

# Naturoropa

COUNCIL OF  
CONSEIL DE L' Europe



# Naturoopa

No 69-1992

Editorial	K. Töpfer	3
"Aquositas"	A. Guillerme	5
✕ Ramsar	H. Lethier	8
✕ Legislation and control	D. Caponera	10
✕ Managing multiple functions	W. Teuber	12
Underground water	R. Traub	14
✕ Freshwater Europe	M.A. Martínez	15
✕ Drinking water	A. Hadjipavlou	19
Lessons from the past	J. Kindler	21
✕ Drink the Thames	T. Curtin	22
In Poland	B. Kaczmarek	23
Exemplary transfrontier co-operation	J.H. Oterdoom	24
✕ Everything has its price	F. Valiron	25
Watchful NGOs	A. P. van der Meché	28
Tyrolean streams	H. Nenning	29
Pool idea	P. Petrich	29
At the Council of Europe		30



Naturoopa is published in English, French, German, Italian, Spanish and Portuguese by the Centre Naturoopa of the Council of Europe, BP 431 R6, F-67006 Strasbourg Cedex.

Editor responsible:  
Ing. Hayo H. Hoekstra

Conception and editing: Christian Meyer

Adviser for this issue:  
J. F. Donzier  
International Office for Water  
21 rue de Madrid F-75008 Paris

Production: KOELBLIN  
Druck + Verlag, Baden-Baden

Articles may be freely reprinted but it would be appreciated if reference is made to the source and a copy sent to the Centre. The copyright of all photographs is reserved.

The opinions expressed in this publication are those of the authors and do not necessarily reflect the views of the Council of Europe.

Cover: original painting made for Naturoopa 69 by Christophe Stern (Switzerland).

Pages 16-17: Danube: D. Robert (Association Le Danube Vert); Camargue: flamingos, B. Pambour; house, A. Pons/Bios; horses, H. Ausloos/Bios

## Taken for granted?

Water  
Vital, irreplaceable, unique; crystal-clear, thirst-quenching, pure; deep, mysterious, awesome; slow-moving, rushing, gentle. Cruel. Life-giving.

Water  
Polluted, misused, scarcer.

Man and water.  
As the century draws to a close, there is not much more ill-treatment we can inflict on what was once a pure and often plentiful commodity. Oh for the limpid springs of yesteryear, the water that was always different-tasting, always refreshing, always inviting!

Most of us take water for granted. It's on tap, we reckon we shouldn't have to pay for it, and rain is just a nuisance except perhaps if you're a farmer.

Does anyone think any more about where water comes from? Or about sharing it

around? In arid climates is it right to be watering golf courses with it in luxury tourist developments when fauna and flora are dying for lack of it in the hills it is taken from?

When are we going to get back into tune with the natural environment (since otherwise we are heading for disaster)?

"Let's start right now" is the Council of Europe's answer: the Parliamentary Assembly has drawn up a full-scale all-European action programme dealing with man and water. The Centre Naturoopa's contribution is this issue of Naturoopa on man, fauna, flora and water.

The next issue will deal with environment and environmental regulation in tomorrow's Europe, starting on 1 January 1993. ■

H.H.H.



W. Lapinski

## Editorial

The Council of Europe has been extremely active in environment protection, particularly nature conservation, and in making protection of water and the aquatic landscape a priority again the Parliamentary Assembly is keeping up the good work. The Council and other international organisations have been major initiators and achievers in this field. This year has seen the signature of an all-European convention, drawn up by the United Nations Economic Commission for Europe, on the protection of international lakes and transboundary water-courses. The next stage is to create Europe-wide awareness. Lakes and rivers must again become, and remain, living components of the natural environment. Promoting that is one of the Council of Europe's undoubted strengths.

An increasingly prominent factor in environment protection in Europe and beyond is European Community environment policy. One of the things the 1987 Single European Act did was pave the way for the EC to develop into an Environment Community.

The polluter-pays principle, a policy of prevention, a high standard of protection, incorporating environment policy into other policy areas, majority decisions of the Council of Ministers in some fields and giving more muscle to the European Parliament, which has a reputation for being environmentally progressive, are all enshrined in the EEC treaty. The Maastricht Treaty maintains that approach:

– there is much more provision for majority voting, which would prevent Community environment protection being reduced to the lowest common denominator;

– the European Parliament's role is strengthened, as regards both environment legislation and joint decision-making;

– an environment fund is proposed, from which the most disadvantaged Community states would start receiving aid in 1993.

Any Community environment policy is bound to be heavily concerned with solving transborder environment problems and protecting the common natural heritage. At the same time it means standardising the conditions of competition and removing barriers to trade. National environment policy will thus receive the reinforcement it needs both from Community action and within comprehensive, all-European joint action on the environment.

The EC Council of Ministers has issued Community regulations on almost all areas of the

environment. At present Community environment law comprises over 200 instruments, many of them concerned with protection of water.

Special mention should be made of the directives concerning:

– reduction of water pollution by hazardous industrial effluent;

– treatment of urban sewage;



– reduction of water pollution by agricultural fertilisers (nitrates).

The way ahead lies in getting the economic sector to accept its responsibility for the environment, promoting the development of innovative solutions, and encouraging European firms to adopt environment-friendly practices. Environment protection has to be properly built into the production process and the product, and production technology and sewage-treatment technology need energetic development. A great deal of importance is attached to reinforcing legal instruments with economic instruments.

An overall approach is crucial, particularly on water pollution by hazardous industrial effluent or agricultural fertilisers and plant-health products. Detailed sewage regulations are needed for each industrial sector.

The Community is not impervious to environment issues outside its own confines. It and its member states have a responsibility to develop wide-ranging environment policy

and a strategy for helping Central and Eastern Europe overcome their environmental crisis. The Council of Europe has a part to play in this, as do other international organisations.

However, interdependence - like the responsibilities of the Community and its member States - is on a far more than European scale. Environment protection is a world issue and world reflection and action are needed to tackle problems like protection of the atmosphere, the ozone layer, the oceans, sensitive forest ecosystems and biodiversity. Only by joining forces globally can we ensure a viable future on planet Earth for our children and grandchildren. This will involve a worldwide change in attitudes and Europe should set an example.

The United Nations Environment and Development Conference at Rio de Janeiro was the first world conference at the highest political level since the world ceased to be split into opposing blocs. It was, and remains, a wonderful opportunity to reorient our political action. The concern must now be to channel the energies which have been liberated into overcoming world environment and development problems and North-South disparities. International collaboration is the only solution.

Here the Rio Declaration is of prime significance, laying down universal guidelines on environment and development policy. The Agenda 21 action programme, a set of specifications for global co-operation on environment and development policy also adopted at Rio, provides a sound basis for freshwater management in the context of meeting regional and national development needs.

But Germany has major challenges to cope with at national level too. After reunification and decades of a planned economy, the environment situation in the new Länder is disastrous - far worse than we had ever feared - and poses a serious health risk. Many rivers are dead and in many places the groundwater is severely polluted. A huge cleaning-up programme has begun, with the ambitious aim of bringing the new Länder up to the environment standard of the old Länder by the year 2000.

Despite the enormous efforts required nationally, however, Germany will honour its undertakings at European and world level. ■

Klaus Töpfer  
Federal Minister for Environment, Nature Conservation and Reactor Safety of Germany



## European Water Charter of the Council of Europe

proclaimed on 6 May 1968 in Strasbourg

1. There is no life without water. It is a treasure to all human beings.
2. Freshwater resources are not inexhaustible. It is essential to conserve, control, and wherever possible, to increase them.
3. To pollute water is to harm man and other living creatures which are dependent on water.
4. The quality of water must be maintained at levels suitable for the use to be made of it and, in particular, must meet public health standards.
5. When used water is returned to a common source it must not impair the further uses, both public and private, to which the common source will be put.
6. The maintenance of an adequate vegetation cover, preferably forest land, is imperative for the conservation of water resources.
7. Water resources must be assessed.
8. The wise husbandry of water resources must be planned by the appropriate authorities.
9. Conservation of water calls for intensified scientific research, training of specialists and public information services.
10. Water is a common heritage, the value of which must be recognised by all. Everyone has the duty to use water carefully and economically.
11. The management of water resources should be based on their natural basins rather than on political and administrative boundaries.
12. Water knows no frontiers; as a common resource it demands international co-operation.

## “Aquositas”

André Guillerme

It was not by mere chance that watercourses came to be diverted for agricultural purposes. The more and more systematic use of hydraulic techniques concentrated cultivation in certain areas of land, which in turn led to the development of technological innovations like the plough (dating from as long ago as the second millennium), new economic techniques, such as accounting and registration of land ownership, and innovative political processes, including the emergence of a class of administrators backed by an army. Thus appeared what Wittfogel called “hydraulic societies” and Clastres defined as “state-based societies”, characterised by a strong ruling authority, relying on strict religious constraints on individuals.

### River control

In actual fact, this development was not inevitable - the North American Pueblo civilisation created complex irrigation systems between the 10th and 12th centuries without ever introducing hierarchical spatial and societal structures - without necessarily arriving at the coercive form described by Marx as oriental despotism. While irrigation does require co-operative action, because of the huge amount of work needed to dig and then maintain a system, it may be done either democratically, as in Mozarabic Spain or the Tennessee valley, or carried out by authoritarian methods, forcing every tenant to contribute, as was done in ancient Egypt and China, or again arranged by the military, using slaves or prisoners of war, as in the lower Somme valley under Napoleon. Despots and democracies alike have an interest in irrigation, drainage and river control.

“I forced the rivers to flow in the beds which I had traced for them; I led them to every place where they could serve a purpose; I made sterile ground fertile with the water of my rivers”: these are the words which Semiramis, the founder of Babylon, had inscribed at the entrance to her hanging gardens.

### The force of religion

Protection by holy means has always proved more effective than mere military defence. But while water protects, it can also destroy. The mythical flood, the storm on the Sea of Galilee and local flooding have brought terror to generations, and the defence against these natural disasters is group prayer and penitential processions, the main ones of which in our day take place on the Rogation Days and Ascension, devised during the early Middle Ages to replace a four-day pagan festival dedicated to the main Gallo-Roman god of flood waters, Jupiter-Taranis. In a marsh, usually very close to its main river, each community buried a dragon symbolising disastrous floods, which the Gauls propitiated with libations and offerings, at the very least part of a suit of armour, a symbol of Dis Pater. Some bishops made an unsuccessful attempt to eliminate this pagan rite, and oral tradition made them into saints: they are depicted in mediaeval statues defeating their dragon (St Marcellus in Paris, St Aignan at Orleans, St Clementin at Metz, etc). The more powerful the dragon, the greater the faith of its vanquisher, and the stronger Christianity became in the area.

### Towns and rivers

Without going all the way back to the oldest urban civilisations, those of the Indus, Tigris, Euphrates and, of course, the Nile, we find that those which are the object of our attention maintained or extended the many uses of hydraulic techniques:

- water as a means of transport, with warehouses at each transshipment point, around which towns grew up;
- water for defensive purposes, a safeguard against enemy raids, channelled into an encircling moat, now disappeared or a feature of the old town centre;
- water as a chemical agent, whose intrinsic properties - making a certain fabric silky or a particular dye glisten - gave a town its reputation and wealth;
- water as a source of energy used for milling grain, fulling cloth, tanning leather and driving pumps, subsequently being harnessed at

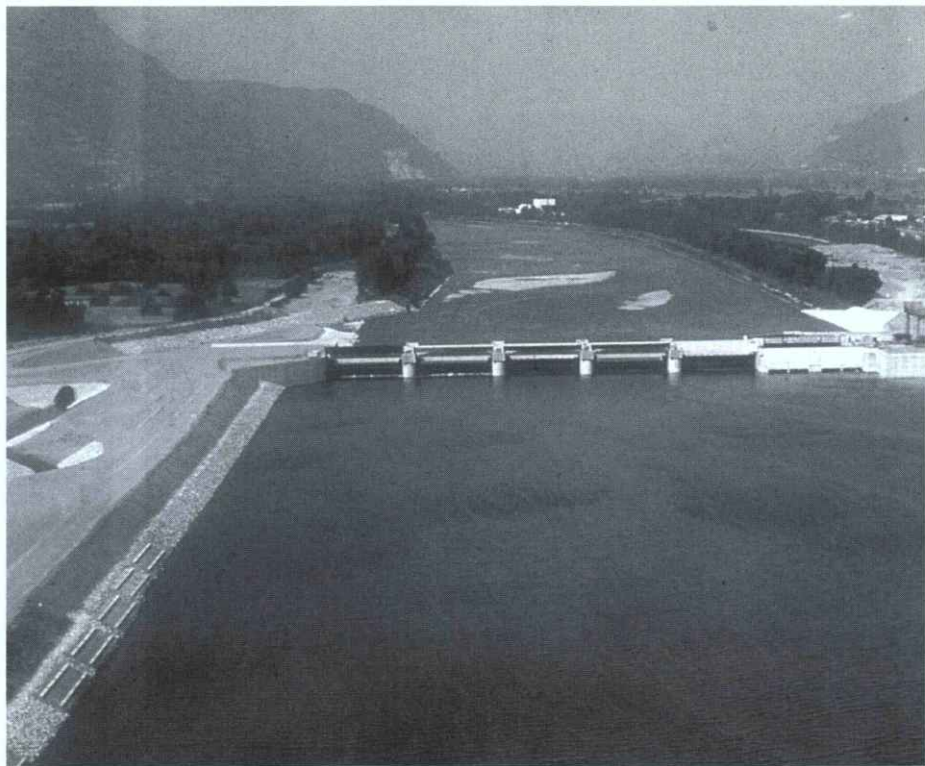
the end of the 19th century to generate electricity, for which towns are the main customers;

- water supplies for fish farmers and townspeople.

Lastly, water as a great contributor to hygiene, adopted by every civilisation for its cleansing powers, ridding the urban fabric of its grime. For centuries, these permanent qualities, whereby water dictates the pattern of urban life, remained to varying degrees the prime factors in the growth of towns, especially in the west.

In more general terms, water is useful to the Indo-European peoples, to which we belong, only if it is under control, channelled and managed. Fearing the wrath of nature, people established their communities adjacent to rivers, but set back from them, thus benefiting from transport by water on which trade largely depended, while keeping clear of flooding. It was specifically the smoothly flowing rivers that were the economic artery of pre-industrial settlements: without the river, there would have been no millers, weavers, dyers, tanners, no communities of craftsmen. In the western world, mediaeval towns forged their originality by gradually acquiring distinguishing features according to their economy, basing this on a crafts infrastructure which depended on river water for its resources.

Mills, like bridges, were economic tools of the feudal system, geared exclusively to the potential energy generated by a waterfall or a current, so running water was important for them, in contrast to marshland. In England, Flanders and northern France almost a third of urban mills were operating by 1080, and such mills were to persist for almost 800 years. The entire mill system was operational by the middle of the 13th century. Mills initially aroused the enthusiasm of monks, and abbey towns grew out of the diversion of major rivers, such as the Scarpe, in Lille, and the Orne, at Caen. By the end of the 10th century enthusiasm for mills had grown among the lay and ecclesiastical aristocracy, who held regalian rights over most of the rivers that they exploited or diverted; on average, they derived one-tenth of the domestic product from mills - and bridges. Mills, as hydraulic superstructures, were particularly valued since they determined the sections and levels of watercourses, which were already fixed in certain places, like Chartres, as early as the 10th century, giving us a timescale of one millennium. The Renaissance and Ancien Régime made no changes when they took over the mediaeval heritage. Their interest was no longer in the dynamic qualities of water, but,



J. Loriec

Rivers that are walled in lose their capacity for self-purification and so are more susceptible to all forms of pollution.

in contrast, in what was static, in steam, while mills spread to the countryside and across to Eastern Europe.

