

Reviving Wetlands – Sustainable Management of Wetlands and Shallow Lakes



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Prof Aitken Clark

Wetlands reborn

Wetlands are fragile and vulnerable ecosystems. Across the planet for more than a century they have been extinguished at an alarming pace with the relentless progress of industrial processes and intensive agricultural practice. Nowhere is the loss of these vital water bodies more acute than in this small intensively developed continent of Europe.

Global Nature Fund, through its Living Lakes partnership network, initiated an ambitious demonstration and recovery project in Greece and Spain with support from the EU LIFE-Environment programme, administered and funded by the European Commission.

A key component of the project is this Manual of Sustainable Management of Wetlands and Shallow Lakes, which offers practical advice on the recovery of lost or severely damaged wetland ecosystems.

The manual sets out clear steps on the preparation of a management plan for wetlands, through an inclusive participatory process involving local communities as well as the many stakeholders whose active support is vital to the successful adoption and implementation of the plan.

The first discernible signs of recovery in the degraded wetlands, Nestos in Greece and La Nava and Boada in Spain, is a positive and encouraging demonstration of what may be achieved through wise wetland management.

Much thought has been given to the preparation of this manual. It is intended to be of value and practical use to local communities who live and work in and around wetlands, as well as those whose primary interest is in the science involved in wetland restoration. I wish to express my warmest appreciation to everyone who has contributed to the production of the manual.

A handwritten signature in black ink, appearing to read 'Aitken Clark'.

Prof Aitken Clark

Vice President of Global Nature Fund

Vice President of BTCV



Dr Helmut Blöch

Water Framework Directive

"Water is not a commercial product like any other, but, rather, a heritage which must be protected, defended and treated as such." (EU Water Framework Directive)

Europe's citizens are increasingly interested in their waters, as part of their local, regional and European environment. It is against this background that the European Union has expanded its water protection policy by the Water Framework Directive (WFD):

- > An ambitious and binding objective - protecting all our waters, and achieving 'good status' for all these waters (rivers, lakes, groundwaters and coastal waters)
- > A holistic approach – good status defined, beyond traditional chemical parameters: for surface waters also in terms of biology (microflora, microfauna, fish fauna) and morphology, for groundwaters also in terms of quantity (balance between abstraction and recharge)

- > Addressing interaction between waters, wetlands and other water-dependent ecosystems
- > Ensuring river basin solidarity – thinking, planning and acting in river basins and sub-basins, across borders in a co-ordinated river basin management plan
- > Getting the citizens involved – providing for broad participation of citizens, NGOs and stakeholders, municipalities etc. in the development of river basin management plans

Implementing this new EU water policy is a major challenge for all involved, at local, regional, national or European level. I am therefore particularly glad that it has been able to establish a broad co-operation in implementing the WFD, the Common Implementation Strategy. It is bringing together not only the European Commission, Member States and Candidate Countries, but also NGOs, stakeholders and the scientific community, thus reconfirming the broad and participatory approach. Looking back now at three years of experience with this strategy, it can already now be regarded as an example of good European governance – building on experience and information across Europe, shaping a network, delivering ambitious guidance documents, workshops and seminars. It has also delivered common ownership by all involved, to the benefit of Europe's waters.

The WFD is now at a first crucial stage of its implementation, from Estonia to Portugal and from Ireland to Cyprus: Following the formal transposition into national legislation, the first environmental assessment for each river basin will have to be finalised by the end of 2004. There are even regions where such activity is going far beyond the borders of the enlarged European Union: for the whole of the Danube river basin, from the mountains of the Black Forest to the shores of the Black Sea, one co-ordinated assessment is being developed by the Danube countries, within the International Danube Protection Commission ICPDR. It will pave the way for implementing the WFD in this largest of the EU's river basins.

In this whole process, at regional, river basin and European level, the role of informed citizens, of NGOs, water users and stakeholders will be crucial. I therefore warmly welcome all the work done in the context of this LIFE project. It will help us achieve our common goal: getting Europe's waters cleaner, getting the citizen involved.

Dr Helmut Blöch

European Commission*, Directorate General Environment

*This contribution reflects the opinion of the author and not necessarily that of the European Commission.

Introduction

LIFE project: Living Lakes - Sustainable management of wetlands and shallow lakes

Background - problems - objectives

Since the beginning of the 20th century two thirds of European wetlands have been lost due to engineering construction works, draining and conversion to arable land, exploitation of groundwater and dumping of refuse. Furthermore, many have been degraded through nutrient enrichment, the main sources being sewage effluents and agricultural fertilisers. Such eutrophication interferes with the important ecological functions of water bodies and is jeopardising the use of water resources by man.

In July 2001 Global Nature Fund started an EU LIFE project for the rehabilitation of wetlands in Spain and Greece with the title "Living Lakes - Sustainable Management of Wetlands and Shallow Lakes". The project areas are the wetlands of La Nava and Boada in the region of Castilla y León in Spain, and the Nestos lakes, lagoons and wetlands in north-eastern Greece. The two wetland complexes are under constant pressure from non sustainable activities. The selected demonstration areas are typical of a great number of wetlands and shallow lakes in Europe.

The main goal of the project was to develop two management plans in co-operation with the respective local communities, authorities and stakeholders focusing on the restoration and sustainable development of the wetlands while benefiting the social and economic needs of the local population. The consequent next step is the

implementation of the measures defined in the management plan.

This will be achieved by:

- > Applying ecological restoration techniques to two degraded wetlands, respectively to demonstrate how wetlands can be managed in ways that enhance their nature conservation values while benefiting the social and economic needs of local communities.
- > Developing appropriate proposals for the extensification of the agricultural land in the catchment area in order to reduce negative impacts.
- > Providing opportunities to demonstrate and spread good practice in wetland management through training courses, work camps and knowledge exchange, using the Living Lakes network as a primary vehicle for the dissemination of results and experiences. A central objective of the project is to use different communication techniques in order to address the broad public as well as international experts.
- > Developing a sustainable tourism concept which includes the wetlands as a valuable asset of the region and implementing some first infrastructure as a step towards proper visitor management.

Technical and methodological solution

The management plans were developed through a participatory process with the local stakeholders in order to maintain the biological diversity and productivity of the wetlands and to allow wise use of their resources by human beings. The structure of the plans was developed according to Ramsar guidelines for the development of management plans and the

requirements of the EU Water Framework Directive.

In order to achieve an overall agreement between the various stakeholders and decision makers, an iterative step by step approach was carried out to finalise the plan for La Nava and Nestos. In a first phase, a possible structure for the management plan was drafted and an analysis and assessment of the available data was carried out and integrated into the structure. The next step was the preparation of the management plan on the basis of regular workshops with the relevant local and regional stakeholders. The members of these working groups discussed the content and focus of the management plan and developed it in further detail. In addition public presentations and hearings took place. As a final result concerted management plans for each project area covering a period of five years were presented to the public and handed over to the competent administrations with the demand to approve the management plan officially and to start the implementation.

Concerning the specific demonstration measures to restore and to protect the wetlands, the project partner organisations Fundación Global Nature in Spain and EPO in Greece were focusing on:

- > A long-term installation of buffer zones by purchase or long-term lease of land in the case of La Nava and Boada in Spain. Because of the steppe character of the wetlands La Nava and Boada, only a few buffer zones were newly planted but the strategy was to convert arable land in the direct vicinity of the fragile ecosystems into set-aside areas. In the case of the Nestos lakes in Greece a land consolidation process was in progress and was used to acquire

appropriate plots for the implementation of the measures. At one lagoon a large "constructed wetland buffer zone" with autochthonous plants, mainly bulrush and reed species was installed, which quickly developed into an interesting wildlife habitat.

- > Installation of a green filter at Boada wetland. The advantages of this innovative filter technology with floating aquatic macrophytes are the relatively low investment and its effectiveness in purifying the water which flows into the wetland (estimated at 40-60% of the nutrients load). This water purification system requires minimal maintenance, although at least once a year a technician has to review the water level, restore dead or lost plants and eliminate the excess plant biomass generated by the filter. The linear form of this green filter is completely integrated into the landscape, even creating an interesting habitat for some vertebrate and invertebrate species. Unfortunately, until the end of the LIFE project the filter could not be installed, because the regional environmental

administration of Castilla y León would not support its implementation.

- > Plantations with different methods like the planting of solitary trees and bushes as well as plantations in groups and rows to create a variety of structures and habitats (La Nava, Boada and Nestos). Plantations of various teasel species (e.g. *Cynara cardunculus*) because these plants are perfectly adapted to the dry climate conditions in the highlands of Palencia.

In both project areas a number of demonstration measures for visitor management were carried out such as the installation of interpretation trails, observation platforms and the publication of booklets describing themed excursions, traditional products or environmental friendly accommodation facilities. Some of the measures are included as practical examples in this manual.

A very important target of the project was the exchange of experience between the partners in the two project areas and the Broads National Park Authority in Eastern England as well as the Lake Constance Foundation in Germany.

The exchange of know-how was extended to include other organisations involved in management of wetlands and lakes in Europe and at international level.

The Broads Authority is very experienced in the restoration of highly eutrophic lakes, environmental education and long-term management of protected areas and lakes. The Lake Constance Foundation has worked mainly in the fields of organic and environmentally sound agriculture, sustainable tourism and environmental management systems. Both partners assisted in the development of the management plans as well as the planning and implementation of the restoration measures. Two international training courses were organised by both of them with a five-day programme focusing on how to put theory into practice and the opportunity to visit several case study examples.

Expected results and environmental benefits of the LIFE project

Forty months is a relatively short time for the realisation of such a complex model project and some of the



Project Team at Boada Lagoon

specific environmental benefits could not be evaluated within the project duration. Based on the first project results the partner organisations made a tentative assessment of the environmental benefits that can be expected.

Results and environmental benefits at local level

Integrated management plans

As a result of the project, integrated management plans for the two representative wetlands in Spain and Greece have been developed to manage a wetland zone with a size of over 1,000 ha in La Nava, Boada and the Nestos area. The management plans include a concept for the extensification of 8,000 ha agriculturally used land and a concept to foster sustainable tourism in the region. Aims and specific measures of the management plans are the result of an iterative and integrative process involving the relevant stakeholders of both areas.

The central role of the project partners Fundación Global Nature and EPO in their capacity as NGOs was to develop the management plans and concepts in co-operation with all relevant stakeholders. The formal approval and implementation of the measures proposed in the plans lies within the responsibility of the regional Environmental Authority of Castilla y León in the case of La Nava, and the national Ministry for the Environment and the Regional Authorities in the case of the Nestos Lakes.

In both cases the co-operation between an NGO and the authorities was difficult. There are various reasons for these problems: limited resources (funds and labour), conflict of expertise, different priorities and objectives with respect to nature and the environment or

even misunderstandings in the past or aspects of competition.

At the end of the LIFE project it was not clear whether or not the two management plans would be used and implemented - fully or partially - by the authorities in charge.

Pilot restoration and management measures

The installation of buffer zones on 57 ha of which 20 ha are newly planted will contribute to the removal of nitrogen and phosphorus loads from concentrated effluents. At Nestos in total an area of 19 ha of valuable biotopes was cleaned from refuse. In total an area of 5.9 ha was cleared from rubble and heavy litter, the old lake banks were restored or new water banks installed.

Visitor management

The installation of visitor infrastructure such as an interpretation trail, an observation platform and brochures in different languages is an important step in order to foster sustainable tourism development in the areas. It will help reduce negative impacts of visitors on sensitive zones around the wetlands. Visitors and nature conservation will benefit from these measures as this infrastructure will make it easier to experience nature while visiting the wetlands and their surroundings.

Lobbying and environmental education

As a result of the lobbying activities of Fundación Global Nature (FGN), La Nava was accepted as a Ramsar wetland in November 2002. Laguna Boada also fulfils the criteria of the Ramsar treaty. FGN has submitted all necessary data to the environmental authority of Castilla y León with the request to apply for Ramsar status for this wetland as well.

In the Nestos area the LIFE Environment Project upgraded the work of

the regional NGO EPO and the skills learned helped to prepare and implement a large LIFE Nature Project that continued to practically manage and protect the Nestos wetlands by reconnecting four different old Nestos branches with the main river course, restored more than 60 ha of riparian forests, constructed 8 new floating breeding rafts for terns, initiated two new vulture feeding sites and installed three more nature trails with 7 observation platforms in the area. The LIFE Environment Project achieved a major benefit through participation on the board of the newly created National Park Management Body of the wider Nestos Wetlands Park.

Media work, information panels and the presentation of two new mobile exhibitions, lectures at schools, in surrounding communities and on site have environmental education effects on local residents (especially young people and pupils) as well as national and international visitors.

Results and environmental benefits at international level

The exchange of experience and information was an important objective of the project. More than 100 managers and decision-makers participated in the four training courses on wetland restoration and management carried out at Lake Constance (Germany, Austria and Switzerland) and in the Broads National Park in East Anglia (England). 90 young people from six European countries participated in the international workcamps and actively supported the nature conservation organisations with practical work and at the same time gained various experiences and insight into the culture and nature of the regions. Another important measure regarding environmental education was the work with school classes at the regional schools around Nestos

and La Nava. In Spain, the team of the Fundación visited 17 classes to explain the importance and function of La Nava and Boada wetlands. Six other school classes came to the Information Centre in Fuentes de Nava and spent a day at the lagoons.

From the beginning of the LIFE Project in June 2001 until June 2004, 52 schools have been visited for environmental presentations with more than 2000 pupils and 119 teachers, most of them also partici-

pating in field excursions. In the neighbouring town of Xanthi a major event for the presentation of all environmental work of the basic schools was organized in the central square of the town at the end of the school year 2003 (see also chapter 10.7).

This manual "Reviving Wetlands - Sustainable Management of Wetlands and Shallow Lakes" and a demonstration video are outcomes of the project and are used to disseminate the results and the experiences obtained in the project.

The manual explains the content of a management plan for wetlands and shallow lakes and describes the necessary steps of its participatory development. All steps are illustrated with clear and specific examples and results from the LIFE project as well as other projects and case studies. The manual is published in English, Spanish and Greek; a German version can be found on a CD ROM as well as on the website

www.livingwetlands.org.

Coordinator

Global Nature Fund

Project Partners

Laguna La Nava; Spain

- > Fundación Global Nature España
- > Ayuntamiento de Fuentes de Nava
- > Ayuntamiento de Boada de Campos

Nestos Lakes; Greece

- > EPO-Society for Protection of Nature and Ecodevelopment
- > AENAK: Development Agency of the Prefecture of Kavala

Lake Constance; Germany, Switzerland, Austria

- > Lake Constance Foundation (Bodensee-Stiftung)

Norfolk & Suffolk Broads; England

- > Broads Authority

We would like to thank the members of the Project Advisory Board for the intensive support and consultation of the project team.

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For further information and addresses see Chapter 14 Project Partners and Supporters.

1 Initial Situation: LIFE Project Areas



European Greylag Geese



La Nava in spring



Polluted water in La Nava tributaries

Project areas of the EU-LIFE project are the lagoons La Nava and Boada in Spain and the Nestos Lakes and Lagoons in North-eastern Greece.

LIFE Project Areas

Wetlands and shallow lakes are among the most important and most threatened ecosystems on earth. They provide habitat for a rich diversity of animal and plant life. But people need wetlands as well - for many reasons - they provide products from fish to reeds and help prevent floods. Furthermore they play an important role in filtering and cleaning water thereby reducing levels of pollutants.

Nevertheless, wetlands are very sensitive and vulnerable systems and over 60% of the European wetlands have been destroyed by mankind since the beginning of the 20th century. Many of the remaining areas are imminently threatened by nutrient enrichment and water abstraction. Global Nature Fund has started this pilot project in order to demonstrate that it is possible to manage wetlands in ways which enhance their natural value while benefiting the social and economic needs of the local community.

Project areas of the implemented EU LIFE project are the lagoons La Nava and Boada in Spain and the Nestos Lakes and Lagoons in North-eastern Greece.

The wetlands **La Nava and Boada** in Spain represent typical steppe lakes, ecosystems of which two thirds have been destroyed during the past 50 years. Steppe lakes are extremely

important for flora and fauna because they are located in arid areas. Often they represent the only remaining natural ecosystem amidst intensive monocultures. As a consequence far too much water is extracted and the groundwater is depleting. Due to the limited water resources massive conflicts between agriculture and nature conservation often arise. Sustainable integration of the wetlands into the land development plans at local level is almost non-existent.

In the 1950s, politicians had a dream of a blooming landscape reaping rich harvests in the La Nava region. The construction of 15 large and many small canals and ditches nearly drained Lake La Nava, but the expected success failed.

In 1990, the Spanish "Fundación Global Nature" brought Lake La Nava back to life. The sister lake Boada, in 14 km distance, was restored in 1996. After a remarkably short period of time, waders and other waterfowl re-discovered the lakes. At present the lakes cover over four square kilometres and are classified as two of the three most important winter resting places for central and north European greylag geese.

Today, the main problem of the Spanish wetlands is the poor quality of the inflowing water as some of the tributaries are polluted with insufficiently treated sewage containing nutrients and other substances e.g. from small-scale tanneries.



Aerial view of La Nava Wetland

La Nava and Boada in Spain

Location	North-western Spain on the Tierra de Campos Plateau, Province of Palencia
Inhabitants	840 in the municipality of Fuentes de Nava, 28 in the municipality of Boada de Campos
Wetland type	Shallow steppe lakes with an average depth of 0.5 m, located in low precipitation areas
Size	Original size 25-50 km ² , today only 4 km ²
Fauna	300 species of vertebrates, 225 bird species (Greylag Geese 15,000 individuals, mallards 25,000 individuals, teals, shovelers, lapwings, whiskered terns, stilts, avocets), 23 mammal species, 7 reptile and 5 amphibian species
Flora	The flora is characterised by seasonal flooding of the wetlands. Typical species are sedges (<i>Carex</i> , <i>Cladium sp.</i>), Iris and Water Buttercup (<i>Ranunculus sp.</i>), Purple Moor-Grass (<i>Molinia caerulea</i>), cattail (<i>Typha sp.</i>) and reed (<i>Phragmites australis</i>).
Legal Protection	Natura 2000, Ramsar site
Threats	Groundwater pollution, groundwater exploitation, insufficient waste water treatment systems in small communities and industries, intensive agriculture, conflicts concerning the use of water, lack of management, lack of integration in local and regional landuse planning.



1 Initial Situation: LIFE Project Areas



Waterlilies in the Nestos lakes



The Curlew is common in the Nestos Delta



Illegal rubbish dumps

The Nestos lakes and lagoons are part of the Nestos Delta, located in north-eastern Greece. Starting in the 1950s large-scale drainage measures were carried out in the delta and the River Nestos was enclosed between flood protection dykes. Thus, large parts of the delta became available for intensive modern agriculture and the area was liberated from malaria. Today the Nestos is flowing at a length of 30 km from the end of the Nestos Gorge to the Mediterranean Sea in a natural river-bed between dams of 1-1.5 km width. From the original 550 km² large Nestos delta, today only about 80 km² show a natural character comprising the following main ecosystems: coastal lagoons and sand dunes, lakes and ponds, the riverbed with riparian forests.

The lake area covers roughly 20 km² and consists of 18 freshwater lakes and ponds. The Nestos Lakes are

precious pieces in a more complex mosaic that includes wetlands, dry meadows, hedges, small Mediterranean bush forests, and small-scale agricultural fields. The lagoons are situated in the north-western part of the delta and cover about 10 km². They are surrounded by a coastal strip of sand dunes and extended salt marshes, reed beds and tamarisk bushes.

Intensive agriculture is one of the greatest threats to the lakes and lagoons. Due to agricultural EU subsidies more and more land is cultivated and intensively used. Farmers pump off large quantities of water from the lakes to irrigate their fields. The excessive use of fertilisers and pesticides in the delta region is causing severe problems to the lakes and lagoons such as eutrophication. The quantity and quality of the groundwater has also deteriorated.

Some parts of the riparian forest in the Nestos Delta are still used for dumping refuse. 120 truck loads of rubbish were collected and removed from 30 ha biotope.



Aerial view of Nestos Lakes

Nestos Lakes and Lagoons

Location	Nestos Delta in north-eastern Greece, about 200 km East of Salonika
Inhabitants	32 communities in the Delta with about 50,000 inhabitants
Wetland type	Brackish-water lagoons and several freshwater lakes
Size and depth	"Nestos Delta" covers an area of 550 km ² of which 80 km ² are wetlands. The depth of the water bodies varies between 0.5-1.5 m (lagoons) and up to 3.5 m (lakes)
Fauna	Over 35 species of mammals (otter, wild cat and golden jackal) More than 320 birds species, of which 110 are breeding species, 2 species of tortoises, 2 terrapins, 2 sea turtles, 9 snakes, 2 lizards, 2 geckos and the glass lizard. 8 species of amphibians and 8 further species of reptiles in the bordering mountains
Flora	The area is characterised by sub-Mediterranean vegetation. Along the lagoons there are extended salt marshes, wet grasslands, reed and tamarisks. The ponds and lakes are surrounded by reed and cattail, and the water's surface is partly covered by waterlilies
Legal Protection	Ramsar site, Natura 2000, SPA Area under Bird Directive, Important Bird Area (IBA) and two large non hunting areas, National Park under constitution
Threats	Intensive agriculture, water distraction, ground water deterioration, industries, illegal hunting, littering



2 Who these Guidelines are destined



The goal of nature conservation work: a stable ecosystem

Normally, an environmental NGO defends the highest standards of nature and environmental protection. But in the end a management plan approved by all stakeholders is always a compromise.

Who these Guidelines are destined for

The present manual describes the contents and the process of preparing a management plan for wetlands or shallow lakes. The target group are technicians, stakeholders and decision makers involved in management of these sites or influencing the ecosystem with their activities. The publication gives answers to questions about why and how a management plan has to be established. Useful information from other manuals has been included - in order that the wheel is not continually reinvented. Practical experience and examples out of the LIFE project "Sustainable Management of wetlands and shallow lakes" and from various Living Lakes partners will facilitate the practical implementation.

The structure of the manual reflects the elements of a management plan.

Principal questions

The development and implementation of a management plan is a time consuming task involving financial and personnel resources. Take your time for reflection and answer the following questions carefully:

- > Is a management plan for the site really needed? Why?
- > Is the need of a management plan only seen by yourself or your organisation? What about the other stakeholders, what about the expert administration?

The elaboration of a management plan is not a one-man show - least of all its implementation. It is absolutely legitimate that the initiative to develop a management plan comes from an NGO or another stakeholder group. But it is necessary to look for partners, especially if similar initiati-

ves were not successful in the past.

- > Who will be responsible for the implementation of the management plan?

Check which administrations and private institutions as well as persons have expertise and responsibilities within the management of the area. How will they be involved in the process? Do you have convincing arguments to motivate them towards a positive attitude, e.g. general legal conditions which have to be fulfilled, answers to serious conflicts of interests, projects to augment the image of politicians? Would your organisation be accepted as co-ordinator of the process?

- > Have you identified all relevant local actors?

How will they be involved in the process? Do you have convincing arguments to motivate them towards a positive attitude, e.g. interesting financial funding and subsidies, advantage for tourism development, answer to serious conflicts of interests, serious involvement and consideration of the different interests etc.? Would your organisation be accepted as co-ordinator of the process?

- > Does your organisation have the necessary personnel and financial resources to lead the process of the elaboration of a management plan?

A management plan requires the research of existing data and information to analyse the actual situation. It is easy to design a participatory process on paper, but to work it out, as many as necessary talks and meetings need to be carried out and a high portion of diplomacy and patience is required. Did you agree in your organisation to assign sufficient dedication and resources to this objective? Do you have the professional background to co-ordinate this process?

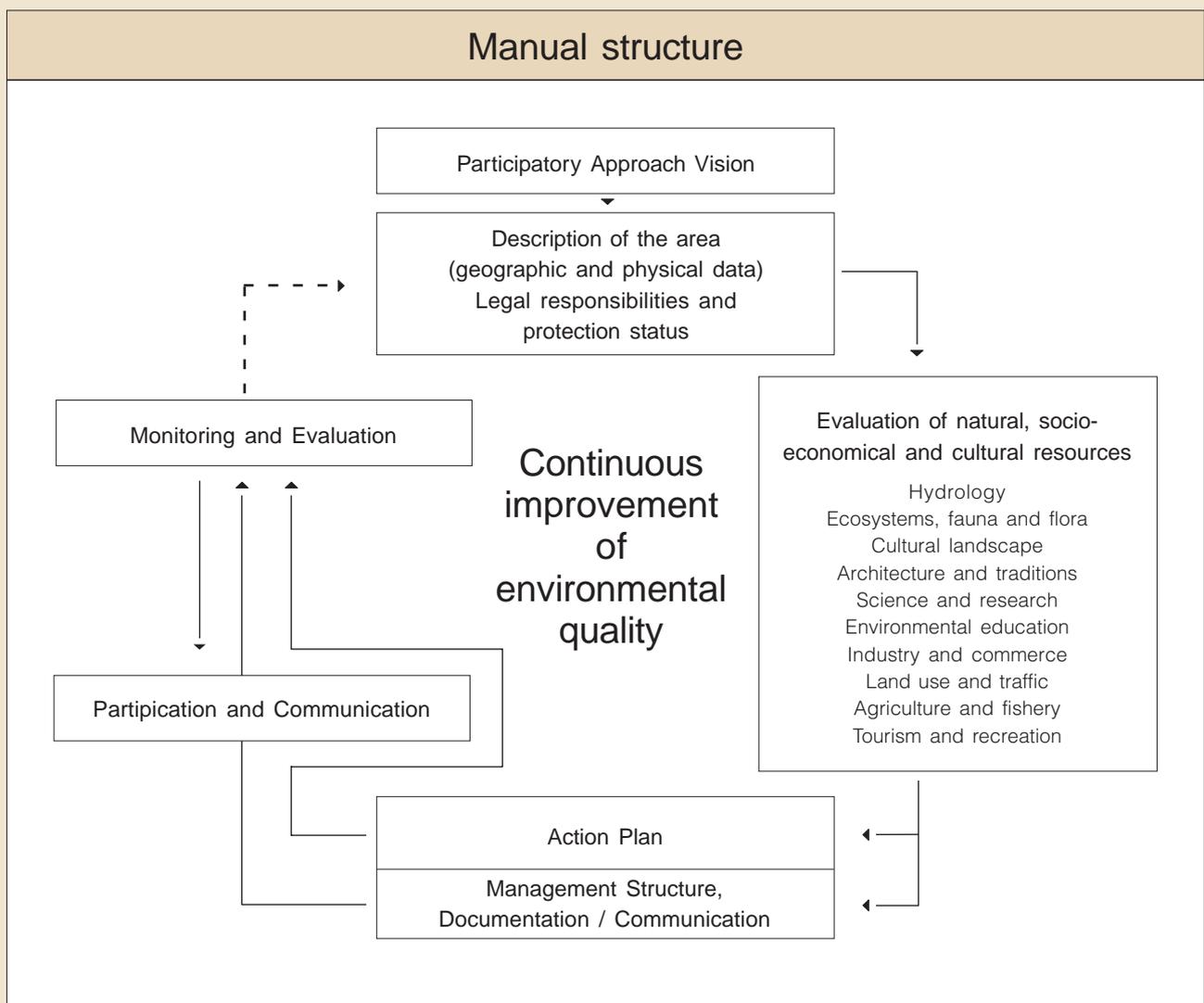
> Do you know successful examples similar to your situation?

It is not necessary or useful to re-invent the wheel. Other examples and positive - or also negative - experiences are very helpful to prepare a coherent and realistic management plan. Get in contact with other initiatives! Invite them to the meetings and ask them for advice and feedback. Practical experience is much more convincing than theoretical planning.

> Is your organisation able and willing to accept a compromise?

Normally, an environmental NGO defends the highest standards of nature and environmental protection. But in the end a management plan approved by all stakeholders is always a compromise. Where are the limits of acceptance within your organisation? Are you flexible enough to bring the process to a successful result acceptable to all stakeholders - including your own organisation?

If, after these reflections, you are still convinced, then please go ahead. An exciting and challenging target is waiting for you and your organisation. Knowledge and professional work are important ingredients for success. We wish you good luck - because this is also needed!



3 The Management Plan: Need and



Cover page of the Broads Plan 2004

The Management Plan: Need and Background

The term management derives from economics and describes the cycle of planning-implementing-controlling-adapting.

During the past ten years, the management idea has found its way into ecology, among other things through the voluntary European instrument "Environmental and Audit Management Scheme EMAS" and ISO 14001 for companies, local authorities and other organisations. Different EU directives, ahead of all the EU Habitat Directive 92/43/EEC (Managing Natura 2000 Sites) and the EU Water Framework Directive (River Basin Management) postulate management plans. The new directive 2001/42/EC on Strategic Environmental Assessment for optimisation on planning processes, especially within the range of land use planning, transport planning and waste management planning, requires different elements of a management system: environmental reports with specific environmental aims and monitoring.

The management plan for an ecosystem or an area is part of a dynamic and continuing management planning process. The plan should be kept under review and adjusted to take into account the monitoring process, changing priorities, and emerging issues. Management planning must be regarded as a continuous, long-term process. Planning should begin by producing a minimal plan that meets, as far as resources allow, the requirements of the site and of the organisation responsible for managing the site. It is important to recognise that a management plan will grow as information becomes available.

Most important functions of a Management Plan are:

- > To identify the objectives of site management
- > To identify the factors that affect, or may affect, the features
- > To resolve conflicts
- > To define the monitoring requirements
- > To identify and describe the management required to achieve the objectives
- > To maintain continuity of effective management
- > To obtain resources
- > To enable communication within and between sites, organisations and stakeholders
- > To demonstrate that management is effective and efficient
- > To ensure compliance with local, national, and international policies.

Environmental and Audit Management Scheme (EMAS) and ISO 14001

The EU Eco-Audit, also called EMAS, is a voluntary management system for businesses and organisations that wish to improve their operational environmental protection measures on a continual basis beyond the practices called for by law.

EMAS stands for "Eco-Management and Audit Scheme". The revised EMAS II includes all the aspects of the international ISO 14001, but in some respects has higher requirements, for example employee participation and the publication of an environmental report.

All organisations participating in EMAS regularly draw up an environmental statement for the public. In it the organisational environmental policy and its environmental programme with concrete measurable environmental

The management plan for an ecosystem or an area is part of a dynamic and continuing management planning process. The plan should be kept under review and adjusted to take into account the monitoring process, changing priorities, and emerging issues.

goals are established. All the relevant environmental aspects that the company or organisation is able to influence must be taken into consideration. Among these are to be numbered indirect aspects as well, such as investments, administrative and planning decisions, products or services of suppliers etc. Each environmental statement must be evaluated by an independent, government-certified environmental verifier or auditor. If it meets the requirements of EMAS, the environmental auditor declares the environmental statement to be valid.

The ISO 14001 is a world wide recognised environmental management scheme, administered and further developed by the institutions responsible for industrial standards in each country. EMAS and ISO 14001 are very similar systems; in certain aspects EMAS has even higher requirements.

EMAS II provides structure and elements for environmental management, and is therefore also interesting for the management of wetlands and shallow lakes. Currently, industry, communities, service providers, e.g. hotels and travel agencies, and even nature and biosphere reserves, apply for EMAS certification. According to EMAS criteria a management structure for a wetland and lake region should be established which would also appear in the management plan.

Further information: <http://europa.eu.int/comm/environment/emas/>

Where is a management plan required?

Managing Natura 2000 Sites

The EU Directive on the Conservation of Natural Habitats and Fauna and Flora provides the legislation for the protection of

habitats and their species and the restoration to favourable conservation status. The Directive establishes a community wide network of Special Areas of Conservation (SACs) which form part of Natura 2000. Also Special Protected Areas (SPAs) established under the Birds Directive (1979) are included within Natura 2000.

Article 6 of the Habitats Directive plays a crucial role in the management of the sites that make up the Natura 2000 network. It sets out the framework for site conservation and protection, and includes proactive, preventive and procedural requirements. It is relevant to special protection areas under Directive 79/409/EEC as well as to sites based on Directive 92/43/EEC. The framework is a key means of achieving the principle of environmental integration and ultimately sustainable development.

The necessary conservation measures can involve "if need be, appropriate management plans specifically designed for the sites or integrated into other development plans". Such management plans should address all foreseen activities, unforeseen new activities being dealt with by Article 6 (3) and (4).

Further information: http://europa.eu.int/comm/environment/nature/art6_en.pdf

EU Water Framework Directive

The Water Framework Directive (WFD) expands the scope of water protection to all waters and sets clear objectives that a "good status" must be achieved for all European waters by 2015 and that water use must be sustainable throughout Europe.

