadow viper (*Vipera ursini rakosiensis*), a non-aggressive small venomous snake now only to be found in Hungary, have also remained on military areas.

Thus, military use has ensured the natural evolution of these grounds. These, together with the nature conservation areas, form important parts of the ecological network in need of being established in order to sustain biodiversity. In 1990, the new Government of Hungary declared that abandoned military grounds of

value to wildlife protection should be given priority. Unfortunately, this is not without its fair share of problems. Their realisation requires time and money consuming surveys.

The same refers to the abandoned military exercise grounds. In really valuable areas, rural tourism seems to be the only alternative, apart from grazing, continued military use or protection. There are, for example, companies that organise individual/family camping holidays that are not directed at the masses. Their attraction is just that - being alone with nature, whilst camping wild. However, the proper forms of interest should be defined and approved (for example tax allowances and other subsidies).

Meanwhile, requests are made for privatisation or the leasing of these grounds with the hope of making quick profits, for example one or two years intensive grazing, waste disposal, utilisation for motocross or golf courses, as well as amelioration and crop production. These mean the death of such areas.

In Hungary, the Ministry of Defence, which is in charge of the abandoned military sites, has handed over seventy-five shooting ranges (about 23 500 hectares) for civil use; of these the primary use is for wildlife conservation. However, by the end of 1993 only three sites (about 3 200 hectares) were placed under wildlife conservation management due to the above factors in addition to the problems associated with land registration. With a lack

of concrete recommendations created on the basis of international conventions (for example, ESA, EECONET) and their approval by new legislation in the countries concerned, these areas may be unable to play a role in the conservation of biodiversity. "Fortunately", considerable parts of these remain in military use. ■

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For five years now, large areas of land are no longer used for military purposes: in spite of serious problems due to pollution, infrastructure and abandoned buildings, it would appear to be giving nature a chance to revitalise - as is seen here in Hungary with the European Suslik



Zs. Kalotás

A Swiss viewpoint

Alain Etienne

One of the principles that the Swiss League for Nature Conservation (LSPN) defends is that conservation must extend to all parts of the territory, including towns; the natural environment must be treated with care everywhere, and not just in a few nature reserves. In the pursuit of its aims, the LSPN is helped by local sections such as the Geneva Nature Conservation Association (AGPN).

Every town is an ecosystem characterised by a pocket of warmth. Temperatures are higher in towns and luminosity greater. This means that towns can offer highly specialised habitats to certain plants and animals, which use them as refuges. Confronted by this diversity and this biological potential, it is up to us to protect the life-supporting sites that are to be found in towns, such as buildings, public gardens and parks, road and railway embankments, building sites, vacant lots, industrial estates, walls, etc.

We can set about it by:

- ensuring that all the natural elements of urban areas are used for conserving species and safeguarding habitats, and by giving them adequate protection and management;
- introducing natural elements into unbuilt zones;
- keeping the trees standing wherever possible and urging that more be planted;
- encouraging the greening of house fronts and flat roofs;
- helping walls to serve as eco-systems.

Habitat networks

The idea of constituting a habitat network can also apply to towns, in which case they are called corridors, green strips or wildlife highways. The idea of a habitat network is to join together isolated natural patches and so enable living organisms to move freely from one part of the town to another. Particularly valuable examples include water courses and canals, roadside verges, railway tracks, and some town forests and public parks.

To complete this network, a scheme for revitalising biologically poor areas must be put in place in every town that does not have one already. This notion of biological networks is beginning, little by little, to make its way into planning processes and development schemes.

Embankments and building sites

Embankments are semi-natural habitats and refuges for orchids and other species that

favour nutrient-poor grass-land. On building sites, mounds of backfill and other gravelly materials are colonised by pioneer plants, such as coltsfoot, poppy and Aaron's rod. These form the staple diet of many animal species including grasshoppers, caterpillars, crickets and granivorous birds.

On unimproved grassland, it is recommended to mow late in the year (in July or August, and possibly a second cut in the autumn) in order to allow the seeds to mature. It is essential to remove the grass-cuttings. The method sometimes employed by the Highways Maintenance and Cleansing Service that consists in repeated cuts to avoid having to gather up the grass is counter-productive. Roadside and railway embankments and vacant lots must also be managed without pesticides or weed-killers.

In parks and botanical gardens

Management considerations frequently prevent parks from offering ideal conditions for wildlife, especially birds. Hollow trees that can cause accidents are felled, thus abolishing the niches that used to provide shelter for bats, cavernicolous birds, beetles and other insects. When the dead wood is taken away, the larvae and micro-organisms that some animals rely on for food disappear. To make up for this loss, special nesting boxes are installed in botanical parks and gardens. However, these are successful only if care is taken to preserve the quality of the environment in general, and of the available food resources.

Landowners and contractors

Cities offer refuges for nesting birds: in attics of old buildings, church steeples, etc. All too often these refuges disappear as a result of a renovator's ignorance or intolerance. Entry routes are blocked by debris or reduced to rubble during demolition work. Whenever a building or engineering structure is erected or renovated, due account must be taken of wildlife species and their search for nesting places and refuges: practical measures must be taken on behalf of bats, birds and small cavernicolous mammals.