What the 13th century called "trades of the river" required, not highwater pressure, but abundant supplies of water. As for the marshland around towns, its colonisation remained one of the main aims of the feudal authorities. The topographical organisation of work stemmed from a tacit agreement coordinating the position of each waterside party. The deliberate water-use policy which developed in 11th and 12th century towns had a rural counterpart in the form of land-clearing. Within their walls, one-third of towns had waterscapes comparable with that of Venice; the figure is almost two-thirds if defensive moats are included, where fish breeding developed and made a then vital contribution to townspeople's daily food supplies.

Rivers, especially slow-flowing ones, left an indelible imprint on the pre-industrial towns they virtually held in their power. Towns' appearance depended on them. They obliged streets and buildings to follow their meandering course. The denser the network of watercourses, the richer the town: the largest mediaeval towns have the most extensive networks, as well as the finest monuments, architectural gems in the shape of Romanesque and Gothic churches.

### Industrial revolution

To maintain the "flow" (it was precisely at this time that the term "discharge" was superseded by "flow") of commodities, the water level had to be kept relatively constant throughout the year. The Napoleonic state allotted "functional roles" to rivers, as its British rival had done to the Thames, Mersey and all the estuaries of Britain: the main ones were to be used for trade and the rest for industry. Local authorities were told "as far as possible, to harness all the water on their territory for purposes of general usefulness", under the guidance of new public servants,

military engineers purporting to devote their skills to civilian tasks. The objects regarded by the said engineers as the most obstructive were removed from the rivers, with floating mills and mills attached to bridge piers being eliminated from Paris as early as 1807: this deprived rivers of some of their oxygen. Water left the sphere of feudal law and entered that of reformed Roman law, still very ill-defined until the middle of the century, but apparently severely upsetting customary practice.

### Canalisation of rivers

New bridges were built in major towns using the most modern techniques, with surbased arches and narrower piers offering less resistance to the current. In order to improve customs control, quays were raised by more than three metres, using a dry-stone technique borrowed from military engineering; paved "platforms" were laid so that cargoes could more easily be loaded by trolley, using the cranes installed to hoist goods ashore. Rivers' cargo-carrying capacity was to be further raised, all year round, through a reduction in the numbers of vessels. Sloping banks disappeared, and with them the areas within towns where boats could be beached, as well as their function as ecotones. There was less vegetation, depriving the banks of shade and the dead leaves needed if fish-farming was to continue, and eliminating the ecotone altogether. More minerals found their way into rivers, which lost their complete self-purifying capacity.

Having become mirrors of industrial wealth, rivers were now linked via canal networks to other river basins, firstly in Great Britain, France, the United States and Germany. These artificial watercourses bore the main burden of industrialisation, and engineers had to catalogue all possible local hydrographic information and police the rivers, in order to maintain the depth of the former. Fleeing the unstable banks and the too damp air near the rivers, textile factories, ironworks and assembly plants were set up along

these tranquil canals, drawing from them the water needed for their machinery and then returning it. Organic, biodegradable water pollution caused by small-scale production gave way to chemical and mineral pollution by the acid and soda plants located in the suburbs of expanding towns. Surreptitiously the water grew more toxic, becoming more turbid with increasing discharge of industrial effluent: half the fish species present in 1830 had disappeared from the Seine downstream of Nogent by 1879.

### Paths for high days and holidays

Ordinary working people found enjoyment along the less industrialised parts of rivers near major cities: London, Brussels and Berlin. Writing in a scornful tone at the turn of the century, Hamel, a bourgeois, recorded that, from April to October the banks were used by "the stroller with no aim other than pleasure, and often a slightly vulgar kind of pleasure. He is a child of Paris, the Parisian met in the upper part of the Seine department at Bercy and Charenton, at Joinville-Pont on the Marne; ... in the lower part of the Seine department and as far as Rouen, walking along happy and carefree, drawing on his inexhaustible fund of good humour ... Each pseudo-oarsman is of course accompanied in his excursion by a would-be oarswoman. She has usually thrown propriety to the winds some time before ... She willingly mimics her boating companion's language, offhand manner and untidiness; she laughs insolently in the face of those bourgeois who wink at her and of their prudish wives, appalled by her free-and-easy attitude ... Still in tireless high spirits after a hugely energetic day, she will find the strength to dance a wild quadrille, uncowed by the vindictive presence of the gendarme. Such people's lives are one long carnival, they cannot do without noise and wild shouting, and their insolence knows no bounds". Every Sunday between May and September, 120 to 150,000 Parisians frequented the water's edge in the Ile de France region, while the comparable fig-

ure for London was 250,000. The river banks, these paths for high days and holidays, were painted by our Impressionists and, happily, the canvases are still in our museums for all to see, providing a further source of historical knowledge.

### Death of the great rivers

After World War I, the public perception of river banks grew more and more unfavourable. They were regarded as places for the fringe members of society, tramps, prostitutes and criminals, and this feeling was mirrored and reinforced by films, which showed more night scenes - the chiaroscuro of "Quai des Brumes" (Port of Mists) - than daytime ones; the watership was a den of thieves that the daily newspapers took pleasure in denouncing. The river's only positive role, in the public view, was that of bringing coal to meet everyday energy needs.

In those days, every riverside town had a port, often consisting of just one quay some tens of metres long, one weighbridge, a storage area, a customs barrier and a cheap restaurant. In 1920, seagoing and inland vessels transported two-thirds of Europe's supplies, and very large investments had been necessary in the 1880s to increase barge capacity. Sluice gates were constructed which could be partly opened when rivers were flowing fast and opened up completely when they were in spate, and locks were also built, changing major rivers into successive stretches of water at a virtually constant level, with the disastrous ecological effects of which we are aware. The development of communications in the twenties attracted to the banks of minor suburban rivers new industries, ejected from the towns as too polluting or turned out of their premises for the sake of urban renovation, and these found a pool of manpower, low-priced land, free running water and local councils blind to their harmful effects, proud to play a part in this empire-building industrial boom. The dirtier the water, the richer the community. Bosses and workers alike took pride in their water, but went farther afield to find the meandering waters of their holidays.

### Traffic must flow

The vast area of water that cuts through major riverside towns became an object of desire to planning/public health specialists with the dawn of the era of motor vehicles and land-based transport. When traffic reached saturation point, there was a need for new roads, especially cross-town routes capable of drawing off the maximum numbers of vehicles. The cost of land was so high that only public property could be used for expressways. The Seine in Paris, London's Thames and the Po in Milan were blackened by pollution, and the technicians' usual solution to the problem of rivers which have become sewers or places of prostitution is to bury them, thereby acknowledging that

nearby dwellers had been right to continue previous generations' practice of discharging their biodegradable waste water by the most fluid means. The river did not turn its back on the town: it remained part of it, but became its excretory channel. Between the world wars, townplanners hit upon the idea of covering over rivers, some advocating the construction of runways for aircraft, others envisaging motorways. The public was in favour: these putrid places were highways of crime-drowned children, floating corpses - and new graveyards for consumer society - stolen handbags, abandoned scrap. Thus water became a sociological object.

### Aquosity

Europe's rivers, particularly those flowing to the sea, visibly continued to keep pace with urbanisation. The town never turned its back on the river. Quite the contrary, it associated its waterway with its main areas of activity: religious during the Gallo-Roman period, military between the early Middle Ages and the French Revolution, craft-trades up to the end of the nineteenth century, industrial until recently, port activities from time immemorial. With this rule, to which two thousand years of history bear witness, the future activities of watercourses, mirrors of town life, can be forecast: services and leisure, as tomorrow's urban activities take shape.

As society's frequentation of rivers was only interrupted for 60 years, namely during the 20th century, this statistically represents just two generations, or a mere 3% of the time

that has elapsed since the era of the Gauls. That is a brief period, and leads us to suppose that this short interval was simply an epiphenomenon.

Water has a social value, which could be designated by the word aquosity. This little-known term, borrowed from the Latin *aquositas* in the 16th century, deserves to be rehabilitated, like its contemporary, the word "paysage" (landscape), which has been defined as "a society's qualitative view of its vulnerable environment". It implies a kind of sociability, a sort of familiarisation, of everyday acquaintance with water. It has something of the heritage about it. It cannot in fact be limited to the element water itself, to stone embankments, to the mere spanning of rivers by bridges, to the ever dry grass of road verges, to the technological sterility of civil engineering, all of which, sadly, are lifeless material things. Aquosity is an integral part of the activities of western society and heritage; it is the objectified form of collective awareness of ambient water; in this context it designates - to take a term from the realms of physics and chemistry - the town's "water value", its plus value as receptacle of watery environment. ■

A. Guillerme

"Theory of Urban Change" Laboratory  
Institut Français d'Urbanisme  
Université de Paris VIII  
4, rue Nobel, Cité Descartes  
Champs-sur-Marne  
F-77436 Marne-la-Vallée

People and water



F. Zwardon/Plurriel

# Ramsar

## The wetlands convention

Hervé Lethier

“Place in Iran, six letters, where an intergovernmental treaty on wetland conservation was signed in 1971.” A clue that would defeat most crossword solvers. Ramsar - though the name looks like an acronym - is actually the town on the Caspian Sea where the Ramsar Convention, which deals with wetlands of international importance, in particular as waterfowl habitats, was adopted on 2 February 1971. Twenty-one years on, 70 governments are parties to the Convention, which came into force in 1975 after acquiring its seventh signatory, Greece.

### What is the Ramsar Convention?

First and foremost it is a group of governments with similar nature conservation problems, which have decided to join forces, technically and financially, so as to pool their experience and expertise and be able to draw on the services of a bureau. Their firm belief is that wetlands are a valuable and irreplaceable economic, cultural, scientific and recreational resource, and in acceding to the convention those governments (to which Peru, Costa Rica, China, Argentina, Indonesia and Bangladesh have been added in recent weeks) have given four main undertakings:

- to designate at least one wetland for inclusion in the list of wetlands of international importance (so far almost 560 wetlands have been designated, covering a total area of some 36 million hectares);

- to promote the rational use of wetlands;
- to consult one another on implementation of the convention, especially - but not exclusively - in the case of wetlands or water systems which extend across national borders;
- to establish nature reserves on wetlands, whether or not included in the list.

### What kind of wetlands are involved?

The Convention's definition of wetlands is extremely broad. Article 1 defines them as "areas of marsh, fen, peatland or water, whether natural or artificial, permanent or temporary, with water that is static or flowing, fresh, brackish or salt, including areas of marine water the depth of which at low tide does not exceed six metres".

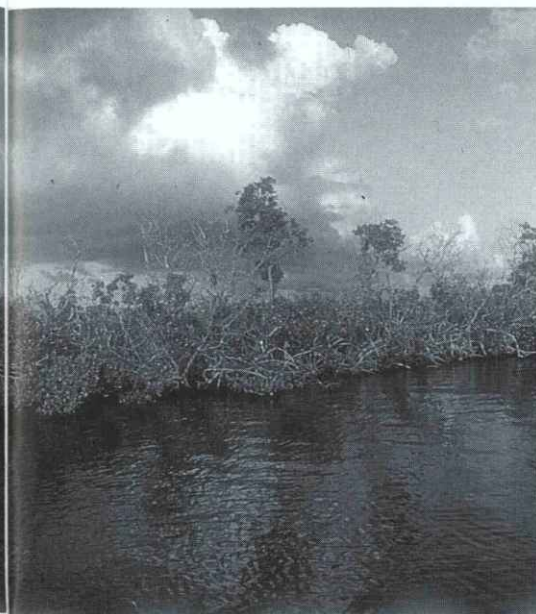
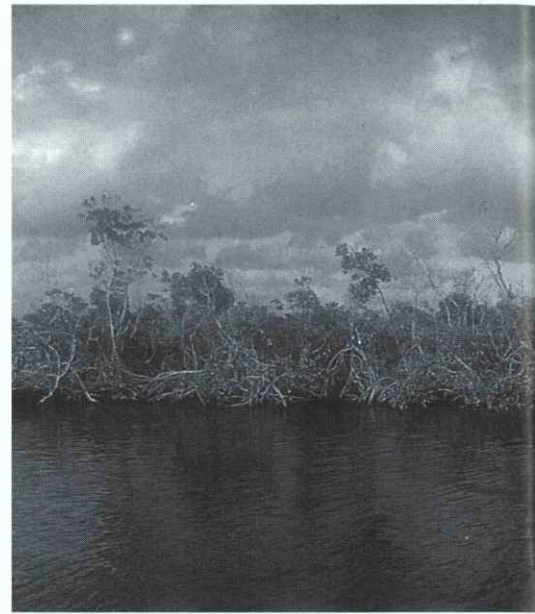
So a wetland is a system of which water is an essential though not always a very visible component, and any human interference with the water regime or the distribution or quality of the water is always liable to cause serious functional imbalances and, from the standpoint of the convention, change the area's ecological character.

To give three examples, a wetland, for the purposes of the Convention, can be such very different things as a tropical mangrove swamp, a river and its floodplain, or a coral reef.

### What is a Ramsar wetland?

Countries parties to the Convention have to formulate and implement their planning so as to promote not only rational use of their wetlands but also the conservation of wetlands on the Ramsar list. To be put on the list, wetlands have to be of international significance in terms of ecology, botany, zoology, limnology or hydrology. For example, an area exemplifying a type of wetland rare or unusual in the particular biogeographical region, or of particular importance to the maintenance of biodiversity in the region, or visited annually by 20,000 waterfowl, would qualify for inclusion.

One Ramsar wetland, Queen Maud Gulf, in Canada, covers over six million hectares whereas Australia's Hosnie Springs covers on a few thousand square metres. In Europe, the Danube Delta, designated by Romania, covers 647,000 hectares whereas Llyn Idwal, in the United Kingdom, covers only 14 hectares.



B. Pambour/Bios

It is not the size of the area which makes it valuable, but its international significance as measured by criteria approved at the latest conference of parties to the Convention, at Montreux, Switzerland, in June 1991.

### How does the convention operate?

The Ramsar Convention has three separate bodies which complement one another.

The Conference of Contracting Parties meets every three years. It is a steering body composed of representatives of member governments, alongside whom non-governmental organisations sit as observers. The conference approves the three-yearly budget as well as taking decisions and adopting recommendations and resolutions for improving general operation of the convention. The next session will be at Kushiro, Japan, in June 1993.

The Standing Committee is composed of representatives of Contracting Parties from each of the main Ramsar regions. Its job is to follow up and implement decisions of the Conference of Parties and it meets at least once a year.

The Ramsar Bureau is the Convention's executive body. Its permanent secretariat - a small team of professionals - is in close touch with a network of correspondents and specialists and is responsible for day-to-day co-ordination of work connected with the Convention. It helps governments tackle wetland-conservation problems and associated problems of rational use of natural resources.