The Water Framework Directive requires that all partners in a given river basin manage their waters together in close co-operation. It stipulates that countries set up a

common River Basin Management Plan with measures to ensure that the ambitious objectives of the Directive will be met within the given deadlines. These plans will be designed and implemented by river basin, the natural geological and hydrological unit which brings together upstream and downstream interests: local, regional, national authorities as well as stakeholders, including NGOs.

In essence, the WFD aims to create new solidarity around water management within river basins and aims to prevent pollution at source and sets out control mechanisms to ensure that all pollution sources are managed in a sustainable way.

In terms of pollution control, the Directive combines two approaches - the best possible reduction of emissions and a minimum quality threshold - to ensure that the objectives of "good ecological quality" of water are met by 2015. This must be achieved by the Member States. The European Commission is preparing "environmental quality standards" defining "good chemical status". At the same time, emission control measures are being prepared which will range from reduction to phase out of releases into the aquatic environment within a period of 20 years for the worst pollutants in European waters, the "priority hazardous substances".

The WFD encourages, and in some cases requires, the integration of policies and actions that can contribute to improve water quality, whether it be farmers who change agricultural land-use practices to reduce nitrate leakage into groundwater, or industrial producers who invest in new technologies to reduce emissions, or consumers who buy environmentally-friendly products such as biodegradable detergents.

3 The Management Plan: Need and

Just as different countries will have to co-operate to protect water resources, so will various actors from different sectors. The Directive encourages all those with an interest to actively participate in water management activities. This co-operation amongst stakeholders such as NGOs, local communities and various levels of public authorities during all phases of the implementation is crucial to ensure the whole process is carried out efficiently and transparently. And this involvement must continue so that there is a balance of interests between the environment and those who depend on it.

Important deadlines of the Directive:

December 2003: National and regional water laws were adapted to the WFD. River Basin co-operation were made operational.

December 2004: An analysis of pressures and impacts on waters has to be completed including an economic analysis.

December 2006: Monitoring programmes have to be operational as a basis for the water management.

December 2008: River Basin Management plans presented to the public.

December 2009: Publishing first River Basin Management Plans.

December 2015: Waters to meet "good status".

Further information: <http://europa.eu.int/comm/environment/water/water-framework/index/>

EU Directive on Strategic Environmental Assessment (SEA)

With an average population of 117.5 inhabitants per km² in the EU it is easy to see why land use planning and management is such an important environmental issue for the

Union. The way we use our land space can have major impacts on environmental conditions. These can be direct, such as the destruction of natural habitats and landscapes, or indirect, such as increasing the amount of traffic on our roads leading to more congestion, air pollution and greenhouse gases. Land use planning and management decisions are usually made at local or regional level.

To devise methods and environmental tools to analyse the impact of proposed development, the Directive on Environment Impact Assessment (EIA) for projects and the Directive on Strategic Environmental Assessment (SEA) for plans and programmes are the two main tools used in this task. These make sure that significant environmental impacts are identified, assessed and taken into account throughout the decision-making process.

The purpose of the SEA Directive is to ensure that environmental consequences of certain plans and programmes at regional and local level are identified and assessed during their preparation and before their adoption. The public and environmental authorities can give their opinion and all results are integrated and taken into account in the course of the planning procedure.

By July 2004, the SEA Directive must be integrated into federal legislation. At the heart of SEA lies the environmental report, which establishes, describes and analyses the environmental impact of a land use plan on regional level, or a plan or project in the field of communal urban land use - and its reasonable alternatives.

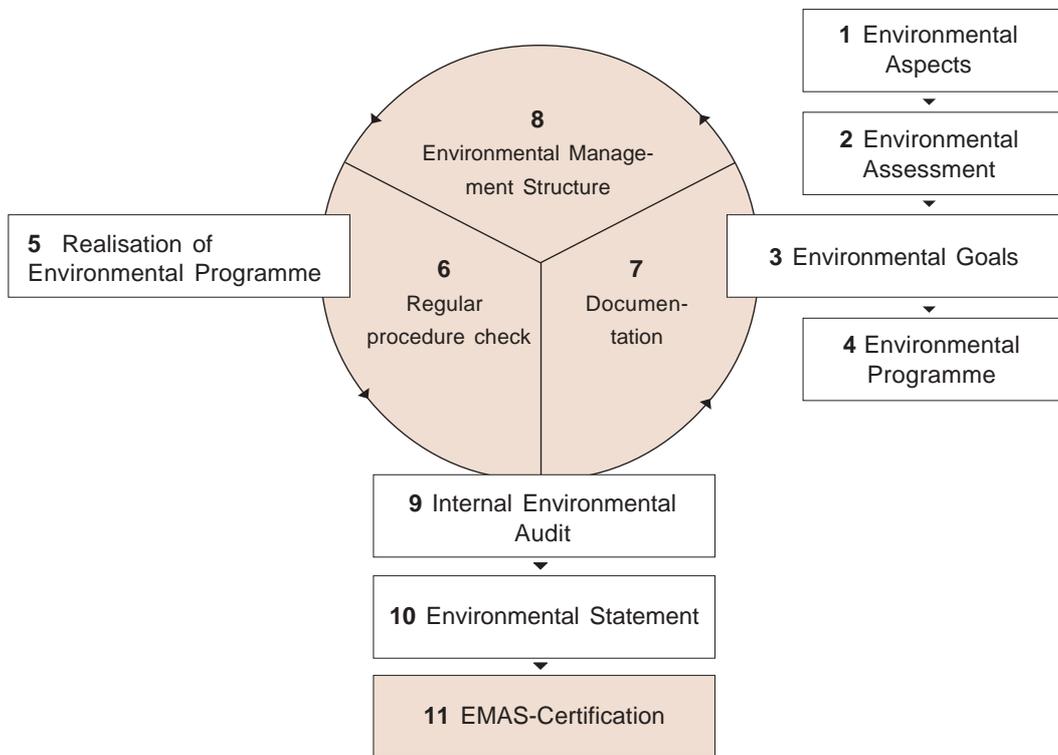
Annex 1 of the Directive specifies the information that has to be

provided in the Environmental Report and calls on information that concentrates on issues related to the significant effects on the environment of the plan or programme. Information on the relationship with other plans or programmes should also be included.

According to Article 10 of the SEA Directive the significant environmental effects of the implementation of a plan or programme should be monitored. The report should contain a description of how that monitoring is to be undertaken. The description should refer to existing monitoring arrangements if these are to be used.

Further information: <http://europa.eu.int/comm/environment/eia/home.htm>

EMAS European ECO-Management and Audit Scheme



1 Environmental Aspects

Evaluation of natural, socio-economical and cultural resources
(Chapter 7 and 8)

2 Environmental Assessment

(Performance Audit and Legal Compliance Audit)
Evaluation of natural, socio-economical and cultural resources
(Chapters 8 and 10)

3 Environmental policy and goals:

Vision (Chapter 5)
Action Plan /Operational Management Goals (Chapter 9)

4 Environmental Programme:

Action Plan (Chapter 9 and 10)

5 Realisation of Environmental Programme

Examples of measures
(Chapter 10)

6 Regular procedure check

Does the organisation work?
Monitoring and Evaluation
(Chapter 13)

7 Documentation

Written Management Plan,
minutes of meetings, evaluation reports
(Chapter 11)

8 Environmental Management Structure

Who is responsible for what
(Chapters 6, 9, 11)
Participation of stakeholders
(Chapters 4 and 12)

9 Internal Environmental Audit

Monitoring and Evaluation
(Chapter 13)

10 Environmental statement

Participation and communication
(Chapter 12)

11 EMAS-Certification

By an accredited Auditor
- at least every 3 years

4 Participatory Approach >>



Workshop with EPO in Greece



Expert team meeting at La Nava in Spain

A new European Water Policy will have to get polluted waters clean again, and ensure clean waters are kept clean. In achieving these objectives, the roles of citizens and citizens' groups will be crucial.

Participatory Approach

Good management can only succeed if all stakeholders are integrated and either agree on the management goals or at least on a compromise. For that reason, the participatory approach is given a high priority within the EU Water Framework Directive.

"The increasing demand by citizens and environmental organisations for cleaner rivers and lakes, ground-water and coastal beaches is evident. This citizen demand is one of the main reasons why the Commission has made water protection one of the priorities of its work. A new European Water Policy will have to get polluted waters clean again, and ensure clean waters are kept clean. In achieving these objectives, the roles of citizens and citizens' groups will be crucial. This is why a new European Water Policy has to motivate more citizens to become involved."

There are two main reasons for an extension of public participation. The first is that the decisions on the most appropriate measures to achieve the objectives in the river basin management plan will involve balancing the interests of various groups. The economic analysis requirement is intended to provide a rational basis for this, but it is essential that the process is open to the scrutiny of those who will be affected.

The second reason concerns enforceability. The higher the transparency in the establishment of objectives, the imposition of measures, and the reporting of standards, the greater care Member States will take to implement the legislation in good faith, and the greater the power of the citizens to influence the direction of environmental protection, whether through consultation or, if

disagreement persists, through the complaints procedures and the courts. Caring for Europe's waters will require more involvement of citizens, interested parties, and non-governmental organisations (NGOs). To that end the Water Framework Directive will require information and consultation when river basin management plans are established: the river basin management plan must be issued in draft, and the background documentation on which the decisions are based must be made accessible. Furthermore a biannual conference in order to provide regular exchange of views and experiences in implementation should be organised. Too often in the past implementation has been left unexamined until it was too late - until Member States were already woefully behind schedule and out of compliance. The Framework Directive, by establishing very early on a network for the exchange of information and experience between water professionals throughout the Community, will ensure this does not happen.

So much for the EU Water Framework Overview.

What applies to river basin management plans also applies to the management of wetland areas. A large number of examples in the past demonstrate that "Top-Down-management plans" failed on account of missing participation and lack of consensus.

However a participatory approach is easier said than done. World Wide Fund for Nature (WWF) noted in its survey "WWFs Water and Wetland Index" from November 2003 that there is still "a long way to go for public participation in water management". In this survey, realised within 23 European member states and accession countries, WWF revealed that public participation is

poor or very poor in almost half of the surveyed countries, especially in Southern and Eastern Europe. The poorest aspects of public participation are the lack of proactive information provisions to non-governmental stakeholders (poor or very poor in 35% of the surveyed countries) and the quality of the means to enable the active involvement of interested parties in decision-making processes (poor or very poor in more than 45% of the countries).

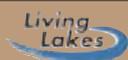
The first step to enable a good quality participation is information. A stakeholder can build up an opinion and participate in a decision only if

he receives sufficient proactive information about legislation, results of ecological, economical and social analysis, specific projects affecting freshwater ecosystems, proposed aims and measures within the management plan and the procedure of communication.

The second step is an adequate structure of the participation process. Well moderated workshops and sufficient space for discussion are important. All invited stakeholders should receive the first draft of the management plan before any first meeting and be given enough time to discuss this draft with their members or supervisors.

The points of view of stakeholders need to be taken seriously into consideration. They should not get the impression of being involved only pro forma. Feedback from all participants should be treated in the same manner. How were their comments or suggestions dealt with? Were they included in the management plan and if not, why were they discarded?

Transparency is a very important quality criterion for a participatory process. A management plan signed by all stakeholders in the end is a good result.



Example Broads National Park: Broads Plan 2004

Designing a participatory process

Maria Conti, Broads Authority

Independent consultants were engaged early in the Broads Plan, considerable efforts were made to ensure that the process was transparent, participatory and inclusive from the outset. Thus, the process was designed to:

- > Bring together a wide range of organisations and individuals to create a common purpose and collective responsibility for the future of the Broads
- > Generate consensus around a set of objectives, based on a shared vision for the future of the Broads
- > Engender a strong sense of ownership amongst organisations and individuals in the objectives of the Plan.

Three main groups of stakeholders were identified for close

involvement in the process:

- > People with information or skills relevant to the Plan and its preparation
- > People affected by what happens as a consequence of the Plan
- > People with authority or resources to help implement the Plan.

These groups comprised the following types of stakeholders:

- > Those who live or work in the Broads Executive Area
- > Visitors to the Broads
- > Partner organisations (governmental, non-governmental and corporate)
- > Local authorities and parish councils
- > The wider public.

The different types of stakeholders were able to participate in the process through a range of mechanisms, as summarised in

Table 1. These included the following features:

- > The Broads Forum, which comprises a wide range of organisations not represented on the Broads Authority but with an interest in the Broads, is well placed to contribute to and monitor the development of the Plan
- > Facilitated events to engage directly with key stakeholders on issues and desirable outcomes
- > Community events held in different locations for those who live or work in the Broads to inform them about the plan and solicit their input
- > Consultation on key documents, notably a leaflet about key issues and a draft Broads Plan, that were widely publicised and disseminated, as well as available via the Authority's website.

4 Participatory Approach >>



Example Broads Plan 2004

Mechanisms by which stakeholders were able to participate in the development of the Broads Plan (Table 1)

Stakeholder	Meetings	Committees	Stakeholder events	Community events	Leaflet Draft Plan
BA Staff	✓	✓			✓
BA Members		✓		✓	✓
Statutory	✓	✓	✓		✓
Non-Statutory	✓	Broads Forum	✓	✓	✓
Public				✓	✓

Design of the process

In designing a participatory process it is important to be clear about the different types of engagement with stakeholders, ranging from information provision with no opportunity for stakeholders to influence the outcome to open dialogue in which stakeholder aspirations can be met and decisions shared (Table 2). The process for developing a new Broads Plan was designed to be as open as possible, beginning with dialogue bounded only by the legal responsibilities of the Authority and other partner statutory agencies and moving into consultation mode once the Broads Plan had been drafted.

The process for developing a new Broads Plan was designed at a facilitated workshop, involving a selection of members and officers of the Authority, and subsequently shared with key stakeholders for information and feedback. Important features of the process, summarised in Table 2, include:

- > Engaging with some 80 key organisations and interest groups through a series of facilitated workshops to identify key issues and how they might be addressed through a set of 20-year aims and 5-year objectives.
- > Engaging with local communities through informal events to provide an opportunity for people to 'drop in', meet members and officers, and record their interests and concerns.
- > Publicising and widely disseminating consultation documents, specifically a leaflet on key issues and the draft Broads Plan, and making them accessible to all via the Authority's website.
- > Establishing a Steering Group to oversee and guide the process, but NOT dictate policy. Membership comprised members of the Authority's Strategy and Resources Committee and the Chairman of the Broads Forum, serviced by officers of the Management Team.

- > Establishing an Expert Advisory Group to provide external advice on the process, strategies and potential resources for addressing key issues. Members are noted national experts and decision makers within sectors relevant to the Authority's interests, the Chairman and Vice Chairman of the Authority, and officers of the Management Team.

Joint business planning

Given that the Broads Plan is about collaborative working, meetings were set up with key partner organisations during the consultation phase (Table 3) to share business plans for the coming year. This provided an opportunity to agree priorities and resources to be allocated to them. It is anticipated that this process will be repeated annually.



Example Broads Plan 2004

Spectrum of engagement with stakeholders and their respective potentials for influencing decisions (Table 2)

Type of Engagement	Features	Stakeholder Response
Open dialogue	Decisions shared by stakeholders	Needs/Aspirations ↑ Options ↓ Reactions
Bounded dialogue	Decisions influenced by stakeholders	
Consultation	Stakeholders have limited influence	
Information gathering	Stakeholders provide information to inform decisions - no influence	
Information giving	Stakeholders have opportunity to react	

Summary of the two-year process to produce a new Broads Plan (Table 3)

Period	Key Stage	Broads Authority	Key stakeholders	Local Communities	Public
Feb.- June	Initial planning	Committee			Annual meeting
July- Aug.	Design process	Committee	Broads Forum		
Sept.- Oct.	Identify key issues	Committee	1 st workshop	5 drop-in events	Issues leaflet
Nov.- Dec.	Develop aims and objectives	Committee	2 nd workshop		
Jan.- Apr.	Draft Broads Plan	Committee	Broads Forum		
May- July	Consult on draft Broads Plan	[1,200 copies disseminated for consultation; also available via Authority's website.]			
Aug.- Dec.	Finalise Broads Plan	Committee	Broads Forum		
Jan. 2004	Launch Broads Plan	[Public event and widespread dissemination of Broads Plan]			



Advice

As a non-governmental organisation you may be initiator of a management planning process as well as stakeholder at the same time. This can lead to

conflicts about the goals to be pursued. To mitigate the risks you should engage an experienced, neutral moderator to guide through workshops for voting on a

management plan. The money for his honorarium is a good investment!



Pantanal, South America



Milicz Ponds, Poland



Mahakam Lake, Indonesia

The World Lake Vision is an important call for sustainable use of lakes and underlines the great importance of lakes for man and ecosystems.

Vision

The South African Zulus consider water as a living entity with soul and memory. And the indigenous people Huichol from Lake Chapala in Mexico believe that lakes are the mirror of ourselves.

What should a lake or wetland look like in five or ten years? What about the water quality and ecological balance of the different natural habitats? Sustainability? Is it more than just a buzzword? How can the principles of sustainable development be implemented?

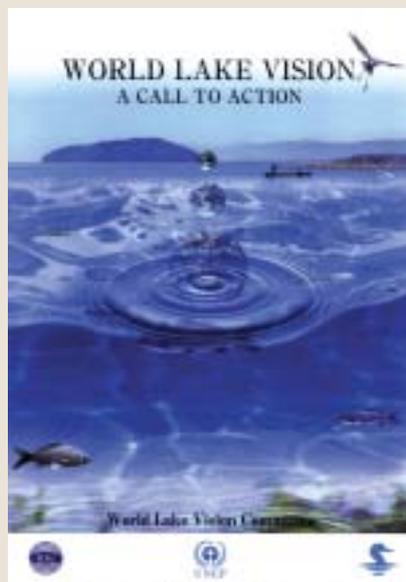
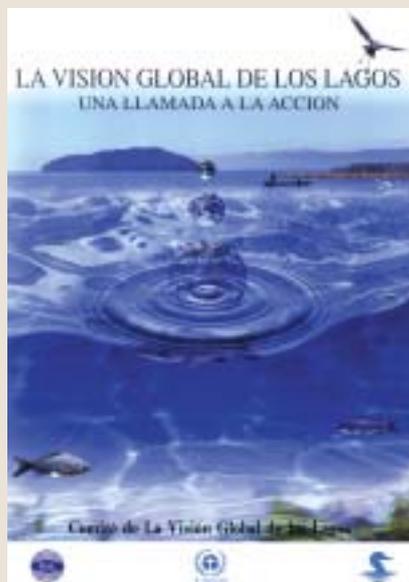
The vision as general target goal for the management plan should be the basis for joint actions of the different decision makers and stakeholders - an outlook for the future everybody is approving and ready to support.

Restoration of ecosystems already degraded as well as the commitment to the "Precautionary Principle" in order to avoid pollution have their place in the vision. The seven principles of the World Lake Vision can be used as guidelines for your work to establish a vision for the wetland/lake in your region.

Frame

In co-operation with the Japanese foundation ILEC, the International Environment Technology Centre UNEP-IETC, LakeNet and other organisations Living Lakes and GNF took part in the preparation of the World Lake Vision. The World Lake Vision is an important call for sustainable use of lakes and underlines the great importance of lakes for man and ecosystems. It provides a set of guiding principles for developing and implementing effective management programmes for the world's lakes. These principles augment those already articulated in the World Water Vision, but focus specifically on lakes, their unique characteristics and uses, and the threats they face. It also describes promising strategies to address these threats, which individuals and organisations working at the local, national, and global level can undertake over the longer term.

The seven principles detailed in World Lake Vision provide a road map for achieving the transition to managing lakes for their sustainable use.



The World Lake Vision was prepared by GNF, ILEC, UNEP-IETC, LakeNet and other organisations



The Dead Sea, Middle East

Principle 1: A harmonious relationship between humans and nature is essential for the sustainability of lakes.

Principle 2: A lake drainage basin is the logical starting point for planning and management actions for sustainable lake use.

Principle 3: A long-term, proactive approach directed to preventing the causes of lake degradation is essential.

Principle 4: Policy development and decision making for lake management should be based on sound science and the best available information.

Principle 5: The management of lakes for their sustainable use requires the resolution of conflicts among competing users of lake resources, taking into account the needs of present and future generations and of nature.

Principle 6: Citizens and other stakeholders must participate meaningfully in identifying and resolving critical lake problems.

Principle 7: Good governance, based on fairness, transparency and empowerment of all stakeholders, is essential for sustainable lake use.

Further information: <http://www.ilec.or.jp>



Boada Lagoon, Spain



On regional level, La Nava is designated as a Catalogued Wetland

Legal Responsibilities and the Protection of Designated Sites

There is no standardised EU regulation regarding the responsibilities for nature and environmental conservation. These vary across the countries within the EU. As for wetlands, all political levels normally have to assume certain responsibilities:

- > The local level (city or municipality) is often the landowner. In most countries they are responsible for land use or development plans, as well as wastewater treatment.
- > At the regional or federal level, in most countries responsibilities for nature and environmental conservation have been transferred to regional authorities, with a few exceptions. The countries are responsible for the designation of protected areas.
- > The national level is the contracting party for the EU to translate European Directives into national law, as well as having responsibilities for implementing obligations from international conventions. The national level is responsible for the designation of National Parks, and various international protection categories such as UNESCO World Heritage Sites, MAN Biosphere Reserves and Ramsar wetlands.

In most EU countries there are independent water authorities, divided into catchment areas, whose responsibilities for groundwater, flowing and still waters also have to be taken into account.

One crucial element of a management plan is an outline of all legal responsibilities, which will influence the subsequent action plan. Each measure should have a responsible organisation or

institution named. As well as political responsibilities, the private landowners of the areas have to be included. Public-private partnerships, where regional authorities assign certain tasks (e.g. restoration, maintenance, management) to private environmental organisations, without losing political responsibility, have become increasingly important.

This chapter cannot present a comprehensive overview of the situation within the European Union; for that, a separate review would be necessary. However, the examples of outline protection categories in Spain and Greece, given below, illustrate the range of political responsibilities for protected sites in each country.

European protection categories

Natura 2000 and Birds Directive: "Special Areas of Conservation" (SAC) under the Habitats Directive with "Special Protected Areas" (SPA) under the Birds Directive, both designated by Member States of the European Union, together form the European network for protected areas Natura 2000. Primary objectives for designated sites are the conservation of species and habitats listed in the appendices.

Bern Convention: This international treaty, signed by 40 nations, came into force in 1982. It is formally known as the "Convention on the conservation of European wildlife and natural habitats. Bern/Berne 19.IX.1979". Its stated aim is to "conserve wild flora and fauna and their natural habitats". The Convention requires parties to give special attention to the conservation of species listed in the treaty's appendices numbered I, II and III.

Bonn Convention: The Convention on the Conservation of Migratory Species of Wild Animals (also known

One crucial element of a management plan is an outline of all legal responsibilities, which will influence the subsequent action plan. Each measure should have a responsible organisation or institution named.

as CMS or Bonn Convention) aims to conserve terrestrial, marine and avian migratory species throughout their range. It is an inter-governmental treaty, concluded under the aegis of the United Nations Environment Programme, concerned with the conservation of wildlife and habitats on a global scale. Since the Convention came into force, its membership has grown steadily to 86 (at 1st June 2004). Parties are included from Africa, Central and South America, Asia, Europe and Oceania.

Migratory species threatened with extinction are listed in Appendix I of the Convention. CMS Members strive towards strictly protecting these animals, conserving or restoring the places where they live, mitigating obstacles to migration and controlling other factors that might endanger them. Besides establishing obligations for each State joining the Convention, CMS promotes concerted action between the States covering the range of many of these species.

European Diploma: The European Diploma is a prestigious designation awarded by the Council of Europe in Strasbourg. It is awarded to protected areas, which are of special European importance for their ecological, scientific, cultural or recreational value. The Diploma is awarded for five years, but can be extended if all regulations are complied with.

The European Diploma is awarded in three categories

- 1 **Category A:** Area for the protection of the European flora and fauna and their habitats
- 2 **Category B:** Area to conserve landscape characters and habitats
- 3 **Category C:** Protected Area to preserve landscapes for semi natural recreation.

International categories for protected areas

Convention on Wetlands of International Importance (Ramsar): The Convention on Wetlands (also

known as The Ramsar Convention) is an inter-governmental treaty providing the framework for international co-operation and national action for the conservation and wise use of wetlands and their resources. It was adopted in the Iranian city of Ramsar in 1971 and came into force in 1975 following Greece's signature as seventh country to the Convention. The Convention's member countries cover all geographic regions of the planet. There are presently 141 Contracting Parties to the Convention. 1387 wetland sites, totalling 122.7 million ha, are designated for inclusion in the Ramsar List of Wetlands of International Importance.

A wetland area is selected using criteria, such as those having a rare or unique wetland type within the site, or the site has to be of international importance for conserving biological diversity, relating to ecological communities or species, especially waterfowl and fish.



Information What are wetlands?

A definition by the Ramsar Convention

Wetlands occur everywhere, from the tundra to the tropics. They are characterised by water as the primary factor affecting the environment with associated flora and fauna. How much of the earth's surface is presently composed of wetlands is not known exactly. The UNEP World Conservation Monitoring Centre (WCMC) has suggested an estimate of roughly 6% of the earth's land surface.

The Convention on Wetlands of International Importance (Ramsar

Convention, Article 1.1) defines wetlands 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".

Five types of wetland are generally recognised:

- > Marine (coastal wetlands including coastal lagoons, rocky shores, and coral reefs)
- > Estuarine (including deltas, tidal marshes, and mangrove swamps)

- > Lacustrine (wetlands associated with lakes)
- > Riverine (wetlands along rivers and streams)
- > Palustrine (meaning „marshy“ - marshes, swamps and bogs).

In addition, there are human-made wetlands such as fish and shrimp ponds, farm ponds, irrigated agricultural land, salt pans, reservoirs, gravel pits, sewage farms and canals.

6 Legal Responsibilities and the Protection

IUCN (1994)

The World Commission on Protected Areas (WCPA), one of the six Commissions of the IUCN (International Union for the Conservation of Nature and natural Resources), is the only body working worldwide for the protection of important nature areas. IUCN categorises protected areas by management objective. It has identified six distinct categories of protected areas:

1 A-Strict Nature Reserve/

B-Wilderness Area: Protected areas are mainly managed for science and wilderness protection. No direct human interference, tourism or recreation allowed.

2 National Park: Relatively large areas managed mainly for ecosystem protection and recreation at a level which maintains the area in a natural or semi-natural state.

3 Natural Monument: One or more natural features of outstanding national interest protected because of their uniqueness or

rarity. Areas may have recreational or tourism value.

4 Habitat and Species

Management Area: Protected areas managed mainly for the conservation of habitats, such as bird nesting areas. May require management intervention (mowing, animal grazing, etc.).

5 Protected Landscape and

Seascape: Includes landscapes which result from a traditional interaction between man and land (or water). Primarily natural areas, managed intensively by man for recreation and tourism.

6 Managed Resource

Protected Area: Areas mainly protected for sustainable use of natural ecosystems. Under considerable pressure for colonisation or greater utilisation.

ecosystems, where the conservation of ecosystems and their biodiversity are combined with the sustainable use of natural resources for the benefit of local communities. This includes relevant research, monitoring, education and training. Thus, the three functions of a biosphere reserve are Conservation, Development and Logistic Support for research and monitoring.

World Heritage Site: The international World Heritage programme nominates specific sites of outstanding importance, either cultural or natural. Listed sites can obtain funds from the World Heritage Fund under certain conditions. The programme was founded with the Convention Concerning the Protection of World Cultural and Natural Heritage that was adopted by the General Conference of UNESCO on 16 November 1972.

Links: www.ramsar.org; www.iucn.org; www.unesco.org; <http://europa.eu.int>

UNESCO

Biosphere Reserve ("Man and Biosphere Programme" from 1970): Biosphere Reserves are areas of terrestrial and coastal or marine



Example Legal protection of Laguna La Nava in Spain

Legal Protection Status	Level	Responsible Administration
Ramsar site	International	Spanish State (Estado Español)
ZEPA Campos-Norte (Special Protected Area under the Bird Directive, Natura 2000)	European	Government of Castile-Leon, Regional Authority of Environment (Junta de Castilla y León, Consejería de Medio Ambiente)
Zona Húmeda Catalogada, Catálogo Regional (Catalogued Wetland)	Regional	Government of Castile-Leon, Regional Authority of Environment (Junta de Castilla y León, Consejería de Medio Ambiente)
Legal Protection planned		
Reserva Natural, Red de Espacios Protegidos (Network of Protected Areas)	Regional	Government of Castile-Leon, Regional Authority of Environment (Junta de Castilla y León, Consejería de Medio Ambiente)



Example Responsibilities of administrations in Spain

Administration	Level of Responsibility	Responsibility
Municipality Fuentes de Nava	Local	Owner and lessor of the wetlands surface
Municipality Boada de Campos	Local	Owner and lessor of the wetlands surface
Provincial Representation (corresponds to the German County)	Provincial	Advisory Function concerning Environment Laws and Regulations
Environmental Agency of the Regional Government	Regional	Administration and Protection of the Natural Resources and Environment
Agricultural Authority of the Regional Government	Regional	Agricultural Production and Rural Area Development
National Ministry of Environment	National	Ramsar-Wetlands, Water Protection
Water Authority (Confederación Hidrográfica del Duero)	National	Ramsar-Wetlands Water protection and other hydrological aspects



Example Legal protection of the Nestos Delta in Greece

Legal Protection Status	Level	Responsible Administration
Ramsar site	International	Greek Ministry for the Environment, Planning and Public Works (YPEXODE)
SPA - Special Protected Area (Birds Directive)	European	Greek Ministry for the Environment, Planning and Public Works (YPEXODE)
iSPA - Natura 2000 (FFH Directive)	European	Greek Ministry for the Environment, Planning and Public Works (YPEXODE)
National Law No. 486/B/80	National	Ministry for Agriculture
Ministerial Decree of 16 September 1996	National	Signed by several ministries, Greek Ministry for the Environment, Planning and Public Works (YPEXODE)
Non-hunting zone river Nestos bed	Regional	Kavala and Xanthi Regional Forest Services
Non-hunting zone Thassopoula island	Regional	Kavala Regional Forest Service
Planned Legal Protection		
National Park	International / National	Greek Ministry for the Environment, Planning and Public Works (YPEXODE) and Greek Ministry for Agriculture

6 Legal Responsibilities and the Protection



Example Responsibilities of administrations in Greece

Administration	Level of Responsibility	Responsibility
Municipality of Hrysoupolis	Local	Owner and lessor of small surrounding areas of wetlands, not the waterbodies
Department for Agriculture (Ministry for Agriculture)	Prefectural (Kavala)	Agricultural land use, management of "common land" for grazing and short-term agricultural use
Land Amelioration Service (YEV, Ministry for Agriculture)	Prefectural (Kavala)	Management and maintenance of irrigation & drainage canals, river waters, land reclamation and reorganization
Department for Fishery (= Eoptia Alias; Ministry for Agriculture)	Prefectural (Kavala)	Management of lagoon waterbodies and lakes (if characterised as "fishing grounds")
Department for Planning and Environment (several sections; Ministry for the Environment, Planning and Public Works YPEXODE)	Prefectural (Kavala)	Land use characterisation, Environmental Impact Assessment, Implementation of environmental laws
Department for Livestock (Ministry for Agriculture)	Prefectural (Kavala)	Management of Livestock, free grazing and animal health
Department for Agricultural Development (Ministry for Agriculture)	Region (Periphery of Eastern Macedonia & Thrace)	Renting and using rights of "common public ground"
Environment Department (Ministry for the Environment, Planning and Public Works YPEXODE)	Region (Periphery of Eastern Macedonia & Thrace)	Administration & Protection of Natural Resources & Environment, Decisions about Environmental Impact Assessments and their regulations
Public Ground Service (KED)	Region (Periphery of Eastern Macedonia & Thrace)	Selling of public ground
Forest Service (Ministry for Agriculture)	Region (Periphery of Eastern Macedonia & Thrace with local services)	Forest protection, reforestation, hunting,
Provincial Representation (corresponds to the German County)	Region (Periphery of Eastern Macedonia & Thrace)	Advisory function concerning Environment Laws and Regulations
Water Authority Committee	Region (Periphery of Eastern Macedonia & Thrace)	Water Framework Directive
National Ministry of Environment, Planning and Public Works	National	Ramsar-Wetlands, Natura 2000 Sites, EU Birds Directive, Water Framework Directive
National Ministry for Agriculture	National	Washington Convention (CITES) - the trade in endangered species of wild flora and fauna



Information NGOs responsible for nature reserves

Concept for the management of the nature reserve and protected landscape "Wollmatinger Ried-Untersee-Gnadensee"

Harald Jacoby, NABU

For decades, nature conservation organisations have been involved in the maintenance and management of nature reserves. An example of well functioning collaboration between an NGO and an environmental authority is the protection and maintenance activities in the Wollmatinger Ried. Since 1991 NABU Germany (German Association for Nature Conservation) has been responsible for this most important German lakeshore nature reserve, comprising more than 800 ha. The activities are being defined in a contract between NABU and the District Office for Nature Conservation and Landscape Management in Freiburg.