Private houses, gardens and allotments can also help to revive nature in cities. Refuges exist in lofts, cellars and garden sheds for insects of all kinds, spiders, isopods, wasps and ant-lions. Outer walls may be decorated with ivy, virginia creeper, climbing fruit trees or other vegetation. These shelters become night refuges and nesting places for certain birds. Town gardens also help to constitute the habitat network.

Green areas and town forests

Flower meadows are not appropriate everywhere as they cannot stand up to trampling. Lawns should be reserved for recreation and children's games. Uniform greensward holds little attraction for small animals or flowers. Distinctions must be drawn depending on the area and the purpose it is intended to serve. In the parts of a park where few visitors go nature may be given a freer hand. But this practice requires a change of attitude on the part of the public and a greater effort to understand.

Forests in towns must be preserved from excessive human pressures. Remedies must be applied early since trampling prevents natural regeneration and any intrusion is disturbing to wild animals. Each forest's capacity to withstand visitor pressure must be assessed. Playgrounds, keep-fit circuits and amenities should be concentrated in areas close to car parks in the less sensitive parts of the forest. Access to other parts should be by footpath only.

Members of the public must be made aware of their responsibility towards the natural environment. The nature in cities campaign will ensure that they do not lose contact with it. Offering town-dwellers an environment that is closer to nature is also a way of reducing the pressure on a country's natural areas and nature reserves.

Nature in cities does not mean nature and nothing else. The idea is to conserve the natural features so that wild plants and animals may continue to live there and keep town-dwellers in contact with the natural world. There is nothing dogmatic about this. It is a case of discovering how the balance of nature functions, preserving it and revitalising degraded areas.

An integrated scheme of ecological management should aim to improve the quality of life for the city's inhabitants. ■

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At the Council of Europe



Model Act on the Protection of the Environment

Subsequent to a decision taken at the first Colloquy on Environmental Law in East and West, which was organised in Budapest in November 1991, and in the framework of the co-operation programme between the Council of Europe and the central and eastern European countries, it was decided to draft a model framework legislation on environmental protection. The Secretariat, with the assistance of some west European experts, drafted the first version. This first draft was discussed and re-elaborated in the subsequent colloquia that took place in St Petersburg in October 1992; Gdańsk in July 1993; and finally in Ljubljana in May 1994, where it was adopted.

The purpose of the act is to assist the central and eastern European countries to review their legislation or to adopt a new one, if they so wish. It provides a model for integrated environmental law incorporating all the detailed structures of an overall environmental administrative law.

The first part comprises definitions, namely of "ecological stability", "environment", "integrated protection", "public authority", "risk", "biodiversity", "administrative proceedings", "environmental impact assessment", "wastes" and "environmental audits".

Part II lays down the general provisions, such as the purpose of the law, general principles, the right to a stable environment, maintenance of biodiversity, substitution, non-degradation of natural resources, the precaution principle, the "polluter-pays" principle, the right of the public to information, participation and co-operation.

Part III regulates the organisational system of environmental protection that particularly specifies the different functions that such an organisational system should cover:

- planning and policy;
- executive and inspection;
- co-ordination;
- advisory.

Part IV specifies the different levels of responsibilities.

Part V concerns the financing of environmental protection, namely environmental funds and their management.

Part VI deals with the right to information and public participation.

Part VII specifies the proceedings relating to environmental matters including environmental impact assessment proceedings.

Part VIII concerns regulatory devices and is divided into four chapters: Chapter 1 is on standard setting, that is setting limits and guidelines concerning the quality of the environment, requirements for hazardous substances, preparations and products, requirements for the use of protected areas, etc.; Chapter 2 is on the control of individual activities, authorisation, notification, modification, suspension or revocation of authorisation,

prohibitions, etc; Chapter 3 is on charges, subsidies, flexible instruments and environmental audits; Chapter 4 lays down the final provisions.

Part IX sets out enforcement measures.

Part X provides for sanctions.

Part XI deals with civil liability and compensation for damage caused to the environment.

The rules on this matter are to be drawn up on the basis of the European Convention on Civil Liability for Damage Resulting from Activities Dangerous to the Environment of 1993.

Several central and eastern European countries have already referred to this draft when preparing environmental protection laws. The Russian Ministry of the Environment has prepared a draft based on the Council of Europe's model act.

Agriculture and environment

The countryside is a priceless part of our European inheritance. It is not, for the most part, a wild countryside; most of it is farmed or managed in one way or another. It is a countryside in which natural beauty and diversity have, in many ways, been enhanced by the land management practices of successive generations. We need, in our approach to rural development and agricultural policy reform, but also in reform of other policy fields, to return to a sustainable and harmonious relationship between human activity and the environment. Agriculture should show the way here.

Some may argue that we will not be able to feed a world population of 5 600 million - set to increase to 8 500 million in some 30 years - without the use of chemical fertilisers and other input factors. That may be so, but we need to make our agricultural practices, as well as other human activities, acceptable for the natural ecosystems where they take place. This implies a much more careful monitoring of production systems, which should increasingly become closed circles, that is without or with minimal negative side-effects. In other words, environmentally non-degrading production systems. Increased knowledge of our biodiversity, but also the use of biotechnology, may help us in this endeavour. ■



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