### Means of action

#### Surveillance

The machinery here is intended to help parties take speedy, effective action both to prevent deterioration of wetlands, particularly those on the Ramsar list, and as far as possible repair damage to them, for while the Convention leaves it to governments to decide the legal status of a designated wetland and how such a wetland is to be protected, it

does require them to preserve its ecological characteristics.

If these change or are likely to change, the party concerned has to inform the Bureau immediately and the Bureau will then set about finding a solution to the problem in co-operation with the national authorities.

At the request of the national authorities, the Bureau can arrange for a visit to a problem site by, usually, a Bureau representative plus one or more relevant specialists. Recommendations are then made as to whatever action the party concerned needs to take to safeguard the wetland's ecological characteristics. A report is made to the Standing Committee on the findings of the visit and the action the national authorities have taken.

The procedure has been used on some 30 occasions so far. In 1992, for example, it was used for the Danube-March-Auen wetlands in Austria and Lake Srebarna in Bulgaria.

### Rational use of wetlands: the project

Wetlands are subjected to a wide range of uses and activities which are not always readily compatible with or protective of natural balances. The purpose of the Rational Use Project, which is co-ordinated by the Ramsar Bureau, is to give governments detailed guidance, based on work being done on the ground, on how to make rational use of the natural resources which local communities derive from wetlands. Wetland use can only be sustained in the long term if present generations use sources - of which water is not the least important - to best advantage without impairing the ecosystem's capacity to satisfy the needs and wants of future generations.

The Waddensee, which is shared by Germany, Denmark and the Netherlands, and the Contentin and Bessin marshes in France are only two of the 20 case studies the project involves. On their own, the case studies cannot provide totally satisfactory answers to all the problems but they do help identify how, in practice, rational use of wetlands can be

achieved and they look at all the natural, institutional, legal, technical and other aspects of the question.

### The wetland conservation fund

Even with the best will in the world and the most enlightened attitudes you cannot solve all the problems of wetland conservation unless you have the money. In 1990, therefore, the Convention set up a wetland conservation fund, called the Ramsar Fund, to provide aid to developing countries. The fund depends on voluntary contributions from governments and non-governmental organisations such as the Worldwide Fund for Nature and is run by the Bureau under the supervision of the Standing Committee, which has laid down rules for its use.

The fund became operational in 1991. It can only be used for the benefit of developing countries and the requests for assistance have to come from an appropriate national authority. Aid is granted to a small number of schemes whose purpose is to encourage wetland conservation measures, including improved management of wetlands on the Ramsar list, preparation of documents for adding wetlands to the list, and rationalisation of the use of resources. Chile, Kenya, Mauritania and Vietnam have all received help of this kind. Countries which want to join the Convention can also be helped to prepare their applications for accession. The Congo received aid for that purpose.

The wetland conservation fund is not the Convention's only means of helping governments financially. One of the Bureau's main purposes is to promote international co-operation and more particularly to help countries raise finance abroad, through bilateral or multilateral arrangements.

The Bureau has instigated wetland conservation projects all over the world, whether directly (by means of special financial contributions from some member countries or indirectly, by liaising between its correspondents).

The twinning between the Danube delta and Camargue Ramsar areas was set up through bilateral co-operation between the two governments concerned. The priority action plan to conserve Bulgaria's wetlands was similarly prepared, with assistance from France.

However, the financial resources available to the Bureau are not yet large enough to meet the many requests for assistance which the Bureau receives and it is to be hoped that in future, development aid bodies will take an increasing interest in the wetland conservation fund.

It is reassuring to see the Council of Europe Parliamentary Assembly taking an interest in management of water resources, because water and wetlands are subject to ever-increasing pressures, the results of which in some cases are alarming.

The January 1992 Dublin Conference on Water and the Environment, which was part of the lead-up to the Earth Summit, drew attention to the dangers of non-sustainable development that pays no heed to natural balances. This collective awareness which is emerging at the highest levels is in line with the Ramsar convention's day-to-day concerns and validates the Convention bodies' work of assistance to governments.

It is a great encouragement.

Let us just hope that the calls for long-term action are a categorical and not just a hypothetical imperative (with apologies to Kant).

H. Lethier

Director of Conservation  
Ramsar Convention  
28 rue Mauverney  
CH-1196 Gland

# Legislation and control

Dante Caponera

Like in other parts of the world, water law has evolved in European countries depending on climatic factors, social, economic and political conditions. Some countries - the so-called civil law countries (France, Italy, Belgium) - have adopted in their legislation the principles introduced by the French Napoleonic Code, while other countries - in northern Europe - have absorbed, in addition to these, Germanic and customary law principles. The United Kingdom has adopted the common law system, of which the riparian doctrine is an expression. Finally, the former Soviet Union and Eastern European countries have their own system, which will probably undergo changes in view of the recent political events.

Despite the existence of systems which vary from one country to another, common trends in water legislation and administration can be identified. These trends are the result of a widespread concern of European governments, which have realised that, due to population growth, technological progress and increased standards of living, water, whether surface or underground, is no longer an inexhaustible commodity.

In addition, it is likely to become unfit for human consumption and other uses if human activities causing pollution are not adequately controlled. In this respect, the European Economic Community has issued a long series of directives and regulations, to which the member States have generally conformed.

It has also been realised that, if the states are to manage national water resources effectively, they must be able, in the general interest, to impose restriction upon human activities, that which they cannot always do if waters are private. As a consequence, the concept of private ownership of water, existing in civil law countries, has been restricted. To give an example, in France and in Italy the term "private waters" has been replaced with the terms "non-domianial" or "non-public" waters.

## National legislation

In synthesis, the measures generally adopted by legislation within the national contexts in order to enable the public administrations to exercise an adequate control over the available water resources are many and varied.

The first one is the enactment of special water legislation, to ensure a more effective control over water (surface and underground) use and adequate water resources conservation. A number of countries have enacted special pollution control legislation, while comprehensive water laws or codes, covering as many water management aspects as possible, are still rare. A good example of comprehensive water law is the Spanish "Ley de aguas" (Water Law) of 1985, as it provides for basin administration and the control over both surface and underground water.

Another trend is the provision for water resources planning (short-, medium- and long-term), possibly by river basin (as in Spain and now in Italy), in order to establish priorities among water uses, to ensure that the utilisation of available water resources takes place in a rational manner and that water quality be preserved.

As a general control measure, general systems of administrative permits, authorisations and concessions of water use have been introduced. These instruments have a limited duration, are personal and non-transferrable without the consent of the administration. They contain conditions concerning the purpose of use, the modality of use and other matters, dependent of the intended utilisation and are subject to the payment of a fee. Finally, they can be renewed, as well as modified, suspended or revoked by the public administration in case of non-compliance with the conditions imposed, or in the public interest.

The introduction of discharge permits is another measure. These have the same characteristics of water use permits, and contain conditions relating to the place and modality of the discharge, treatment requirements and the effluent standards to be respected. They are subject to the payment of discharge fees, on the basis of the "polluter pays" principle. The amounts charged contribute to subsidise the fight against pollution.

The protection of groundwater from direct pollution and pollution from diffused sources, like agriculture, has become a major concern for European countries, which have adopted a system of permits for

the control over the use of underground waters.

Moreover, in order to discourage the wastage of water, the tariffication of water uses, on the basis of measured quantities, has been introduced. Rates vary according to the economic development of the country.

Another instrument which has been adopted is the introduction of an obligation to treat effluents before discharge, in conformity with given effluent standards. In this connection, public, mixed or private institutions for the collection, treatment and disposal of waste, whether liquid or solid, have been established, generally at the local level.

In addition, financial - tax or non-tax incentives, in order to encourage research on, and the adoption of "clean technologies" and the treatment of waste have been devised.

Another measure of significance is the introduction of protected areas or zones, accompanied by the limitation or prohibition of certain activities within these areas or zones, for purposes such as the protection of underground waters, the control of water quality in relation to given uses, and the protection of water intakes.

The issuance by the European Economic Community of directives and regulations concerning the quality of water intended for human consumption, both surface and underground, has determined the adoption by the member States of corresponding internal legislation.

Systems of control over activities which may cause surface and underground water pollution, such as industrial and commercial installations or the storage of polluting substances in the ground have been devised.

Finally, heavier penalties for offenders against water legislation have seen the light.

## National administration

Water administration varies depending on the political and administrative framework of each country. While some states are unitary, others are federal, or, without being federal, are subdivided into various territorial levels of jurisdiction enjoying a certain degree of autonomy vis-à-vis the central government, depending on the country.

In spite of the different administrative organisation of European countries, common trends may be also found in the administration of water resources.

Water management in European countries is generally the responsibility of various ministries or other public institutions at the central or at other territorial level of jurisdiction. Often, each ministry or institution carries out its own water resources planning, its own data collection, and delivers permits within its own water utilisation sector, without being sufficiently coordinated with other ministries or institutions. This may result in the overlapping of competences and in a waste of financial and human resources, if adequate coordination measures are not introduced.

Aware of this, some countries have established mechanisms of coordination (councils, committees or commissions) of water resources management aspects among the different ministries or institutions, at a higher level of administration. This is the case of France, Spain, Denmark and the Netherlands.

## International Conventions

On 17 March 1992, at a meeting in Helsinki of the United Nations Economic Commission for Europe, the Senior Advisers to ECE Governments on Environmental and Water Problems adopted two international Conventions, one on the transfrontier effects of industrial accidents, the other on the protection and use of transfrontier water courses and international lakes.

Both conventions were immediately opened for accession by the member States of the ECE, by States having consultative status and

by regional economic integration organisations having the authority to conclude treaties on the matters covered by the two texts. The European Economic Community is one such organisation.

The Convention on transfrontier water courses sets out a body of rules for States with a common river or lake boundary, showing how they should co-operate in accordance with optimum environmental practice to prevent or reduce pollution and aim to ensure sustainable management of water resources. Warning and alarm systems are envisaged, as well as practical measures of mutual assistance to be adopted in critical situations.

Secondly there is a recent tendency to entrust water resources management responsibilities at the central level to newly created Ministries of the environment or environmental institutions, like in the case of France, Denmark, Finland and the United Kingdom.

Thirdly, other countries like Spain, for instance, have adopted a form of water administration by river basin. Limited water management responsibilities are entrusted to river basin authorities in France (pollution control and collection of discharge fees), and in Italy (water resources planning). In the United Kingdom, water supply and sewage treatment and disposal responsibilities have been assigned by the Water Act of 1989 to ten private companies operation under licence within the preexisting Regional Water Authorities areas.

Finally, it is worth mentioning the increasingly important role vested in ministries of public health in what concerns water quality control, the prevention of water pollution and the protection of public health. These ministries are generally entrusted with the elaboration, in consultation with the other ministries concerned with water resources management, of water quality and effluent standards.

## International aspects

There are about 56 international river basins or river systems in Europe, that means rivers crossing the boundary of two or more states, or separation two or more states for various purposes (water supply, agricultural, industrial, hydroelectric power production, navigation, etc.), with the result that competition is very high.

There are a number of international agreements concerning the use of the waters of European international rivers, originally limited to boundary demarcation and navigation, and later concerning other water utilisations. Many of them relate to the

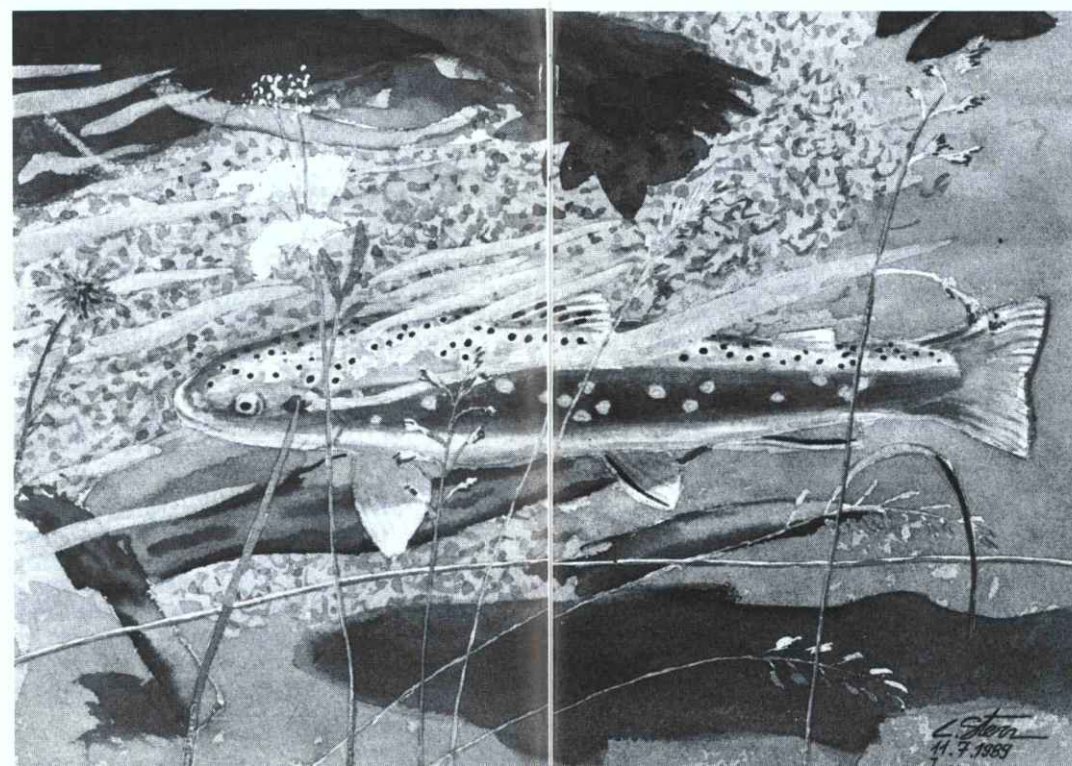
apportionment of water for irrigation, hydroelectric power production and other utilisations, so as to avoid conflicts among neighbouring states.

More recently, agreements have been entered into by the European states for the purpose of protection of river waters against pollution. In this connection, it is worth mentioning the damage caused by France, an upper riparian allowing potassium mining in Alsace, to downstream riparian (Belgium and the Netherlands), for which recourse had to be had to a court. The case is still pending.

In spite of the large number of international river basins in Europe, only a limited number of international commissions for their management exist. The most important among these commissions are the Danube Commission for Navigation, the Central Navigation Commission for the Rhine and the Rhine Pollution Commission.

Finally, it is worth mentioning that the Council of Europe has shown a great concern for the state of water resources in the continent. This is demonstrated by the fact that in 1967 it has elaborated the European Water Charter, containing basic principles of conduct of European states. More recently, it has prepared a Draft European Convention on the Protection of International Watercourses against Contamination (1974).

D. Caponera  
President of the International Association  
of Water Rights  
Via Montevideo 5  
I-00198 Roma



C. Stern

# Managing multiple functions

Wilfried Teuber

Water is essential to all human, animal and plant life. As well as being a source of drinking water, lakes and rivers have always been sailed and fished, had effluent poured into them, been harnessed to industrial processes and been used for refrigeration, irrigation and much else besides. For centuries, until after the last war, alluvial plains were reclaimed for housing development or farming by means of river straightening and embankment and huge drainage schemes. Riverworks were carried out to improve flood protection, navigability and power generation. But all use involves risk to and pollution of water resources and the environment. Human impact has greatly altered the state of our rivers. It is increasingly clear that water use long since exceeded the environmentally critical level, for even in temperate Western Europe water resources are limited.