Goal

Maintenance and promotion of typical landscape ecosystems and their biological diversity.

Principles and focal points of the management and maintenance activities:

- > Management measures and associated research linked to theory and practice to achieve optimum biotope management
- > Reduce deficiencies in research knowledge by zoological and botanical monitoring and survey programmes

- > Develop the best possible protection through regular monitoring and sensitive PR work which recognises species protection requirements.

Scope of activities

- > Monitoring animal and plant populations at regular intervals (some permanent observation of certain indicator species) as basis for all management measures
- > Elaboration and optimisation of management and development plans. Implementation of management and landscape measures
- > Biotope management maintenance activities taking into consideration scientific aspects (preliminary surveys, application of results)
- > Organisation of guided tours on a fixed route with a limited number of participants
- > Monitoring the reserve
- > Preparation of annual reports.

Conditions for qualified management of a conservation area

- > Full time expert staff, additional external staff members
- > Administration building with research and maintenance facilities, PR department
- > Appropriate technical equipment for administration, management care of biotopes and accompanying research
- > Clear defining of responsibilities between nature conservation authorities and practical management organisations

- > Adequate financial government subsidies for the management maintenance costs.

Tasks of the NABU Nature Conservation Centre Wollmatinger Ried

- > Management and maintenance of the Wollmatinger Ried and other conservation areas on behalf of the District Office for Nature Conservation and Landscape Management in Freiburg
- > Information and expert advice for local people and visitors about the rich valuable biodiversity of the Lake Constance area and promotion of environmentally friendly behaviour
- > Production of expert opinion and reports concerning planning permissions and other plans related to the environment
- > Provision of ecological advice to authorities and initiating conservation-related ecological research.

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Black-winged Stilt

How to evaluate the Resources

If management and a management plan are intended to improve the environmental situation of a site, it is necessary to record and analyse the initial status of the natural, socio-economic and cultural resources. The first step is to define the outline of the project area and to gather reliable background information. It may be necessary to check information in the field before it is used to describe the state of the project area. Information should be collected both on the area as it is, and on developments that may affect the area in the future. A short summary of all information gathered could be included in the Management Plan.

An objective and comprehensive evaluation of the present status provides a basis for the definition of goals, the control of measurements, and long-term monitoring. Environmental assessment or performance audit normally takes at least four key areas into consideration:

- > Current situation of natural resources
- > All activities that have substantial effects on the environment

- > The legal, administrative, and other regulations that need to be accomplished
- > The administrative structure with responsibilities and influence on management.

Evaluating data and information on the environmental situation: SWOT analysis

A SWOT analysis is a useful tool for an assessment of the situation. SWOT stands for Strengths, Weaknesses, Opportunities and Threats. Strengths and weaknesses take account of internal resources and capabilities, whereas opportunities and threats refer to external factors - environmental, social and economic - which may impact upon the situation. A SWOT analysis is a good method for conducting a qualitative evaluation of the data on relevant natural resources and on aspects which may have substantial effects on the environment. Priorities are set according to which aspects are determined to be significant.

The data and information are presented and discussed in the course of a SWOT workshop. The results are to a certain extent subjective, as the starting points are

An objective and comprehensive evaluation of the present status provides a basis for the definition of goals, the control of measurements, and long-term monitoring.

Strengths	Weaknesses
S	W
O	T
Opportunities	Threats

SWOT means
<p>Four Blocks</p> <p>S Strengths W Weaknesses O Opportunities T Threats</p> <p>Upper and Lower Rows Current situation (upper row) is separated from expected conditions (lower row)</p> <p>Two Arrows</p> <ul style="list-style-type: none"> > Evaluate strengths with reference to dangers > Approach weakness on the basis of opportunities.

not available for all natural resources and for the direct and indirect environmental aspects, and because very few standards of comparison can be brought into the discussion on how to evaluate the local data. The final results will also depend upon the characteristics of the people who participated in the workshop.

Collecting base data, indicators and reference figures

To realise a SWOT analysis or any other kind of evaluation, all relevant data and information are needed. Very often this is the most time consuming part of the development of the management plan. This may be because there is no central information point for the data needed, or because data is either not comparable or not credible.

Base data are usually statistics that measure land, population, use of land, water quantity, bird population, etc. They establish the status quo for the area. Data regarding land and population can be obtained from federal, state and municipal statistical offices.

Indicators are often two or more base data in relation to each other. They can, for example, disclose how

the environment is being harmed, or highlight a possible development or trend and its effects on the environment. A typical indicator is population density (inhabitants per hectare or square kilometre of surface area), which shows the extent to which the available landscape is used for settlement.

Standards

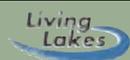
Are nitrate values of the wetland high or low? Is the proportion of sealed-up surface area large or small? Has the percentage of biological agriculture reached its maximum or can it be increased? Comparing data with those from preceding years can reveal a continuous amelioration (or the opposite). Comparing data with those from other areas with similar basic parameters or standards can identify whether a particular aspect of the site is situated above or below the average, where its strengths have to be preserved, and where priorities have to be set to improve or eliminate weak points. The European Union sets standards for health and environmental protection as well as for the improvement of living standards in terms of EU directives. In addition, voluntary regulations from institutes, economic lobby and pressure groups, social

organisations, citizen and consumer initiatives exist, generally shown by consumer labelling or by customer information and orientation.

Core reference data

For evaluation and monitoring it is important to agree on a set of core reference data. These data should be meaningful and relatively easy to obtain during a long-term period. They should cover all relevant environmental aspects. Most of the reference data indicate a status quo and must be adapted to serial data or a benchmarking system so that the improvement in environmental performance can be shown.

A range of base data and indicators is included in chapter 8. Some of them are identified as core reference data. It is necessary to choose the most appropriate set of core reference data - if possible adjusted to the data which are used for the management of comparable wetland areas to permit a regular exchange and benchmarking.



Advice Direct and indirect environmental aspects

The EU EMAS Directive differentiates between direct and indirect environmental aspects. This distinction is useful for the elaboration of a management plan, especially within the definition of responsibilities. Direct environmental aspects are defined as those aspects under

the direct supervision of the organisation, and as a whole dependent on the influence of the supervisory entity. Indirect environmental aspects are related to those activities of the organisation which it does not control completely, but which it can influence to a certain extent. Indirect

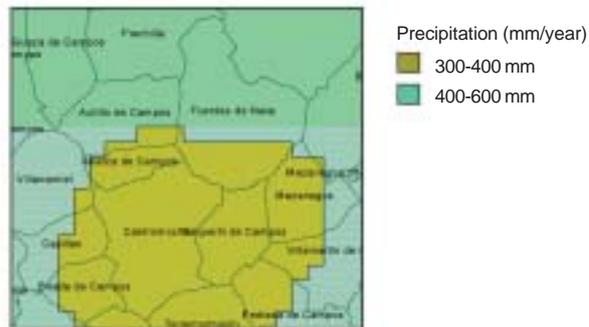
environmental aspects can result from a regional or national administration with superior responsibilities, but also relates to aspects such as the behaviour of local population and tourists.



Example Relevant data and sources

Data	Source of information	
General	Statistic Services, Environmental Agencies, Ministries, Universities and Academies, Land Survey Offices, Authorities, Federal and Regional Offices for Environmental Protection, Federal and Regional Departments of Nature Conservation	
	Greece	Spain
Geographical and geological data <ul style="list-style-type: none"> - Origin/Formation - Geology - Geomorphology - Geographical Maps - Climate and soils - Size 	Service of Geological Exploitation, Ministry of Agriculture, Topographical Service, Meteorological Service, Department of Agriculture	Regional Service of Infrastructures and Land Use Planning (Consejería de Obras Públicas y Ordenación del Territorio) Territorial Environmental Service (Servicio Territorial de Medio Ambiente) National Institute of Meteorology (Instituto Nacional de Meteorología) National Geographic Institute (Instituto Geográfico Nacional)
General hydrological data <ul style="list-style-type: none"> - Depth - Water quality - Average temperature - Nutrient budgets 	State Amelioration Service, National Health Service	River Duero Water Authority (Confederación Hidrográfica del Duero) Territorial Environmental Service, Government of Castile-Leon (Servicio Territorial de Medio Ambiente de la Junta de Castilla y León), National Institute of Meteorology (Instituto Nacional de Meteorología)
Current land use of the area <ul style="list-style-type: none"> - Agriculture - Forest - Settlement - Traffic - Industry - Fishery 	Department for Agriculture, State Forest Service, Department for Planning and Environment, Department for Traffic, Department for Industry, State Fishery Service	National Geographic Institute (Instituto Geográfico Nacional) Agriculture, Livestock and Fishery Service, Government of Castile-Leon (Consejería de Agricultura, Ganadería y Pesca de la Junta de Castilla y León) General Directorate of Traffic (Dirección General de Tráfico) Regional Office of Industry and Trade (Consejería de Industria y Comercios)
Conservation	Department for Planning and Environment in the Prefecture and Region; Ministry for Environment, Planning and Public Works; Forest Service	Regional Authority of Environment (Consejería de Medio Ambiente)

Example Map of precipitation in La Nava and Boada



Example Physical description of the Nestos Delta

Geology

The plain of the delta is of alluvial origin. The bordering mountain chain that expands its foot into the delta, is tertiary limestone with large white marble intrusions and mixed conglomerates. The catchment area of River Nestos is the central and western part of the Rhodope Mountains, of Palaeozoic age, and consists of metamorphic rocks, gneisses, granites, plutonites and amphibolites.

Soils

The delta soils show a characteristic mosaic pattern for coastal regions, which is small and very variable. Soils are basically sandy and on top with higher silt or clay contents. Totally sandy expanses can be found at the river bed, the river branches and its mouth. These sandy areas have large depth and are infertile. The sand is a result of the erosion of the mountain lands, since the River Nestos comes to the delta straight from the mountains transferring huge amounts of sandy grains. Because of over salinisation near the lagoons and coast and due to the high groundwater level a

characteristic stratification is found, typical for clay and marsh soils, developing towards salt marsh.

Climate

Characteristic Mediterranean climate during summer months, hot and dry without rain for several months and very continental conditions in winter with very low temperatures and strong northern winds. The average yearly rainfall is about 580 mm, recently getting fewer and the average yearly temperature 15°C. Minimum air temperatures occur in January (4°C) while maximum temperatures occur in July (26°C). November, December and January are the wettest months and July the driest. The coldest period is December-February with an average number of 11 days of frost. The temperature rarely falls below -20°C. Even the brackish coastal lagoons freeze, killing large numbers of fish. In short, the climate can be described as fairly continental.

The climate has changed noticeably since the Second World War, according to the older inhabitants of

the Nestos Delta. The summer thunderstorms, so important for agriculture in the area, often no longer occur. There is evidence to suggest that this is connected with the large-scale clearance of vast stretches of the Kotza Orman forest in the second third of the 20th century. Today, only artificial irrigation can guarantee the harvest to farmers.

Hydrology

The entire catchment area of River Nestos is 5,751 km² of which the 2,314 km² lie in Greece. The River Nestos has high water levels in winter and spring with an average annual discharge of 58 m³/s. An irrigation dam has been operating since 1966 in Toxotes. Two very large hydroelectrical dams have been constructed in 1996 and 1999 causing serious changes in the water flow regime and the sediments. The lagoons are shallow with a maximum depth of 1.8 m and have high water levels in the summer and autumn. The lagoons are quite eutrophic, and the tidal variation is very narrow (25 cm).



Aerial view of the Broads



Spanish exhibition panel on water quality

8.1 Hydrology: Water quality and quantity, water management

Julia Masson, Broads Authority

Water quality

Freshwater wetland systems are not isolated or self-contained. Materials and substances enter wetlands from their catchments and others exit via the streams that drain them.

Substances such as carbon and nitrogen are processed within the system, thus water quality within a wetland system is critical, as the concentrations or presence/absence of nutrients, substances and compounds will influence the floral and faunal composition of the aquatic community.

How do you gather the information to determine water quality?

Who could carry out the work?

> Statutory Agency

Generally, statutory agencies carry out water quality data gathering and analysis. In England and Wales this is carried out by the Environment Agency. Water samples taken from the Broads are analysed locally at Haddiscoe Laboratory or by the National Laboratory Service.

> University Researchers

University research departments could carry out specific research information about water quality or quantity. Depending on the complexity of the work, projects could be carried out by undergraduates through to PhD students, taking three or more years. Many university departments have associated consultancies.

> Consultants

Taking on a consultant, or contracting a university, will

require a budget. With sufficient funding for a contract, consider letting to a consultant with expertise in a particular field or to a consortium of various consultants for a more complex issue. The costs of employing a consultant usually require a tendering process to ensure value for money, and contracting the most suitable contractor.

> Staff

Staff with the ability to carry out survey work are invaluable and can become a source of expertise and knowledge on a subject area. Annual survey and monitoring work on water quality indicators, such as macrophytes and macro invertebrates, will build a valuable database to use with water quality data.

> Volunteers

Local people may have skills and knowledge to assist with water quality measurement and monitoring, such as taking pH readings, basic nitrogen and phosphorus monitoring.

What substances are important to monitor in a wetland and where do they come from?

Thousands of different substances are dissolved in natural water. Most of these substances will undergo some degree of transformation as they enter a wetland or lake system. Some may be nutrients supporting growth of aquatic organisms; others may enter into reactions that maintain less soluble nutrients in solution. Others may be light absorbent and affect the growth of plants and algae. Of all these the key nutrients present in aquatic systems are the compounds of nitrogen and phosphorus.

Nitrogen and phosphorus are described as limiting components, because their natural supply is lower

The critical locations for substance loading into the water tend to be easier to identify from point sources, such as sewage treatment works, rather than from diffuse sources, for example from agricultural land, which could arise from a number of unspecified locations.



Information Water quality testing

Analytical chemistry can be carried out by staff and trained volunteers using a Photometer, which measures the colour intensity of water samples treated with reagent tablets. Light is

passed through a test tube containing a sample solution. The wavelength of light detected by a photocell is proportionate to the concentration of the substance being measured, such as phosphorus. The final result is

obtained by comparing the light reading against a calibration chart. Further information about equipment can be found on the internet, for example at www.palintest.com

than the amounts organisms need. These elements enter the aquatic systems as ammonium or nitrate ions containing nitrogen, and as phosphates containing phosphorus. Clay colloids and iron minerals also carry adsorbed phosphate and detritus containing nitrogen, into the aquatic system. These forms of nitrogen and phosphorus may become available for algal or plant growth directly, by simple chemical reactions or by action from bacteria. These amounts are referred to as Total Nitrogen and Total Phosphorus.

For stable, aquatic plant communities without the threat of domination by phytoplankton, phosphorus levels should be around 25-50 mg/l of total phosphorus per litre, and nitrogen at 250-500 mg/l per litre. The presence of nutrients above these levels will eventually switch the system 'forward' from aquatic plant domination to phytoplankton domination. Other 'forward switches' include herbicides

and pesticides, increased salinity, mechanical or boat damage, exotic vertebrate grazers and loss of piscivores. Methods used to reverse the switch include adding piscivores or carrying out biomanipulation.

Sediments

One of the key questions is where are sediments coming from?

For example, sediments entering the system arise from soil washed from land or eroded from river banks, or from organic matter arising from dead algae, leaves and other plant matter. The source of sediment can affect water quality as it brings in nutrients and pollutants causing eutrophication and toxic effects, whilst in suspension. The sediment itself also affects the availability of light. Deposition of sediments causes rivers and lakes to silt up and can lead to closure of navigation channels. Sediment quantities can impact on fishing interests particularly

where changing patterns of sediment deposition alter fish spawning substrates. Variations in water depth can change the growth of aquatic plants and their rooting substrates.

Where are the critical locations for loading nutrients?

The critical locations for substance loading into the water tend to be easier to identify from point sources, such as sewage treatment works, rather than from diffuse sources, for example from agricultural land, which could arise from a number of unspecified locations.

The key point sources for phosphorus inputs tend to be from sewage treatment works, industrial process effluents and from domestic septic tanks or smaller wastewater digesters. Phosphorus also enters the aquatic system via soil loss through erosion containing phosphates bound to soil particles. Chemical processes within lake



Information Monitoring of nutrients

In England and Wales, the Environment Agency monitors nutrient loadings of nitrogen and phosphorus, salinity, and pesticides. This information is stored on a National database providing data on chemical and biological river quality and nutrient (nitrate and phosphate)

concentrations of monitored rivers. River water quality is one of the UK Government's 15 indicators of sustainable development. This is a useful starting point for gathering data as it can be found on the internet at

www.defra.gov.uk/environment/statistics/inlwater/iwnutrient.htm

Data on pesticides in freshwaters are also prepared by the Environment Agency. About 100 pesticides are commonly detected, but in very small quantities. Two most frequently found pesticides in surface waters are isoproturon and mecoprop - both agricultural pesticides.

8 Resources >>

sediments can lock up the phosphorus, removing it from the overlying water body. However, phosphorus is still available to aquatic plants, which obtain phosphorus through roots and rhizoids.

Nitrogen has been identified as the key nutrient to reduce from aquatic ecosystems. Nitrogen mainly enters the aquatic system as nitrate from agricultural fertiliser inputs via land drains or soil leachate. These diffuse sources are difficult to remove where they enter the watercourses. A changed approach to agricultural land management within wetland

systems will be needed to reduce inputs by use of buffer zones and different practices.

Pesticides

The presence of herbicides and pesticides can have a profound impact on water quality and the health of the wetland. Even at low concentrations, pesticides can accumulate through the food chain and remain in sediments for many years. Decades of pesticide inputs into aquatic systems have shown that pesticides can build up in the food chain, such as one of the most

potent, the organochloride DDT. This causes infertility in top predators, such as otters.

Several thousand new chemicals are introduced into the environment every year through industrial developments. Linking these substances to effects in lakes usually requires intensive research.

Water quantity

Where is the water coming from?

Water on the Earth's surface moves in a cycle through rivers, oceans, clouds and rain. This cycle is

Summary table showing key substances to monitor in a wetland system and their sources

Substance	Source
Nitrogen	<ul style="list-style-type: none"> - Nitrates from agricultural fertilisers - Fertiliser run off through land drains - Leaching through soils - Sewage treatment works
Phosphorus	<ul style="list-style-type: none"> - Sewage treatment works - Domestic septic tanks and soakaways - Detergents from boats - Large bird roosts
Pesticides	<ul style="list-style-type: none"> - Agricultural - Antifoul on boats, e.g. TBT - Sewage treatment works
Sediments	<ul style="list-style-type: none"> - Upstream river erosion - Soil run off - Erosion through boat traffic - Organic sources, such as leaves, algae, slurry



Example Use of biomanipulation

A technique known as biomanipulation has been used to further the establishment of clear water. This technique involves the temporary removal of planktivorous fish to one side of an artificial barrier. Numbers of

zooplankton on the other side of the barrier build up with the predation pressure removed. Zooplankton, particularly water fleas *Daphnia sp.*, graze algae, so promoting improved light conditions within the water and encouraging aquatic plant growth.

Experiments using giant 'cobweb' brushes, acting as artificial plants, have shown that providing predator-free refuges for zooplankton enhances the return to clear water and establishment of aquatic macrophyte communities.

powered by the sun, which causes evaporation of water from the oceans. Condensed water vapour blows over the land as clouds, where rain and snow fall. This precipitation runs off the land into streams and rivers, which flow down to the sea to complete the cycle.

Water resources are greatly influenced by the interplay of rainfall patterns and seasonal losses through evaporation. Rivers are sustained and reservoirs replenished, by the balance between rainfall and evaporation loss. Evaporation can occur directly from the soil, from open water surfaces or as transpiration from plants. Abundant water resources can lead to flooding, too little rainfall to drought conditions. Records for the last decade show great variability in river flows and groundwater levels, and underline the vulnerability of wetland systems to extreme weather conditions.

What systems are in place that impact on the water supply?

A constant water supply is demanded for domestic, agricultural and industrial use, which can put pressures on natural freshwater wetland systems.

Methods of acquiring water include storing water in reservoirs, extracting from groundwater or damming rivers and streams. Water is removed from the system by abstraction for domestic or agricultural use. In England, the Environment Agency issues water abstraction licences, which permit agricultural businesses to abstract specific volumes from rivers or groundwater sources. In agricultural systems pumping can impose lower water levels in ditches and drains. So, in areas where the land is located near to the sea, pumping can draw saline water into the groundwater and into the wetland system.

How can water be managed for better ecosystems?

Water management is the control of the water supply, which is influenced by rainfall, surface flows, groundwater and evapo-transpiration.

Controlling the water supply to and within a site can be carried out using sluices, dams and bunds. There are numerous different designs for these structures, which can be employed in isolation or in combination. Some of these can be found in books listed under further reading, or see the RSPB Reedbed Handbook.

Consideration of the following questions will help to determine which to use:

- > Are there any legal requirements, such as licences required, for holding up and releasing water?
- > Are there any limitations on the volumes of water that can be used?
- > Should a levelling survey be carried out before planning water management on site?
- > Should the site be managed in a series of hydrological units so that finer water level controls can be in place?
- > What management practices are required after installing water control structures?
- > Could the units be interconnected using a series of sluices and pipes?

Careful design and quantity measurement work will be required, to ensure that the volumes of water are reaching the right areas and in the expected quantities. Over flooding or too much draw down should not be part of the result.

Water distribution can be controlled by:

Sluices

Sluices conduct and control water flow. They can be self-contained or

part of larger dams/bunds or weirs where the aim is to regulate, as well as impound water.

Designs for sluices can include:

- > Pipes - swivel, flexipipe
- > Dropboard
- > Lifting gate eg penstock.

The type of sluice used is influenced by the precision of water control required, range of depths required, labour available to operate and maintain structures, extent of variation in seasonal flows, any vandalism problems and susceptibility to blockage from debris and plant growth.

Water control structures - dams and bunds

These are structures/barriers used to impound water, and are not usually used for overtopping onto wetlands, except where an overflow/spillway is incorporated into the design.

The disadvantages of installing a dam or bund are that they:

- > Require water control equipment which must be installed and maintained
- > Inhibit movement of aquatic species eg fish.

Pumping

Water pumps can be used to draw down or raise water levels in ditches, reedbeds and other water features where levels may have fallen due to abandoned sluices, diversion of supply or water abstraction. Raising water levels can impact on the hydrology of a site. Raising water levels will encourage reed establishment, and prevent colonisation by scrub although well-established willow and alder may tolerate flooding.



Information Water quality legislation

In developing a management plan to include measures for water quality first set the site in the context of legislation that applies to water quality.

What legislation applies to the site?

European Directives set the framework for establishing water quality measures across member states.

The most influential piece of legislation is the Water Framework Directive, and a number of areas of legislation relate to this Directive.

Water Framework Directive

The Water Framework Directive establishes a list of priority hazardous substances which are of concern for freshwater, coastal and marine environments. These substances will be removed from discharges and

emissions within the next 20 years. Heavy metals, pesticides and organic compounds are included.

Nitrates Directive

Implementation of the Nitrates Directive is the culmination of twenty years of European Community measures concerned with nitrogen pollution in waters. This Directive adds to the emphasis placed on the environmental effects of excess nitrogen, in particular eutrophication. Two key actions will be extensive Nitrate Vulnerable Zones and Codes of Good Agricultural Practice, such as buffering, good soil management and appropriate applications of nitrogen.

Urban Wastewater Directive

The objective of this Directive is to protect the environment from the

adverse effects of discharges of urban wastewater and of wastewater from industrial sectors of the agro-food industry. In particular this prescribes the phosphorus limits for sewage treatment works discharging into susceptible waters - that is those water bodies which are eutrophic.

Habitat Directive

The Habitats Directive relates to sites with communities and species of European importance.

The Habitats Directive imposes the requirement for sites designated as SACs to meet favourable condition and EU member countries set their own criteria for meeting favourable condition. Criteria set can be a measure of water quality.



Example Case study

The shallow lakes in the Broads are classified as hard, oligo-mesotrophic waters with benthic vegetation of stonewort *Chara* formations. The measure of water quality measure is given as the 'absence of algae and unicellular algal blooms'. The total range of

phosphorus is established by quarterly measurements over a three year period and then annually in July/August. The target set for a *Chara* lake is 30 mg per litre total phosphorus or below. In eutrophic conditions above 30 mg per litre should not be prevalent. Applied on the ground this

criteria for favourable condition has been developed into a working criteria for one of the shallow lakes in the Broads, Hickling Broad, to 35 mg per litre mean summer total phosphorus.

Fernando Jubete, Fundación Global Nature

The steppe lakes La Nava and Boada belong to the lagoon complex "Mar de Campos" within the catchment of the river Duero. Due to low precipitation and rapid evaporation in the summer months there are few large rivers, which are generally canalised.

Water catchments in Spain

Natural water bodies in this area are classified in three groups:

- > Rivers and streams, which permanently contain water, e.g. the river Carrión
- > Rivers and streams with variable water levels (short length, wide course, low gradient), e.g. the rivers Valdejinate, Retortillo, Salón
- > Natural reservoir without outflow, formed by geological processes in clayey, permeable soil.

The natural reservoir La Nava

In the Tierra de Campos region there are two catchments for natural reservoirs, from which two lagoon complexes originated: Mar de Campos near Palencia with the steppe lakes La Nava and Boada still present, and the salt lakes of Villafáfila in the region Zamora.

Mar de Campos, located at about 760 m above sea level, used to have a catchment area of 864 km². In autumn and winter the original lagoon was fed by a number of small streams which flooded the shallow depression and formed the lagoon. In summers, due to clayey soils, low precipitation, and hot and dry weather, the water disappeared except for a few patches. The area was then used as grazing land by the surrounding municipalities.

These pastures showed fresh growth even in August and were in high demand.

Water Management in La Nava

Canalisation of rivers, intensive irrigation of agricultural areas, and difficult ownership structures complicate the water management of the steppe lake La Nava. Also, a number of drainage channels still exist on private land around the lake. Thus, the natural cycle of flooding and desiccation has to be maintained by management measures. As the rainfall in autumn and winter is not enough to fill up the lake, additional water from the nearby Canal de Castillo is fed into the lagoon in October. The water from the canal is of good quality and mainly used for agriculture. With the help of sluices, the water feeds into the steppe lake via the streams Retortillo and Carrepadilla, until an average depth of 40 cm is reached.

With increasing temperature from the middle of March, almost the entire water surface is colonised by sedges and rushes (*Carex* and *Juncus*) within a short time. Only the deepest areas remain open at first, but by the end of April they are covered with water buttercup (*Ranunculus sp.*), laying a white flower carpet across the surface. Other water plants, such as stone worts (*Chara spp.*) or pondweed (*Potamogeton spp.*), follow and by producing oxygen ameliorate the water quality. Moreover, they are an important part of the diet for breeding birds at La Nava.

Water Management of Boada

The steppe lake Boada is located in a depression of the plains of Tierra de Campos, which are dominated by

grain production. Restoration measures returned the lake, which had disappeared completely, back to two thirds of its original size at 65 ha.

Analyses of the chemical components of the water showed a slightly saline character, with a pH of 9.8. The lagoon has no outflow and in former times was fed solely by the river Lobera and by rainfall. Today, water has to be supplied to reach an average depth of 40 cm. Water from the Canal de Castilla reaches the lake through the river Lobera, but untreated wastewater from the municipality of Villaramiel (1,200 inhabitants) with eight small leather production enterprises, is discharged into the river Lobera as well. Additional impacts result from diffuse nitrate and phosphate loads from agriculture, which also concentrate in the river Lobera. The leather industries have ignored legal requirements so far and discharge toxic substances containing aluminium, chrome and sulphides in large amounts. This has a considerable affect on water quality, with negative consequences for water plants.

Water catchment of the river Duero in Spain



■ Catchment of the river Duero



Aquatic buttercup formations in La Nava lake



Details of hornwort leaves



Diverse types of vegetation in a healthy wetland

8.2 Ecosystems, flora and fauna

Santos Cirujano,
Real Jardín Botánico Madrid, CSIC

Evaluation of ecosystems: Aquatic plants as indicators

The aquatic plants that live in steppe ponds and the emergent plants found at the water's edge or in shallow areas offer valuable information about the state of conservation and ecological characteristics of the aquatic ecosystem.

There are two fundamental types of aquatic plants, emergent and strictly aquatic. The strictly aquatic plants are most sensitive to environmental changes and provide the best information about what is happening in the aquatic habitat. It should not be forgotten that these plants, known as aquatic macrophytes, complete their biological cycle in the water.

A well conserved aquatic ecosystem usually contains both aquatic and emergent plants, and the aquatic flora differs depending on the ecological characteristics of the aquatic ecosystem. The plants in a seasonal pond, like most of the steppe ponds, are different from those that colonise permanent ponds. In addition, if the waters are brackish we will find halophilic plants that have adapted to two selective ecological factors: seasonality and an increase in salinity as the annual cycle progresses.

Thus, wetlands of different types have different aquatic flora. In order to analyse the changes that occur in a wetland in response to a variety of reasons, it is essential to know what plants are characteristic of each type of aquatic habitat.

Although it is difficult to define a general scheme for steppe ponds, the main aquatic plant formations

present can be analysed. These can be summarised as:

- > Submerged algae formations (stoneworts, or charophytes)
- > Flowering aquatic plant formations
- > Emergent plant formations
- > Filamentous algae.

Submerged algae formations

Stoneworts, or charophytes, are advanced algae that live under water. This means that they dry out in contact with air, as usually occurs in summer when the water depth decreases due to evaporation.

These formations are constituted by different species and varieties that colonise from fresh waters with scant mineral content to continental brackish ponds with salt concentrations that greatly surpass those of seawater.

In any case, the presence of charophyte meadows indicates good water quality and the absence or only a low level of pollution. These formations are the first to disappear when effluents enter the pond, regardless of origin. They are a good indicator of the environmental quality of aquatic ecosystems. In the Iberian Peninsula, 45 charophyte taxa have been identified, belonging to the genera *Chara*, *Nitella*, *Tolypella*, *Lamprothamnium*, and *Nitellopsis*. On the other hand, these green algae contribute to water transparency because they keep bottom sediments from being disturbed and they produce oxygen that diffuses through the water and enhances the biotic potential of the wetland.

Flowering aquatic plant formations

This section includes a number of aquatic plants that may grow completely submerged, others that have floating flowers and leaves, and a few that float freely on or near the water surface. Some, like

A well conserved aquatic ecosystem usually contains both aquatic and emergent plants, and the aquatic flora differs depending on the ecological characteristics of the aquatic ecosystem.

buttercups (*Ranunculus peltatus*, *R. trichophyllus*) or most species of Zannichellia, live in shallow seasonal waters. Others, like duckweed (*Lemna minor*, *L. gibba*), float on the surface of polluted water. Hornwort (*Ceratophyllum demersum*, *C. submersum*) lives on muddy pond floors rich in organic matter. *Ruppia drepanensis* is found only in seasonal and highly brackish waters. About one hundred different species of aquatic plants constitute the Iberian water flora, although some of them, like water lilies (*Nuphar luteum*, *Nymphaea alba*) or pondweeds (*Potamogeton lucens*, *P. natans*), only live in permanent waters.

Depending on the nature of the waters and degree of pollution, different species will be present, offering information about the characteristics of each wetland and its state of conservation.

Emergent plant formations

Marginal or emergent plants are also an important component of wetland

vegetation. Their presence usually provides less information than strictly aquatic plants, but it is also useful and advisable to be familiar with these plants.

Generally, in seasonal wetlands the largest emergent plants, like bulrushes, or cattails (*Typha domingensis*, *T. latifolia*), and softstem bulrushes (*Scirpus lacustris*) colonise zones where water remains longer. Smaller emergent species, like saltmarsh bulrush (*S. maritimus*) or spikerush (*Eleocharis palustris*), live in enclaves with shorter periods of flooding. Consequently, emergent plants offer information about the permanence of water, since most plants of this type not only tolerate water pollution but often grow more robustly and abundantly in polluted ecosystems. In the Iberian Peninsula, 225 species of emergent plants are recognised.