A decade or two ago water was still managed at the local or regional level. Now the approach has to be global to reconcile the many, often conflicting pressures to which we subject lakes and rivers, and in many cases ecosystems, and to cope with all the repercussions for the entire water system, comprising groundwater, rivers and river landscapes and the sea.

## Quality trends

Because of its high population density and high concentration of industry, Western Europe had water-quality problems sooner than other parts of the world.

By the early 1970s water pollution had increased worryingly in Germany. In the post-war years of rebuilding the country, water protection had not kept pace with industrial expansion. Water quality in all the main German rivers, measured at five-yearly intervals from 1975 onwards, is shown on maps charting their recolonisation by living species.

The 1990 water-quality map is the first after German reunification. It shows very clearly the serious pollution of rivers and lakes in the new Länder.

In the old Länder pollution by biodegradable organic substances has decreased markedly, as can be seen from a comparison with previous maps. Many watercourses have reached category II (dark green, moderately polluted). On account of low eutrophication many lakes can be shown in blue.

Pollution by dangerous substances such as heavy metals and organic halogenated compounds has also greatly decreased.

## Treatment of effluents a priority

Effluent pollution is the outstanding problem. Three groups of substances in sewage need distinguishing:

- oxygen-consuming substances which deoxygenate water as they break down;
- organic substances essential to plant development but which, if present in too large quantities, help cause eutrophication;
- toxic substances.

Success so far in cleaning up lakes and rivers is mainly due to treatment of urban and industrial sewage.

There has been a lot of emphasis on building and improving plants for physical and biological sewage treatment and for rainwater treatment. Alongside development of sewage treatment, industry has taken steps of its own to prevent or reduce sewage pollution and cut down the amount of effluent.

Physical and biological sewage treatment primarily reduces pollution caused by highly biodegradable substances. Conventional physical and biological sewage treatment only filters out a small proportion of substances which are not readily biodegradable

or of nutrients such as phosphorus and nitrogen.

Additional action is therefore aimed at more effective removal of nutrients or toxic substances from sewage and preventing pollution by them.

As a result of the Community directive on the treatment of urban wastewater (91/271/EC), the next few years in Europe will see many more urban sewage plants capable of filtering out a large proportion of nutrients. The directive lays down stringent standards for sensitive areas up to 1998, standards comparable to the German regulations on sewage.

The trend on industrial effluent containing toxic substances - more of which are being discovered all the time - will have to be away from end-of-pipe technology towards environment-friendly production methods: in other words away from treatment and towards prevention.

Regulations on effluent should contain detailed provisions on all pollutants produced by the various industrial sectors, and at a water seminar at Frankfurt in 1988 European Community Environment Ministers called for new European regulations on sewage on those lines. Monitoring of effluent needs to take into account the synergy of effects and guide values.

## Groundwater protection

Two-thirds of Germany's drinking-water needs are met by groundwater, often totally untreated. Although groundwater is less vulnerable than surface water, ever-worsening environment pollution has for some years been affecting high-quality groundwater resources. Unfortunately the situation is deteriorating.

The main causes of pollution are:

- accidents during the handling of substances which are harmful to water;
- leaching of fertilisers and plant-health products;
- infiltration of air pollutants in precipitation;
- leaky sewage pipes;
- sewage-sludge application in agriculture;
- pollution from former industrial sites, military installations or rubbish tips.

The ecosystem is liable to be sensitive to the slightest groundwater pollution, so it is vital to prevent any pollution whatever of the aquifer. Hitherto, preventive measures have certainly not been fully effective. We are uncovering a growing number of pollution cases, many of them unexplained.

The aquifer has a good memory, though. Cleaning it up - if possible at all - takes large resources and a long, long time.

## Diffuse pollution caused by farming

Increased use of chemical fertilisers, large-scale stock farming producing large quantities of manure, and increased use of plant-health products have results in serious water pollution.

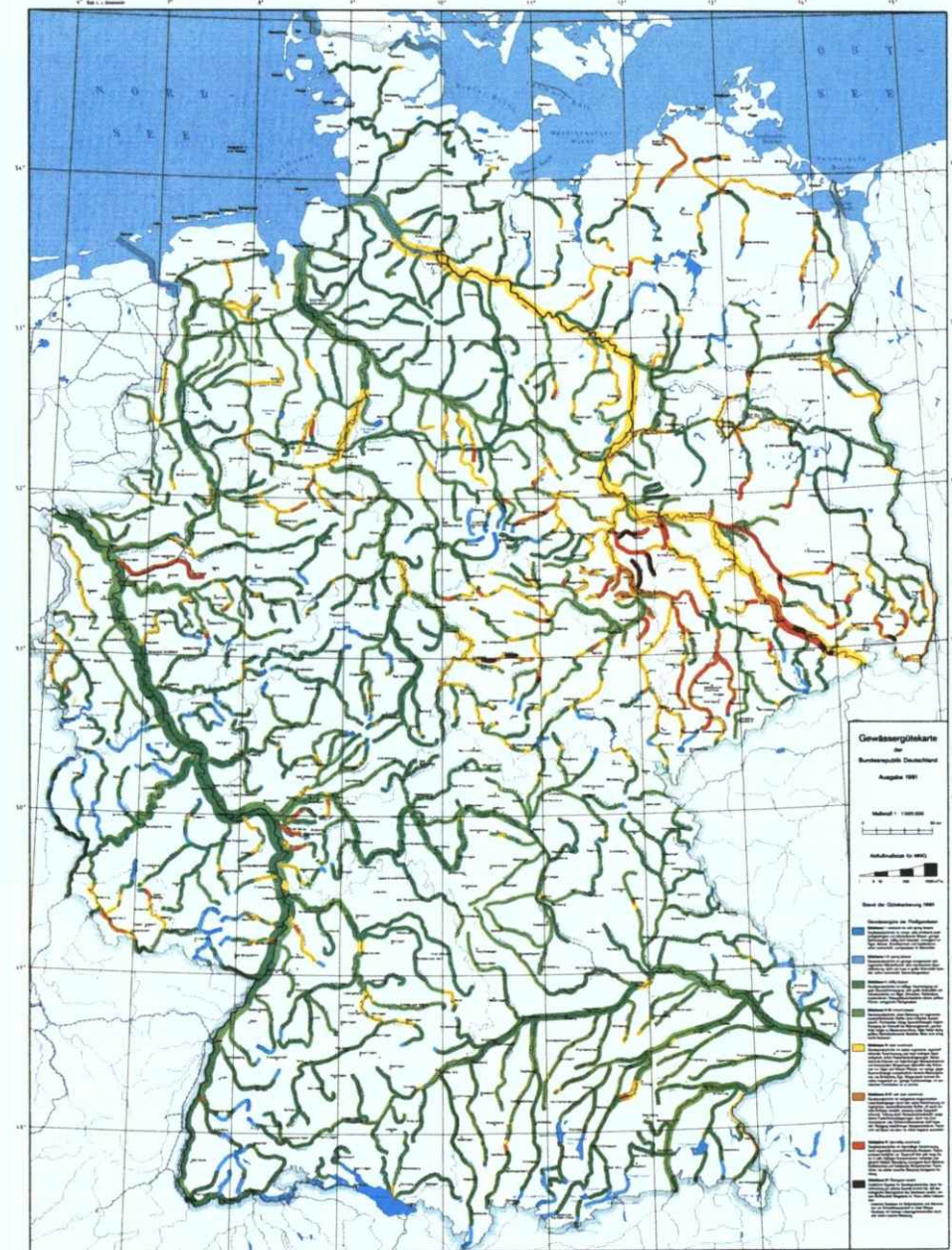
It is not enough to repair the damage by technological means, such as ever more complex treatment of drinking water. That makes sense neither environmentally nor economically. Nor is the answer to redraw the admissible levels of pollutants.

Any solution has to tackle the root causes, one of which is agriculture policy which encourages "good" use of fertilisers and the use of plant-health products. We need an environment-friendly European agriculture policy that encourages co-operation between farming and water management to ensure a continuing supply of clean, unpolluted water. Interaction between agricultural problems and water management spectacularly illustrates the need for an overall approach to water protection. Regulations aimed at environmentally-sound agriculture, such as the Community directive on nitrates, have been introduced. What we need to do now is make sure they are put into agricultural practice, and that means providing farmers with continuing training and advice.

## Water as a natural habitat

In our effort to reduce pollution we must not forget that watercourses, with their beds, banks and alluvial plains, are also habitats.

Shrinkage of rivers and natural lakes in Western Europe is becoming worrying. Many native animals and plants have lost their habitats; the few stretches of natural watercourse or alluvial plain which have been preserved need coherent protection,



Rivers in Germany: water quality

Dark blue: pure or almost pure. Light blue: minimal pollution. Dark green: considerable pollution. Light green: critical pollution level. Yellow: severe pollution. Orange: very severe pollution. Red: excessively severe pollution. Striped red: ecologically dead.

and regeneration of those that are savable should be attempted as far as possible. Banks of streams and rivers should be returned to as natural a state as can be achieved. Not only are they refuges for threatened animal and plant species but the plant species themselves have an important role to play in biological self-purification and in stabilising the banks.

## Flood protection

Just as water needs protecting from human impact so we ourselves need protecting from water, a fact of which flooded housing developments and roads remind us.

Flood protection was not invented yesterday. In many areas flood risk has been reduced. Existing embankments are equal to most floods.

However, the damage potential is much greater and flood protection is - possibly - essential despite the harm it may do to the en-

vironment and to communities far downstream. New planning must take account of all possible local impacts, from the headwaters to the estuary. Priority must go to preserving or reconstituting natural flood zones such as alluvial plains or natural watercourses. We need to restore and improve the landscapes natural capacity to retain and store water.

Water management's role is to reconcile the various requirements with one another and with environmental necessity. To keep our natural environment functioning effectively and to protect natural beauty and variety, we have to manage water rationally and thriftily as one of our major assets, and restore our lakes and rivers to as nearly natural a condition as possible. ■

W. Teuber  
Federal Ministry for the Environment, Nature  
Conservation and Reactor Safety  
Postfach 12 06 29  
D-5300 Bonn 1

When a groundwater body breaks the surface, the streams it forms are crystal clear, maintain a constant temperature and harbour an abundant fauna and flora.



S. Cordier/Pluriel

## Underground water

Reinhard Traub

Groundwater is supposed to be naturally fresh, limpid and clean. Only recently have we discovered that this is no longer the general rule. Europe was concerned with the problems of flood control, the use of water for navigation and, later on, electricity production, long before the cleanness of surface water became an issue. Systematic large-scale monitoring of groundwater quality did not begin until some ten years ago.

The work of the Parliamentary Assembly of the Council of Europe also reflects this growing awareness. In 1954 the Assembly dealt with marine pollution (Recommendation 68). It addressed the problem of the pollution of the Rhine in 1963; but not until 1971 did it examine water resources in the Rhine valley, i.e. the water table. Yet groundwater is an essential part of Europe's drinking water reserves (almost 90% in Italy, 70% in Belgium and Germany, and some 50% in France). The Parliamentary Assembly notes that, although it is not immediately apparent to the public, pollution increasingly threatens fresh water reserves. It calls on the governments concerned to cooperate in combating every type of pollution

threatening this shared resource (Recommendation 629).

### Multitude of dangers

It is common knowledge that subterranean water is under attack from agricultural fertilisers, industrial and domestic pollution, dumping of household waste and refuse, and seepage of polluted surface water.

Substantial amounts of pollutants - for instance nitrogen, sulphur and lead - reach underground water through the soil. Up to 10% of the nitrogen in commonly used fertilisers seeps down through the soil to the water table.

Nor is it widely known that human activities can cause damage far beneath the earth's surface, e.g. through drawdown of the water table around a well. In certain unfavourable situations, salt water lying deep underground may rise into the well. A further problem should be highlighted in this connection: measurements done in the Kehl area at a depth of about 140 m have revealed that the water at that depth is between 2,000 and 4,000 years old. If large quantities of water are pumped up from such depths, we must expect the level of young, polluted water near the surface to sink, thus exposing an intact aquifer to gradual pollution.

### Conflicts of interest

The relation between groundwater protection and the majority of society's activities is one of conflict. Groundwater is mainly used for public and private water supply, for manufacturing and industrial activities, and for irrigating agricultural land. Again, regions

with abundant groundwater resources also have sand and gravel reserves. The two aims of supplying water and exploiting sand and gravel are incompatible. Water supply systems also have to compete with agriculture, housing, new development, industrial estates, road and rail infrastructures, and so forth.

### Protecting groundwater and resolving conflicts of interest

The Rhine valley is a particularly spectacular example of these incompatible aims. Other major European aquifers are certainly facing the same problems. How can a balance be struck between these conflicting aims?

The first task must be to take stock of groundwater resources, current and foreseeable exploitation, and the potential risks. For a few areas along the Rhine valley hydrogeological cartography has been used to carry out such a stocktaking. These maps show all the main hydrological and geological data. There are between 10 and 20 maps on a scale of 1/50,000 and 100 pages of explanatory text. They are accompanied by mathematical groundwater models required for authorisation procedures.

Such a stocktaking provides a basis for elucidation and quantification of the problems. The documents are a step towards securing effective groundwater protection and the resolution of conflicting interests. ■

R. Traub  
Landesanstalt für Umweltschutz  
Baden-Württemberg  
Postfach 21 07 52  
D-7500 Karlsruhe 21

## Freshwater Europe

Miguel Angel Martínez

Water - on which life itself depends -, rivers and lakes determined the siting of towns and villages and have shaped the pattern of economic activity. But the life-giver can turn killer and destroyer in the shape of torrential rain and floods, even drought.

Man has always tried to win control of water. The devastating droughts which seem to be increasingly afflicting many countries, floods, giant dam schemes and industrial pollution accidents in recent decades all seem to have raised the level of awareness as well as creating an urgent need for comprehensive integrated management of freshwater resources.

Realising the urgency, and at the investigation of a French member of the Committee on the Environment, Charles Pistre, who is now the committee's rapporteur on the subject, the Parliamentary Assembly set in motion the Freshwater Europe action programme.

The Council of Europe's interest in protection and management of both surface water and groundwater goes all the way back to the European Water Charter which the Committee of Ministers adopted on 6 May 1968 and which spelt out the basic principles of integrated management, such as making an inventory of resources, both quantitative and qualitative conservation of resources, and consultation with all interests. Underlying and informing the charter was the recognition and basic tenet that water was not governed by national boundaries.

But in the late 1960s governments and indeed the public were not as concerned as they should have been. The charter did not meet with the response it deserved from member States or our societies and consequently did not produce any radical change in national policy.

The Parliamentary Assembly nonetheless kept up its interest in the question and in 1969 put forward a draft convention on freshwater pollution which was the first attempt at collective legal action on water pollution, particularly pollution of transfrontier watercourses. But governments again dragged their heels and the convention never got beyond the draft stage, much to the Assembly's disappointment.

Now, growing awareness in various circles and a commitment on the part of international organisations such as OECD and the European Community to integrated management of water resources have brought support for the Assembly's position and have convinced the Assembly of the need for a multi-disciplinary all-European inquiry aimed at producing a set of comprehensive policy guidelines for member governments by 1993.

So 25 years on from adoption of the Water Charter we are setting about updating its general principles and translating them into more specific guidance.