Filamentous algae

Filamentous green algae are not an essential component of aquatic

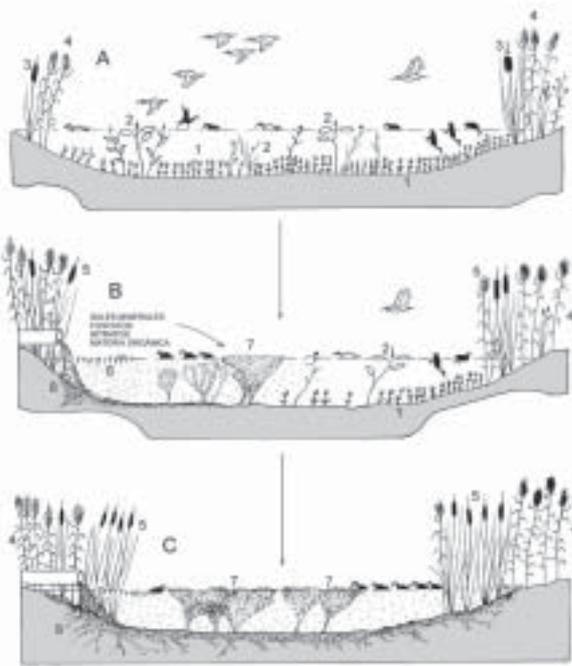
ecosystems. These formations are initially submerged but rise to the surface as the waters warm, forming large floating masses. They appear and develop exuberantly in the presence of excess nutrients, as usually occurs when wetlands are polluted by effluents, especially urban wastewater.

Filamentous algae are always good indicators of pollution and their development is inversely related to charophyte growth. If we visit a wetland and see that it is covered by filamentous algae, usually of the genera *Cladophora*, *Spyrogira*, or *Oedogonium*, it is a clear sign that the ecosystem has an excess of phosphorus, an unequivocal symptom of eutrophication.

Each of the plants in these groups has its own ecology. Some are more abundant than others, but all of them provide information about what is happening in the wetlands that they colonise.



Abundant filamentous algae is an unequivocal sign of pollution



Phases of wetland eutrophication

A The system is balanced and biologically diverse, with charophyte meadows covering the pond floor and a variety of aquatic plants. **B** The entrance of polluting effluents alters the ecosystem; the charophyte cover decreases and some aquatic plants disappear; filamentous algae and duckweed appear; the marginal vegetation changes; organic matter in sediment and water turbidity increase. **C** The wetland is hypertrophic; charophyte meadows have disappeared and there are abundant filamentous algae and duckweed; there are no other aquatic plants and the marginal vegetation is monotonous and intensely developed; sediments contain a large amount of organic matter; waters are turbid, poorly oxygenated, and foul smelling.

1 Charophyte meadows **2** other aquatic plants, *Zannichellia*, *Potamogeton* **3** *Typha latifolia* **4** *Phragmites australis* **5** *Typha domingensis* **6** *Lemna gibba* **7** filamentous algae **8** organic matter and sediments

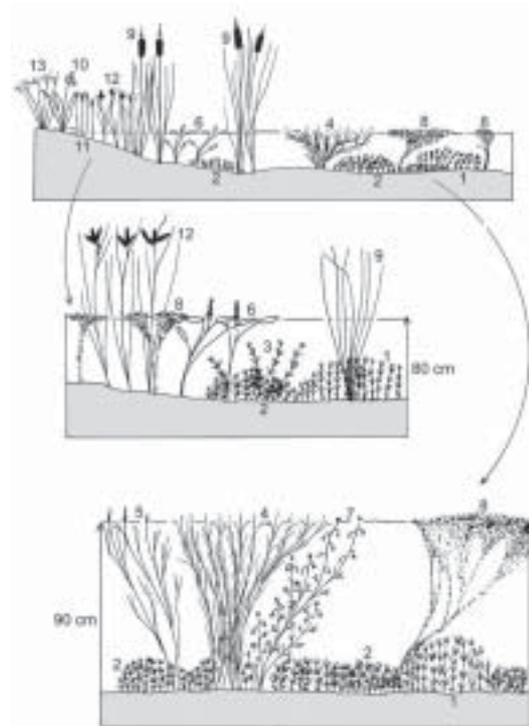


Diagram of aquatic vegetation in a well conserved wetland (Arcaute pond in Vitoria, Spain)

1 *Chara fragilis* **2** *Chara vulgaris* **3** *Chara hispida* var. major **4** *Potamogeton berchtoldii* **5** *Potamogeton pectinatus* **6** *Polygonum amphibium* **7** *Ranunculus trichophyllus* **8** filamentous algae **9** *Typha latifolia* **10** *Iris pseudacorus* **11** *Eleocharis palustris* **12** *Scirpus maritimus* **13** *Juncus effusus*

Since their restoration ten years ago, the steppe lakes La Nava and Boada have become one of the most important wetlands in northern Spain. Currently 43 bird species winter or rest in the lagoon complex. Waterfowl are the most widespread bird species: up to 30,000 Greylag Geese, thousands of ducks, among them Common Teal (*Anas crecca*), Mallard (*Anas platyrhynchos*), Shoveler (*Anas clypeata*), Wigeon (*Anas penelope*) and Pintail (*Anas acuta*).

Whilst many of the wintering birds move on in spring to breeding areas in Central Europe, breeding birds

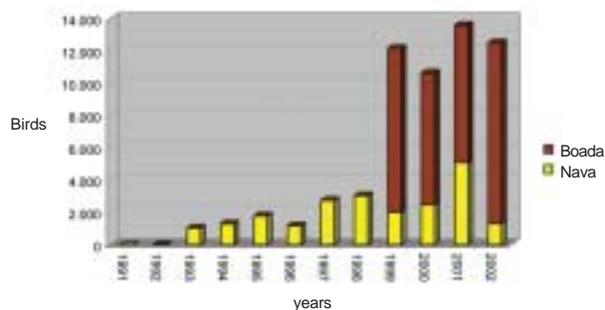
return and enjoy the short period of water-filled lagoons. Black-winged Stilt (*Himantopus himantopus*), Lapwing (*Vanellus vanellus*), Coot (*Fulica atra*) and Marsh Harrier (*Circus aeruginosus*) nest in the reed areas and raise their young.

During the summer months and in autumn, the steppe lakes are dry and appear more as a desert than a wetland. Helophyte vegetation and bushes which survive the dry summers offer food for birds feeding on insects and shelter on their way to the wintering area, among them Willow Warbler (*Phylloscopus sp.*), Black Cap (*Sylvia sp.*), Reed

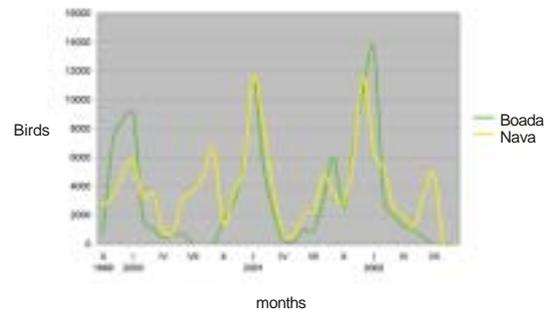
Warblers (*Acrocephalus sp.*), Flycatcher (*Ficedula* and *Muscicapa*), and Grasshopper Warblers (*Locustella sp.*).

Since 1991 Fundación Global Nature España has carried out regular bird counts at the steppe lakes of La Nava and Boada. Winter censuses are carried out from October to January. In the summer breeding sites are monitored and birds ringed. Experienced volunteers ring about 10,000 birds annually at a specialised ringing station. The data is being exchanged between other ringing stations in Europe.

Development of the number of Greylag Geese (*Anser anser*) in lagoons La Nava and Boada (censuses in January)



Comparison of the monthly bird censuses in the lagoons La Nava and Boada, October 1999 - September 2002



Warbler (*Acrocephalus sp.*) after ringing



Example The ecosystem of the Nestos Delta lagoons

Research and management proposals for their conservation and restoration

G. Sylaios, National Agricultural Research Foundation

V.A. Tsihrintzis, Democritus University of Thrace

H. Jerrentrup, Society for Protection of Nature and Ecodevelopment (EPO)

Coastal lagoons are complex ecosystems, which are in a state of fragile natural balance. Environmental degradation caused by pollution and other human activities can easily cause deviation from this natural balance. In general, they are ephemeral coastal features of recent origin, where intense mixing of fresh and saline water takes place. Coastal lagoons occupy 13% of the world's coastline and have a number of common characteristics. They appear in all continents from the tropics to polar regions, but they are particularly prominent in the low latitudinal zone. They usually occupy coastal shallow depressions and are separated from the open sea by a natural barrier. Coastal lagoons exhibit salinities that range from completely fresh to hyper saline, relating closely to the local dominating climate and hydrographical conditions.

Importance of lagoons

As coastal lagoons are important for fisheries, aquaculture and wildlife on a global level, and for Greece in particular, research is directed towards the study of the relationship between the various environmental factors and biological production of the lagoon. Environmental parameters may directly influence the fishery production dynamics of the ecosystem. Therefore, water, salt, nutrients and heat balance are central to understanding the

biological, chemical and physical processes of coastal lagoons; basic requirements for their management and conservation.

Management goals

As coastal lagoons are linked to adjacent land and ocean ecosystems, the exchange of water, salt, nutrients and heat between these systems plays a major role in determining the processes in the lagoon. Water and materials enter the lagoon via stream run off or groundwater flow, react in the lagoons and accumulate in the sediments, or are removed to the ocean without reaction.

This land-lagoon-ocean system linkage is complicated, but unravelling the complexity brings about an understanding of the lagoon productivity patterns. Water fluxes control the lagoon flushing and help to maintain water quality. This also provides a mechanism for planktonic inward/outward transport, and maintains the lagoon's function as a fisheries nursery. Salt fluxes determine the estuarine characteristics of the lagoon and define floral and faunal community structure as well as the spatial distribution of fish. Dissolved inorganic nutrients provide the raw materials for the marine trophic chain as lagoons serve as the main routes for nutrient fluxes coming from continental (landward) drainage into the marine environment.

The integrated management of the coastal Nestos Delta lagoons focuses on:

- > The quantitative and qualitative characteristics of lagoon water
- > The exchange dynamics of lagoon water with the adjacent coastal sea

- > The mechanisms stimulating primary production (phytoplankton) in the lagoon
- > The growth and distribution of macrophytes and other benthic organisms
- > The species composition and populations of wildlife
- > The existing fishery and aquaculture activities.

Research results

A series of studies have focused on the estimation and quantification of water, salt and nutrient fluxes between the land-lagoon boundary and the lagoon-ocean boundary. These studies have also investigated the influence of the human activities (agriculture, livestock, domestic and industrial) on the whole drainage basin of the lagoon. Sylaios and Koutroumanidis (2002) carried out a theoretical evaluation of nutrient loads by investigating the different sources of nutrient losses in the Nestos Delta lagoons. Nutrient sources were divided into point sources (generally man-made such as urban, industrial or animal wastes) and non-point sources (generally derived from losses from cultivated and uncultivated land, precipitation or urban run off). To theoretically estimate nutrient loads it was necessary to collect data concerning land use, population, agricultural, industrial activities and animal wastes and to factor them by applying an appropriate effluent discharge coefficient. This evaluation gave an indicative estimate of nutrient loadings, as it was based on generalised effluent discharge coefficients for a single source of release, calculated without

taking into account the differences between drainage basins. Following the LOICZ (LOICZ, 1996), methodology the amounts of total nitrogen and phosphorus (in kg/yr) entering the Nestos Delta lagoons were expressed in terms of dissolved inorganic nitrogen and dissolved inorganic phosphorus (in mol/yr).

For the measurement of fluxes between the lagoon-ocean boundary, intensive monitoring at the lagoon mouth has to take place in order to quantify the amounts of water, salt, nitrogen, phosphorus, chlorophyll-a and suspended sediments that are exchanged between both systems. Such studies can lead:

- > To calculating pollutant loadings to and from the open sea, thus identifying sources of pollution
- > To assessing the 'return flow factor' (e.g. the amount of water returning back into the lagoon during flood) at the lagoon mouth
- > To the estimation of the lagoon's flushing time under various tidal, hydrological and meteorological conditions.

Sylaios et al. (2002) presented results from an intensive monitoring programme at the Vassova lagoon mouth, and quantified the

mechanisms responsible for water, salt and nutrients exchange between both systems.

Proposals from the research

The results of this research suggest that the increase in agricultural activity in the wider lagoon region, and the cultivation of water and fertiliser demanding crops (rice, corn, cotton) have led to the degradation of the ecological condition of the Vassova lagoon. Even in micro-tidal lagoons (lagoons forced by tidal amplitude less than 0.5 m), tides provide the principal mechanism for transporting water and substances at the mouth and the inner channels of the lagoon. Superimposed on the tidal circulation is wind influence and that of freshwater input. In Vassova lagoon we have found that wind-induced exchange may equal the levels of tidal exchange when assisted by the effects of wind on an inclined surface. Southerly summer winds transport water inwards, while northerly winter winds have only a small impact on the overall transport mechanism. Freshwater inflow appeared suppressed, due to limited direct freshwater imports, and precipitation only plays an important role in the lagoon flushing. Thus the improvement of water circulation and flushing conditions of Vassova lagoon has naturally led to the consideration

and speculation about dredging the existing entrance canal (increase of width, depth or both), or opening a second entrance canal. The aims of these suggestions are to improve water exchange with the adjacent sea, reduce the observed nutrient buffering capacity of the system, and ultimately improve lagoon water quality.

To supply relatively unpolluted freshwater at the lagoon's eastern shore, a vegetated buffer filter strip of about 6 ha was created to remove nitrogen and phosphorus loads from concentrated effluents in the drainage canals. In this zone, more than 50,000 water plants (*Typha angustifolia*, *Typha latifolia* and *Phragmites sp.*) were planted in three basins in succession. More than 770 m of old drainage canals were filled with excavated materials to bring controlled water flow into the three basins. Between the last basin and the lagoon an overflow containing an additional earth-gravel filter was constructed. The filter strip was flooded and drained with fresh water three times to wash out surface salt. Afterwards it was flooded permanently and first measurements show that at least 60% of the phosphorous and nitrogen loads are filtered out already in the first year by the planted water plants.

8.3 Aspects of cultural landscape

Cultural landscapes are brought about by human influence; they are landscapes with a human imprint. Important factors in the development of cultural landscapes are existing natural aspects such as the character of the area, the original fauna and flora, human influences and needs, as well as interactions between these factors. Cultural landscapes reflect the exposure of nature to humans in many ways.

Traditional agricultural management has mainly formed central European landscapes. By developing variety in structure, this traditional land use has created habitats richer in

species diversity than some of the original natural landscapes. Many species therefore depend on traditionally managed habitats. However, since the beginning of agricultural intensification for economic reasons, this variety has increasingly disappeared.

If nature conservation work focuses on protection of areas including particular species which only exist due to human activity, it is essential to define the "preferred" status of the area and the most important conservation goals before carrying out any management work.

Wetlands and lakes, whether natural or man-made, are important parts of the cultural landscape. In order to describe the interactions and interdependencies between

wetlands and other aspects of the cultural landscape a systematic assessment of the history of origin, status quo and future development is required.

The purpose of a cultural landscape assessment is to enable a wetland manager to identify, evaluate, and manage the cultural resources inventory. Collection of appropriate data provides the basis for assessing the significance of various elements of the cultural landscape. Once the significance of the property has been established, however, the integrity of the property must be assessed. The aspects of integrity are: location, design, setting, materials, workmanship, feeling and association.



Example Orchards at Lake Constance

The Lake Constance region is well known for its fruit production. Until about the 1950s orchard meadows had been the traditional way of fruit-growing in Germany. These meadows with scattered fruit trees typically consist of mature, tall-growing trees which have not been treated with fertilisers or pesticides. They provide habitats for up to 5,000 animal species, and contain a wide range of ideally adapted fruit species and varieties of regional and local origin. With the emergence of modern production methods, increasing costs for labour and competition from foreign producers, traditional practices have proved to be inefficient. Thus, orchards have been abandoned and many areas cleared in favour of large, highly productive plantations with small, but fruitful trees. The use of inorganic fertilisers and pesticides, as well as the lack of structure and variety in modern

plantations, has reduced the number of species living on and around the trees.

Orchards can only be managed extensively and perform their ecological function if they are in use and being maintained. To enable this, the harvest needs to be sold for an economic price for the producer. If a sufficient supply of high quality fruit for juice producers can be guaranteed, adequate prices can be gained via juice marketing.

A good example of a marketing initiative for orchard products is the joint project "Apple Juice", which was initiated in 1991 by organisations like Friends of the Earth (BUND), Lake Constance Foundation, Model Project Constance, and regional producers and farmers.

The farmers commit themselves to grow their fruit without using

pesticides or fertilisers and replant trees to avoid obsolescence. In return they get a fair, fixed price throughout the year. The pressing houses produce unfiltered juice, without preservatives, sugar or water. Fruits, trees and juice products are tested for any pesticide residues, on a regular basis.

Since 1994 a register of all press houses is available. Further information has been produced, promotion and tasting takes place at fairs and festivals. In 1996 marketing was widened to restaurants and cafés, canteen kitchens and schools.

Today, about 8,000 tall-growing trees on 410 ha are protected through the project without causing additional costs.

Further information: www.streubst.de (in German)



Flowering apple tree in the Lake Constance region

8.4 Architecture, customs and traditions

Aitken Clark, Vice President of EUROPARC

Wetlands are special sparkling fragments of the fragile mosaic of Europe's protected areas. Traditionally, buildings in wetlands have used local natural materials such as reed and sedge in their construction. Thus the distinctive form and character of such structures has been rooted in local customs and practice. The meeting point of land and water has generated a range of buildings designed to fit these special conditions. The thatched boat-houses illustrated on page 54 are a classic example of a structure which is both part of, and in harmony with its natural context. The boathouses appear to emerge as natural forms in a living wet landscape, both functional for their purpose and aesthetically appropriate.

This part of chapter 8 draws on ideas and discussion which formed the

basis of a seminar which explored how buildings within a protected area such as a designated wetland can be designed to fit within their natural and cultural setting, whilst demonstrating principles of low environmental impact and sustainability.

The seminar looked at how to recognise and define the special qualities of local building in areas such as wetlands and considered the opportunities for taking an innovative approach to design in the future.

Key principles

James Simpson is an architect whose day to day practice in his home city of Edinburgh is engaged in the conservation of historic buildings and in sustainable building. The following is a summary of his views on the need for a sensitive and responsible approach to the conservation of buildings in special places such as wetlands.

"Nothing stands still. Communities, local economies, transport and

communications all change. Environments, landscapes, settlements and buildings must also change. But they don't have to change for the worse. Within a specially protected wetland, change should be managed with particular care, with a view to ensuring that the essential qualities and characteristics of the area are properly understood and valued, and that their survival is ensured. Managed change should be responsible to social and economic needs, ensure the preservation of what is best, permit the destruction and replacement of what is worst and promote the positive management and enhancement of everything in between. It is easy to say, not easy to achieve.

Heritage and tradition are not finite commodities. As we conserve the best of what we have inherited from the past for the benefit of future generations, so should we create for their benefit as well. This is the essence of sustainability.

'Vernacular' and 'traditional' are not styles that can be copied, but ways

8 Resources >>



Marshman's cottage "Toad Hole"



Eric demonstrating reed



Model of planned visitor centre near Norwich



Horsewindmill in Norfolk

Our architecture comes
from the surroundings,
from the nature
of the place.

of building unique to a place. Vernacular means literally 'of the country'. Most of the buildings we commonly call vernacular would be better called 'artisan', in that they were built by tradesmen in local materials according to local ways of building.

The traditional buildings of an area are rooted in its physical geography in a way that modern structures are not. By contrast, 20th century structures frequently seem to be alien, insensitive, intrusive, cheap, and as diminishing the sense of place. This is the dilemma with which we are now faced. How do we build, not just in nationally protected areas, but in the countryside generally today, in these sophisticated and prosperous times?"

James poses the question with consummate accuracy. How to conserve what is best of the past and echo the traditions in building for the future in areas which have a special sense of place and identity?

Robin Snell in the following passages offers an answer with an approach to contemporary design which draws inspiration and clues from the past.

Aiming high

Robin Snell is an architect who practices in London. Robin argues that while the designs from his practice are unashamedly modern, he feels that a sense of continuity is vital. The following is a summary of the approach to design taken by his practice. The case project is for a Visitor Centre in the Broads, UK.

I would like to focus on the design of new buildings in sensitive locations by using a current project to illustrate our design approach. I want to talk about continuity, aspiration, searching for clues and finding inspiration. For us, with a sensitive

site, design is a conversation between the past and the present. It is also a collaboration between the individuals involved, the client, the users and designers, to uncover the possibilities of the site.

Good buildings need good clients as well as architects. I would encourage all clients to 'aim high' and to foster their vision. We have a particular interest in the materials and the brief, and of the fine engineering of how to make the detail work. This helps us develop the way we make our buildings. The process of designing is understanding, describing, persuading - and building a momentum for the building. The architect has to understand the psyche of where the building is. For us it is not an international universal architecture which can be placed anywhere, it has to come from the place and be particular to that place.

One example of a simple building we are making in a contemporary modern way, is a visitor centre near Norwich, within the Norfolk Broads. Our brief was to provide shelter and amenity; basic facilities for visitors. We started by finding clues from the site.

Part of our intention for the area is to make a series of modern pavilions, each with a different set of identities, which might be used to create the form and materiality of the enclosures.

The building for the visitor centre already exists in the form of a traditional Norfolk long barn, a simple single cell building with a roof, which we will re-model. The new design for the adjacent café building will be a modern version of this traditional barn. The inspiration for the design of the roof is taken from the site - in particular from an avenue of Lime trees.

Local materials are used throughout in traditional Norfolk solid masonry



Experience Keeping traditional skills alive!

Life on the marshes is interpreted in the Broads in a small thatched Marshman's cottage known as 'Toad Hole' cottage. This tiny cottage shows how a marshman and his family lived over a hundred years ago. A marshman's calendar explains the seasonal tasks undertaken by the whole family. Toad Hole cottage is not a listed historic building, yet is important in the wetland history of the marshes.

Eric is living history! Eric Edwards is rare - an endangered species. Eric grew up on the marshes. He learned the skills of reed and sedge cutting from a long line of craftsmen. Harvesting the wetlands, keeping the intricate hierarchy of water channels clean and clear, maintaining the boats; grey ones for the narrow dyke passages; green reed lighters wider and stacked high with reed bundles moving

along the main channels to the river. Reed and sedge bundles stacked on the 'staithe', the traditional mooring and collection point. Transport is now by road, previously by 'wherry' when rivers formed the transport highways. Wherries were the shallow draught huge sailed trading vessels which negotiated the waterways inland to and from the villages and towns to the seaports carrying cargoes.

Wherries may be seen as 'historic buildings afloat'. Hundreds of these distinctive vessels plied the waterways of the Broads. Now only seven remain. Four within 'Trust' care, requiring restoration and maintenance as do historic buildings. Keeping such vessels sailing and accessible to visitors and local people is a vital part of interpreting and understanding the special quality and character of the

wetland. Keeping the skills of sailing and restoring these historic craft is vital if they are to keep sailing long into the future. The Trusts which care for the wherries have a team of volunteers, some skilled, others willing to learn the traditional skills needed. Engaging the public in such enterprises is promoted and encouraged by policies in the management plan.

Eric interprets the 'wetland harvest' cycle for visitors to the Broads, particularly to parties of school children. His demonstration of the art of bundling reed and sedge brings alive the special wetland history and traditions. The management plan includes promoting traditional skills by the provision of apprenticeships in traditional wetland skills such as those demonstrated by Eric.

construction as part of the passive solar approach to the design to assist in our sustainable approach to the buildings.

Nearby, our second project in the Park is a new water activity centre or sailing club. The building form is derived from the imagery of a resting bird drinking by the edge of the water. The roof is made from 'wing like' fabric sails stretched out to cover the building. The construction of the floor of the building and all the rooms are inspired by a ship's deck with timber cabins made rather like boats, alluding to traditional Norfolk timber sea-side chalets. We have also designed the pavilion so that it can be built in phases, as funds become available.

Our architecture evolves through the design process. Design development is part of an ongoing conversation. Our architecture comes from the surroundings, from the nature of the place.

The principles for conserving and enhancing the built environment, together with the design approach illustrated above, are commended as models of good practice for building sustainably in areas of special sensitivity such as fragile wetlands.

The main ideas which emerged from the seminar are:

- > Conservation and change are not mutually exclusive: they must coexist

- > Local can be sophisticated
- > Design costs - but it pays as well
- > Constraints such as limited budgets can inspire creativity.



Thatched boathouses in the Broads



Experience Listing of buildings of historic value in the Broads

A management plan will list and document the range of buildings within a protected wetland. The inventory will rank the importance of historic buildings in the area according to the National classification system which is determined by the appropriate government agency; usually the Ministry for Environment. It is important that buildings and architectural features which are not on the classified list, yet are of architectural merit or distinctive character are also documented and 'protected' as adding to the special character and identity of the wetland.

In the case of the Broads the thatched boathouses illustrated above are not 'listed' buildings. They are nevertheless significant features of distinctive wetland character and are important and merit protection by the National Park management authority.

The practical task of assembling an inventory and technical assessment of the importance of the historic buildings is usually undertaken by an architect who has specialist knowledge of the subject with advice from the regional office of the national government agency.

Grant aid may be provided from both the national agency and the management authority to assist private owners of historic buildings with their care and maintenance. Any alterations or changes proposed for 'listed' buildings require special permission in addition to the normal 'planning' controls placed on development.

Special building features in the Broads include drainage mills, now redundant from their original functions of controlling water levels across the vast marsh landscape. These 'sentinels' remain as powerfully evocative heritage

features and as symbols of wind driven sustainable power. Many of these distinctive elements deteriorated and disappeared. Twenty years ago the Broads management authority undertook a survey of the remaining seventy and set in train, in the management plan, policies for their protection and a practical programme for their restoration. While some were on the 'listed' programme, many were unlisted yet important in the landscape. Many were given temporary forms of cover from the weather in order to halt their deterioration, while funds were assembled from a variety of sources to begin full or partial restoration. The management authority for the Broads worked in partnership with a special Trust to a programme set within a carefully prepared strategy set out in the management plan.

8.5 Science and research

Dr Andreas Bally, BiCon AG

Before starting a project on the conservation or restoration of shallow lakes or Ramsar sites, any existing scientific background will provide invaluable information and insight. Consideration of recent technology and results from previous studies ensures that research and management proposals are up-to-date. This helps save time and money and avoids repetition of research. The information might be published in scientific journals or as reports or articles collected by specific governmental agencies, museums of natural history, technical schools, NGOs or local authorities. Gathering information can be difficult and may require personal contact and knowledge about what resources are already available.

Scientific publications

Officially published articles in peer reviewed journals are relatively easy to find. For registered members libraries of universities or museums provide access to scientific journals. Depending on the local situation databases such as Web of Science, BIOSIS (Cambridge Scientific Abstracts), Water Resources Abstracts, ASFA (Aquatic Sciences in Fisheries) etc. can be searched for specific authors, keywords and years. Employees of libraries can help with the search. After finding the references the original article can be looked up in electronic journals, hardcopy journals, or ordered via the library. This information is mostly a year old from the date of publishing. Building up a personal computer-based databank of existing articles and reports (software like Endnote) will save time in the future and

facilitates the organisation of collected information. Scientific books, also accessed from university libraries or museums, will give a better overview about a specific field of interest rather than using articles alone. However, the information is usually a couple of years old.

Access to grey literature

The so-called 'grey literature' that has not been published in peer reviewed journals is much harder to find. Local experts could be approached to obtain contact information about relevant people and institutions, the history of the area, historical traditions of management techniques etc. Information that has never been published could be obtained by personal communication.

In searching for such 'grey' studies or data, contact with institutions and agencies may be able to provide substantial help for the project, saving money and manpower. This might range from providing information, data, computer programmes or even active participation in the project (field

work, data or chemical analysis). Authorities and technical universities have to demonstrate the public relevance of their work because they are financed by tax money. Hence these institutions may be interested in collaboration, if this fits the scope of their work. The interest and willingness for co-operation is often increased if the project attracts public recognition and will be mentioned in the press or TV. The institutions may even have students or volunteers who could participate in field or laboratory work for the project.

The first step is to work out which relevant institutions are present in the region: e.g. authorities for environmental protection or nature conservation, technical schools, museums for natural history, environmental consultancies, departments in environmental sciences, ecology or fisheries at universities. Nowadays much information is available on-line using search engines such as 'Google'. Telephone numbers and e-mail addresses are often provided on websites.



Water analysis at Nestos Lakes

Make contact with these people by sending an e-mail with a short description of the project and any questions. The e-mail should say that a follow up call will take place a few days later to discuss the request. Building up a network of contacts and personal relationships with members of agencies and governmental institutions might be the secret to finding out important information, fruitful co-operation and future projects.

8.6 Educational facilities and programmes

Bettina Jahn, Global Nature Fund

Agenda 21 has consistently highlighted the essential role of citizen involvement at all levels of environmental decision-making in guaranteeing the success of sustainable development. European citizens have shown time and again their concern for environmental protection and their empathy with sustainable development. Education

should be a priority first step towards such citizen involvement. Information, communication and education are three increasingly sophisticated and complex steps of one major process: the involvement of citizens in this decision-making process and their role in sustainable development.

One objective of the management plan should be the improvement of quantity and quality of the environmental information and education. When people have an understanding of how the natural



Example Spanish partner institutions

The scientific institutions that have collaborated with this project were:

- > The University of Coruña which has carried out a total of five water analyses between October 2001 and July 2003.

Dr Santos Cirujano working for the Real Botanical Garden of Madrid of the Superior Council of Scientific Investigations (CSIC) has interpreted the results of

these analyses. He concluded that the quality of the water that flows into the wetland of Boada should be improved to guarantee the conservation of the wetland as an area of biological interest.

- > The public authorities involved in the project are the City Councils of Fuentes de Nava and Boada de Campos, as landowners where the wetlands are located,

giving technical support as well as providing land for the lagoons.

- > The Department of Agriculture of the Autonomous University of Madrid designed the Green Filter project and the buffer zones, advising on the type of plants to use and giving seeds of thistles (*Cynara cardunculus*) used in the buffer zones.



Example Greek partner institutions

- > **National Agricultural Research Foundation**
Fisheries Research Institute (INALE)
Dr A. Kallianiotis
Nea Peramos, GR-640 07 Kavala, Greece
E-Mail : fri@otenet.gr
www.fishri.gr

- > **Democritus University of Thrace**
School of Engineering
Department of Environmental Engineering

Laboratory of Ecological Engineering & Technology
Prof Dr V. A. Tsihrintzis
GR-67100 Xanthi, Greece
E-Mail: tshrin@otenet.gr,
www.duth.gr

- > **Technological Education Institute - TEI of Kavala**
Economics and Business School
Department of Business Administration
Dr A. Karasavoglou
PO Box 1194, GR 65404 Kavala, Greece

E-Mail: akarasa@teikav.edu.gr,
www.teikav.edu.gr

- > **Fachhochschule Brandenburg**
Fachbereich Wirtschaft
Prof Dr Ulrich Brasche
Magdeburger Strasse 53
14770 Brandenburg, Germany
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www.fh-brandenburg.de

world works, then they will be ready to contribute to its protection.

Environmental information and education is a long-term process, which should follow a long-term strategy. It should not be based on short-term activity.

Environmental education comprises a great variety of possible activities. These range from working with children and pupils, right through to adults, from theoretical indoor activities to practical outdoor work. Over the past years there has been progress in integrating the environment into all levels of education and further training.

Nevertheless, additional offers to provide environmental education, especially in schools and kindergartens, are welcomed. It is important to involve partners with expertise in order to adapt the environmental education programme not only to the expectations of the target groups, but also to the needs of the organisers.

Environmental education for young people

Environmental education lessons in schools and nurseries

In co-operation with the teachers, instruction and lessons can be prepared. The subject matter should be adapted to the pupils' age and grade of school. The lesson topic should deal with an interesting problem related to the local wetland area. Lessons should be as interactive as possible with objects to look at and touch from the natural world. Things that are difficult to understand need to be explained in a simple way.

School trips, youth vacation and excursions

Wetland areas are an excellent destination for school trips, holidays and outings for young people. The activities planned for children and

young people should focus on environmental problems and the respective solutions. Practical work in the natural area may be included in the programme of several day trips. The young people learn "out in the natural world" about different plants and animals, and in particular, about endangered species. It is important to show the causes of environmental damage as well as ways of finding solutions to the problems.