This is no mean task when you think about the problems there have already been. But times have changed, everyone sees water as a priority, and in drawing up the Freshwater Europe programme the Parliamentary Assembly has sought to build on the new water consciousness.

### Indispensable co-operation

Knowing that the programme's success essentially depends on involving and closely consulting all concerned, the Assembly has invited government (national, regional and local), those with an economic interest (both water users and water managers), scientists and non-governmental organisations to set up or take part in action aimed to investigate the issues and decide how the desired result should be achieved.

The response has been excellent, confirming that in some countries and organisations the need for consultation was felt, sometimes acutely. We have received suggestions for activities as well as offers of, among other things, financial help, co-operation, facilities for activities and specialists' services.

In co-operation with the Standing Conference of Local and Regional Authorities of Europe, the Centre Naturopa and the Scientific Co-operation Division, the Parliamentary Assembly's Committee on the Environment has drawn up a varied programme of work designed both to assess the state of knowledge and take stock of needs and expectations so that there is proper coverage of the technical problems, the interests involved and the suggested topics.

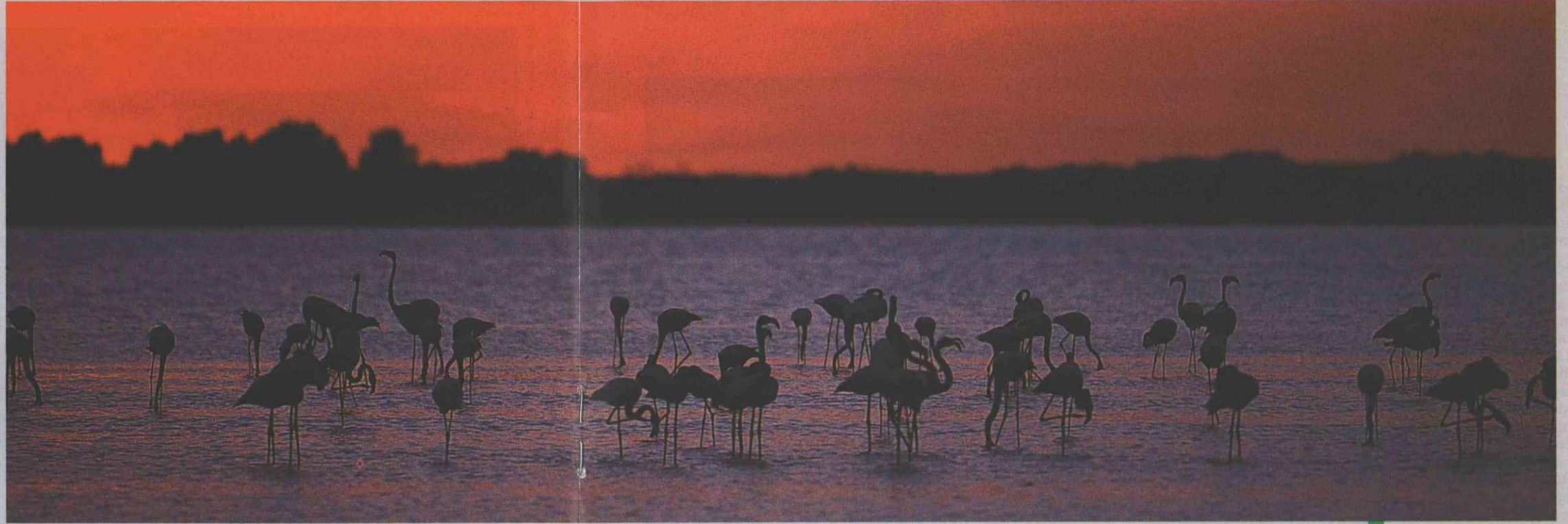
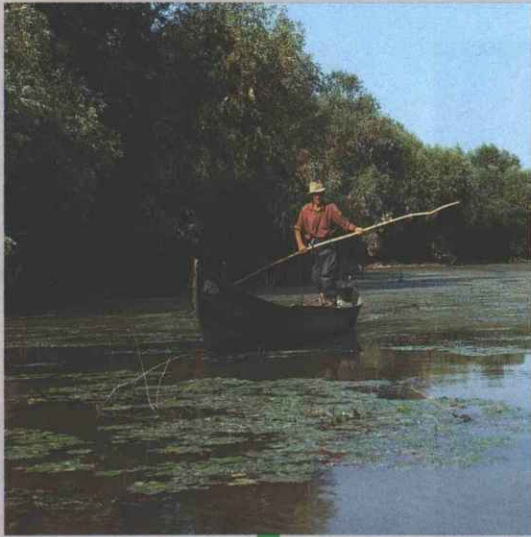
The challenge will be to have everyone concerned address the ten topics while having regard to the Council of Europe's geograph-

The trouble with water is that there is either too much of it or not enough.



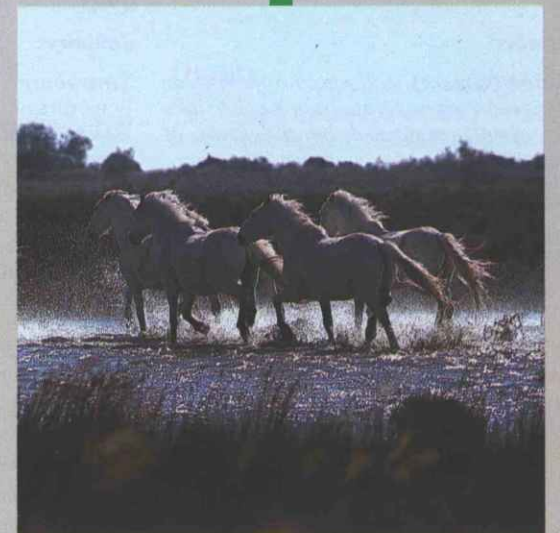
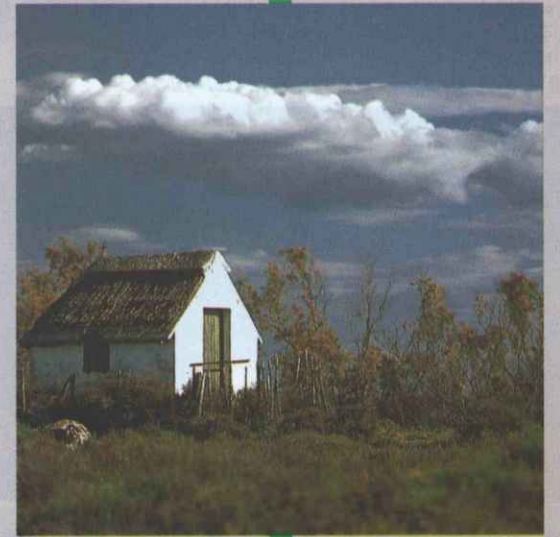
J. Teton





## Twinning

The Danube delta, one of the richest in Europe in natural features, was the subject of a Centre Naturopa colloquy in September 1992. On this occasion, France and Romania signed a twinning agreement between the Danube delta and the Rhone delta—the latter being the Camargue, one of the areas to which the Council of Europe has awarded its Diploma. Sponsored by Catherine Lalumière, Secretary General of the Council of Europe, this twinning arrangement will serve to promote two objectives: the protection of both wetland areas and the rational use of their resources.



ical extent and thus the specific problems which, say, Central or Eastern Europe or the Mediterranean or Baltic countries may have to contend with.

Of the ten topics selected in the light of the results of work so far by the Council of Europe and other international organisations, one may be of particular interest: a comparison and assessment of different management approaches. This is bound to give rise to debate between those who advocate a private approach, as in France and the United Kingdom, and those who advocate public management on the Italian model. The committee is less interested in argument for its own sake than in identifying the pros and cons so that local authorities can choose the management approach best suited to their particular circumstances.

Discussion about the roles of central government, local government and private enterprise will be in the same spirit, as will the enquiry into training - the cornerstone of any

effective concerted policy - for local councillors and local government officers.

Knowing how important it is to educate all concerned, the committee particularly wanted to encourage schemes for developing more awareness of water-related issues.

The county council of the Tarn département (France), for instance, is going to be running a schools environment education project in 1992-93. The aim is to set up exchange of information about water management between school children in the 27 Council of Europe countries.

The Committee on the Environment's own contribution - made with corporate financial help - has been to publish a booklet for the general public, clearly explaining the various dangers to which we risk exposing what is neither an inexhaustible nor always renewable resource.

Convinced that national parliaments have a crucial role to play in this area, but also to as-

sess the results of the various joint activities, the committee is holding two major conferences: a 2nd Pan-European Parliamentary Conference, and the Freshwater Europe final conference in Cologne at the end of March 1993. The latter will be attended by all the Council of Europe's partners in the programme and will agree final proposals for inclusion in the report which is to be submitted to the Parliamentary Assembly at its May 1993 session.

As a result of Europe's geopolitical reshaping, the Council of Europe has become the obvious promoter of future water-resources management policy. The challenge was one the Parliamentary Assembly had a duty to take on.

M. A. Martínez  
President of the Parliamentary Assembly  
of the Council of Europe



Klein-Huber/Bios

## Freshwater Europe: Outline programme of action

<p><b>1992</b></p> <p><b>September</b></p> <p><b>Agrinion (Greece):</b> colloquy on freshwater management (an integrated approach to lake management) organised by the town of Agrinion.</p> <p><b>December</b></p> <p><b>North Brabant (Netherlands):</b> colloquy on a European water policy, organised by the province of North Brabant, the Regional Union of Water Suppliers and the National Water Supply Organisation.</p> <p><b>Bari (Italy):</b> colloquy on water and agricultural practices, organised by the Centre International des Hautes Etudes Agronomiques Méditerranéennes.</p> <p><b>Budapest (Hungary):</b> conference on relations between local authorities, European financial agencies and water suppliers.</p>	<p><b>1993</b></p> <p><b>January</b></p> <p><b>Strasbourg (France):</b> colloquy on central government, local government, industry and water, organised by the city of Strasbourg, the French water boards and the Committee on the Environment.</p> <p><b>Limoges (France):</b> colloquy on training for local councillors and local government officers, organised jointly by the Committee on the Environment, the International Water Office and the Centre National de la Fonction Publique Territoriale.</p> <p><b>February</b></p> <p><b>Birmingham (United Kingdom):</b> colloquy on water management and scientific and technological advances, held by Aston Uni-</p>
--	---

versity and Cranfield Institute of Technology, Bedford (United Kingdom).

**Austria:** 2nd Pan-European Parliamentary Conference held by the Parliamentary Assembly.

### Mars

**Cologne (Germany):** final winding-up conference held by the Committee on the Environment.

### May

**Strasbourg, Parliamentary Assembly session:** presentation of the report and proposals by Charles Pistre, rapporteur, chairman of the Freshwater Europe working party, member of the Committee on the Environment.



J. Frebet/Bios

## Drinking water

### The role of local authorities

Antony Hadjipavlou

“Water systems have traditionally been the subject of little interest outside the industry. Most people take water for granted until something goes wrong”.

This comment, in the 1991 annual report of one of the private water companies established in the United Kingdom under the 1989 Water Act, with the responsibility for supply of drinking water and sewage services, ie Anglian Water plc, illustrates the surprisingly complacent attitude of the public about a subject which should be of considerable concern, ie the difficulties encountered by local and other public authorities in ensuring, in many parts of Europe, an adequate supply of good quality drinking water.

Hardly a summer goes by without stories of drinking water rationing and severe shortages caused by low rainfall over long periods and increased demand. Problems are sometimes concerned with quantity, particular-

ly in the summer months and in areas of tourist pressure; sometimes with quality; generally with both.

It is against such a background that the Council of Europe's Standing Conference of Local and Regional Authorities of Europe (CLRAE), for its part, has just completed a report on the responsibilities of local authorities and the difficulties faced by them in ensuring for their population an adequate supply of good quality drinking water (Report on the quantity and quality of drinking water in Europe: the role of local authorities, Rapporteur: Edoardo Martinengo, Italy).

The report, based upon nearly 600 replies to a questionnaire circulated throughout member countries, constitutes an up-to-date analysis of the current situation.

### Quantity

In respect of quantity, the main problems identified in the report are:

- leakage from antiquated mains pipes and infrastructure (in Italy, for example, there is an estimated 25% loss);
- inadequate distribution networks and storage facilities;
- insufficient exploitation of surface waters;
- high summer demand, particularly in tourist areas, ie often those which furthermore have a low average rainfall; lack of a state policy in many countries for water resource management.

Measures to increase quantity include:

- measures to reduce demand through public appeal and specific restrictions on use, gen-

erally a hose pipe ban on washing cars, watering gardens, etc;

- an improved distribution network, with computerised systems and interconnecting reservoirs;

- exploration of new sources, construction of new reservoirs and additional boreholes;

- mains rehabilitation, upgrading of existing works, aquifer protection schemes and connection of shallow wells to the public mains services;

- various miscellaneous measures to reduce water consumption in public facilities;

- leakage reduction, waste detection programmes, tariff adjustment, desalination, particularly in coastal areas, and improved sewage recycling;

- development of metering to reduce consumption and encourage repair work.

In many countries, the current "single supply" system is currently under review. It is thus being considered whether it is justified to use drinking water for all domestic purposes, including laundry, cleaning, sanitary and personal hygiene, when in fact a dual supply system could be devised and thus achieve considerable reduction in consumption of "quality" water.

### Quality

The replies reveal a constancy in the problems encountered, which concern mainly:

- presence of heavy metals, particularly lead from pipes (plumbosolvency); aluminium, arising from the use of aluminium sulphate, as a coagulant in the treatment process; iron from old unlined pipes and arising, together with manganese, from the nature and structure of the ground - elements which, apart from affecting health, give a specific taste to the water;
- nutrient loading arising from the leaching of pesticides into the water supply - nitrates, sulphates - causing, amongst other effects, algal blooms;
- presence of chlorination bi-products, known under the heading of trihalomethanes (THMs);



J.P. Ehrismann

Long may fountains flow ...

– bacterial and micro-biological pollution, particularly in private supplies, arising from inadequate source protection and from animal and human faecal matter - generally known as coliforms;

– organic debris from low levels in reservoirs.

In addition to health hazards created by the above, there are also cosmetic problems, such as taste, odour, colour and turbidity - usually seasonal and associated with algal blooms or the nature of the ground in the catchment area.

The point is also repeatedly made that, where there are problems of quantity, there are also inevitable problems of quality.

#### Effects on health

As to the effects on health of poor quality water, there remains considerable divergence of view. However, it is generally thought by the medical profession that there is a causal relationship between the presence of certain substances and specific diseases, eg from lead: damage to children's brains sufficient to hinder intellectual progress, mothers with higher than average levels of lead in blood having increased chance of still births; from aluminium, a higher risk of Alzheimer's disease; from nitrates, methaemoglobinemia in babies (blue baby syndrome) and possible links to stomach cancers in adults; from trihalomethanes, a possible link with cancers of the bladder, colon and rectum.