Workcamps

Under the motto "learning by doing" school classes and youth groups learn about nature conservation work and environmental problems. One to four weeks camp is the best length of visit. The children stay in hostels or tents in the vicinity of the natural areas. They undertake activities such as management, cutting reed and brushwood in order to keep areas open, they collect refuse and help install nature trails and construct visitors' facilities. This is an excellent way to teach environmentally friendly behaviour and to raise the environmental awareness of young people.

Scavenger hunt

A scavenger hunt can be prepared for groups of young people. The children have to find answers to questions on the wetland area, plant and animal species living there as well as threats posed to them. So they learn in a fun way about different issues for the natural area and its conservation needs.

Holiday calendar

During summer break a variety of outdoor activities may be offered for young people, such as one-day nature tours, guided visits to information centres and organic farms.

Environmental quiz

An environmental quiz (leaflets or from the internet) can be offered to

schools and other youth groups. Questions about nature conservation and the natural landscape have to be answered. A multiple-choice format is recommended. The answers to the questions should be included in texts and other information. This will encourage the young people to carefully read all the information provided.

Environmental competitions

Environmental competitions can be offered at schools and youth groups. The children could make a drawing or picture, something using handicrafts, photography or sculpture to illustrate a topic concerning nature conservation.

Youth research

Under the theme "youth research" young people may present, maybe as a competition, their ideas for effective techniques in the fields of nature conservation, renewable energy or landscape maintenance. Enough time and the necessary equipment should be provided for them to put their ideas into practice and to construct tools or machines.

Nature conservation on the Internet

A website for young people to explore environmental topics may be installed. Interactive questions and answers, a photo gallery and facilities to exchange their experiences and concerns with other young people (chat site) could be provided. Thus the children acquaint themselves with modern media and learn about nature conservation topics. The German Federal Agency for Nature Conservation created an exemplary website for children called "Nature detectives" with a wide range of information.

Further information:
www.naturdetektive.de



Field trip with children in England



School visit in Spain

Regular youth groups

A regular environmental youth group could be established, along the lines of a Boy Scout or Girl Guide group. Different activities and topics may be offered on a weekly or two-weekly basis. The group should be open to all interested young people. Through the regular meetings the environmental awareness of the children will continue to grow.

Environmental books for children

Text and picture books for children and young people may be provided covering different nature conservation topics.

It is worth exploring whether regional banks or savings banks as well as private businesses can be involved in environmental activities for children and young people and whether any funding is available.

Information centres

An information centre may be established near the wetland area. Here an exhibition, information material and maps can be provided for visitors. The centre and its information should be attractively designed for all ages. Guided tours with further explanation could be offered from the visitor centre. A contact point on site with infrastructure combined with multiple use facilities is an important contribution to successful nature conservation work and implementation of the management plan.

There are advantages and disadvantages in having an information centre and unfortunately many centres have had financial difficulties or have been forced to close. It is imperative to take advice on legal regulations and standards before constructing or converting a building, particularly where environmental programmes for children and young people are to be

carried out or if accommodation is being offered. Financing information centres is a great burden for the operators, and the better-funded ones tend to be those which are located in tourist areas and offer regional products and explorer trails as well as environmental education activities. Currently, there are few opportunities for co-financing the establishment of an Information Centre. This is worse if the on-going costs and activities for the next five to ten years are not being financed.

Financial resources

The following section lists foundations and programmes where financial support is available.

EU Youth Programme

The Youth Programme is the EU mobility and non-formal education programme targeting young people aged between 15 and 25 years. The Programme is open to young people in 30 European countries. The Youth Programme offers possibilities for young people to participate in group exchanges and individual voluntary work, as well as support activities.

There are five main Actions:

- > Youth for Europe
- > European Voluntary Service
- > Youth Initiatives
- > Joint Actions
- > Support Measures.

Further information: http://europa.eu.int/comm/youth/program/index_en.html.

European Youth Foundation - Grants for international youth activities

The European Youth Foundation (EYF) is a fund established by the Council of Europe to provide financial support for European youth activities. It aims to encourage co-operation amongst young people in Europe by providing financial

One objective of the management plan should be the improvement of quantity and quality of the environmental information and education.

support for youth activities. It supports activities which serve the promotion of peace, understanding and co-operation in a spirit of respect for human rights, democracy, tolerance and solidarity.

The EYF provides financial support to the following types of activity undertaken by youth NGOs or networks, or by other NGOs involved in the areas of youth work relevant to the Council of Europe's youth policies and work:

- > Educational, social, cultural and humanitarian activities of a European nature
- > Activities aimed at strengthening peace and co-operation in Europe
- > Activities designed to promote closer co-operation and better understanding amongst young people in Europe, particularly by developing the exchange of information
- > Activities intended to stimulate mutual aid in Europe and in developing countries for cultural, educational and social purposes
- > Studies, research and documentation on youth matters.

Further information:
<http://galadriel.coe.int/fej/index.jsp>

Environmental awareness raising

The Environmental Awareness programme aims to improve information available for the general public and to raise awareness levels in relation to environmental protection. It also supports the creation of partnerships at a European level and aims to promote an efficient ecological approach to economic activities.

The four priority areas are:

- > Climate change
- > Nature and biodiversity
- > Environment and health

> Natural resources and waste.

Projects should be aimed at:

- > Integrating environmental concerns into all relevant policy areas
- > Working closely with business and consumers to identify solutions
- > Ensuring better and more accessible information on the environment for citizens
- > Developing a more environmentally conscious attitude towards land use.

Further information: http://europe.eu.int/comm/environment/funding/general/index_en.htm

International Youth Foundation

The International Youth Foundation is an independent, international, non-governmental organisation dedicated to the positive development of children and young people throughout the world. The Foundation works with national foundations and organisations currently operating in 31 countries. The IYF aims:

- > To identify effective programmes and approaches for young people
- > To advocate for improved policies benefiting children and youth

> To increase understanding of others by young people at local and international level.

The Foundation supports programmes aiming at providing a range of support and services in areas such as: vocational training, health education, recreation, cultural tolerance, environmental awareness, the development of leadership, conflict resolution, and decision-making skills.

The IYF also aims to increase global awareness of children and youth issues, to strengthen the organisational skills of youth programme leaders, and promote greater knowledge and application of best practices for young people.

The aim of these efforts is to increase the effectiveness, scale and sustainability of proven approaches to meeting young people's needs.

Further information: <http://www.iyfnet.org>

German Ministry of Culture, Youth and Sports, Baden-Württemberg

There are different programmes for international youth work:

Youth groups

- > Emphasis on: politics, environment



Spanish Information panel of La Nava visitor centre

- > Discussions and workshops for young people from different countries.

Individuals

- > International workcamps in the field of environmental protection.

German Ministry for Family, Seniors, Women and Youth

Federal youth plan: supports international youth work (encountering young people from different countries).

Similar programmes may be available in your country at a national, regional or local level.

8.7 Industry and commerce

The presence of dangerous or hazardous substances in European waters is still a major threat to the aquatic environment and to human health where surface waters are used for drinking water, abstraction or fishing. There are many known adverse effects such as eco-toxicity to aquatic organisms, bioaccumulation in the food chain and toxicity to man through drinking contaminated water. Pesticides such as lindane and atrazine affect water plants and result in increased requirements for treatment if the water is for drinking. Heavy metals such as mercury and organic metal compounds like tributyltin (TBT) pollute water and sediments and are currently accumulating in the aquatic food chain. Populations of marine and limnic snails have been found to be endangered by increasing concentrations of TBT.

95% of the industrial enterprises in the Lake Constance area are small and middle-scale businesses

employing more than 75% of the labour force. There are only a very few large-scale companies with thousands of employees.

How do industry and commerce affect the environment?

Often the designation of new industrial estates leads to conflicts with nature protection, and particularly if the estates are located around wetlands and lakes, which are densely populated. Substances can be released (air emissions, infiltration through the soil, discharge to water) during the ordinary production process and in storage places but also as a consequence of accidents, technical troubles and breakdowns. Industrial wastewater may contain toxic substances which could disturb the functioning - the biodegradation performance - of the communal wastewater plant. As a result of new technologies, heavy metals that in the past mostly came from the industrial sector can be effectively reduced. Today the input of heavy metals into lakes is mostly from diffuse sources. Other pollution sources come from noise, odours, vibrations or turbulence.

Examples of harmful substances in Lake Constance caused by industry and commerce:

- > DTPA or EDTA: A complexing agent used in the paper and textile industry, milk production
- > Flame retardants used in the plastics and textile industry
- > Phthalates used in the production of plastics to make them flexible and durable and in the dyestuff industry.

The national and European laws and guidelines concentrate on limiting emissions at source. By optimising storage and production techniques, recycling and environmental audit (EMAS, ISO 14001), the water pollution load could be considerably reduced.

Article 16 of the Water Framework Directive (2000/60/EC) sets out a "Strategy against pollution of water". In January 2001, the European Commission adopted an Amended Proposal for a European Parliament and Council Decision establishing the list of priority substances in the field of water policy (COM/2001/17 final). The list identifies 32 substances or groups of substances, which are shown to be of major concern for European waters. Once the list of priority substances is adopted, the Commission will propose community-wide water quality standards and emission controls for the priority substances.

Within the list of priority substances the Commission has identified the priority hazardous substances, which are of particular concern for the freshwater, coastal and marine environment. These substances will be subject to cessation or phasing out of discharges, emissions and losses within an appropriate timetable that shall not exceed 20 years.

Further information:

www.europa.eu.int/comm/environment/water/water-dangersub/pri_substances.htm

Other related EU directives

- > Urban Wastewater Treatment Directive

www.europa.eu.int/comm/environment/water/water-urbanwaste/index_en.html

- > Drinking Water Directive

http://europa.eu.int/comm/environment/water/water-drink/index_en.html

- > Directive on Bathing Water Quality

www.europa.eu.int/water/water-bathing/index_en.html



Example Regulations at Lake Constance

In the Lake Constance catchment area the industrial and commercial direct and indirect wastewaters are registered in a special emission inventory. For plants and industries with high risks there are special regulations for breakdowns to prevent serious accidents and to limit the consequences.

These regulations comprise:

- > Obligations for the factory owner to take all necessary measures to avoid serious accidents and limit the consequences for man and environment
- > Establishing an inspection programme by the authority to allow

systematic and regular surveying of regulations compliance

- > Establishing a central reporting point for serious accidents

In addition, all Seveso II guidelines for serious accidents with hazardous substances must be respected.

8.8 Land use and traffic

Land use as an environmental problem

With 147 inhabitants per square kilometre, the European Union is amongst the most heavily settled regions in the world. The amount of built-up surface area increases by 2% every ten years (European Commission: Caring for our future, 2000). The resulting impacts on nature and the environment include: the release of toxic substances into the ground, air and water, increasing concentration of traffic, increasing impact of human inhabitants on the landscape and natural areas.

Where settlements, traffic zones, industrial areas and other infrastructures already exist, measures will need to be taken to reduce the environmental pollution and to put in place management to repair the environmental damage. Ideally environmental targets for sustainable settlement development should be set during the planning stage and implemented to prevent future environmental stress.

In most EU countries land use planning is the direct responsibility of local authorities. Legal requirements are dealt with at national and regional level but the

local community, in many countries, can decide on the use, settlement planning and design of community-owned areas. Closely connected with land use planning are the aspects of 'surfacing' over open land and the use of green areas - both of high environmental relevance. A system of land use planning can further influence other important environmental aspects such as traffic/mobility, energy, water, landscape development and nature protection.

Therefore it is important to consider land use planning and urban development as an element of the wetland management plan and to discuss and fix targets and measures for sustainable land use with local representatives (urban planning, mayor, municipal council) with responsibilities for sustainable land use and settlement construction.

The project areas La Nava/Boada in Spain and Nestos in Greece are situated in regions with continuing migration into cities. In this situation, land usage and traffic may not be of prior importance. However, many European wetlands and shallow lakes are located in densely populated areas. Thus, a reduction of environmental impacts within the towns and villages can also benefit

the wetland - especially if the town or village is situated in the immediate vicinity of the wetland or lake.

In Greece most wetlands are situated in the coastal region. As the country consists of 73% mountains, large pressure exists on the coast for tourism development, agriculture, intensifying lagoon fisheries and road infrastructure. Developing coastal roads for beach tourism with associated recreation facilities, bars, parking, weekend settlements and even military recreation sites, are a major threat to the very sensitive coastal dunes and marshes around the lagoons.

What measures can a town or village take to reduce land usage?

Measures with direct influence

- > Establish how much land is available for construction, maintain settlement borders
- > Settlement development that conserves surface area
- > Optimise the relationship between land dedicated to transport and to settlement
- > Make an inventory of empty lots and fallow areas within the city, town or village



Railway following Lake Constance's shoreline



Village around lakes in Upper Swabia

In Greece most wetlands are situated in the coastal region. As the country consists of 73% mountains, large pressure exists on the coast for tourism development, agriculture, intensifying lagoon fisheries and road infrastructure.

- > Retrospective consolidation: use of empty lots, additional storeys, extensions, combined types of usage, allocating need for new housing space within given dimensions, consolidation of housing and working spaces, raising occupation density.

Measures with indirect influence

- > Decreasing further dispersion of settlement
- > Avoiding fallow areas within the city
- > Conservative use of surface area in development and choice of construction type
- > Intensified usage of attractive locations
- > Quantitative and qualitative compensation for loss of surface area for construction.

Supporting measures

- > Managed city development policy, environmental management for urban development
- > Integrated settlement and transportation development
- > Concentration of supply, administrative and service facilities
- > Choice of location, designation of type of use according to criteria of environmentally fitting usage
- > Co-ordination of temporary building usage (intermittent usage).

"Surfacing" over soil

When construction 'surfaces' over soil, problems are created for the environment by disturbance to the local natural and water balance, the increase in frequency of peak levels of flood run off, and the resulting additional burdens for the sewage system and water treatment plants. In addition, processes of exchange between soil and atmosphere are limited or prevented altogether. With

this negative impact on the microclimate the natural habitat for flora and fauna is destroyed.

The re-exposure of the soil can be accomplished by completely removing the sealant, whether concrete, tarmac or some other material, and changing the type of covering to create a permeable ground surface where plants can grow (partial re-exposure). Or non-essential sealed surface areas can be transformed into green areas. The following surfaces come into consideration for partial re-exposure:

- > All types of parking and storage surface area, as well as access roads and paths
- > Sections of intersections that are not driven over, centre areas of traffic roundabouts
- > Surfaces that do not have to be accessible for traffic
- > Schoolyards, market squares, paved courtyards.

Re-exposure can also be undertaken as a measure of compensation for other changes to the environment or towards an "eco-account". In this way, such measures can be made attractive to local governments from a financial perspective. Further positive aspects are the relief to the sewage system and water treatment plants from excess run off, the improvement to the microclimate, as well as the surroundings in which people live and work. Just as important as re-exposure is to ensure that only very little new ground is sealed over.

Green areas

Everyone is aware that green areas play a substantial role in improving the quality of life within settlements. They are immeasurably valuable not only as green belts, but also in the centre of settled areas. Park areas in the heart of a town improve the

attractiveness of housing and service centres located nearby, so that the heightened value of neighbourhoods with expanded green areas can create a focus for development in municipal centres.

A settlement area can be divided into a wide variety of different green systems, such as parking facilities, planted areas, green plots connecting built areas with natural house gardens. These improve the microclimate and develop into valuable habitats for a wide variety of animals and plants. Green areas offer opportunities for leisure and recreation, they are meeting-places for a neighbourhood and make a major contribution to people's association with their place of residence. Green connecting plots take on a very important function within a community.

Adorned with trees, hedgerows, and other elements of greenery, they encourage "soft mobility" use by pedestrians and cyclists. A green connecting plot can be a footpath already lined with trees. Similarly, roads connecting a settlement with the surrounding natural landscape can be treated in the same way. Along with their function for human recreation, the green corridors

represent an important contribution to the maintenance of biotope networks.

Traffic and mobility

Today, mobility is both a fundamental human need as well as a prerequisite for our ability to cope with the demands of everyday life. However, at the same time, motor traffic causes particular harm to human health and to the environment.

In the year 2000, the surface area used for transportation purposes totalled 17,280 km² or 4.8% of Germany's surface area, increasing by 0.5% (81 km²) by 2002.

Nonetheless, it is interesting to note that the increase in problems caused by our need for mobility and the environmental problems associated with them cannot be attributed alone to an increase in the number of trips individuals undertake in their daily lives.

What causes the increase in harm to the environment related to transportation are the ever-increasing distances people must travel to work, to shop for their needs, and to reach recreational areas, as well as the shift in transportation mode used in doing

so. Due to the increasing expansion of urban land use practices and the growing accessibility of private automobiles, cities are expanding outwards into the surrounding countryside. This leads to an increase in traffic. This is the very area on which communal urban land use planning can have fundamental influence - communal transportation development planning and the environmental problems related to it.

What possibilities are there for regional and local government to influence and to reduce the negative impact of traffic in urban areas and their surroundings?

General:

- > Combination of different types of land use instead of separation into distinctive use type districts
- > Reduction of surface area used by compacting settlement structures with short distances between destinations instead of excessively extensive settlement and sub urbanisation
- > Optimal integration of areas newly zoned for construction into the existing development network
- > Optimal integration of neighbourhood centres into the local development network



Information ECOLUP

Recent studies and projects have proved that most cities and municipalities do not have central statistical offices that collect and evaluate all data relevant to communal administration. Although the most important base data such as on population density and surfacing over soil are available,

they exist in varying formats: different collection years, refer to different areas, and vary the categories of measurement. Base data and indicators are the basis for monitoring, but to collect and evaluate data requires resources. Therefore it is preferable to limit the collection of data to a few easy to

handle and meaningful key data.

Within the EU LIFE project "ECOLUP: Environmental Land Use Planning" Lake Constance Foundation and the University of Nürtingen developed a "Core Reference Figures Set" for all relevant environmental aspects regarding land use planning.

- > Differentiated development of transportation surface area by using terminal streets, courtyard housing developments, short link roads and residential streets in residential areas instead of allowing transportation development in residential areas
- > Reduction and relocation of parking spaces.

Specific:

- > Designate Park+Ride parking spaces
- > Parking control systems and vehicle storage concepts
- > Traffic calming, designation of 30 km/h zones
- > Expand existing cycle paths and footpaths
- > Reduce overall parking space available
- > Construction to improve public transportation access
- > Increase frequency of public transportation departures on timetable
- > Build roofed cycle parking lots
- > Improve proportion of streets to cycle paths and footpaths
- > Reduce noise resulting from traffic

- > designation of surface areas for required protective measures
- > reduce average distance to nearest public transportation access.

8.9 Agriculture and forestry

Current situation

Over three quarters of the surface area contained within the European Union is used for agriculture or forestry (44% agricultural use, 33% forest). Agriculture and forestry depend more than other economic sectors on intact natural resources as the prerequisite for their successful functioning.

Technical innovations, the increased use of new technology in farming and the resulting changes to economic conditions, as well as the political framework set by EU agricultural policy, have in recent decades led to great losses in valuable cultural landscapes, which have been shaped over the centuries by traditional farming practices. Landscapes managed extensively are particularly affected

by this development. In addition, structural changes in agricultural practice have led to an increase in orchards where fruit is sold at market, whilst at the same time permanent grassland has decreased. Crop rotation has been simplified (to monocultures), animal husbandry has been concentrated in specific areas by specialisation, and as a part of farmland consolidation, agricultural use of river flood plains has increased, marshy areas drained, and structures that had previously linked biotopes (hedges, etc.) cleared away. Furthermore, irrigated areas have increased dramatically (the EU has collected related data since 1961).

Although the surface area of land used for agriculture has as a whole decreased in the last 20 years, farming's negative effects on nature have increased markedly. This can be attributed to the great intensification of farming practices as a result of the changed conditions mentioned above, and to the resulting increased use of production factors that raise crop yield such as fertilisers and plant protecting agents e.g. pesticides.



Advice Key reference data settlement and traffic

Key reference data to measure / evaluate urban expansion

- > Proportion of settled surface area (Settlement and transportation surface area to surface area of municipality)
- > Settlement Density (Number of inhabitants to settlement and transportation surface area)
- > Housing Density (Number of inhabitants to structure and open site surface area in ha)

- > Surfaced transportation area in percentage of total relevant surface area.

Key reference data to measure / evaluate transportation / mobility

- > General extent of development (Transportation surface area to total surface area or municipal surface area)
- > Extent of development planned in project (Transportation surface area to total zoned construction land)

- > "Modal split" - choice of mode of transportation (number of bicycles, number of motorists and motorcyclists, number of public transportation users)
- > Kilometres per person / inhabitant / day according to mode of transportation (local statistics).



Grain field in Spain

Legal situation

Within the European Union, a great number of different directives regulate agriculture's access to and use of water. These are intended to minimise negative impacts on this resource. Among these are the Groundwater Directive (80/68/EEG), the Nitrates Directive (91/676/EEG), the Fertiliser Ordinance (FO), and the Agri-Environmental Action Programme (2078/92 EEC). In order to co-ordinate these usually very inconsistent regulations, the Water Framework Directive (WFD) was passed in 1995 and came into effect on 22 December 2000. The aim of the WFD is to define unified principles for the entire field of water protection.

Around 60% of the phosphates in the water supply and over 70% of the nitrates originate from diffuse sources. For this reason, agriculture is seen as the main cause of excessive nutrients in bodies of water. The WFD therefore sets a strong focus on agriculture so that we can expect that regulations for

farming practice currently valid for water protection areas will be extended to apply to all river catchment areas. By way of example, the WFD already contains a list of 33 priority substances, ten of which are pesticides (e.g. Atrazine), the use of which is either to be reduced or to be eliminated within the next 20 years. In the coming years, the Commission will introduce quality norms and require regular testing of limit values.

Advisable measures for the prevention of negative impacts of pesticides and fertilisers on water bodies are:

- > Establishing protected shoreline strips and buffer zones
- > Raising minimum standards for water quality
- > Banning use of pesticides at problematic locations, e.g. those in danger of erosion
- > Employing modern application technology for pesticides, PSM and mineral fertiliser output
- > Reducing the level of nutrients in bodies of water (reduction of

nitrate fertilisers, use of catch crops featuring legumes only prior to crops with strong erosive capacity, crop rotation that sustains groundwater quality, plant vegetation on fallow land, plant field crops with minimal need for nitrates such as summer barley or flax).

Many of these measures can at present only be realized within the framework of voluntary agreements. Their greater acceptance can only be achieved through compensation payments or the goal-oriented support of new market strategies or sustainable production methods.

Sustainable agriculture in the EU

Integrated crop cultivation means agricultural cultivation and production methods that meet both ecological as well as economic demands. Factors such as crop rotation, cultivation technology, plant nutrition, and crop protection are adjusted to fit natural conditions in order to support environmentally friendly agricultural practices. These

8 Resources >>

measures will avoid the pollution of groundwater and surface water, as well as the deposition of foreign substances into nearby biotopes. Since there is no standardisation for monitoring integrated production in the EU, the benefits it brings to the environment are difficult to estimate. One instrument of the EU agricultural reform that both relieves economic pressures on the agricultural market and avoids or reduces damage to the cultural landscape is the Agri-Environmental Action Programme (2078/92 EEC), which, along with the

Early Retirement Regulation (2079/92) and the Forestry Regulation (2080/92), represents one element of a set of complementary measures. The Agri-Environmental Action Programme is intended to make production processes in agriculture more environmentally friendly. In order to achieve this goal, various environmental measures have been linked to funding available to farmers. The implementation of this programme lies in the hands of national or regional authorities. Examples for measures within the

Agri-Environmental Action Programme are:

- > Transformation of intensively used land such as arable farmland into extensive grasslands
- > Reduction of the use of nutrients and pesticides
- > Continuation of traditional, environmentally friendly cultivation practices in areas threatened by the loss of this type of land use
- > Creation of biotopes that are not subjected to the production cycle.

Parameters for evaluating agriculture

Total surface area farmed and crop production

- > Farm land (FL) in absolute ha and in % of total surface area
- > Farmed land (FdL) in absolute ha and in % of total surface area
- > Division of FdL according to types of use (permanent grassland, ploughed fields, specialised crops and garden areas, forest when present) and types of crops
- > Percentage of organically farmed land and percentage of organic farms

Animal husbandry

- > Animals according to species (cattle, pigs, sheep, goats, horses, fowl, others) in livestock unit (LU) or fertiliser produced per livestock unit (FLU)
- > Average number of animals per farm
- > Average number of animals per unit of surface area

Structure of farm businesses

- > Number of farms and number of farms according to size
- > Level of education of head of farm and plans for farm's inheritance

Characteristics of the cultural landscape

- > Percentage and quality of protected areas
- > Variety of landscape structures (average size of field, variety of types of land usage, presence of smaller structures within agricultural landscape, percentage of woods to open land)
- > Cultural-historical characteristics (e.g. archaeological factors, as in Greece)

Additional factors

- > Fertilisers: Mineral fertilisers N and P (e.g. in t N or P or ha FL and year), fertilisers produced by farm, sewage sludge, compost, other fertilisers)
- > Pesticides

A much more effective step towards environmentally appropriate agriculture is organic farming. Through organic farming, negative impact on the environment is greatly reduced through extensive reductions in use of fertilisers and pesticides. Furthermore, the soil undergoes much less intensive use, thus preventing harmful side effects to soil and groundwater.

Since the European Community's agri-environment policy came out in favour of conversion to organic farming methods, the acreage on

which organic farming is practised within the EU has grown steadily. The highest percentages of organically farmed surface area are found in Austria (11.6%), in Italy (8%), and in Finland (7%) (source: SÖL, Feb. 2004).

Due to the fact that organic farming processes not only have less negative impact on the environment, but also prevent the presence of toxic residues in food, organic products generally bring higher market prices. For this reason, organic farming and the respective

designation of organically grown farm products and foods have been made subject to binding standards in the EU by means of the Organic Farming Directive (2092/91/EEC, dating from 24th June, 1991).

In this directive, both the cultivation as well as the processing of organic produce are given an exact definition and made subject to explicit labelling. Consumers are able to identify organically grown produce by means of the EU board of control numbers and the information on the packaging to this effect. Although the

Sources of information (example Germany)
Authorities
> Communal authorities
> District authorities (District Council Office)
> Agricultural authorities
> Regional Council
> Ministry of Agriculture (federal state and national)
> State and federal statistical offices
Educational institutions
> Universities and other institutions of higher learning
> Agricultural schools
Agricultural federations and associations
> Co-operatives (e.g. ZG, WLZ)
> Farming co-operatives (e.g. apple culture federation, associations of organic farmers)
> Professional associations (AG Junge Bauern, AbL, Hauptverband)
Farmers
Dependent branches
> Processing (e.g. dairies, breweries, bakeries, juice production)
> Trade
> Gastronomy and cafeterias

EU introduced a standardised logo for the designation of organically grown products in 2000, it did not find acceptance in many EU member countries. A few EU countries (such as Germany, Austria, Denmark, and France) have for this reason introduced their own national organic labels which have in their own right been met with varying levels of acceptance.

Indicators for the environmental impact of agriculture on lakes and wetlands

Agriculture has a great impact on many lake and wetland regions. Because the conditions under which production takes place (terrain, climate, availability of water, soil quality, etc.) are often quite good, many of these locations have been drained and transformed into cropped land. On the other hand, this intensification of agriculture and a tendency towards extensive management of areas with high crop production potential have resulted in greater damage to neighbouring areas, among them wetlands, due to infiltration of fertilisers and pesticides.

Nutrients

Fertilisers used in agriculture contain nitrates, phosphates, and other nutrients that plants need. These contribute to the eutrophication of bodies of water and as a result can lead to undesirable algae growth and changes in the chemical content of the water, as well as to flora and fauna.

Parameters for evaluation:

- > Nutrient balance of farm (N, P, K)
- > Fertilisation schedule (when, how much)
- > Livestock (livestock unit/ha, NH₃ emissions).

Pest management

Both chemical-synthetic as well as mineral plant protecting agents have a direct impact on the quality and the well being of wetlands and lakes. Pesticides and heavy metals demonstrate a direct negative impact on a wide range of organisms and can accumulate in the food chain as well as in soil sediments.

Parameters for evaluation

- > Type and amount of pesticides used
- > When used
- > How up-to-date is application technology?
- > Use of alternative pesticides.

Management of farm production processes

The way in which farm production processes are managed has a direct impact on wetlands and lakes. Through well-balanced crop rotation and the cultivation of regional crops, many negative effects that agriculture may have on bodies of water can be avoided. Agri-environment programmes, for example those encouraging the introduction of buffer strips of land around arable fields and along shorelines and water courses, make it possible to prevent or minimise

the introduction of agricultural substances into sensitive areas. If a farm participates in agri-environmental programmes it is a good indication of how open the farm director is to environmental protection.

Parameters for evaluation

- > Range of types of land use and crop rotation
- > Are genetically modified crops grown?
- > Condition of grasslands (age, make-up, use for hay, when mowed)
- > Measures to protect and maintain biotopes (type, size, common or uncommon, endangered and status of protection of biotopes)
- > Participation in programmes to support environmental protection measures and in agri-environment programmes
- > Variety of species of domestic animals and cultivated plants (particularly rare breeds and species)
- > Biological parameters (e.g. endangered, rare or endemic species in the macroflora and macrofauna, rare vegetative ecotypes, indicator species).

Soil cultivation

The way in which the soil is cultivated also has an impact on bodies of water. Inappropriate cultivation can lead to erosion causing sedimentation and siltation in water bodies, and any agricultural substances carried on soil particles can impact on water quality.

Selected "seals" of organic production in Europe



Austria



Denmark



EU-Seal



France



Germany



Netherlands



Traditional way of sheep breeding in Spain

Parameters for evaluation

- > Erosion due to water and wind
- > General soil characteristics and reference values:
Soil compaction, waterlogging of soil, potential yield, function as filter, buffer and transformation agent, natural capacity for retention.

Water and energy balance of farm

Two thirds of the water used across the world is needed for agriculture. In EC countries this percentage may be significantly lower (in Germany only 3% of total water usage), but nevertheless effective water management in agriculture is an important starting point for the sustainable protection of water and biotopes. Environmentally appropriate plant species, organic farming practices, and careful use of irrigation and drainage can prevent harm to rivers and groundwater resources. Damage to water resources arising from the use of

fossil fuels and lubricants in agriculture needs to be prevented.

Parameters for evaluation

- > Absolute amount of water used (incl. irrigation and amount of water drawn from groundwater table)
- > Relative water use per biomass produced
- > Water drainage (drainage systems, water draining from irrigation, water retention systems)
- > Morphological parameters (structure of bodies of water, buffer zones, protective shoreline or watercourse strips)
- > Fossil sources of energy (oils, diesel, potential threat for bodies of water, gas)
- > Material cycles.

8.10 Fishery

Fishery at Lake Constance

Understandably, the activities of subsistence and recreational fishermen at Lake Constance are geared towards catch yield. Under the aspect of justifiable impact on nature, recreational fishery has to be put to the ecological test, especially intensive angling in nature reserves. It is not only the fundamental contradiction between conservation and leisure activities, there are also incompatibilities in the exercise of angling with regard to the environment: e.g. impact on animals, shore vegetation. The solution of the conflict could be authorized recreational fishery in ecologically less important areas only.

Fishery and nature conservation have common goals especially in the preservation of natural resources. Fish species protection



Predatory pikes can help to regulate fish populations

A great fish variety can only be achieved or conserved by habitat protection of many different natural habitats – especially of the shallow water zone, representing the "nursery" of most of the Lake Constance fish species.

has to be taken seriously, about two thirds of the fish species of Central Europe are considered endangered. That is why nature conservancy organisations together with fishery associations have to fight for better living conditions of the fish fauna.

Sustainable fishery

Sustainable development of fishery at Lake Constance requires a strategy combining ecological responsibility (especially for the natural biodiversity) with economic carrying capacity, and seeking dialogue with the society. The goal is measured catch yield of wild fish and to achieve moderate added-value out of a seasonal high quality regional product.

Generally, in nature reserves fishery is allowed as a privileged exploitation and considered as practical nature protection. In view of the intensive exploitation most nature reserves are subject to, fishery in the internationally important nature reserves at Lake Constance is not compatible with effective nature conservation.

Fish protection zones

A great fish variety can only be achieved or conserved by habitat protection of many different natural habitats – especially of the shallow water zone, representing the "nursery" of most of the Lake Constance fish species. Therefore fishing in the shallow zone and along the shoreline should not be allowed, especially in already recognised protected areas where far reaching regulations have to be formulated in accordance with the Nature Conservancy.

Fishery management in lakes and ponds

Lakes and ponds are mainly affected by nutrient inputs from the catchment area and recreational use such as swimming, boating, angling, and fishing. Restoration measures chiefly focus on the reduction of nutrient inputs from surrounding areas. Another helpful instrument is ecologically-oriented fishery management in accordance with the following principles:

- > Establishing and maintaining a balanced fish population adapted to the local condition of fishing waters
- > Preservation of the waters and their environment as flora and fauna habitat.

Fish population

Usually high nutrient content of waters leads to high biological productivity often resulting in mass increase of white fish (cyprinid). The increasing number of cyprinids crowded together is responsible for the decrease in zoo plankton thus provoking excessive algae growth, low visibility depth and animal and plant species depletion.

The following measures can prevent undesired fish stock development:

- > Emptying of artificial ponds in winter or summer allows controlled fish removal and fish stocking (new population). The draining period varies depending on the water conditions
- > Stocking measures influence the natural development and can balance the fish population. Stocking should be implemented with native fish species of young age groups, adapted to the natural conditions and in consultation with the responsible fishery authorities
- > Regular fishing of mass species as "biomanipulation" and regular

stocking with predatory fish can also regulate fish populations.

Maintenance of water bodies

Lake shores rich in structures are extremely important for the entire ecology of the water body.

Appropriate measures are:

- > Reduction of trees and scrubs in favour of reed plants
- > Regular mowing of reed in winters or summers
- > Leaving or bringing in structures in the water
- > Designation of protected areas for birds and fish
- > Extensification of agriculturally used areas near the lakes or ponds.

Fishery management in coastal lagoons

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Lagoons are of the most productive ecosystems in terms of fisheries. As an intermediate zone between the sea and the freshwater systems in the mainland, they are inhabited by fish species able to adapt themselves either to brackish or saline water. Generally lagoons and most other coastal wetlands are shallow and communicate with the sea by small channels, usually open during the rainy season in the northern hemisphere or by permanent branches of the nearby rivers. Today only a few coastal lagoons and wetlands are still in a natural condition and often the hydrographic morphology and topography of the main parts have changed after several decades of human intervention. This includes attempts to dry them out completely or other lighter interventions such as technical works to adapt lagoons to conditions favourable for extensive or semi

intensive aquaculture. In the Mediterranean almost 10% of the general fish production comes from the lagoons or other coastal shallow biotopes. Fortunately only a few of them were transformed totally to intensive aquaculture units, allowing the coexistence of the natural ecosystem with the traditional fishery system. Fisheries is an important part of their management and therefore some general rules should be applied to allow their conservation and in parallel to maintain the local fishery communities.

Lagoon types

The most important element in a wetland and particularly in the lagoons is the hydrological regime in the area and its water quality. The hydrology depends on the balance of two opposite forces, where one is the tide force coming from the sea and the second the influence of the running freshwater from the near river or stream. The two forces are in relation with the meteorological conditions in the area, and depending on their equilibrium, there are several types of coastal lagoons. On the one hand there are the open lagoons where the continuous flow of a strong freshwater current is present, maintaining the opening of the channels. On the other hand there are the semi-closed lagoons, where the communicating channels are closed during the dry season. Without any communication, the lagoons sooner or later turn into shallow marshes, and in the dry season, into flat salted areas.

Requirements for management

When we intend to apply a new management system to a coastal wetland or lagoon, we need the following data to define the local natural regime. Some of these data are essential and others can be optional. The data needed for the

definition of the general management are the following:

Seasonal hydrological cycle in the area, including data on the rain season, the current direction and the tidal regime. The nutrients in the water depend on the current force and on freshwater quality.

Seasonal temperature profile in the water, mainly during the winter and the summer. Local data on the main wind directions combined with water temperature can explain easily the thermal situation in the water as for instance anoxic situations, permanent water stratification and ice coverage of the surface, conditions very dangerous for fishery production. The water salinity and the oxygen depend partly on the temperature and the main local wind.

These natural conditions influence the primary production in the waters or in other words, the speed of nutrient incorporation and transformation inside the lagoon, the local food chain, on which the fish species that are able to inhabit the ecosystem depend, and finally, the other vertebrates like birds and mammals depending on fish. Other aspects like the bacterial activity, the level of photosynthesis, the presence of plankton and sea weeds and the anoxic layer in the bottom are in direct relation to these primary conditions. At the bottom of the food chain there is the microbial activity, generally high due to the richness in organic matter and at the top, fish such as the sea bass, some birds or the otter are recognized as general predators at different levels.

Fish production

In a typical Mediterranean lagoon, there are some fish species characterised by their permanent presence in the ecosystem throughout their whole life cycle while others are immigrants. The fish

production depends on the immigrants which are attracted seasonally by the water quality and the temperature regime, inhabiting the water for food, reproduction or safety purpose. The term migration does not reflect the real nature of the phenomenon. The movement of the populations of several euraline fish species could be described better by the terms invasion and departure. The fish invade the lagoons during spring and early summer, when the conditions are more favourable in comparison with the colder sea water and then depart when the temperature starts to rise, as in cases where the intercommunicated channels are open, or in late autumn or early winter, in cases where the lagoon is deep enough to maintain a more stable water temperature. In both cases permanent man-made enclosures aim to maintain the fish population under control, fishing them in special traps according to the season and the market demand.

Even if this human intervention is considered by some naturalists as a violation of the natural ecological cycle, the local fishery communities and their extensive fishery system are recognized as an essential part of these areas, ensuring the safety control of remote areas, the decrease of illegal hunting, the water equilibrium and on a long-term basis, the conservation of this fragile ecosystem. In order to maintain a healthy extensive exploitation of the coastal lagoons, the following requirements are needed:

- > A good water circulation regime is essential for good fish production in euraline ecosystems, even if the construction of large communication channels is not recommended due to their negative influence on natural ecosystems. With the construction of small interventions the stabilization of the water circulation in the lagoon

can be guaranteed. These interventions should be included in a general management system plan to be defined under the control of the local experts.

- > The good knowledge of the fish migration seasonality, including the existing empirical information from local fishermen, should be incorporated into the local management plan and along with rules to ensure stable fish production.
- > The application of some general restrictions is necessary in the exploitation of the nearest coastal area close to the lagoons from where the local fish production depends. For the time being, the general technical and legal measures applied in Mediterranean fisheries seem to be sufficient to guarantee a minimum vital fish population in the coastal areas.
- > In many Mediterranean lagoons, fishermen seasonally introduce young fish for the enhancement of local fish production. In order to maintain the autochthonous genetic fish stocks intact, it is necessary to avoid the introduction of fingerlings of unknown origin, keeping in mind, that in most cases the young fish born in the big hatcheries around the Mediterranean are of dubious origin. Recently the European Union began to finance the construction of small local hatcheries for the purpose of maintaining local stocks.
- > The coastal zone close to the inner part of the lagoon is essential, not only for local birds, but the many young fish which spend part of their early life in these areas for foraging. The good condition of this area is an important index of the lagoon's health. Polluted lagoons or eutrophic water bodies show a disturbed image with dead organic matter in semi

ecomposition or concentration of various pollutants.

- > The natural fish populations inside the lagoons include young and older fish. As a general rule for all professional fisheries, selective fishing gear should be used to avoid the capture of immature fish. If it is no possibility to maintain the young fish during winter inside the lagoon, it is much better to open the traps and to facilitate their return to the sea. Many of them will be back in the lagoon during the next year.
- > Fishing with enclosures, traps or installation of stable fishing gear is restricted to some deeper areas of the lagoon. Usually piscivorous bird species avoid preying in these parts and thus conflicts with fishermen are only occasional. There is no general solution to avoid these conflicts. Any case should be analyzed and the possible solutions should be discussed with the fishermen. Some technical devices able to discourage birds to approach the fishing gear, could be applied, but only temporarily and in any case not during the breeding period. The euraline fish in the Mediterranean are caught mainly during the autumn, when most of the birds conclude their breeding. Consequently the restricted use of these devices should not be a problem.

8.11 Tourism and Recreation

Sustainability - the challenge for tourism in the coming years

The typical European tourism product depends to a large extent on the sustainable development of destinations. The vast majority of tourists are looking for intact nature,

In the course of the LIFE Visit-Project (Voluntary Initiatives for Sustainability in Tourism), Friends of Nature International collected and evaluated an exhaustive list of indicators used in different regions or suggested by previous studies. The VISIT-experts identified the following set of key indicators:

Sustainability concepts

Key questions for sustainability:

- > Existence and evaluation of the effectiveness of environmental management and monitoring tools for a more integrated tourism strategy?
- > Are different stakeholders involved in the process?

Key questions for the quality of the region:

- > Is there a continuous reporting and monitoring system designed to improve or maintain the destination's quality?

Key indicators to measure/evaluate sustainability concepts:

- > Existence of a local policy (strategy, action plan) for enhancing sustainability in the destination
- > Involvement of stakeholders
- > Existence of an inventory of sites of cultural interest
- > Existence of an inventory of sites of natural interest
- > Number of eco-labelled tourism facilities or facilities applying environmental management schemes (such as EMAS or ISO 14000).
- > Number of sites monitored with the Blue Flag system and total number of bathing sites.

Environmental performance

Tourism transport

Key questions for sustainability:

- > Is the amount of transport pressure caused by tourism decreasing?
- > Are tourists arriving by more sustainable means of transport? Current situation and evolution in time to see whether there is change towards improvement.
- > Is the length of stays decreasing or increasing? More same-day visitors or longer staying tourists?
- > What are the main means of transport tourists are using during their stay at the destination?

Key question for quality:

- > Impact of transport on noise and air quality, traffic jams?

Key indicators to evaluate tourism transport:

- > Share of environmentally friendly modes of transport in all arrivals (car, aeroplane, train, bus, ship or bicycle)
- > Number of same-day visitors per km² (Monthly table of same-day visitors)
- > Local mobility (Monthly table of the number of passengers transported by local public transport, percentage of accommodation, tourism facilities and other tourist attractions accessible by public transport, extra means of transport especially set up for tourists).

Carrying capacity

Key questions for sustainability:

- > How much land is taken up by tourism accommodation?

- > What is the amount of area occupied by second homes?
- > Does the destination try to protect and preserve natural areas?
- > Impact of different tourism activities on biodiversity?

Key questions for quality:

- > Degree of urban sprawl which reduces attractiveness of destinations?
- > Number of natural areas which enhance the attractiveness of the site?

Coastal destinations

Key question for sustainability:

- > What is the pressure on aquatic systems (coastal destinations and destinations to lakes)?

Key question for quality:

- > Are coasts in danger of becoming overcrowded?

Mountain destinations

Key question for sustainability:

- > Tourism pressure in mountain destinations?

Key question for quality:

- > Are mountain destinations in danger of becoming overcrowded?

Key indicators to measure /evaluate carrying capacity:

- > Maximum population density (peak season) per km²
- > Beds in secondary residences (in % of total lodging capacity)
- > Types of area of destination (built up area, area reserved for building, green land, forest, water, other) in km²
- > Size of protected natural areas (in % of total destination area)



Advice Indicators for sustainable tourism development

- > Evolution of different leisure activities with intensive use of resources (size of golf courses, size of areas covered with artificial snow, capacity of lifts, capacity of harbours and marinas, number of hydro speeds etc.)
- > Percentage of natural coastline (if applicable).

Use of energy

Key questions for sustainability:

- > How effective is the use of energy within the destination (total amount of energy used for tourism and source of energy)?

Key questions for quality:

- > How can the effects of climate change, which may have a long-term impact on the quality of the destination, be reduced?

Key indicators to measure /evaluate sustainable use of energy:

- > Percentage of renewable energy in total energy consumption (entire destination, locally produced or imported)
- > Energy use by type of tourism facility and per tourist.

Use of water

Key questions for sustainability:

- > What is the pressure on the local water resources?

Key questions for quality:

- > Is there enough water available for tourists?
- > Are the water bodies (groundwater and surface water) of good quality and condition?

Key indicators to measure /evaluate sustainable use of water:

- > Sustainable use of water resource (ratio of water imported or coming from processed sea water to total water sources, average development of groundwater table in the last 5 years)
- > Percentage of houses and facilities connected to wastewater treatment plants.

Solid waste management

Key questions for sustainability:

- > Is there a system of effective waste management?

Key questions for quality:

- > Is waste illegally dumped in natural areas or the countryside, are there negative effects of waste treatment on health (e.g. waste incineration)?

Key indicators to measure /evaluate waste management:

- > Percentage of households where solid waste is separated for recycling
- > Total of solid waste land-filled and/or incinerated (in tonnes)
- > Monthly table of waste production.

Social and cultural performance indicators

Key questions for sustainability:

- > Development of living conditions for local population?
- > Are developments driven by external influences?

Key questions for quality:

- > Do tourists feel accepted by residents?
- > General safety of tourists?

Key indicators to measure /evaluate social and cultural performance:

- > Seasonal percentage of non-resident employees in total number of tourism employees
- > Average length of contracts of tourism personnel
- > Percentage of land owned by non-residents
- > Number of recorded thefts
- > Tourist/host population ratio.

Economic performance indicators

Key questions for sustainability:

- > Economic viability of tourism sector?

Key questions for quality:

- > Dependence of economy on tourism sector?
- > Seasonal variation of tourism income?

Key indicators to measure /evaluate economic performance:

- > Tourism-related employment in peak season/low season to total employment in the destination
- > Share of tourism in overall destination GDP
- > Seasonal variation of accommodation occupancy
- > Total accommodation capacity per capita of resident population
- > Average length of stay.

Further information

www.yourvisit.info



beautiful landscapes and a rich cultural heritage. They want a clean and healthy environment and they want to enjoy the ambient climate. In fact there is a strong link between sustainability and quality: most issues such as low noise, less traffic, clean air and water, rich biodiversity, intact landscapes are all the focal points of sustainability strategies and crucial for the quality of destinations.

As tourism by definition involves the movement of people from one place to another, it affects not only local sustainability but also sustainability at the regional or even global level. In the past, this problem has not been covered sufficiently either by tourism science or by tourism policies. Whether a journey is organised independently or through commercial agents, the cycle of the tourism activity can be divided into three stages:

- > Access to the destination or destinations and return to the point of departure
- > Stay at the destination
- > Activities at the destination (which determine whether it is a tourism or a business trip).

Our wetland or lake is part of the tourism destination - or should become part of a sustainable tourism destination. Therefore the main focus within our Management Plan should be the stay and activities at the destination.

Stay at the destination

- > Construction of accommodation
- > Maintenance and operation of accommodation
- > Supply of food and other goods
- > Disposal of waste.

Activities at the destination

- > Construction of tourism facilities
- > Maintenance and operation of tourism facilities
- > Local mobility
- > Tourism activities linked to facilities
- > Tourism activities not needing special facilities.

Main problems concerning tourism and sustainable development

Tourism transport: Especially air transport and the use of private cars, contribute increasingly to global warming and climate change, and to the depletion of oil resources. Emissions, noise and congestion are also growing problems at tourism destinations and along the big tourist routes. 90% of energy used in the tourism sector is used for access and return travel. There is a growing trend towards air travel and particularly short distance flights, towards traffic intensive event tourism, larger destinations and unsustainable vacation patterns (more travels per year and person, shorter stays, longer distances, out-of-season activities, such as skiing in summer or swimming in winter), which increases the impact of tourism transport.

Carrying capacity: Land use, biodiversity, tourism activities. Tourism is a heavy consumer of land area and nature at the local level. Negative trends are: increasing numbers of secondary residences or tourism activities with intensive use of natural resources (e.g. golf, skiing) or motorised activities in natural areas.

Use of energy: Tourism facilities are using more and more energy for air-conditioning, transport or indoor activities so that the source of energy (renewable or non

renewable) is also becoming a focus of interest.

Use of water: Some destinations, such as islands or southern coastal destinations, have increasing problems with the freshwater supply and there is even competition for water between local economies (for example agriculture) and tourism. Wastewater may also become a problem for high-season mass tourism destinations.

Solid waste management: Waste is becoming a major problem for tourism destinations and rural societies, which are overwhelmed by waste products but do not have sufficient capacity to cope with this problem.

Social and cultural development: Bad working conditions in tourism, seasonal employment and high dependence on the tourism industry may create a negative social climate, detrimental to the quality of the entire destination.

Economic development: High dependence on the tourism sector, high seasonal variation of tourism activity or a high percentage of day-visitors may also be harmful to the community and have negative effects on economic development.

Institutional governance: Measures taken by local and regional institutions and the instruments they have set up to implement sustainability strategies and to involve different stakeholders in the process.

Recreation

Naturally, transitions between tourism use and leisure activities are smooth. Infrastructure and service facilities should ideally be used by both tourists and the local population.



Tourists enjoying the Broads



Floating on Columbia River, Canada

Negative impacts on nature and environment cannot be prevented completely with creative visitor management, but at least it can be reduced considerably.

A positive sign of acceptance and identification is if locals spend their leisure time within the wetland area, at the lake or its surroundings. Negative impacts on nature and environment cannot be prevented completely with creative visitor management, but at least it can be reduced considerably. But it becomes a difficult issue if the lake or wetland is located close to a large city and serves as leisure park for all urban dwellers. How many visitors can a site carry before its long-term degradation starts? In this situation, the Carrying Capacity of the site has to be examined carefully and in detail.

Carrying capacity

Carrying capacity is usually defined as the maximum population of a given species that can be supported indefinitely in a defined habitat without permanently impairing the productivity of that habitat. However, because of our seeming ability to increase our own carrying capacity by eliminating competing species, by importing locally scarce resources, and through technology, this definition seems irrelevant to humans.

To determine roughly how many tourists or leisure activists are compatible for an ecologically valuable area, so called Carrying Capacity analyses are carried out. In general, ecological, physical, social and economic influences are evaluated.

The following key figures or indicators for the analysis of Carrying Capacity are examples, recommended by the Spanish Ministry for Environment to administration departments of National and Nature Parks (based on Heberlein 1977).

Ecological carrying capacity

- > Number of Species

- > Ratio of surface area covered with natural vegetation
- > Bio-Indicators
- > Combining/sealing of surface area.

Physical carrying capacity

- > Number of people per hectare or square kilometre
- > Number of camping grounds and pitches
- > Number of parking sites
- > Number of bath-towels fitting on a beach.

Resources carrying capacity

- > Number of people per bus
- > Number of seats available in the room where a video is shown
- > Number of people that can be guided through the museum every day
- > Number of sanitary facilities
- > Number of nature or city guides
- > Reasonable waiting time.

Social carrying capacity

- > Degree of contentment of visitors
- > Sensation of mass tourism
- > Distance between different groups of excursions (e.g. for guided climbing tours)
- > Number of people encountered on a nature trail.

The four sectors interact with one another. Heberlein distinguishes three limit values indicating positive development - consistent situation - and negative development. The disappearance of an indicator species (e.g. crayfish as indicator for good water quality) means exceeding ecological Carrying Capacity. Of course you should always move within the range of positive development in order to provide a buffer for events that cannot be influenced by management (e.g. drought period).



55,000 boats are registered on Lake Constance

The carrying capacity of a particular area can be increased by measurements such as:

- > Enhancement of regeneration (measures against erosion, reforestation, e.g.)
- > Geographical and/or temporal zoning of an area in terms of limitations on access and/or limitations on activities
- > Entrance fees
- > Supply of guided tours
- > Reservation and booking systems
- > Visitor guidance through pathways, signposting, nature

trails, observation platforms, displays, barbecue areas, etc.

- > Information and raising awareness of visitors (leaflets, information centres, first hand experiences)
- > Supply of public transport, etc.

In chapter 10.6 you will find a number of instruments and positive examples of sustainable tourism. The fact that calculations of Carrying Capacities can only be guidelines needs to be taken into account. Furthermore, it is a dynamic process which can change over the years. The definition of critical values often

is a political issue and its interpretation can be too generous, especially if tourism development is economically successful and the area is of high importance for recreation. The capacity for regeneration of natural habitats without external support can normally only be calculated after perennial field studies. For this, time and resources are needed which should be considered in the management plan.



Action is required to achieve goals

"A vision without action is
just a dream.

Action without vision is
a waste of time.

A vision with action is
able to change
the world!"

Nelson Mandela

Action Plan

Gaining the agreement of different representative interests on a common vision or on general key management issues is often fairly straightforward; it is in the detail of the action plan - that is, the concrete targets and measures - that problems can be found.

"The Broads is subject to a number of key external factors, many of a policy or legislative nature, which are driving change and will have a major influence on its future. Understanding and anticipating such factors is vital in order to manage change proactively rather than respond to it reactively." Broads Plan 2004, Broads Authority.

As indicated in the above quote, the targets and concrete measures of an action plan should consider external factors, and the challenges and opportunities they present. For example:

- > What are the consequences of the EU Environmental Directives with respect to their adoption into national legislation? What measures have to be adopted to comply with the legislation? E.g. Habitats and Birds Directive Natura 2000, EU Water Framework Directive, Directive on Strategic Environmental Assessment (SEA), EU Bathing Water Quality Directive, Nitrates Directive, Urban Waste Water Treatment Directive.
- > What demands arise from international conventions? Which measures in the management plan are able to contribute to achieving targets? E.g. Ramsar Convention for the Protection of Wetlands, World Heritage Convention, Biodiversity Convention, Bonn Convention on Migratory Species and the Kyoto-Protocol.
- > What changes and opportunities are there within European and

national economic policies, especially for agriculture and tourism?

- > What measures have to be adopted for the wetland in order to promote positive developments? E.g. reorientation of the agricultural subsidies from productivity to area payments, agri-environment programmes for promoting environmentally friendly agriculture, tourist demand for environmentally high quality holidays, the growing target group of active older people who enjoy culture, heritage and nature.
- > What are the regional and local factors influencing the management area? Which measures in the management plan could respond to regional land use plans, transport development plans, regional initiatives for the development of rural areas, reduction of unemployment, the designation of industrial areas, or points of focus within the regional tourism strategy?

Action plan - the concrete work programme

Five years is a realistic and achievable time frame for an action plan. The targets should, if possible, be quantified, e.g. establishment of new buffer zones encompassing 100 ha, reforestation 500 ha, 40% reduction of the nitrate content of the lake, installation of a Green Filter, extensification of 2000 ha agricultural areas, construction of a 20 km cycle track.

It is not always possible to quantify targets. This may be because information/data on the initial position are lacking, and therefore potential for improvement cannot be assessed, or because qualitative improvements are involved. In the management plan, the section dealing with raising people's

awareness and encouraging their participation in developing the plan should use mainly qualitative, measurable targets. An example is given below.

Target

Improved knowledge and awareness of the population of the five surrounding communities (in the subject matter/s).

Measures

- > Preparation of a travelling exhibition which will be presented for at least one month in each city hall within the five communities.
- > Development of a handout exhibition brochure, 5,000 print run

- > Informative material for at least 50 lectures in the regional schools (at least 1,200 children and young people).
- > Regional press coverage (at least five articles per year).

Feedback from the local population on the various measures used will provide a useful indication as to whether or not the target was reached. An evaluation questionnaire could be distributed, enabling local people to assess whether the lectures and information material were helpful and to make any suggestions for improvement.

Often there are different ways to reach the goal. It is therefore important to carefully consider a range of alternatives before

determining which measures to include in the management plan.

All measures contained in the action plan should be described in detail and contain the following elements:

- > Reference to the target
- > Description of the activity
- > Place of implementation
- > Time schedule
- > Who is concerned
- > Who has to be included/informed
- > Institution/person responsible for implementation
- > Definition of the person charged with doing the legwork
- > Budget (financial and personnel resources) - financing source.

 Example Action file card Management plan of La Nava and Boada	
Regular water analysis	
Objective	Improvement of water quality
Priority	High
Location	Wetlands of La Nava and Boada and rivers
Start and end of measure	Continuously, every month
Methodology	
Monthly samples to be taken:	
Laguna de Boada	1 Colector de Villarramiel 2 Canal de Castilla 3 Arroyo Lobera 4 Desvío de aguas a la laguna 5 Laguna de Boada
Laguna de La Nava	1 Antes de la captación de aguas del Retortillo 2 La Cogolla 3 Corralillos 4 El Prao 5 Arroyo del Canalizo 6 Arrollo de la Culebra
Analysis of PFQ, quantitative analysis of anions, quantitative analysis of cations, analysis of organic and inorganic carbon, PH, P reagent, N-ammoniacal, N-organic, P-total, BOD, QOD	
Yearly report of results	
Responsible Organisation	Junta de Castilla y León for La Nava and Fundación Global Nature for Boada Lagoon
Costs	€1,260/each analysis
Resources needed	Subcontract of a laboratory to analyse samples
Evaluation	Comparison of results of yearly reports to determine the efficiency of the implemented measures. Comparison of data of La Nava and Boada with valid standards, and with data from the lagoon Villafáfila in Zamora.



Newly planted constructed wetlands



Established constructed wetland

10.1 Measures to improve the water quality

Constructed wetlands for wastewater treatment

Dr Andreas Bally, BiCon AG

Why constructed wetlands?

The world-wide trend over the past 70 years in the construction of water pollution control facilities has been towards concrete and steel. These "conventional" treatment plants were developed to provide the highest performance on the smallest possible site; they are highly technical installations, which are fully dependent on electricity, experienced personnel and good maintenance. The disadvantages of such facilities are high construction and operational costs, a demanding maintenance, and a strong dependence on spare parts.

The "natural" way - treating sewage in artificial wetlands - is becoming increasingly popular. Hundreds of such reed bed treatment plants are in use in the USA and all over Europe; their popularity is growing every year. Scientific research and an intensive international exchange of experiences are the basis for this success.

Constructed wetlands are an appropriate technology for areas where inexpensive land is generally available and skilled labour is less available. Whether they can be used essentially alone or in series with other appropriate technologies depends on the required treatment goals. Additionally, they can be appropriate for onsite systems where local regulators call for and allow systems other than conventional septic tank and soil absorption systems.

What are constructed wetlands?

Constructed wetlands are ecological systems that combine physical,

chemical, and biological processes in an engineered and managed system. Successful construction and operation of an ecological system for wastewater treatment requires knowledge and understanding of the components and the interrelationships that compose the system.

Constructed wetlands are artificial wastewater treatment systems consisting of shallow ponds or channels filled with gravel, sand or soil which have been planted with marsh plants, and which rely upon natural microbial, biological, physical and chemical processes to treat wastewater. They typically have impervious clay or synthetic liners, and engineered structures to control the flow direction, liquid detention time and water level. Once a constructed wetland is designed and becomes operational, the system requires regular monitoring to ensure proper operation.

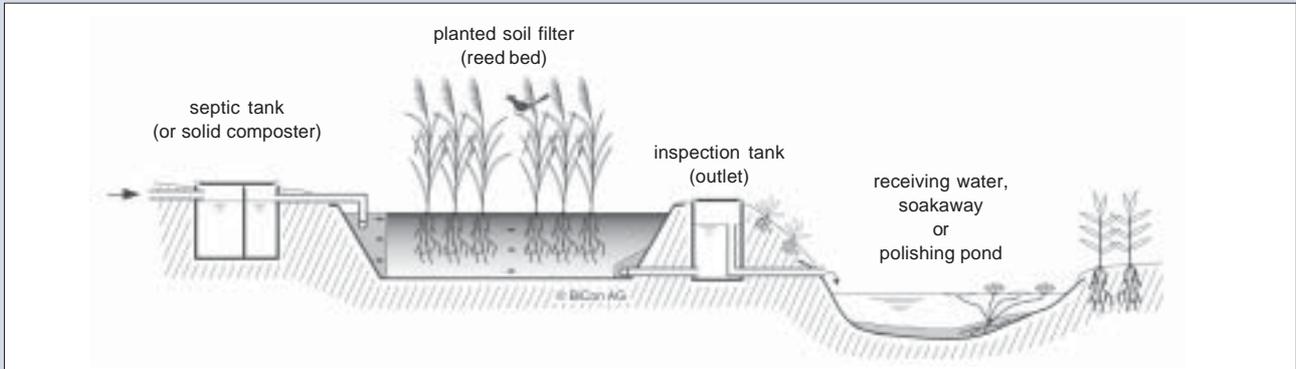
Types of "reed bed" systems

Constructed wetlands can be classified into two main types, dependent upon whether the water level lies over or beneath the soil surface. The first type is called surface flow wetlands (or free water surface wetlands), the second type subsurface flow wetlands (or vegetated submerged beds). In both systems sand and gravel are used as soil-filter substrate. Periodically charged and vertically percolated subsurface flow systems show the best efficiency regarding the oxidative degradation of pollutants whereas horizontal flow wetlands have a favourable effect on the denitrification rates.

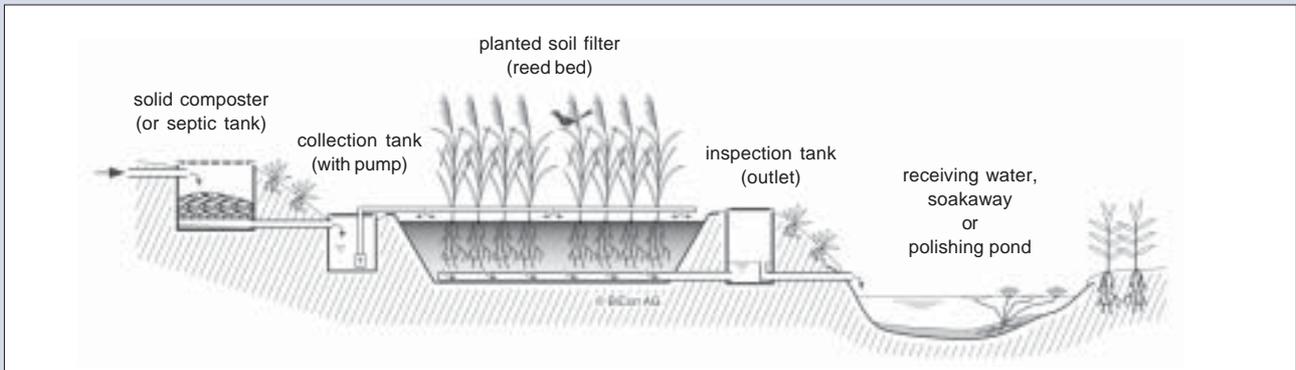
Reed bed treatment plants can be constructed for treating domestic, municipal, industrial or agricultural effluents. Each wetland system must be adjusted to the quantity and type of wastewater to be purified in the plant in order to function properly.

The purification efficiency of wetland treatment systems is as good or even better than the performance of technical wastewater treatment plants, even in the cold season.

Horizontal flow soil filter



Vertical flow soil filter



Therefore, there is no general construction design; every case is different and has to be carefully evaluated. Skilled experts must supervise planning and construction.

Odour

Conventional wastewater treatment processes produce odours mostly associated with anaerobic decomposition of human waste and food waste found in sewage. Wetlands, in contrast, incorporate normal processes of decomposition over a relatively large area, potentially diluting odours associated with the natural decomposition of plant material, algae, and other biological solids. If the solid fraction of wastewater is separated in a process with a short retention time (e.g. solid composteer) the pre-treated wastewater does not become anaerobic and does not smell.

Operation and maintenance

Maintenance of constructed wetlands is generally limited to the control of unwanted plants. Harvesting of plants generally is not required, but annual removal or thinning of vegetation or replanting of vegetation may be needed to maintain flow patterns and treatment functions. However, constructed wetland systems require monthly or weekly inspection of weirs. In addition weekly sampling is required at the effluent end as well as periodic sampling between multiple cells.

Mechanical pre-treatment

For the removal of most of the solids to prevent clogging of the sand filter, a mechanical pre-treatment of the raw wastewater is essential. This can be achieved with a grid in front followed by a sedimentation pond, a septic tank system or a solid composteer. Sedimentation ponds are

only recommended in cases where huge amounts of wastewater have to be treated (e.g. industrial wastewater). The solid composteer works as a filter in which the solids rot. The composteer consists of at least two chambers. While one chamber is being fed, the collected material in the other chamber is composting. Each chamber has capacity of about one year. The advantage of the composteer is its overall aerobic environment. The effluent of the composteer still contains oxygen and doesn't smell, whereas the effluent of a septic tank is anaerobic and malodorous. The sludge of a septic tank is putrefied anaerobically whereas the collected material of a composteer is composted aerobically to humus. The sludge disposal is less pleasant and more difficult than digging out earthy humus, which doesn't smell.



Constructed wetland planted with bulrush in Greece



The same wetland three months later

The filter system showed rapid positive results and generated a high interest for the future installation of additional filter strips at other lagoons.