Measures to improve quality, which crop up constantly in the report, include:

a. specific physical measures such as the improvement of mains pipes through air flushing, renewal or relining of pipes, with costs often shared with the owners; reduction of chemical and nitrate pollution through improvement of filtration (carbon filters), ozone treatment, ion exchange, electrodiolysis and reverse osmosis systems; reduction of bacterial and micro-biological pollution through ultra-violet treatment and chlorine disinfectant plants, particularly in respect of private supplies; addition of ferrous sulphate to reduce iron content; the replacement and refurbishing of existing mains pipes and general infrastructure, generally carried out as part of an ongoing programme; mixing or blending waters, whereby water which has a high concentration of a certain element is mixed with another water which has a low concentration of the element, until the resulting water is of an acceptable standard.

b. measures of a more general nature such as the restrictions on the use of fertilisers; the protection of water resources; installation of new treatment plants; the location of waste disposal sites, so that they have the least harmful effect on surface and ground water resources; tighter controls for sewage discharge.

There is also encouragement of owners of private supplies to fit correct systems and free advice given to them to improve well sites.

#### A. Hadjipavlou

Mayor of Limassol (Cyprus)  
President of the CLRAE Committee on the Natural and Built Environment

*The report presented at the Plenary Session by Edoardo Martinengo was the basis for a Resolution, which made a number of specific recommendations to national and local authorities, including:*

*–the adoption of legislation, in those countries where this was not yet the case, establishing legal limits to the discharge of dangerous substances into water, in line with the Directives of the EEC which have established quality standards and regulations for maximum admissible concentrations (MACs) of toxic and bio-accumulative substances;*

*–the establishment of water authorities which have a statutory responsibility for the provision of adequate supplies of good quality drinking water;*

*–the creation of national and local Drinking Water Inspectorates, with responsibility for control, monitoring and providing water training courses, particularly for local authority officials.*

## Lessons of the past

Janusz Kindler

Are "errors" of the past useful for the future? Being confronted with such a question immediately another comes to mind: "whose errors?". Our own? Could be, since our post-war and not such self-designed past certainly teaches us several important lessons. But maybe the question is how much can we learn from the past errors made by the others? But do we have any right to call them "errors"? One should rather refer to the experience of others "past errors" involve subjective value judgements which do change in context and time.

The question addressed in this brief paper is how much the re-born democracies of Central and Eastern Europe can learn from the lessons of Western Europe concerning protection of the natural environment.

From this point of view, the almost 50 years long history of the post-war Western Europe can be seen as divided into three distinct periods. The first one, about 20 years long, was the period of deterioration of environmental quality caused by economic reconstruction and exploding growth. The second period, of six to eight years long, is the one of environmental awakening. Finally the past two decades, leading to a fundamental change in views on the interactions between economic development (sustainable development, instead of mere growth) and environmental quality. They are not seen any longer as mutually exclusive. On the contrary, it is recognised that economic development and environmental quality are complementary and, in the long run, mutually reinforcing.

#### Legacy of the past

The legacy of the past, however, must be taken care of. There are magnificent examples of clean-up operations, such as the Ruhr Basin or the Thames River, to mention just a few. But the costs are high and there is a consensus that preventive strategy is always preferable to a remedial action. A key element of such a strategy is to increase the efficiency with which water, energy and materials are used. This allows people's needs to be

satisfied with fewer resources and less environmental harm. The residuals, like wastewater, cannot be treated as a purely technical problem to be solved by technical means. There is an ever growing interest in the partnership with nature - in the use of biological methods which would provide little or no sludge, generate useful byproducts, use no hazardous chemicals in the treatment process and remove toxic substances from the wastewater. How much can we learn from this experience toward the solution of environmental problems in Central and Eastern Europe?

To answer this question, distinction has to be made between environmental rehabilitation and preventive needs. Although there are several heavily contaminated industrial regions, water pollution is widespread, and environmental health risks in some regions go beyond anything that can be related to Western experience. Central and Eastern Europe should not be seen as a region of total ecological disaster. The major contaminated areas are fairly well defined and the task of paramount importance is to prevent environmental deterioration in those areas that are still relatively untouched. This can usually be done at a cost that is almost negligible in comparison with capital outlays required to address the pollution problems inherited from the past. Many of these areas are ecologically fragile, as for example the "Green Lungs" region in northeast Poland, and they should be protected against environmentally disruptive growth just to avoid situations known from Western Europe, where many of such areas are now being restored at great expense.

In the area of environmental prevention, which calls less for money than for the appropriate legislation, regulation enforcement and monitoring, the experience and current practices of Western Europe should be applied fully and to the largest possible extent. In fact, several of the EC PHARE project are of such a character.

Regarding rehabilitation of the past damages the situation is more complicated. It should be recognised that there are several significant differences between the current situation in Central and Eastern Europe and the past situation in the West. Above all, large-scale environmental improvements in the West have been undertaken at a time of relative capital abundance and in the framework of well-functioning economics. In contrast, the countries of Central and Eastern Europe experience severe capital economics, are weak, political life is fragmented, and priority choices are difficult to make.

#### From the centrally planned to market economies

Is it better policy to close a polluting factory at the cost of increase of unemployment, or should a measure of job security be pre-

served while risking the health of those exposed to pollution? Is it better to support financially the local hospital or to improve local waste disposal facilities? These are real choices facing policy-makers in the region.

The environmental rehabilitation of Central and Eastern Europe must be seen in this very unique context of a transition from the centrally planned to market economies. This context is obviously very different than that of Western Europe 20 years ago. It is well known, for example, that oil shocks of the 1970s have led the Western world to a significant replacement of old capital stock by new equipment that was more energy efficient, thus meeting much higher environmental standards. It was a good demonstration that world markets can contribute to improved environmental conditions by spurring efficiency in resource use. Obviously it is too early to expect similar effects in the countries of Central and Eastern Europe. Time is needed until transformation processes initiated two or three years ago will integrate the region fully with the outside world.

Recognising all differences, repair of environmental damage in the countries of Central and Eastern Europe should take full advantage of all experience of the West. This goes far beyond the so much needed transfer of clean technologies and environmentally sound engineering. Not less important are non-structural experiences, such as the need of political will, appropriate institutional arrangements; legislation coupled with well-functioning enforcement mechanisms, diversification of local mono-economies, to mention just a few.

As everything cannot be done at once, policies should be focused on a limited number of priority problems, emphasising inexpensive, cost-effective approaches. Probably this is one of the most important lessons to be learned from the West. Without clear articulation and ordering of priorities, there is a danger that the severity of budgetary constraints might push environmental issues to the margins of the economic and social reforms.

#### J. Kindler

President of the Administrative Board of the Regional Environmental Centre for East and Central Europe, in Budapest  
Director of the Institute of Environment Engineering University of Technology  
ul. Nowowiejska 20  
PL-00-653 Warsaw

# Drink the Thames

Tom Curtin

British water is among the best in the world. The water industry has been transformed in Britain from its "Cinderella" status of past decades into an industry of activity, technology and progress.

Water that is treated and supplied by Thames Water is safe to drink and meets stringent United Kingdom and World Health Organisation health based standards. Even stricter new laws will mean further investments to improve the quality and taste even further. The River Thames is now one of the cleanest metropolitan rivers in the world. Proof of this are the 112 species of fish, including the salmon, and other water life, that live in the estuary.

Thames Water has been a major force in cleaning up the River Thames - described as a "dead" river as recently as the 1960s and early 1970s - and is continuing to clean up the environment by removing man's waste, treating it to high standards and disposing of it safely. Achieving a standard of excellence in this sphere is made possible by ensuring that effluent from the company's 398 sewage treatment works meets stringent quality standards. A number of these sewage works are producing effluent that is among the highest quality in the country. High standards are also made possible through a continuing commitment to meeting environmental obligations. This involves funding substantial improvements in drinking water in quality, supply, and distribution.

In a recent British Medical Journal article, Dr Alison Walker provided a calm, sensible overview of tap water. She concluded: "If fad or simply fancy advertising persuades

you to buy bottled water, spare a thought for your purse. A litre of bottled water may cost 50p or more, while a litre of tap water costs as little as 0.03p". Indeed, bottled water often costs more than petrol.

### Investing for the future

Thames Water is driving forward with a huge programme of investment in the best technology available. Investment of 1 million £ every day is enabling the company's operations positively to benefit the environment, by helping to ensure the environment is protected from pollution.

The challenge ahead is to provide customers and shareholders with the best possible service and return for their money. Thames Water bill s are the lowest in the land, and among the lowest in Europe. Financial analysts and economists are generally agreed that water is a sound, solid investment. Confidence in the City has a direct impact on both longer-term investment within the company, as well as the company's daily operations and engineering work. Daily operations have a direct impact on rivers. Engineering expertise ensures the best available technology is used to treat waste water to the highest possible quality and standards.

Privatisation under the British Government in 1989 has revitalised the water industry and is proving a huge success, although it was not easy and there was strong opposition, as well as support. The Water Act 1989 freed the industry from negotiating budgets with government, and allowed the newly formed companies to target money where it was most needed. The same Act demanded that water companies carry out far-reaching improvements to meet new, even higher standards. These are now underway, and the water industry has begun a massive 28 billion £ investment programme over the decade.

### Working for quality - advanced water treatment

One of Thames Water's aims is to supply the highest quality drinking water to its 7 million customers. To achieve a standard of excellence, a 430 million Advanced Water Treatment programme to improve further the already high quality of its tap water was announced in October 1991. Advanced Water Treatment (AWT) will ensure that customers benefit from a drinking water supply of a very high quality. It uses ozone, combined with Granular Activated Carbon (GAC), as new multi-stage processes for existing water treatment plants.

Ozone is a natural activated form of oxygen and may be used at various points in the treatment system to improve taste and colour; to improve removal of algae by existing filtration processes; to break down natural and synthetic organic materials (pesticides)



Thames Water Utilities

Whenever the level of dissolved oxygen in the Thames falls so low as to jeopardise the survival of the fish and other forms of life, the "Thames Bubbler" goes into action. It injects microscopic bubbles of oxygen into the water: these dissolve and keep all the aerobic functions going.

making them more biodegradable; and to act as a powerful disinfectant.

Granular Activated Carbon is a high quality filtration medium made from materials such as coal or wood. It is very absorbent and removes most traces of organic substances from water, including pesticides that are not broken down by the ozone treatment stage. When used with ozone, GAC becomes biologically active enhancing natural biodegradation and prolonging the useful life of the carbon. GAC also improves taste and colour in a similar way.

Advanced Water Treatment technologies being introduced during the 1990s will provide water of a quality that is even higher than the toughest UK and international standards, including those for pesticides. A huge upgrading programme is already underway in London, where the water treatment works are among the biggest in the world. At present nearly 99% of analyses meet all the UK Regulations which incorporate, but go further than EC standards. Pesticides are not in any way harmful in the tiny concentrations which can be found in water. The Department of the Environment has issued health based values which take a more practical view than the essentially zero standards of the European Community.

Nevertheless, Thames Water shares the sentiment that pesticides should be erased from the water supply.

To this end, its scientists have been working to identify the principal users of pesticides and herbicides and to discuss with them more environmentally friendly solutions as alternatives. This approach aims to tackle the problem at its source, so preventing traces of these substances from reaching the source waters in the first place.

### Striving to excel

Thames Water's 4 billion investment programme is working to achieve excellence by funding substantial improvements in drinking water:

- first, by installing Advanced Water Treatment at major works to give people better tasting and brighter looking drinking water;

- second, by allowing construction of the London Water Ring Main, now more than half complete and already supplying water to parts of London;

- third, by making possible a major building programme of new reservoirs and pipelines in many areas to reinforce supplies; this includes cleansing and relining main pipes and assessing water quality data to direct scientists to parts of the system which need renovating;

# In Poland

Bernard Kaczmarek

In Poland, water is a rare commodity; some regions face chronic water shortages every summer. Furthermore, the thorough indifference of water management authorities over recent decades towards environmental protection issues meant that the natural environment, especially rivers and lakes, became increasingly polluted. Broadly speaking, in 1990 the percentage of high-quality surface water was less than 5%, while that of very low-quality water was approximately 50%. In a country such as France, these percentages are reversed (50% high-quality water, 5% very low quality).

The environmental sector has not been left untouched by the radical change initiated two years ago in Poland. The Polish govern-

- fourth, by allowing new technology to be installed at sewage treatment works to ensure strict effluent quality contents are met while providing the highest standards of treatment;

- fifth, by properly taking account of environmental and conservation issues.

### Achieving the best

To ensure consistent quality, requires regular monitoring and continual testing. One and a half million tests a year from source to tap are carried out. Thames Water's inspectors even visit people's homes to perform random sampling.

During last year its scientists completed 355,000 statutory analyses on drinking water samples. There are placed on a public register, held at the company's headquarters in Reading, Berkshire, and results are sent to people on request.

ment is concerned to reform and rationalise water management, and so has decided to take account of some long-forgotten principles: management based on catchment areas, and full-scale implementation of the "polluter pays" principle in order to meet the costs generated by water pollution.

The Polish government has been particularly interested in the functioning of the water authorities in France: the water agencies ("Agences financières de bassin") and water boards ("Comités de bassin") are the linchpins of a decentralised water management policy, with financial resources based on the "polluter pays" principle.

These structures, which have been operating in France for 25 years now, have proved their ability to make the necessary choices such as to benefit the whole area they cover.

The Polish government has now set up its own structures based on this example. Even before the new water resources legislation was passed, seven regional agencies, divided up into sub-basins, were set up across the country.

These agencies are not only carrying out studies but also bringing about the precondi-

These figures are reported on a quarterly basis to the Drinking Water Inspectorate (DWI), the independent water quality regulator. DWI inspectors visit Thames Water's laboratories once a year to study records and ensure that results match accordingly. At the end of 1990 after an audit the DWI Chief Inspector found that British water was generally of a very high quality.

In addition, local authority environmental health officers routinely take samples of drinking water and carry out their own independent testing.

### The challenge ahead

The agenda is set. Investment is now well underway. Quality standards are stringent. Regulation is dependent, and tough.

The result is a streamlined company with first class operations, a cleaner environment, healthy rivers and drinking water that is regarded with respect by fellow water companies and scientists around the world. ■

T. Curtin

Thames Water Utilities  
Nugent House  
Vastern Road  
GB-Reading Berks RG1 8DB

tions for a new water management policy by instituting water boards. The boards are made up of local elected representatives, water users and representatives of the State, and play a role (currently one of putting forward proposals) in major decisions, including securing the requisite funding for proper water management.

The proposed legislation on water management gives genuine decision-making powers to the boards, especially in financial matters. They would then instruct their agencies to implement the measures necessitated by the decisions taken.

In order to secure optimum conditions for applying these principles in Poland, close cooperation has been initiated between Poland and France, particularly in the fields of law and vocational training for agency staff. This action will continue with twinings between the Polish and French agencies, a vital process in extending the co-operation which already exists. ■

B. Kaczmarek

Adviser to the Polish Minister for the Environment,  
seconded by the French Government  
Bureau de coopération franco-polonaise  
ul. Wawelska 52/54  
PL-00922 Warsaw

# Exemplary transfrontier co-operation



The Rhine catchment basin

Johannes Harm Oterdoom

The Rhine and the Meuse, two of Europe's major rivers, are of enormous significance in the provision of drinking water. More than 25 million people in Switzerland, Austria, Germany, France, Luxembourg, Belgium and the Netherlands are dependent on the water of these rivers, their tributaries and the lakes in their catchment area. In the Netherlands both rivers are used to prepare drinking water.