Plant-soil filters - technology description

Planted soil filters are subsurface flow wetlands. The reed bed itself is a sealed hollow with a depth of about 1.2 m, filled with a permeable soil medium of particular characteristics, mainly sand and gravel, and vegetated with marsh plants (e.g. reed or bulrush). Sealing is done with a plastic liner, clay mineral or layers of compacted loamy or red soil. The wastewater trickles through the soil filter horizontally or vertically. Horizontal flow filters are fed continuously; the retention time depends on the water level within the soil filter. Vertical flow filters are fed intermittently (with flushing a few times per day). The sewage seeps away within approx. 30 minutes and is purified while percolating slowly through the filter medium. There are no exposed water surfaces remaining. Soil filters are not "constructed swamps". The purification effect - removal and retention of the pollutants - is achieved by natural biogeochemical processes in which the soil particles, the plant roots and the micro-organisms of the soil participate.

Design and performance

Wastewater treatment in constructed wetlands requires more space than conventional highly technical plants.

Vertical flow filters: For domestic sewage, it has to be calculated with a minimum area of 1 - 4 m² per person (or population equivalent), depending on the climatic conditions (in tropical regions 1 m², in Central Europe 4 m²).

Horizontal flow filters: They need much more space if used as main biological step, approximately 8-12 m² per person in Central European climate. Horizontal filters are recommended for post-treatment and for denitrification.

The purification efficiency of wetland treatment systems is than good or even better than the performance of technical wastewater treatment plants, even in the cold season.

Installation of constructed wetland buffer zones at the Vassova Lagoon in the Nestos Delta

Hans Jerrentrup, EPO

Vassova is one of three coastal brackish lagoons that are situated in the north-western part of the Nestos Delta, covering an area of approximately 10 km². The lagoon is surrounded by a coastal strip of sand dunes and extended salt marshes, reed beds and tamarisk bushes.

In former times, when the delta was less exposed to anthropic influences, River Nestos branches provided the necessary quantity of freshwater to the lagoons. As a consequence of melioration measures in the 1950s and 60s, the River Nestos was straightened and dammed. This led to a lack of freshwater in the lagoons. The subsequent main drainage canals were constructed to end up in the lagoons, thereby causing excessive eutrophication due to the use of agricultural fertilisers in the catchment area. Consequently the canals were diverted in the late 70s directly to the sea. Now freshwater was again deficient in the lagoons. Local fishermen then tried to help themselves by using controlled quantities of drainage water from canals for the supply of freshwater.

The nutrients in the freshwater inflow had and still have a massive eutrophication impact on the lagoon, causing negative effects to the biodiversity, and resulting in less valuable fish species. On the other hand the supply of freshwater is necessary to reduce the salt content

of the lagoon and provide necessary nutrients - a biological requirement for spawning fish.

In the project area in Greece, at the coastal lagoon Vassova, a filter system with a surface area of six hectares was created in autumn 2003 in order to remove nutrient loads from inflowing agricultural drainage canals. The Constructed Wetland was planted with more than 50,000 autochthonous (native) water plants (*Typha angustifolia*, *Typha latifolia* and *Phragmites sp.*) in three adjacent basins. Between the basins, earth-gravel filters were installed in order to regulate the flow velocity. Between the last basin and the lagoon, an overflow in combination with an additional earth-gravel filter was constructed. The used water comes from one of the main drainage canals and remains for about 2-3 days inside the filter system.

Continuous water quality monitoring has been carried out by the University of Thrace in Xanthi. The results of this detailed weekly water analysis quantitatively and qualitatively show, that at least 80 % of the phosphorus and nitrogen loads which cause the eutrophication are filtered by the planted water plants inside the three basins.

The filter system showed rapid positive results and generated a high interest for the future installation of additional filter strips at other lagoons. The fishermen of the local co-operatives and the water management board (TOEV), responsible for the management of the lagoons in the western Nestos Delta were intensively involved in the realisation of this measure and recognize the opportunity to solve long-term eutrophication problems. A very important side effect was that the installation of the filter proved to function as a freshwater marsh with positive impacts for biodiversity.

Already in the first spring, four different amphibian species reproduced in incredible numbers in the filter. Hundreds of waders were feeding, and even very rare bird species like the Glossy Ibis stayed here for several days during migration. Also in summer, the new reed beds host important numbers of egrets, herons, waders and warblers.

Phosphorus removal from Barton Broad, UK

Julia Masson and Andrea Kelly,
Broads Authority

Nutrient build up in lake

Barton Broad, with the River Ant flowing through it, is the second largest lake in the Broads wetland system. By the 1970s, the broad had silted up and its turbid waters were dominated by algae. This degraded ecosystem arose from years of nutrient inputs, mainly nitrogen and phosphorus from sewage treatment works and agricultural land. This nutrient rich water encouraged algal growth, which blocked out sunlight and, on death and decay, added to the silt load in the broad. In this aquatic climate, water plants could not survive.

Phosphorus removal from Stalham sewage works

Improvements to Stalham sewage works in the 1970s reduced phosphorus inputs bringing water quality improvement. Ferric sulphate, used at the sewage works, converted soluble phosphate to insoluble ferric phosphate, which precipitated out of the water. By the late 1990s additional phosphate stripping equipment at the sewage works carried out final polishing of the effluent. Four Dynasand towers, housing a pump system to agitate sand columns within, caused any residual phosphorus to precipitate out. The effluent returning to Barton Broad was now virtually phosphate free.

Clearwater 2000

However, the nutrient legacy remained within the lake sediment. So, a project known as Clearwater 2000 implemented a six-year programme of suction dredging mud from Barton Broad. The total project cost was £3 million (€4.5 million), with one million (€1.5 million) spent on sediment removal alone - the quantity of mud dredged could have filled 160 Olympic swimming pools! Dredged material was dried out in



Section of Gis-map of buffer zones in the Nestos Delta

10 Examples of Measures >>



Barton Broad margin



Biomanipulation - boat with fish barrier

Restoring aquatic ecosystems is a long-term process and the Clearwater project still requires resources, particularly for biomanipulation and monitoring.

settlement lagoons located on adjacent farmland, constructed using topsoil bunds to contain the drying liquid sediment. Resulting dry lagoons with one metre depth, nutrient-rich mud were ploughed into the land, returning nutrients back into the agricultural system.

Signs of recovery

Overall the suction dredging has removed 20 years worth of phosphorus input from Barton Broads and its catchment. The phosphorus concentration has continued to decrease each year. The ecosystem shows good signs of recovery with longer periods of clear water in the spring and lower algal populations, with a change from toxic blue-green algal populations to bottom-growing species, indicating improvements in light penetration through the water column.

Restoring aquatic ecosystems is a long-term process and the Clearwater project still requires resources, particularly for biomanipulation and monitoring. Diffuse pollution, mainly from agricultural nitrates is still to be addressed.

New floating macrophyte green filters

Eduardo de Miguel, Fundación Global Nature

The treatment of wastewater in the Mediterranean basin is deficient. Wastewater from small cities, villages and tourist centres, the food production industry (canneries), intensive livestock farming (pig farms), and other highly contaminating industries (tanneries) severely aggravate river and coastal pollution. The lack of effective water treatment exacerbates the scarcity of water resources in these arid regions where much wastewater cannot be reused.

Part of the problem, which is common to much of Spain, is the lack of urban wastewater treatment and the poor operation of existing water treatment plants. Although there are many water treatment stations installed, as a result of economies of scale they are scarcely operational or non-operational, costly, and involve the use of highly mechanized and complex systems. These factors make maintenance costs prohibitive for municipalities or tourist residences with low budgets.

In many regions of Spain, numerous isolated population centres and tourist urbanisations cannot dispose of their wastewater collectively with other population centres due to the distance between centres.

One main problem of the wetland Boada de Campos in the project area in Spain was the poor quality of the inflowing water of some of the tributaries that are polluted with insufficiently treated sewage containing nutrients and other substances e.g. from small size tanneries in an adjacent community. Water analyses carried out within the project showed that the poor water quality threatens indigenous animal and plant species in the wetland.

A new water treatment method

This wastewater treatment system has been developed by the Madrid School of Agricultural Engineering, and it is based on emergent macrophytes that naturally root to the soil, but in this case are converted into artificially floating macrophytes.

Since they float, these species form a dense mat of roots and rhizomes that occupy the entire volume of the collector (pond or canal), thus forcing all the water to circulate through the matted vegetation, which supports micro-organisms that degrade organic material. At the same time, the leaves pump oxygen

to the roots, thus favouring the process of contaminant degradation.

This new method combines the advantages of floating and emergent macrophyte systems, eliminating or reducing the drawbacks of these systems. The system is capable of secondary and tertiary treatment of wastewater, eliminating eutrophication effects, particularly phosphorus and nitrogen. It also eliminates large amounts of heavy metals and decomposes phenols, which makes the system useful for treating industrial effluents. To date, *Typha*, *Phragmites*, *Sparganium*, *Scirpus* and *Iris* have been used in particular.

Floating macrophyte filtration systems are particularly suitable for installation in temperate and warm areas of the northern and southern Mediterranean coasts. Here, municipalities have less resources, and warm winters make it possible to use green filters without protective plastic because the plants do not experience a pause in their vegetative cycle. This makes these systems even cheaper. In addition, these filters are most active in summer, when plant production reaches its peak, coinciding with the growth in population caused by the arrival of summer holidaymakers to coasts.

Other similar methods already tested but not as efficient are:

1 System of emergent superficial-flow macrophytes:

In superficial-flow systems, contaminants are eliminated through reactions that take place in water and upper zone of contact. Little wastewater circulates through the roots, which limits their water treatment capacity.

2 System of emergent subsuperficial-flow macrophytes:

As in the previous system, a layer of gravel or soil is used, through

which water circulates by gravity. Its most important drawback is the rapid clogging of the terrain over time by roots, rhizomes, and sedimented solids.

3 System of floating macrophytes:

These systems use species that float naturally, such as *Lemna*, *Wolffia*, *Spirodella*, *Azolla*, or *Eichornia*. These species do not reach a large size and their production of biomass is limited, which reduces their absolute water treatment value.

Madrid airport treatment plant

At present, a Floating Macrophyte Filter is being used experimentally at Madrid-Barajas, Reus and Alicante airports. The first one is a 3000 m² semi-industrial facility for 500 inhabitant-equivalents, for the specific treatment of domestic and aircraft wastewater containing highly specific substances. It runs under the direction of the School of Agricultural Engineering of the Polytechnical University of Madrid. The project involves the use of the Floating Macrophyte Filter system as the sole biological system and as a tertiary system for the elimination of nitrogen and phosphorus.

Another wetland wastewater treatment based on the Floating Macrophyte Filter system is now being developed in Villacañas, Toledo. The project includes the construction of a 550 m long channel for treating nutrient-laden water from a primary and secondary water treatment plant in order to improve the quality of the water in a protected wetland area. After this project has been developed and becomes fully operational, the experience obtained here will be applied to other environmentally valuable wetland areas with similar water quality problems.

Cost-effectiveness

The construction and operating costs of conventional systems are often cost-prohibitive. Many conventional water treatment plants in rural communities and small towns are neglected soon after their inauguration because of high operating costs.

The advantages of the FMF system with respect to other systems are:

- > Economy and easy installation
- > Minimum energy demand
- > Greater effectiveness than other systems, including other green filters, because the entire volume of wastewater circulates through the treatment mesh (daily absorption rate 0.5-4.6 g N/m² and 0.6-0.8 g P/m²).
- > Easy harvest of the biomass above and below the water surface. Harvesting does not destroy the system, as it does in the case of rooted-plant systems.
- > Production of a large amount of biomass: In the case of cattails (*Typha latifolia*), the system annually produces 2.2 kg/m² of dry material above water, which can be used as compost, livestock feed, or as an energy source.
- > It absorbs hydraulic peaks without serious problems because the filter volume acts as a laminator.
- > Few controls are needed because the process takes place automatically as a natural process. Slurry does not have to be recycled and there are no problems of washing out bacteria. The oxygen level in the treatment tank does not have to be checked because macrophytic plants oxygenate water.
- > The system produces little noise and has a low visual impact.

Carrying out the project in the Mediterranean regions is particularly cost-effective because:

10 Examples of Measures >>



View of Trinity Broads



Bream and macrophytes



Endemic Lake Constance Forget-me-not
(*Myosotis rehsteineri*)

One of the aims of the biomanipulation was to reduce the amount of algae in the broad leading to macrophyte growth and clear water.

- > The absence of a winter vegetative resting period allows water treatment to continue throughout the year.
 - > Tertiary treatment of effluents allows the water to be reused in this parched region.
 - > Macrophytic filters are not subject to economies of scale as in the case of large water treatment plants. They can be used in small, isolated population centres.
- municipality of Lorca, 2 FMF in two single-family homes and 1 FMF in an Interpretation Centre in the municipality of Lorca, and 2 FMF in one pig farm.
 - > Scientific follow-up carried out by the Department of Plant Production in the Madrid School of Agricultural Engineering, with bi-weekly analyses of wastewater, treated effluents, and plant material.
 - > Information campaigns.

LIFE project "Macrophytes": a pilot project in Lorca, Spain

Fundación Global Nature is now managing a LIFE Environment project financed by the European Commission and the municipality of Lorca to demonstrate the effectiveness of a wastewater treatment system using floating macrophyte filters (FMF).

Main objectives

- > Implementation of these new systems in Mediterranean regions that do not have a winter vegetative rest, thus favouring plant activity, is especially suitable for centres of tourism, which are sometimes located at a distance from urban centres and have a large summer population, the time of maximum filter activity.
- > Development of new water treatment systems that are not dependent on large-scale economies can be used in small communities and different activities (urban areas, livestock farms, and industries), and are inexpensive to install and operate.

Actions and means

- > Creation of 7 filters of different sizes as prototypes for different applications: 3 FMF in three small isolated population centres located more than 20 km from the central urban area of the

10.2 Examples of restoration measures for wetlands

The Trinity Broads, UK

Julia Masson, Broads Authority

Poor water quality

Water from the Trinity Broads complex flows out into the Muckfleet water course. A sluice installed in the Muckfleet in around 1850 isolated the Trinity lakes from the River Bure and, therefore, from river nutrient inputs and saline incursions. In addition, the absence of a sewage treatment works means that additional nutrients are not received from this source. However, water quality has deteriorated from diffuse inputs of nitrogen and phosphorus, mainly from agricultural land around the broads and leaching from domestic septic tanks into water courses flowing into the broads.

Biomanipulation for Ormesby

In 1995, with funding of about £1 million from EU LIFE funding, Ormesby Broad underwent a process of biomanipulation - a restoration technique aiming to establish stable, macrophyte dominated clear water with diverse, stable fish and invertebrate populations.

The process of biomanipulation involved placing a fish barrier between Ormesby and Rollesby Broad. The original barrier, made of stone-filled gabions with a ramp to allow access for small craft, was in place between 1995 and 2000. This has been replaced with a PVC curtain barrier with attached floats, to enable better boat access. Once the barrier was in situ, 300,000 fish were removed from Ormesby Broad into Rollesby Broad on the other side of the barrier. Fish were temporarily stunned using electro-fishing techniques in order to record numbers and condition and remove them. The reduced numbers of zooplanktivorous fish, particularly bream and roach, enabled zooplankton populations to grow, particularly water fleas. This increase in grazing pressure from zooplankton resulted in reduced phytoplankton population, leading to a well-balanced lake environment.

Optimism for improved water quality

One of the aims of the biomanipulation was to reduce the amount of algae in the broad leading to macrophyte growth and clear water. Algal levels, measured by chlorophyll-a have remained fairly low and stable, with some fluctuations. Depth of water clarity relates to phytoplankton levels, and this has generally remained clear and stable.

Since biomanipulation, phosphorus levels have shown great variability, with the underlying trend remaining similar to pre-biomanipulation. Higher levels experienced in the summers of 1996 and 1999 could have resulted from pollution, changing fish populations in response to biomanipulation or from sediments releasing phosphorus into the water column.

Ormesby Broad still has the highest levels of nitrogen in the Trinity Broads system, but at favourable

limits compared to other sites in the Broads.

EU LIFE project "Untersee life"

Rüdiger Specht, Untersee life

Lake Constance, second largest lake on the northern fringe of the Alps, borders Germany, Switzerland and Austria. Its western end shows the longest continuous natural or semi-natural banks on the German side covering a shoreline of 20 km in length and comprising several adjoining nature reserves with a total of 1,100 ha. Characteristic habitats are the shallow water zones with beds of the benthic algae (*Chara spp.*), the Molinion meadows with threatened butterflies (*Glaucopteryx teleius* and *G. nausithous*), a unique lakeshore community with the endemic *Myosotis rehsteineri*, and the estuary of the river Aach which shelters the first population of the European beaver at the lake since this species disappeared 200 years ago.

For optimising this habitat network, the EU LIFE project "Untersee life" was implemented from 1999 to 2004 by the Bezirksstelle für Naturschutz und Landschaftspflege ("District Office for Nature Conservation and Landscape Management") in Freiburg. Among the numerous project partners (regulatory authorities, municipalities, NGOs), the NABU - German Association for Nature Conservation plays an important role in monitoring an operation on site. 50% of the budgets of about €2 million were financed by the Union's LIFE-Nature programme. The remaining costs are provided by the Nature Conservation Administration and other project partners.

Wetland management

The project covers a wide range of different actions, for the most part,

besides monitoring and public awareness activities, relating to landscape management. The Molinion meadows are one main focus for conservation activities in the project area. About 120 ha are subject to mowing as regular management. For the regeneration of valuable wetlands, a further 35 ha of successional brush were cleared in the course of the project. On other sites the project launched a pasturing concept and started the development of alluvial forests in accordance with the management plan.

Lakeshore and river restoration

Other challenges needed technical solutions. On 300 m the shoreline was reinforced with concrete walls, thus interrupting the natural banks and impeding the development of a natural shallow water zone. When the project was inaugurated, the water management authorities joined in as partners for a restoration scheme. Extensive discussions with the municipality, with the relevant authorities and with local stakeholders followed. In the end, an even longer strip of the shore could be restored, the surplus costs being shouldered by the community involved. Instead of concrete walls, local people and tourists now cherish a close-to-nature shoreline.

Another restoration activity took place at the river Aach, where two river meanders had been disconnected from the water course in the 1960s for the purpose of drainage. These actions had backfired: The shortening of the river course led to increased erosion due to higher flow velocity. The nearby harbour of the community of Moos silted up and has to be dredged regularly. Moreover, the water quality in the artificial still-water courses decreased, and the former meanders became inaccessible for water organisms.

10 Examples of Measures >>



Planting trees in La Nava



Burning reed in the Nestos Delta



Fen harvester of the Broads Authority

From experience only 30-40% of all plants survive the first year in areas like Tierra de Campos due to lack of nutrients in the soil and sparse average rainfall of 400 mm per year.

So, the project pursued various variants on reconnecting the meanders to the river course. Hydrological studies were made to gather information on the water body as well as to disperse fears of flooding among the local population. Property had to be purchased in the surroundings of the meanders, and several meetings with the three municipalities affected by the planned actions secured the backing of the local authorities in the end.

Eventually, a three-stepped action plan for the reconnection was implemented. First, the meanders were dredged to avoid sediment outflow after reconnection. Secondly, fir trees were fixed in the river bed as biological silt traps, and thirdly the separating dams were removed and the meanders reconnected to the river course. One effect can already be seen. Fully grown specimens of fish have been observed in the old meanders, drawn by new spawning grounds.

Reforestation at La Nava

Fernando Jubete, Fundación Global Nature

In the region of Tierra de Campos, several periods of land consolidation and intensification of agriculture have destroyed forests, bushy areas and hedgerows which had served as boundaries between fields. However, these structures are important habitats and retreat areas for vertebrates, insects, amphibians and reptiles. They offer protection against strong winds, or shade during hot summer months, and thereby help to balance the extreme climatic conditions of the region. Additionally, trees, shrubs and hedgerows act as buffer zones and help to reduce nutrient loads from agriculture such as nitrates and phosphates.

This development also affects the steppe lakes La Nava and Boada

and their environment. Although selective afforestation had been realised by Fundación Global Nature in the past years, trees, shrubs and natural shore vegetation have disappeared almost completely. In winter 2002 and 2003 in the scope of the LIFE-project, substantial reforestation measures have been carried out. Wide corridors between the wetlands and agricultural fields were chosen for the plantations.

In total 16,460 trees and shrubs from regional forest nurseries were planted. The holes of 30 cm in diameter and 60-80 cm depth were dug with a ground driller. Around each plant a small earth wall was piled up to improve the water supply, and the soil around the plant was covered with jute to prevent evaporation and competing fast growing grasses.

The plants used are: *Populus nigra* (black poplar), *Populus alba* (white poplar), *Ulmus minor* (smooth-leaved elm), *Tamarix gallica* (tamarisk), *Crataegus monogyna* (hawthorn), *Rosa canina* (dog rose), *Rosa pounzinii*, *Rosa micrantha* (small-flowered sweet-briar), *Rubus ulmifolius* (bramble), *Prunus spinosa* (blackthorn), *Prunus insititia* (bullace), *Cornus sanguinea* (bloodtwig dogwood), *Euonymus europaeus* (spindle), *Sambucus nigra* (elder).

Cardoons - Appropriate plants for the installation of buffer zones

For the buffer zones, the experts recommended cardoons because these plants are perfectly adapted to the dry climate conditions in Spain. The species *Cynara cardunculus* produces on average 15-20 t biomass per hectare per year and therefore removes high amounts of nutrients. A second advantage is that cardoons show a high photosynthetic activity in winter as well.

10.3 Examples for vegetation management

Burning as a management tool for reed beds and fens

Julia Masson and Sandie Tolhurst, Broads Authority

Burning is a traditional technique used for reed bed management and is usually carried out in the winter when the reed is dead and dry. Burning can also be used to manage areas of mixed fen. Managing fens requires careful consideration, as they usually support diverse invertebrate populations, and the impacts of burning large plots of fen vegetation are largely unknown. Burning small areas may be less detrimental, but the labour required to create fire breaks may make the effort less economic. Using burning management on fen vegetation traditionally cut for valuable products such as marsh hay, litter for animal bedding or as forage is not recommended.

The way the burn is managed for a slow 'hot' burn or fast 'cooler' burn will have different outcomes, as set out in the table below.

Burning a reed bed or fens requires very careful planning. There are questions to consider when preparing for burning management:

- > Has a survey been carried out to establish important species within

the reedbed system? Invertebrate populations are particularly vulnerable.

- > Can the burning be managed to enable fauna to recolonise afterwards?
- > Can the site be divided into blocks for burning on a rotational system?
- > Where are fire breaks required? Burning in small plots requires the creation of long lengths of fire breaks, which is very labour intensive.
- > How many people are required to manage the burn? Ensure that no-one will become cut off by the fire.
- > Liaison with local fire brigade
- > Will neighbouring properties or roads be affected by the fire?
- > Is the correct equipment available to manage the burn in a controlled way (including a pump and generator required on site with pipes)?
- > Which direction is the wind coming from? How strong is it?
- > What is the condition of the underlying substrate? Fires on dry peat can move underground and burn for weeks.

Mowing techniques - fen harvester

The Broads Authority and its partners recognised the need for a machine that could cut, gather and remove fen vegetation from large areas of the

Broads fens with minimal environmental damage. And so the wetland fen harvester was launched in 1998 with funding from EU LIFE programme.

As the fens are of high ecological importance, special features were designed for the fen harvester to limit damage to the fen peat. These include:

- > Use of tracks rather than tyres to give low ground pressure, minimising damage to the peat soils.
- > An 800 m long blower pipe to blow cut material to a collecting point off the site. This removes the need for additional machinery to take material off site causing damage to delicate habitat from repeated passes.
- > The fen harvester gains access across the wetter areas using lightweight portable bridges, comprising modular jet floats. These are 1m³ plastic blocks that can be joined together in various lengths or doubled-up to carry extra weight.

The fen harvester cuts the fens on a three to five year rotation. A technique of cutting, by leaving strips, has been developed so that some vegetation is left on a longer rotation. When the fen harvester returns after three to five years, it cuts at 90 degree to the previous cut, applying the same strip cutting. This creates an interlinked mosaic of vegetation of different ages and has greater benefit for biodiversity.

Different burn temperatures	
Slow 'hot' burn	Fast 'cooler' burn
<ul style="list-style-type: none"> > Burn on very still day with little or no standing water > Removes litter > Greater impact on trees and young saplings > Can be very damaging to fen ecology 	<ul style="list-style-type: none"> > Burn with the wind and standing water > Leaves litter untouched > Leaves pockets of untouched fen > Less damaging for fen ecology.

10 Examples of Measures >>



Reed harvest in the Broads



Vegetation management in La Nava

In another part of the lagoon a herd of 12 horses from the Doñana National Park grazes. These horses are well adapted to particular wetland conditions and to climate changes. They are used to living outside all year round and need little care.

Different uses of the cut material have been explored. It is important that the use of the material is as local as possible to the cutting site to avoid environmental and financially costly transportation. Early ideas, such as for animal feed and bedding, proved to be uneconomic due to the bulky nature of the material, the need for dry material and because of legal requirements. Currently, most of the material is used as organic compost. However, a new opportunity has arisen to use the material as a biofuel in a heating plant for greenhouses.

Vegetation management in La Nava

Fernando Jubete, Fundación Global Nature

On the large areas around the La Nava lagoon complex about 10 tons of biomass per hectare and year are being produced. Dead reed plants such as *Carex divisa*, *Juncus gerardi*, *Eleocharis palustris*, *Scirpus maritimus* or *Thypha domingensis* fill up the steppe lake and cause eutrophication. Within the LIFE project for the protection of the Aquatic Warbler a vegetation management plan was developed and four different exemplary measures realised.

- > (Manual) Scything
- > Mechanical mowing
- > Controlled burning
- > Horse grazing.

Scything, mowing and controlled burning is done once a year in late summer when the steppe lake is almost completely dried out. In another part of the lagoon a herd of 12 horses from the Doñana National Park grazes. These horses are well adapted to particular wetland conditions and to climate changes. They are used to living outside all year round and need little care. The

results of the horse grazing are collected regularly over a three year period and analysed. Also, the development of the areas which were scythed, mown and burned is being surveyed. The most successful method or a combination will finally be adopted in La Nava and recommended for ecosystems with similar conditions.

Vegetation mapping at Villacañas shallow lakes

Santos Cirujano, Real Jardín Botánico Madrid

Villacañas wetlands situated in the Province of Toledo (Spain) are a group of three seasonal shallow lakes: Laguna Larga (107 ha), Tirez (98 ha) and Peña Hueca (126 ha). The areas around the lagoons have been used intensively for agriculture for more than 50 years. The natural vegetation has been largely destroyed and today can only be found on a few hills around the lake. The vegetation survey was part of a Life project carried out by Fundación Global Nature for the restoration of the lagoons, and served as the basis for the management plan. The survey included vegetation around the lagoons as well as aquatic plants, especially those species which are characteristic of saline, continental wetlands.

Four aquatic and 20 terrestrial plant communities were analysed. Based on the vegetation study and on aerial photography, a vegetation map with typical plant communities was produced in 2000. Areas with the highest ecological value were designated as "Reserva Botánica" and are now under protection.



Example of map of shore vegetation of the Lagoon Larga de Villacañas

Management of wetland vegetation with water buffaloes in Greece

Y. Kazoglou, Society for the Protection of Prespa
 H. Jerrentrup, Society for the Protection of Nature and Ecodevelopment (EPO)

The excellent adaptation of water buffaloes (*Bubalus bubalis*) to wetland conditions and their unique abilities as animals for work and production established this mammal as the most reliable companion of Greek farmers that settled near wetlands, particularly in the central and northern regions of Greece. The water buffalo belongs to the group of Asiatic buffaloes and probably originates from the wild buffalo of India (*Bubalus arni*) that was domesticated 4,000 years ago. From a genetic point of view, it belongs to the type of common buffalo (River buffalo) and the sub-type of the Mediterranean buffalo that has developed particular characteristics because of long isolation in Greece for at least 1,600 years. According to Demetriadis (1957), it seems that water buffaloes were gradually introduced to south-eastern Europe - including Greece - by the end of the

Roman Empire during the raids of Attila and later during the raids of Turkish origin groups.

The population of water buffaloes in Greece before the 1950s was estimated to be more than 100,000 animals, but declined to less than 700 animals in the early 1990s due to massive changes in land uses, the mechanisation of agriculture, the import of improved breeds of cattle and the exclusion of buffaloes from European Union subsidies. For example, in the Nestos Delta the last herd of water buffaloes disappeared in 1984, shortly after the country's membership to the union.

Since 1998, the situation has improved mainly because of the implementation of an EU supported programme by the Greek Ministry of Agriculture for the preservation of rare domestic breeds. However, a growing understanding of the conservation significance of grazing for the management of protected areas in Greece has been observed during the last fifteen years and water buffaloes hold an important position concerning wetland management. At present, there are

approximately 1,400 buffaloes at eight Greek wetlands: Lake Kerkini, Lake Volvi, Axios Delta, Lake Mikri Prespa, Amvrakikos (all five are Ramsar sites), River Sperchios and two other small wetlands in the prefectures of Thessaloniki and Komotini. The aim of the present paper is to briefly present two experiments on the management of wetland vegetation with water buffalo grazing that took place within the framework of two different LIFE Nature projects and are continued beyond.

Water buffaloes and wetland conservation projects

Water buffaloes have played a very important role in wetland vegetation management by maintaining early succession stages on their grazing sites. Among the most important Greek wetlands, Lake Kerkini, which hosts the largest water buffalo population, is grazed with large expanses of wet meadows on which many specialised aquatic organisms depend. On the contrary, at many other wetlands, wet meadows are scarce due to increasing agriculture or deteriorating because of the

10 Examples of Measures >>



Water buffaloes in Greece



Helophytes fill in open water spaces in La Nava

Unhindered spreading of reed plants can interfere with the preservation or restoration of biodiversity, the ultimate ambition of good management of lakes.

absence of traditional vegetation management which has led to the expansion of dense reed beds or woody vegetation.

In 1997, the Society for the Protection of Prespa (SPP) launched an experiment to investigate the potential of restoring wet meadows by means of water buffalo grazing at the reed-dominated sites of Lake Mikri Prespa. Initially, the five grazers created corridors in the dense reed bed in order to reach the most readily accessible locations of the experimental site and "mud pools" for refreshing and protection against insects. The consumption of reeds (*Phragmites australis*) and trampling had important effects on the cover, species composition and structure of the littoral vegetation: reed cover, density and height were reduced, while litter and bare soil gradually increased. The main result of the experiment was the creation of a wet meadow habitat type on a large part of the experimental area. Additionally, the grazed parts of the experimental site were regularly used as feeding grounds by many rare bird species while carp spawning was observed in April 1999 and 2000.

In 2000, the Amvrakikos Development Agency (ADA) conducted a similar experiment at the brackish Swamp of Rodia at Amvrakikos, a site hosting the largest reed bed in Greece covering a total area of 25 km². Five water buffaloes grazed in a fenced area mainly covered by sea clubrush (*Scirpus maritimus*) and tamarisks (*Tamarix sp.*). The main effects of grazing on the vegetation were the decrease of sea clubrush density and height, which was the dominant species on the wet meadow habitat type of the experimental site, and the reduction of tamarisk cover by approximately 70%. The latter was mainly caused by the grazers scratching on the

shrubs, while trampling did not allow for the sprouting of young plants. More than thirty water bird species were observed feeding in the grazed site. Riddell (2000) concluded that the fenced grazed site was much more favourable for feeding birds than the ungrazed sites.

Water buffalo grazing proved to be a very effective technique for the control of high emergent helophytes and woody species and for the maintenance of typical wet meadow vegetation in two different wetland types. In both cases, the positive experimental results were combined with the endorsement of the activity by the local communities and the enthusiastic reaction of visitors, who were guided to the experimental sites. By the end of the two projects, it was very pleasant to see that both the SSP and the ADA decided to continue the grazing activity although additional funding had to be secured for that purpose. At present, the Prespa herd numbers thirty five water buffaloes and the Amvrakikos herd twenty five. For some years additional incentives have been given by the EU for the growing of buffaloes as a rare domestic breed and it is realistic to hope that they will be reintroduced in other wetlands too. In the recent management plan prepared by the LIFE Environment project for the Nestos Lakes and Lagoons, it has been proposed to use buffaloes for the management of reed beds and as a great tourist attraction. The buffaloes are known by local people to also be of great value at the Nestos Lakes for their positive influence on carp stocks.