The hydrological character of these two rivers is quite different. The Meuse is a rain-fed river with peak flows in winter and generally very low flows in summer, whereas the Rhine has a mixed character being fed partly by rain and partly by snowmelt from the Swiss Alps. Table 1 shows some characteristics of Rhine and Meuse.

Catchment area (km<sup>2</sup>), highest, mean and lowest observed discharges of the Rhine and the Meuse at the Dutch border

Upstream catchment area (km <sup>2</sup> )	Discharges at the Dutch border (m <sup>3</sup> /s)		
	highest	mean	lowest
Rhine 160 000	13 000	2 200	620
Meuse 33 000	3 000	230	0

Both rivers flow through densely populated, highly industrialised regions, with a great many chemical companies, notably the Rhine. A striking difference between Rhine and Meuse as sources for drinking water is that almost all the water abstracted from the Meuse is exported away from the Meuse basin, whereas the water drawn from the Rhine stays in the Rhine basin.

Waste water emissions either insufficiently treated or not treated at all from communities and industries along the rivers have had a very serious effect on their environment and have caused problems in the provision of drinking water for millions.

As final link in the chain of countries through which the Rhine and Meuse flow, the Netherlands are particularly dependent on the quality of the river water in the preparation of drinking water. This is the reason for the water companies coming together to perform extensive analyses of Rhine and Meuse water in order to investigate its composition, to bring the pollution problem to public attention and, where necessary, to adapt their purification techniques. The results of the work are published in annual reports which are used as a basis for discussions with public authorities, international organisations and polluters as well. Furthermore the regional organisations (Arbeitsgemeinschaft Rhein-Wasserwerke ARW, Arbeitsgemeinschaft Wasserwerke Bodensee-Rhein AWRB, and Samenwerkende Rijn- en Maaswaterleidingbedrijven RIWA) of the water companies from Switzerland to the Netherlands and Belgium work together in an international grouping, International Association of Water Works in the Rhine Basin Area (IAWR), in order to operate more efficiently.

The two Amsterdam-based organisations, RIWA and IAWR, have cooperated on national and international levels for many years in formulating guidelines and stimulating laws applying to drinking water and their direct approach to large industrial polluters has also seen some success.

## Fight against pollution

The IAWR and the RIWA have edited, for Rhine and Meuse, Memoranda which formulate in the form of ten or twelve points the

urgent water pollution control demands of the water works.

The Rhine Memorandum came 1986 in a new edition, the Meuse Memorandum 1988.

An individual memorandum for each river enables to take into account its hydrological and socio-economic characteristics. In both memoranda limit values are laid down for the water quality assessment. Doing so, the international and national standards as well as the results of recent research could be taken into consideration.

Furthermore, the current water quality and the experience of the waterworks in the preparation of drinking water could be borne in mind.

In the meantime a great deal has been accomplished - thanks to the efforts of international bodies, national and regional governments, communities and industry. Oxygen deficit, heavy metal pollution and visible pollution have declined perceptibly in Rhine and Meuse.

## Quality guarantee

As scientific knowledge about the dangers to human health expands, the demands placed on drinking water - which ought to be free from pollution caused by civilisation - are becoming increasingly stringent. To guarantee good drinking water, the water suppliers are forced to invest in stepping up their water treatment. But improvement of the purification techniques is not unlimited. So bodies of water which are used for drinking water supply have to meet higher standards.

This means that the authorities responsible for the river quality have a complex task, since Rhine and Meuse are polluted via a great number of effluent discharge points and, relative increasingly, by diffuse sources (atmospheric deposition, precipitation and surface run-off).

Whenever measures are implemented for improving the quality of water in the Rhine and its tributaries, the ecological relationship should be taken into account (Statement 12 of the Rhine Memorandum).

Ecologically intact bodies of water are an important precondition for a dependable drinking water supply system. Measures with one-sided effects can produce hazards as well as advantages. The condition of bodies of water and the quality of effluents cannot be assessed merely on the basis of a few parameters and limit values. What is needed is an overall evaluation. Measures advocated in the interest of maintaining a dependable supply of drinking water are in harmony with the effort to keep the environment healthy and unpolluted.

J. H. Oterdoom

RIWA  
Postbus 8169  
NL-1005 AD Amsterdam

## Everything has its price

François Valiron

In Europe, one of the world's most developed regions, especially in its western part, water is comparatively plentiful. It was here that the first water supply and disposal system was created, serving practically every household. The continent resources mobilised its water for the benefit of industry and agriculture, and turned its rivers into effective highways for the exchange of goods.

However, as a consequence of the lavish use made of this abundant natural heritage, water quality deteriorated, potential stocks were depleted and considerable and sometimes severe damage was inflicted on the environment. The means of alleviating these effects were not brought into use early enough and were certainly not applied in the same way in every country.

This article will examine how in some countries the price of water is beginning to make users more responsible and encouraging them to be less wasteful and avoid inadvertent discharges.

## Resources and demand

The figure shows how water resources and the demand for water vary from country to country according to climate, topography and the distribution of human settlements and activities.

There are variations too, some of them considerable, within each of the countries mentioned. In Spain, for example, average resources range from 500 m<sup>3</sup> per year per head



Thames Water Utilities

in Andalucia to 6,500 m<sup>3</sup> in the Basque Country; in France, demand is a mere 300 m<sup>3</sup> per head in the Department of Contentin but over 1,200 in Bouches du Rhône.

The highest rates of abstraction are measured where there is a demand for irrigation: more than 700 m<sup>3</sup> per year per head on average for irrigation in Spain and Italy, but less than 50 m<sup>3</sup> in England and Germany.

Where public use is concerned water demand fluctuates much less widely: 1 to 2.5 m<sup>3</sup>, and slightly more for industry (approximately 1 to 4). These differences are often increased when resources are consumed wastefully, hence the tensions that arise when the volume abstracted comes close to the available volume. Such scarcities are found in the countries of Southern Europe with marked climatic variations, such as Spain, and those like Poland which suffer from pollution.

In such cases the need to treat the water more thoroughly or correct regular flows will tend to push up costs considerably. Spain has been obliged to dam 30% of its water resources as compared with less than 7% in France. In Malta, sea water is desalinated for distribution and in parts of Spain and Italy, urban waste water is re-used for irrigation.

Pollution is having an increasing impact on the Mediterranean, a vulnerable semi-enclosed sea where salt concentrations are high, and acid rain is impairing the purity of the Scandinavian lakes.

## Economic theory and the effects of pricing policy

For the past 30 years, the marginal cost theory has begun to be applied to water. According to this theory, the optimum utilisation of water in a market economy requires

Demand for water (m <sup>3</sup> /year/head of population)	Water resources (m <sup>3</sup> per year per head of population)				
	Very meagre <500 m <sup>3</sup>	Meagre 500 to 1,000	Medium 2,000 to 10,000	Rich 10,000 to 100,000	Very rich > 100,000
Very low <100	Malta		Albania		
Low: 100 to 500		Poland	UK	Sweden Hungary Switzerland	
Moderate: 500 to 1 000		Belgium	France Germany Netherlands	Portugal	Norway
High: 1 000 to 2 000			Spain Italy	CIS	



A. Visage/Bios

Water in plenty—at a price.

that the price be made equal to marginal cost (ie the sum of the capital and operating costs incurred in producing one additional cubic metre). This means that costs and prices must take account not only of the direct cost but also of the indirect costs of maintaining the inherited asset in good condition. For when the cost of repairing damage is charged to the user who caused it by consuming and discharging water, there is an incentive to reduce the amounts used by eliminating losses or by recycling, and to purify waste water before returning it to the natural environment.

With this policy of systematically containing external costs there is a risk of user costs rising so steeply as to make certain forms of water use uneconomic.

As a result, these provisions have been applied almost exclusively to urban water supplies and industrial users and only in the richest EEC countries.

In France, the "Water agencies" have been levying dues on water consumption and on discharges since 1970; until 1991, these dues covered only 20 to 25% of the cost of damage repair. This figure will rise in stages to 40% between now and 1995. The funds thus collected are put towards the cost of engineering works necessary for restoring the balance disturbed by the volumes abstracted and discharged.

In Germany, since 1986 (in the former Federal Republic) the Länder levy dues calculated according to the quality of the water discharged; in the Netherlands, this is done by the regional water offices. An investment of over 40 million DM will be needed to bring East Germany's water to the standard of purity currently achieved in the West.

In the United Kingdom and Denmark, there is no state aid to cushion the price of water against the impact of external costs. As elsewhere, the law is backed up by regulations which require industries to treat their discharges.

In Spain, since 1990, pollution dues have been levied at the federal level, but still at a fairly low rate. This system is based on the one introduced two years previously in Catalonia.

The five countries mentioned above are the ones most committed to this policy, and the results so far are encouraging, especially where the reduction of industrial pollution is concerned.

The other EEC countries are for the time being making do with regulations whose impact is still very uneven.

The countries of Eastern Europe are still further behind in this respect. For example, in Poland, the consumer has until now been required to pay only a very small fraction of the cost of water, not enough to cover, as in Hungary, the total cost of equipment maintenance and operation. Investment and renewal used to be funded by the state; this included resource husbandry and environmental protection. However, these sectors were regarded as unproductive and therefore tended to be overlooked in the treatment of industrial discharges and the like. As a result, the highly industrialised areas are facing an extremely serious situation.

#### Agriculture

In the case of water for agriculture, state aid continues in all countries and the amount

borne by the farmers does not cover even the direct costs in France or Italy any more than in Spain or Greece; indirect costs are borne by the farmer or passed on to the water consumer (for example, the increase of nitrate levels in water caused mainly by the use of fertilisers).

But the EEC finds the situation alarming and could adopt solutions similar to those applied in Germany and Netherlands for the diffuse forms of pollution:

*Objectives in the matter of fertiliser use are discussed with the representatives of the farming community, and levels are set which ensure reasonable profitability for holdings where appropriate agricultural practices are adopted. Only farmers who fail to keep within the limits are liable for payment. If it is proposed to overstep those limits, the cost is either borne by the public authorities or passed on as in the Netherlands - to the water consumer. In Germany, every Land offers aid to the farmers whenever the conversion is made from intensive to extensive agriculture or from arable cultivation to grass-based land use.*

In the Netherlands there is a tax on "surplus" pig slurry spread on the fields, and in France, the new water Act (1992) will make pollution

#### Organisation of services

Countries concerned	Responsibility for water and treatment	Form of management
Spain - Portugal - Denmark - USA - Austria - Finland - France - Italy - Germany - Switzerland - Sweden - Norway	Local authorities	Municipal company with areas of competence: Switzerland - Germany - Italy gas - electricity (water supply) Leasing to private sector France: 70% Spain: 20 to 25%
England and Wales	Water Board	Devolved to the private sector
Belgium Netherlands Hungary	Province - Region Regional grouping	

dues applicable to concentrated discharges generated by agricultural activities.

#### Urban water services

The funds allocated to water supply and waste water and rain water treatment account for between 65% and 80% of the total investment in the water sector, and indeed for a very sizeable proportion of the external costs, including groundwater protection, river regime improvement and pollution abatement.

In all countries apart from England, Belgium and the Netherlands, the local authorities are responsible for these services and set the rates. Generally, local authority management is flexible. Exploitation may, however, be handed over to the private sector either in full, as in the United Kingdom over the past two years or in part as in France and Spain.

State subsidies to these services have diminished considerably. They are nil in the United Kingdom and Denmark, low in France, and range from 20% to 50% in the other EEC and EFTA countries; Germany subsidises only abnormal costs. The operating and renewal costs and an increasing proportion of capital costs are borne by the user. By contrast, we have seen how in the countries of Eastern Europe, even the operating costs are not charged to the user.

For water supply and waste water treatment, the price is usually based on "proportional" or "binomial" formulae per cubic metre, similar in principle to marginal cost pricing. Fixed payments are unusual and everywhere special prices apply to the most important industries.

In the United Kingdom, Norway and to some extent in Denmark, the price varies according to the rental value of the property and sometimes the number of residents. This is a low cost system since no meters or readings are required, but it does nothing to reduce wasteful consumption. In some cases the binomial form adopted is a progressive one, which is favourable to small families and helps to limit waste, but does not really make economic sense.

In the case of rainwater, the formula for passing costs on to the user varies considerably from one country to another.

In France and a number of other countries, the finance is obtained through local taxation. In some others, such as Switzerland, Germany, Sweden and the Netherlands, revenue is drawn partly from a rainproofing tax per m<sup>2</sup> and partly from the price of water per m<sup>3</sup>; in England and Norway, the index is still the rateable value of the property.

The overall average price of rainwater treatment and that of wastewater treatment ranges from 200 to 1,500 F per year for a family of three persons (the lower rates apply where the service is not provided in full).

These average prices vary only in the range 1 to 3.3 in the case of water supply and 1 to 7.5 in the case of treatment, chiefly because the situations are not comparable.

The variations discernible in regard to the average price in each country are as wide if not wider. In France, the difference ranges from 1 to 10 in 98% of cases and similar variations are found everywhere, notably in Finland. This is explained by the fact that the price is set at the local level; in the United Kingdom, on the other hand, the range is

very narrow (1 to 3) because of the standardisation policy to which every water boards adheres.

#### Previsions

After this brief survey, we can attempt to forecast the main trends to which costs and prices will be subject in the future.

In the countries of the EEC, and presumably those of EFTA, the Brussels Directives on drinking water, treatment and Community environment policy will have the effect of pushing up prices. These will have to encompass an increasing proportion of external costs. Lower subsidies and the need to renew obsolete plant will reinforce this trend. It is likely that the lowest prices will rise fastest, thus reducing the differences. In France and England, prices could double in real terms between now and the end of the century and go some way towards catching up with those of Germany. The differences between the countries of Central Europe and those of the North will diminish, but more slowly. In Eastern Europe, prices will go up very quickly at first but alignment with Western standards is still a distant prospect.

It may be assumed that water service structures will become more efficient, without adhering to one single model. Privatisation will go forward, and "flexible, municipal companies" will gain ground at the expense of state controlled companies and rigid municipal services.

#### F. Valiron

Honorary Professor at the Ecole Nationale des Ponts et Chaussées, Paris  
Consultant for Water Management  
51, rue Edouard-Nortier  
F-92200 Neuilly

Due allowance must always be made for the cost of sewage treatment. With well designed lagoons and ponds, installation of the kind shown below may actually be attractive to animals and wild flowers.



M. Gunther/Bios

## Watchful NGOs

Antonius Petrus van der Meché

The Netherlands has some 1 million anglers, whilst in addition some 300 professional fishermen fish in the Dutch inland waterways. Of the anglers, approximately 400,000 have organised themselves in associations, and about 900 of these associations, totalling around 350,000 members, are affiliated with the Dutch Association of Angler's Federations (NVVS).

The NVVS employs 25 staff and has a budget of 3 million guilders, financed directly by its members. Apart from the NVVS, which is a non-governmental organisation, there is another active body, the Organisation for the Improvement of Inland Fisheries (OVV). This statutory organisation employs 40 staff and has a budget of 6 million guilders. For its funding the OVV depends almost entirely on contributions from anglers holding the amateur fishing licence, which is a compulsory licence.

The fisheries belong to the owner of the water, who generally leases them to professional fishermen or anglers' organisations. The umbrella organisation, the NVVS, holds no fisheries.

Under the fisheries law, the owner/leaseholder of the fisheries controls the fish stock. The government is striving to lease fisheries in split portions. The right to fish for eels will be leased to the professional fishermen.

### Aquatic ecosystem

Fish are an important component of the aquatic ecosystem. The control of the fish stock can influence this ecosystem, both for better and for worse. By virtue of their powers as leaseholders, anglers' associations and professional fishermen are actively committed to the aquatic environment, as is shown in many ways.

Since their foundation at the beginning of this century, anglers' organisations have been concerned with fish stock conservation and with the water management this requires. They have protested and are still protesting against water pollution, overfishing by professional fishermen and the disappearance of spawning and maturation grounds, etc.

For 15 years now, the NVVS has had a network which monitors the oxygen levels of the fishing waters. At 2,000 locations throughout the country, oxygen levels are measured each month by 800 volunteers. All the infor-

mation is used to monitor and warn water authorities and politicians. In a trend analysis, the trends in water quality are followed over the years.

The quantity of oxygen in the water follows a day/night rhythm. In the light, green plants produce oxygen. In the dark, all living organisms consume oxygen. Consequently, water has the lowest oxygen level just before sunrise.

Water quality control organisations which regularly monitor water quality carry out their checks during office hours. In the Netherlands this is between 09.00 hours and 17.00 hours. Thus the oxygen will sometimes exceed the lowest permissible norm even when in reality it is too low at sunrise. A day of action held in this context, from 22 to 23 June 1990, revealed that at sunrise the oxygen levels of 10% (!) of the sample locations were below the tested value. This is particularly common in small rivers and polder waters. The NVVS therefore urges that water quality controllers should conduct continuous measurements during one day and one night at least once a year.

### Education and information

Fish stock conservation requires expertise. Each year the OVV gives courses, generally in collaboration with the NVVS, in which volunteers from anglers' organisations receive instruction on fish stock conservation and the effects of fishing on the aquatic ecosystem, as a form of nature conservation.

In this context the NVVS has brought out a book, "Visstandbeheer in het Nederlandse binnenwater" (Fish stock conservation in the Dutch inland waterways). Apart from a theoretical section on water, water plants, fish species and water types, the book systematically discusses the creation of a fish stock conservation plan. Fish stock controllers are assisted in creating their fish stock conservation plan via five stages: what do we have, what do we want, what are we doing, when should we do it and are we successful.

It is those who hold the fishing rights who know most about the distribution of fish species in the Netherlands. The NVVS is engaged in setting up a network of fishermen who will help construct a computer file of distribution data by registering fish caught by angling. This information will eventually form the basis for a fishing atlas of the Netherlands which is to be published.

Fish heed no boundaries. Some species of fish travel between the sea and the upper reaches of rivers. In conjunction with umbrella organisations of anglers' associations from Belgium and Luxembourg, Germany and France, the NVVS consults twice yearly on the fish stock and on water pollution across borders. In our own country, some 100 anglers' associations near the river Meuse have drawn up an Angling Development Plan for the Meuse, which sets out

their willingness to help devise an integrated approach.

### Responsibility

Anglers' associations control the fish stock in order to fish. The idea is that the fish stock serves man, since man is nature's top predator. Sometimes this gives rise to heated debate.

Does angling affect nature and the environment? The answer is: yes. All life, both flora and fauna, affects nature and the environment. The main question is, "Does angling have an adverse effect?" There is no doubt that angling based on sensible and informed fisheries management is not harmful. By sensible, we mean taking into account not only economic standards (man's needs), but also ecological standards (the needs of wild plants and animal species), the so-called "wise-use".

In this way, man becomes part of the system. Man's life should be geared towards nature. Showing active concern for the interest of man and nature is by no means easy, but in the long run there will be rewards; it is the only way to achieve a balance between man's actions and respect for nature.

Anglers come in large numbers, they hold the right to control the fish stock and are committed to nature; in other words they are ideally suited to devoting the necessary attention to nature in general and to the aquatic environment in particular. As far as the aquatic environment is concerned, the last few decades have proved this: without anglers, the aquatic environment in the Netherlands would be in a far worse state than it is today.

A. P. van der Meché  
NVVS  
Postbus 288  
NL-3800 AG Amersfoort

## Tyrolean streams

Official recognition of the "Hohe Tauern National Park" in the Eastern Tyrol means that the protection of the watercourses in the north of the province is now, as far as can be judged, secured for many years to come.

However, this places even greater pressure on the streams and rivers outside the national park. Plans are being made to offset - in accordance with the dictates of community economics - the "losses" resulting from the halting of the gigantic "Dorfertal" project by building a multiplicity of small power stations. The Eastern Tyrol currently



Hannelore Nenning

has no less than 50 (!) electric power plants, from large-scale round-the-clock operations to the smallest types run by private companies, and many others which are being developed. Streams are gradually disappearing as locals begin to perceive them as "potential profit-makers".

The provincial authorities must be pressed to carry out surveys for the whole Alpine area, in co-operation with the nature conservation department, assessing watercourses and placing protection orders on attractive

or ecologically important sections. Any large-scale action would then depend on the conclusions of a tolerance analysis.

"Schwarzachwasser", watercolour, 1991. This watercourse is also to be harnessed in the near future. The decision has apparently been taken to carry out a "major development project".

H. Nenning  
Weidachweg 24  
A-9990 Nussdorf

## Pool idea

Maybe you don't fancy a swimming pool in your garden with blue tiling, chlorinated water and the feel of an over-sized bathtub. Maybe you would rather have a living, natural pond with rare plants and animals in it and buy a season ticket for the local swimming pool. Now you can have it both ways by having a pond-pool with a deep end for swimming and a shallow end for pond life. Plants and plankton in the pond do the water-purification job for the

pool as well and you don't need to bother with expensive filters or polluting chemicals.

Compared with a conventional pool, a pond-pool needs next to no upkeep. Some maintenance is needed once a year but you can do it yourself. Otherwise the pond-pool is self-purifying like any natural biotope. And as well as swim in the pool in summer you can skate on the pond in winter.

A family-size pond-pool averages out at 70 m<sup>2</sup>. The cost is comparable to that of a conventional pool. Another cunning feature is that the water in the shallow end heats up quickly and makes a heating system unnecessary.

After the 1987 Austrian environment protection prize was awarded to Biotop Ltd for the pond-pool project, the authorities began taking an interest, and the first totally biological municipal swimming pool has just opened in Styria.

But forget about the occasional spot of fishing in the back garden. If you put fish in the pond-pool they would eat the pond-pool's self-purifying apparatus - the microorganisms!

P. Petrich  
Biotop  
Hauptstrasse 285  
A-3411 Weidling-Klosterneuburg



P. Petrich

# At the Council of Europe



On 19 and 20 October 1992 the Council of Europe is organising in Strasbourg a seminar entitled "Between dereliction and over-use. How shall the land be managed so as to benefit wildlife, countryside and landscape?"

This pan-European seminar will look at successfully completed schemes designed to stimulate the rural economy, which treat the environment with respect, allow wildlife to prosper and have a beneficial impact on the landscape.

Particular attention will be paid directly, but not exclusively, towards agricultural development schemes whose initiators may be environmentalists, local authorities, farmers or forest managers.

Schemes advocating the deliberate creation of contemporary landscapes of good quality will be presented alongside others that aim to protect high-grade traditional landscapes in a dynamic process. The seminar will be an occasion for focusing thought on the necessary links between the protection of outstanding areas, development and production.

This seminar is especially aimed at civil servants and staff working in agriculture and forestry ministries, ministries responsible for the environment and local authorities engaged in policy-making in the field of countryside management. Agronomists, environmentalists, landscape designers, teachers, development engineers working in the technical institutes, governmental and non-governmental organisations concerned and journalists are also welcome.

For all participants, this seminar is primarily conceived as a means of comparing experience, gaining a better understanding of the structural, cultural and economic differences between the various countries of Europe. The seminar should help form a Europe-wide network of specialists capable of addressing problems of development and conservation with equal concern. The conclusions of the seminar should give subject matter for the Council of Europe with a view to proposing recommendations to its member States.

## Conservation of the wild relatives of European cultivated plants: developing integrated strategies

A workshop is being organised as part of the programme of the Council of Europe Group of Specialists "Biodiversity and Biosubstance" which was set up to review the present situation of cultivated plants native to Europe, to identify research priorities and development procedures for basic and efficient research to achieve the effective conservation of this genetic heritage.

This workshop will be held on 8-11 November 1992 in the Ria Formosa Nature Reserve at Faro, in Portugal.

It is planned to hold a second workshop in 1993. The aims of the workshops are to "combine the skills of biologists from different specialities (pure biology, conservation, population, biochemistry, biotechnology, genetics ...) and those of conservationists, managers of protected areas and gene bank managers, and apply these to the surveying, conservation and management of the genetic diversity of the wild gene pools of the cultivated plants of Europe. The workshops will identify key elements for the elaboration of management and survival strategies for these plants".

## Current activities of the Council of Europe (partial agreement in the social and public health field) on plant protection products

The Council of Europe fosters European cooperation by harmonising national requirements for pesticides through the work of the Committee of experts on pesticides and its subsidiary Group of experts.

Of the current activities related to environmental aspects, the following are of particular interest.

The assessment of the potential risks of environmental impact that might be caused by the use of plant protection products is considered as a top priority activity. The risks range from the poisoning of wildlife and natural habitats to the presence of chemical residues in soil and groundwater.

A team of over 100 experts are at present establishing consistent and explicit decision-making schemes for the environmental risk assessment of plant protection products by which the logic of assessment is set down as a step-by-step procedure of how decisions are reached.

The indications regarding groundwater contamination by plant protection residues and the impairment of drinking water give cause of concern in all Council of Europe member States. Around 50 widely used agricultural plant protection products may be regarded as particularly hazardous to the quality of groundwater and may have an impact on the environment and human health.

A report on the actual situation and policy in the Council of Europe member States and guidelines for the appropriate protection of groundwater from pesticide contamination is under preparation.

In recent years more than 35 different pesticides have been detected in surface waters. Regarding the environmental effects of pesticide contamination of surface waters they are usually discerned only when the effects are apparent such as killing of fish. The highest possible quality of surface waters is of vital importance for the human use of drinking water and to protect aquatic life. The aim of the report under preparation is therefore to establish guidelines to reduce pesticide residues in surface waters to an absolute minimum.

# National Agencies of the Centre

## AUSTRIA

Dr Ernst ZANINI  
Amt der Steiermärkischen Landesregierung  
Rechtsabteilung 6 - Naturschutzverwaltung  
Karmeliterplatz 2  
A-8011 GRAZ

## BELGIUM

M. Jean RENAULT  
Ministère de l'Agriculture  
Administration de la Recherche Agronomique  
Manhattan Center 7<sup>e</sup> étage  
Avenue du Boulevard 21  
B-1210 BRUXELLES

## BULGARIA

Mme Auréola IVANOVA  
Division des relations internationales  
Ministère de l'Environnement  
67, rue V. Poptomov  
1000 SOFIA

## CYPRUS

Mr Andreas PISSARIDES  
Nature Conservation Service  
Ministry of Agriculture and  
Natural Resources  
CY-NICOSIA

## CZECHOSLOVAKIA

Dr Bohumil KUČERA  
Czech Institute for Nature Conservation  
Slezska 9  
ČSFR-120 29 PRAHA 2

## DENMARK

Ms Lotte BARFOD  
Ministry of the Environment  
The National Forest and Nature Agency  
Slotsmarken 13  
DK-2970 HØRSHOLM

## FINLAND

Ms Leena KARHUNEN  
Information Officer  
Ministry of the Environment  
PO Box 399  
SF-00121 HELSINKI

## FRANCE

Mme Sylvie PAU  
Direction de la Protection  
de la Nature  
Ministère de l'Environnement  
14, boulevard du Général-Leclerc  
F-92524 NEUILLY-SUR-SEINE CEDEX

## GERMANY

Mrs Helga INDEN-HEINRICH  
Deutscher Naturschutzring e. V.  
Kalkuhlstraße 24  
Postfach 32 02 10  
D-5300 BONN-OBERKASSEL 3

## GREECE

M. Donald MATTHEWS  
Société hellénique pour la protection  
de la nature  
24, rue Nikis  
GR-10557 ATHENES

## HUNGARY

Mrs Louise LAKOS  
Department for International Relations  
Ministry of Environment  
PO Box 351  
H-1394 BUDAPEST

## ICELAND

Mr Sigurdur Á. THRÁINSSON  
Ministry for the Environment  
Vonarstræti 4  
ISL-150 REYKJAVIK

## IRELAND

Mr Michael CANNY  
National Parks and Wildlife Service  
Office of Public Works  
51 St Stephens Green  
IRL-DUBLIN 2

## ITALY

Dr. ssa Elena MAMMONE  
Ministero dell'Agricoltura  
Ufficio delle Relazioni internazionali  
18, via XX Settembre  
I-00187 ROMA

## LIECHTENSTEIN

Mr Wilfried MARKER-SCHÄDLER  
Liechtensteinische Gesellschaft für Umweltschutz  
Heiligkreuz 52  
FL-9490 VADUZ

## LUXEMBOURG

M. Jean-Paul FELTGEN  
Ministère de l'Environnement  
Montée de la Pétrusse  
L-2327 LUXEMBOURG

## MALTA

Mr Joe SULTANA  
Secretariat of the Environment  
M-FLORIANA

## THE NETHERLANDS

Drs. P. W. BOS  
Ministry of Agriculture and Fisheries  
Department for Nature Conservation  
Environmental Protection  
and Wildlife Management  
PO Box 20401  
NL-2500 EK 's-GRAVENHAGE

## NORWAY

Mrs Irene SIGUENZA  
Ministry of Environment  
Myntgaten 2  
PO Box 8013 DEP  
N-0030 OSLO

## POLAND

M. Marcin HERBST  
Krajowe Centrum Edukacji Ekologicznej  
ul. Dubois 9  
PL-00-182 WARSZAWA

## PORTUGAL

Prof. Miguel Magalhaes RAMALHO  
Liga para a Protecção da Natureza  
Estrada do Calhariz de Benfica, 187  
P-1500 LISBOA

## SAN MARINO

Mme Antonietta BONELLI  
Département des Affaires Etrangères  
Contrada Omerelli  
Palazzo Begni  
Via Giacomini  
47031 SAN MARINO

## SPAIN

Mme Carmen CASAL FORNOS  
Dirección General de Medio Ambiente  
Ministerio de Obras Públicas y Transportes  
Paseo de la Castellana 67  
E-28071 MADRID

## SWEDEN

Mr Ingvar BINGMAN  
Swedish Environment Protection Agency  
Smidesvägen 5  
PO Box 1302  
S-171 25 SOLNA

## SWITZERLAND

M. Jürg KÄNZIG  
Ligue Suisse  
pour la Protection de la Nature  
Wartenbergstraße 22  
CH-4052 BALE

## TURKEY

Mr Hasan ASMAZ  
Turkish Association  
for the Conservation of Nature  
and Natural Resources  
Menekşe sokak 29/4  
Kızılay  
TR-ANKARA

## UNITED KINGDOM

Mr M. W. HENCHMAN  
English Nature  
Northminster House  
GB-PETERBOROUGH PE1 1UA



C. Vidrín

Information concerning Naturopa, the Centre Naturopa or the Council of Europe may be obtained from the Centre or the National Agencies listed above.