Recommendations

Scientific research on the effects of water buffalo grazing should be continued to cover important gaps in the relevant knowledge, e.g. effects in river ecosystem vegetation. On the

other hand, it seems clear that grazing management in Greek wetlands should follow the example of wetland management at many protected European wetlands, where livestock raising is linked to nature conservation. Such a scheme would provide the necessary funding for the sustainability of management by grazing in wetlands. Especially for the water buffalo, the challenge is to combine the financial support given for its preservation as a rare breed with its abilities as a management tool and its potential for the production of very high quality primary sector products: meat, milk and numerous delicious dairy products of increasing market demand.

Management of water plants

Santos Cirujano, Real Jardín Botánico de Madrid

Water vegetation is one of the most important and most influential elements in temporary steppe lakes and wetland areas. The development of reed plants depends on general hydrological and ecological conditions. Reed plant populations can substantially alter the physiognomy of wetlands or lakes within a few years.

Unhindered spreading of reed plants can interfere with the preservation or restoration of biodiversity, the ultimate ambition of good

management of lakes. Two different habitats have to coexist in wetlands to ensure a balanced development:

- > Open water surfaces without reed plant populations but with submersed vegetation as a feeding source for water fowl, and
- > Reed population in shallow waters and shore zones as retreat areas for water fowl and other birds.

It is a difficult task to achieve a balance of these two habitats especially if the wetland or lake is rich in nutrients which add to an uncontrolled growth of reed plants.

Water vegetation of Mediterranean wetlands consists of several helophytes, such as reed (*Phragmites australis*), cattail (*Typha domingensis*, *T. latifolia*), rushes, bulrushes (*Scirpus lacustris*, *S. litoralis*, *S. maritimus*), and sedges (*Carex divisa*). They produce large amounts of biomass, which can fill in the wetland within a few years. This development can be particularly critical in water bodies without outflow or those where water renewal takes place very slowly.

On the one hand, high-growing reed plants cannot grow optimally in wetlands which dry out during long periods of time and are quickly replaced by smaller species or rush meadows. On the other hand, a regular water supply contributes

towards better conditions for reed populations, and ultimately nurtures eutrophication of the water body.

Other aspects have not been completely investigated yet, such as the influence of fish populations. However, in several Spanish wetlands a significant spreading of reed population was determined, after removing the carp (*Cyprinus carpio*) stock. It has also not yet been sufficiently investigated yet what influence on reed plants emanates from the widely distributed American crayfish (*Procambarus clarkii*).

Measures to control reed plants

- > Mowing and clearing of biomass
- > Controlled burning
- > Removal of sediments
- > Grazing with cattle, horses and other large herbivores.

All measures have assets and drawbacks, and have to be chosen according to the attributes of the wetland.

Mowing of reed can only be effective if the biomass is removed from the wetland. On average, mowing should be carried out twice a year.

Controlled burning generally is applied where mowing is not adaptive. Compared with mowing and removing biomass, only 60% of the nutrients are removed when burning

Production of biomass by different water plants in El Hondo National Park and La Nava steppe lake

Plant species	Height (cm)	Dry mass (g/m ²)	Dry mass (t/ha)
Reed (<i>Phragmites australis</i>)	400	5,786	57.86
Reed (<i>Phragmites australis</i>)	208	1,690	16.90
Alkali Bulrush (<i>Scirpus maritimus</i>)	130	1,605	16.05
Common Spike rush (<i>Eleocharis palustris</i>)	60	792	7.92
Divided sedge (<i>Carex divisa</i>)	65	745	7.45

10 Examples of Measures >>



Restored river in Upper Swabia

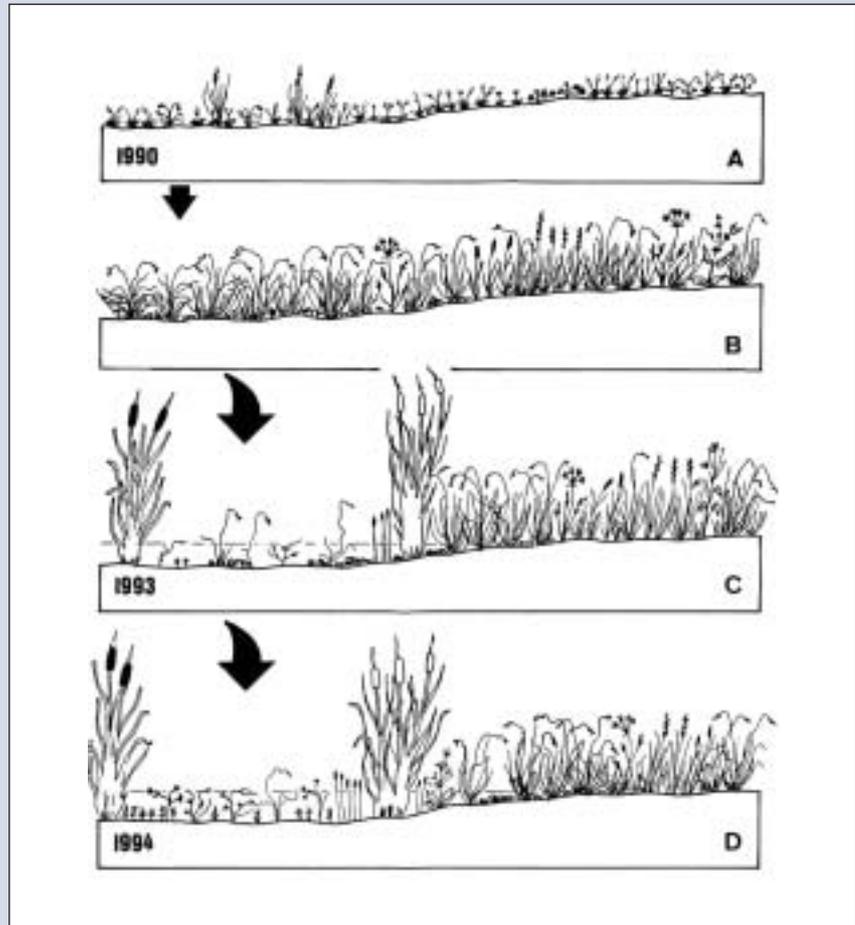


Upper Swabian lakes



Buffer zone between agricultural land and lake in rural area of Upper Swabia

At the moment a total area of over 770 ha surrounding about 50 lakes are reserved for extensive farming by contracts in Upper Swabia.



Development of water plants in La Nava steppe lake, since regular water supply is provided

A The steppe lake was dried up and covered with low bush pasture land.

B After first flooding the lake, vast populations of *Carex divisa* developed which covered the total steppe lake within a few years. Regular

is applied. The rhizomes normally remain intact, but dead plant material is largely removed to allow a better water circulation. However, it is important to pay attention to breeding times of birds and to burn divided into lots to preserve retreat areas for animals.

The removal of sediments is a drastic measure for vegetation management, but can be of vital advantage compared to all measures described before if carried out in the right way.

In wetlands rich in nutrients the removal of 5-30 cm soil layer

flooding promoted other water plants, such as *Typha latifolia*, *T. domingensis* and *Eleocharis palustris*. Open water surfaces were occupied by *Chara vulgaris* and other aquatic plants such as *Ranunculus peltatus*, *Zannichellia pedunculata*, *Potamogeton pusillus*. The composition of vegetation depends on regular flooding.

eliminates the bigger part of nitrates and phosphates. In addition, the entire biomass including all rhizomes is removed, which can affect retarding of regeneration of reed plant populations for four or more years. However, sediments including all nutrients have to be removed completely from the wetland system and should not be deployed onto an adjacent field. One disadvantage of this method is the loss of most seeds and spores, especially in old wetlands. For this reason, the removal of sediments should be carried out in several phases.

Grazing of large herbivores is especially suited for spacious wetland areas. Although this method is often applied today, there is no comprehensive knowledge on the return of nutrients through urine and excreta of the animals. Nutrient supply can alter the water quality just as the composition of flora. The most important and difficult task for the manager is the calculation of adequate livestock unit per hectare. Comprehensive inventory before the grazing starts as well as continuous monitoring of the impacts are required.

10.4 Examples of agricultural extensification

Restoration of Upper Swabian lakes

Albrecht Trautmann,
Pro Regio Oberschwaben GmbH

There are almost 2,300 stillwaters (lakes and ponds) in the southern part of Upper Swabia, north of Lake Constance. These lakes and ponds make up over half of all stillwaters in Baden-Wuerttemberg. All of these stillwaters have been heavily burdened with high levels of nutrients especially in the past half-century. The results of this have been excessive growth of algae and higher water plants, loss of biodiversity, unfavourable composition of the fish stocks, partial fish dying, strongly increased production of digestive sludge and very fast siltation.

In 1989 a research programme, the "Programme of Action for the Restoration of Upper Swabian Lakes" was started by the environmental ministry of Baden-Wuerttemberg. For 33 selected stillwaters and their catchment areas a project group,

consisting of staff of the water management and agricultural offices, carried out surveys, developed restoration concepts and the necessary measures to implement these. In the year 2000, 15 lakes had been successfully cleaned up and were taken out of the programme. In the same year 41 new stillwaters were added to the programme. The management of the project was transferred to a private organisation, the Pro Regio Oberschwaben GmbH.

Wastewater treatment plants are not allowed to drain their water into lakes, and excess rainwater basins are optimised. The major impacts on lakes and ponds now come from agriculture. Active consultation in the areas of fertilisation and cultivation, creation of enough storage capacity for solid and liquid manure and the extensification of critical areas can lead to changes in the farming behaviour and can significantly reduce nutrient input. At the moment a total area of over 860 ha surrounding about 50 lakes is reserved for extensive farming by contracts. €260,000 compensation is currently paid for these areas.

The restoration of regulated and technically enhanced rivers in the catchment area of the lakes and ponds is another important measure. In a few cases, sedimentation ponds and flooding areas have been created upstream of stillwaters. These are most useful during heavy rainfall when they can filter out the erosion sediment which is carried in the tributaries.

Use of the ponds for fishing should be adapted to the demands of the restoration measures. The management of artificially created and drainable ponds should follow traditional cleaning methods (regularly draining the pond every 3-6 years). As well as the reduction of the

nutrient input, a further measure used in some cases is the removal of fish (biomanipulation). The use of the ponds for recreational purposes should not affect the ecological stability of the ponds. It is recommended that regional concepts which regulate the recreational use and the environmental protection of the ponds are put in place.

Conclusions

The restoration of small lakes and ponds by reduction of the diverse nutrient input from the catchment areas is to be preferred to measures taken inside lakes and ponds which only affect the symptoms. The implementation of measures on a voluntary basis takes up a lot of manpower and is not always easy to carry out but, especially in the area of agriculture, can lead to sustainable improvements and manageable costs.

Model Project Constance Ltd - farmers' markets at Lake Constance

Michael Baldenhofer,
PLENUM Westlicher Bodensee

The Modellprojekt Konstanz GmbH (Model Project Constance Ltd) initiates and supervises projects aimed at the sustainable protection and development of cultural landscapes around the western part of Lake Constance. The work of the case study is based on the understanding that landscape conservation, nature and resource protection can only be realised on a large scale in co-operation with farming and with other relevant regional partners. This is the reason why the model case study Constance gathers representatives of municipalities, farming, nature protection, tourism, trade and business together to decide on strategies for implementing joint projects.

10 Examples of Measures >>



Farmers' market in Radolfzell, Lake Constance

The farmers' market Radolfzell is centrally located and offers a wide product range at competitive prices. Five regional full-time farmers - within a radius of about 25 km - are running the market.

One focus of the "Modellprojekt Konstanz GmbH" is to maintain the carrying capacity of the cultural and recreational landscape thereby strengthening the rural areas and to balance the economic needs with the urge to preserve and improve the natural environment. A main activity field of the project during the last decade was the marketing of regional products, goods and services through the establishment of close co-operation between producers, refiners, traders and consumers.

Farmers' markets

The privileged climatic situation of the Lake Constance region allows the cultivation of a wide range of agricultural products. Nevertheless the local farmers have great difficulties earning their living and building up long-term economical perspectives through farming only. In the framework of the project, two farmers' markets had been launched, offering fresh regional agricultural produce. The intention of these farmers' markets is to provide additional income by direct marketing, thus guaranteeing a secure living of small family businesses and at the same time offering the opportunity to buy daily fresh and high quality regional food to the consumers.

The farmers' market Radolfzell is centrally located and offers a wide product range at competitive prices. Five regional full-time farmers - within a radius of about 25 km - are running the market. Traders are not accepted. The goods offered in the market are produced by the five farms involved. The possibility of buying in vegetables during the vegetation break in winter was an agreement reached, but only the same kind of vegetables that are cultivated by the five farmers. Foreign produce, such as citrus

fruits, is not offered. All dairy products are produced outside the region (neighbouring district) as there are no dairies in the district of Constance.

The distribution of the general costs (investment costs, rent, staff, PR) is made on the basis of the size of the area and the expected annual turnover. Each farmer keeps track of his own costs.

An important element of the comprehensive marketing concept of the farmers' market is a very strong Corporate Design. The developed logo (brand) is seen everywhere in the shop, on wall tiles, freezers, on the shop windows, on wrapping material, product package and in press advertising. In an early project phase, consultations took place with the municipal authorities, the Office of Economic Promotion, the Economic Control Department and the Public Veterinary Service. Thereby differences and possible later costs for alterations could be avoided.

A campaign together with the regional daily paper was organised to introduce the farmers involved in the project. An annual budget of about €5,000 is allocated for press advertising.

The farmers' market concept can be assessed as very successful. The real turnover exceeded the calculated break-even point from the first year and has increased since then. An additional value of the market was the stimulation of the pedestrian zone and the creation of new jobs for shop personnel.



Comparison of Farmers' Markets in Radolfzell and Constance

	Farmers' Market Radolfzell	Farmers' Market Constance
Size (sales area) in m ²	110	350
Investment	€1,000 per m ²	€750 per m ²
Subsidies	Small subsidies (< 10%) from a Rural Development Programme (ELR)	None
Calculated Turnover Break-even Point	€380,000 per year	€1,500,000 per year
Annual Turnover in the first year	approx. €500,000	approx. €1,000,000
Inauguration	October 1996	May 1999
Main Product Range	Vegetables, fruits, sausages, meat, bread, beverages, pastries, dairy products, honey	Vegetables, fruits, sausages, meat, bread, beverages, pastries, dairy products, honey, fish
Opening hours	Mon - Fri 8.00-18.00 Sat 8.00-13.00	Mon, Tues, Thu 9.30-18.30 Wed 9.30-14.00 Fri 9.00-18.30 Sat 8.00-15.00
Average customers	200 per day	350 per day
Slogan	...da kauf' ich natürlich... (... where I buy naturally...)	... hier isst das Leben... (... here eats life...)

Timetable for Radolfzell's markets

April 95 The project idea was born and discussed with interested farmers of the Constance district.

Summer 95 In several meetings with interested farmers a concept was developed and an action group was formed. A charter and market regulation was created.

October 95 Development of a first concept for the interior decoration, furnishing and facilities.

Winter 95/96 Meetings with the authorities in charge (Economic Control Department, Public Veterinary Service, Municipal Public Affairs Office, Office of Economic Promotion of Radolfzell).

February 96 Foundation of the Association "Bauernmarkt Radolfzell e.V."

April 96 An adequate location was found and rented.

May 96 Final planning of the shop equipment and PR concept (name, logo, slogan, PR and packaging material).

Summer 96 PR campaign with the local media. Renovation of the shop in accordance with the official regulations. Interior installation by local craftsmen and experts.

October 96 Opening and Inauguration of the market.

June 97 Client survey (250 customers interviewed).

August 97 A four-colour consumer leaflet was published.

September 2000 Second Client survey.

LIFE Project : Restoration of the Villacañas wetlands, Spain

Eduardo de Miguel, Fundación Global Nature

Through the LIFE Programme, the European Commission has supported the project of Fundación 2001 Global Nature for the recovery of the Villacañas wetlands, a group of three seasonal ponds: Laguna Larga (107 ha), Tirez (98 ha) and Peña Hueca (126 ha).

The three Villacañas wetlands have been declared Special Protection



Transhumance was included in the agri-environmental programme in Spain



LIFE-trail Untersee with interactive elements

Although farmland occupies only 40% of the Spanish territory, seventy percent of the erosion in Spain is generated in cultivated farmland using conventional techniques.

Areas for birds (SPA). These wetlands are home to many birds listed as priority species in the European Directive of Birds.

The saline steppes that surround the Villacañas wetlands constitute unique plant communities. They are protected by the European Directive of Habitats and their preservation is a priority.

The restoration of the wetland complex has involved activities such as:

- > Creation of a green filter to improve the quality of water entering Laguna Larga
- > Recovery of the natural vegetation along margins
- > Establishment of nesting islets
- > Debris removal
- > Land purchase and rental
- > Community awareness raising
- > Surveillance.

One of the main goals of the project was to implement certain agri-environmental measures to create a buffer zone around the Villacañas wetlands complex. This project should serve as a demonstration project illustrating how this important financial tool can be used to restore and protect other wetlands in Central Spain.

Environmental impact of agriculture around the Villacañas wetlands

- > Erosion caused by conventional farming methods and sediment accumulation in ponds

Although farmland occupies only 40% of the Spanish territory, seventy percent of the erosion in Spain is generated in cultivated farmland using conventional techniques.

- > Use of pesticides and fertilisers

There is no significant problem with excessive use of fertilisers or pesticides. The farmland around the wetlands is dedicated to cultivation of low-yield dryland crops which require little input.

However, as local farmers are indifferent to organic farming in this region, we prefer to focus on other more urgent agri-environmental measures that are easier to implement.

Measures such as extensification, complete set-aside, increasing fallow land, or new tillage methods make it possible to reduce agrochemical products.

> Overgrazing

Overgrazing affects only certain plots around the Laguna Larga and Tirez wetlands. In Laguna Larga, a rental and compensation contract was signed to eliminate grazing in the most sensitive areas. Sheep are grazed mainly on fallow land and stubble fields. Natural vegetation areas are only marginally used. Consequently, agricultural set-aside is a much more important measure for recovering the natural habitat than sheep reduction programmes.

> Destruction of flora and fauna habitats

The replacement of natural habitats by CAP subsidized crops is the main ecological problem in the area of influence of the wetland complex.

Conservation of fallow land should be one of the main goals here. In Villacañas, many endangered species use fallow land as nesting and feeding habitats, such as the Collared Pratincole (*Glareola pratincola*). Ploughing fallow land in spring destroys nests and is one of the main dangers for some of these species. Consequently, it is fundamental to establish a programme for increasing the area of fallow land and preventing useless tillage during nesting periods. Early harvesting can also damage populations of steppe birds such as Great Bustard (*Otis tarda*).

The new agri-environmental scheme of Spain

This new programme was released on 12 January 2001. It is based on nine different measures, applicable throughout the country.

- 1 Extensification
- 2 Preservation of endangered varieties of cultivated plants
- 3 Reduction of agrochemical use
- 4 Erosion control
- 5 Protection of wetland flora and fauna
- 6 Traditional farm systems in the Canary Islands
- 7 Irrigation water saving
- 8 Landscape protection and fire control
- 9 Integrated management of live-stock production

Measures applicable to Villacañas

After conversations and discussions with Villacañas farmers, we have concluded that the following measures are more practical and applicable:

- > Agricultural extensification. Improvement of traditional fallow land: environmental fallow land.
- > Agricultural extensification. Protection of flora and fauna and actions to improve steppe bird habitats.
- > Set-aside recovery of wild flora and biodiversity.
- > Fight against erosion in arboreal crops and herbaceous crops.
- > Integrated management of live-stock production. Actions in pasture and stubble fields.

Conclusions

One of the main objectives of nature restoration in Castilla La Mancha should be the recovery of saline habitats around wetlands. The only feasible measure for achieving this

goal is set-aside. Other measures may improve the habitat of steppe fauna adapted to extensive dry land agriculture. The set-aside measure must be modified to eliminate some of its commitments, such as the conservation of ploughing or grazing plots. The elimination of commitments reduces the farmer's conservation costs and increases the grant. The Regional Administration has decided to propose set-aside as a single measure for restoring wetland habitats:

- 1 Although set-aside is one of the most expensive measures, it achieves visible and effective environmental results in a short period. The 5-year costs of set-aside for grain crops or olive groves in Villacañas are around €48,000, an average of €16,000 per medium-size lagoon (90-100 ha).
- 2 It is the easiest measure to verify, thus minimizing the cost of controlling compliance.

Villacañas belongs to the Site of Community Interest called "La Mancha Wetlands" (12,226 ha). It has at least 28 important lagoons. The extension of the programme to all these wetlands would theoretically cost the Regional Administration €93,000/year.

Note

This is a theoretical study. In order to achieve massive set-asides, we should:

- > Increase the grant by 20% to 30%
- > Inform farmers directly
- > Use other agri-environmental measures in areas where vineyards occupy most of the farmland.
- > Irrigation reduction schemes should be a priority in wetlands located on overexploited aquifers. Set-aside programmes cannot succeed in these conditions due

to the higher yields under irrigation conditions.

Inclusion of transhumance in the Spanish agri-environmental programme

One of PROJECT 2001's main outcomes was the approval in 1995 of a new Law on Drovers' Routes. After different efforts, we could include a €60/ha grant for transhumance as a special measure in the new agri-environmental programme.

- > The stockbreeder must accept a general measure of landscape improvement, with a basic grant of €36-48/ha.
- > Animals must be absent from the farm of origin for at least 4 months from June on.
- > A minimum movement of 75 km or a change in altitude of 500 m is required.
- > The grant may be increased by €12/ha, if at least 75% of native breeds is raised.

The main problem of this measure is that it does not differentiate between transhumance on foot or by truck or train.

10.5 Examples of visitor management

Lake Constance trail

Wherever people come across protected natural areas, prohibition signs catch the visitor's eye. There is no information available on ecosystems with all their plants and animals species living in them for strollers and hikers.

The Lake Constance Trail is a concept that offers descriptive and clear information on natural history on the spot. Thus, the trail represents a new destination for locals and tourists, where they learn about

10 Examples of Measures >>



Information panel on mammals at Boada trail



Hedgehog exhibition at Conservation Centre Eriskirch



Building Herons Carr Boardwalk in the Broads

animals, plants, habitats and landscapes from appealingly designed information panels.

Since 1999, 12 sections of the Lake Constance Trail have been realised:

- > Langenargen located at the Upper Lake Constance (Obersee) in Baden-Wuerttemberg
- > Moos at the Lower Lake Constance (Untersee)
- > Überlingen located at the Lake of Überlingen (Überlinger See)
- > Wasserburg and Lindau at the Upper Lake Constance in Bavaria
- > Kressborn towards the restored part of the river Argen
- > From the district office of the region of Lake Constance to the landscape protection area Lower Argen Valley (Unteres Argental) and to the nature trail in the Hepbacher-Leimbacher Ried
- > Friedrichshafen with an agricultural trail in Kluffern and Raderach
- > Immenstaad along the shore trail towards Kirchberg and the restored part of the river Lipbach
- > Island of Mainau as an entrée for the island.

Further sections are planned for Friedrichshafen-Kluffern, along the alpine river Rhine and on the island of Reichenau.

The information panels are made of Aluminium-Dibond, which are fitted into a frame of metal and then installed in the field. Texts and illustrations are printed on a special foil and attached to the panels.

The trail sections are financed by municipalities, administrative districts, the International Conference of Lake Constance as well as private donors and sponsors. As part of the marketing strategy, a brochure for locals and tourists is being prepared.

Life Trail Untersee

One of the latest sections of the Lake Constance Trail is the "Life Trail Untersee" installed by the EU-LIFE-project "Untersee life" (for details on project see chapter 10.2). The trail leads visitors along a 6 km long footpath to the lake shore close to Radolfzell (Germany). For the Life Trail, the design of the Lake Constance Trail was enhanced, some displays now including interactive elements. Both text and graphics follow a clear hierarchical structure, taking new didactical guidelines and reading habits into account. Thanks to the attractive and at the same time robust design, the reception by the public is very good and damage to the plates is minimised. The municipality of Radolfzell supported the Life Trail in logistical and financial terms. The trail proves to be an attraction for tourists and for locals as well.

Nature trail Laguna Boada

In the scope of the EU LIFE project, a nature trail going from the village Boada de Campos to the steppe lake was constructed. On four panels along the way the visitors get information on traditional clay architecture, traditional agricultural use, steppe birds, mammals, amphibians and reptiles.

Conservation Centre Eriskirch - experience nature at Lake Constance

Gerhard Kersting, Conservation Centre Eriskirch

Over 60 years ago, several scientifically valuable reed areas with scenic landscapes at the shore of Lake Constance were designated as nature conservation areas, such as the Wollmatinger Ried near the City of Constance, the Mettnau peninsula near the City of Radolfzell, and the Eriskircher Ried near the city of Friedrichshafen.

The Herons Carr Access Project was designed to provide new opportunities for people to enjoy the open water of Barton Broad from the land as part of the Clearwater 2000 project.

With a size of 552 ha, Eriskircher Ried is the largest conservation area at the eastern shore of Upper Lake Constance. It is characterised by extended reed meadows, the river Schussen with its back waters and alluvial forests as well as the shallow zones of Lake Constance. More than 500 flowering plant species, 280 bird species and numerous small animals have been observed here. The area is of special importance as the resting and wintering spot for Nordic water fowl and waders.

For 10 years the Conservation Centre Eriskirch, on behalf of nature conservation authorities, has been in charge of the Eriskircher Ried and other protected areas in the region of Lake Constance. As type of organisation a charitable foundation has been chosen, financed by the land of Baden-Wuerttemberg, the region of Lake Constance and the municipality of Eriskirch. At present the foundation employs three people, several freelancers as well as one person in the "Zivildienst" (mandatory community service). The annual budget amounts to €135,000. However, the maintenance measures in the reed area, making up approx. €25,000 per year, are not financed by the Conservation Centre itself, but by the Rural District Office of the Lake Constance Region. Overall the costs are covered by the land of Baden-Wuerttemberg (70%) and by the region of Lake Constance (30%). Particular projects like the construction of nature trails or visitor platforms were financed through special grants. The city of Friedrichshafen also gave financial shares in such activities in the past.

The Conservation Centre generates €12,000/year itself. Besides the maintenance measures of the protected areas, environmental education is another focus of the activities. Each year 10,000 people visit the attractive permanent exhibition

"Nature at Lake Constance", or the changing exhibitions presented in the former railway station building of Eriskirch, which is provided loan free by the municipality.

However, the Conservation Centre is not a classical museum. The central concern of all employees is to jointly experience nature with children and adults. Thus, the majority of all activities with over 5,000 participants per year take place outdoors in the Eriskircher Ried or other natural areas.

The annual programme covers about 75 events, such as presentations on topics of cultural and natural history, guided tours with a certain focus e.g. "Bird feathers", seminars, and events for children. School classes may independently explore plant and animal life with the help of biologists.

All events are announced in the yearly programme brochure, in the information boxes at the building and in the region, via local and sometimes regional media and radio channels, and on the Internet. While exhibitions and presentations are free of costs, seminars and excursions are charged to cover the costs.

Naturally there are sensitive zones which have to stay more or less free of impact. In other areas different measures to optimally experience nature were implemented: Two platforms at the lake shore allow easy observation of water fowl, two nature trails inform the visitor with descriptive panels on habitats, animals and plants, and at the newly constructed pond frogs, snakes and dragonflies can be observed.

Visitor trail: Herons Carr Boardwalk in the Broads

Julia Masson and Eilish Rothney, Broads Authority

The Herons Carr Access Project was designed to provide new opportunities for people to enjoy the

open water of Barton Broad from the land as part of the Clearwater 2000 project. The Clearwater 2000 project aimed to restore the water quality of the broad by sediment removal and re-establishing aquatic plant communities, and to enable people to understand better the wetland environment of the Broads.

The walkway is located in a protected area within wet woodland (carr). A site assessment was carried out prior to starting work, including an invertebrate survey and Environmental Impact Assessment. As the site is very wet, some of the framework support timbers are driven into 7-10 m of wet mud, and at times high water levels prevented work progressing. The walkway itself is constructed of tanalised timber decking with ridges routed into the planking to prevent people slipping. The timber is sourced sustainably from European companies who are members of the Pan European Forest Certification.

The walkway is designed for access for disabled people, particularly wheelchair users, with provision of a car park for their use close to the trail. The whole route is on one level without steps, and with safety handrails where deep mud, corners or passing places are a hazard. Strong plastic netting has been placed over deep mud as an extra safety measure.

By Winter 2004 the boardwalk will have several interpretation panels along its route, and a trail pack in braille is available for blind or partially-sighted visitors.

Part of the project development involved consultations with the local community through the parish council and by holding a public meeting. Businesses, recreation user groups and landowners were included in the consultations. A local liaison group was formed to help steer the project, which is still operating beyond the life of the

10 Examples of Measures >>

Building the boardwalk: Fact file	
Cost of materials and equipment for building the boardwalk	£115,000
Labour costs (contractors, staff, volunteers and trainees)	More than £200,000
Length of boardwalk	610 metres
Amount of timber piling	9,000 metres
Amount of decking board	7,500 metres
Number of nails keeping decking board in place	32,000 nails

project in developing a management plan for the water space at Barton. Establishing a liaison group has proved to be productive beyond the life of the project.

The boardwalk took two years to complete and was officially opened by David Bellamy at an event with local schoolchildren.

Funding for the whole of Clearwater 2000 project, which included

restoration work on Barton Broad, creation of the walkway, the solar powered boat 'Ra' and an environmental education centre at How Hill, came from Broads Authority, The Millennium Commission (Lottery), Anglian Water, Environment Agency, UK Cleaning Products Industry Association, Department of Environment, Transport and the Regions, Landfill Tax, East of Eng-

land Development Agency, English Nature and Norfolk Wildlife Trust.

Questions to consider before starting:

- > Is the site protected for its nature conservation importance?
- > Is a site assessment required for important species and habitats?
- > What funding is available for the project, and what are the funders' requirements?

Broads Authority staffing for the Herons Carr Boardwalk	
Area Countryside Ranger	Responsibility for day-to-day running of all facilities. Managing staff and volunteers, ensuring health and safety measures are in place. Co-ordinating with other Broads Authority departments.
Projects Team Supervisor	Responsible for the structural integrity and technical matters of the walkway.
Seasonal Countryside Assistant	Weekly maintenance programme for car parks and paths leading to the walkway during the summer season.
Assistant Countryside Rangers	Responsible for site checks, patrolling, liaising with public, vegetation management on boardwalk, minor repairs, reporting any problems. Assisting the Area Countryside Ranger (ACR) with taking groups along the walkway and the events programme.
Other Staff	Involved with the provision of interpretation, signage and promotion. Once these are in place the responsibility passes to the ACR.

- > How will any consultation be carried out with local community groups, landowners, businesses as well as the recreational user groups?
- > Who will use the facility?
- > What other infrastructure is required such as picnic site, toilets, refuse collection?
- > How will people arrive at the site - by car, train, bus, walking? How will visitors be directed to the facility, and to parking areas?
- > What impact might the project have locally, such as extra traffic on country roads, the impact of one user on another?
- > What maintenance will the boardwalk require? What is the lifespan of the materials?

How suitable is the site for the project? Need to consider:

- > How easy the site is to access with machinery and materials
- > Ease of construction of the boardwalk
- > Use of materials from sustainable sources
- > Disturbance to wildlife during construction
- > Negotiating access with adjacent landowners
- > Providing information for the public.
- > Health and Safety issues
- > Any insurance requirements.

10.6 Examples of environmentally sound tourism development

"In future our main concern will no longer be whether we can travel to every place on earth. Our main interest will be whether it is worthwhile arriving there!"
(Herman Löns, 1908).

In the 1970s, in Europe - especially in Germany - initiatives emerged to analyse the negative effects of tourism on the environment, social welfare and culture. Most of the groups criticised and still criticise in a constructive way tourism impacts on nature - for instance they give positive examples of sustainable tourism.



REISEPAVILLON Hanover

Alternative travel?! Thinking about all the environmental and social effects? Holidays are supposed to be fun! True. But if we want them to be fun in the future too, we'll need an intact natural environment and welcoming holiday regions.

At Reispavillon, the fair for alternative travel, 280 operators from 50 countries show sustainable ways to the pleasures of travel. Reispavillon is the showcase for a different kind of travel business, one that can make almost every holiday wish come true.

Nature, arts, culture, relaxation or activity holidays, for single people or families, with or without the kids ... The travel specialists, regional tourist boards and environmental associations at the fair offer individual advice, detailed information and a cornucopia of ideas for holidays that feel 'good all over'.

Since 1991 Anke Biedenkapp, the founder of Reispavillon, has been the motor of this marketplace for alternative travel which started as a meeting place for a few alternative travel agencies and convinced ecologists. Today it is the most important international fair for sustainable tourism with an interesting programme about new trends, studies and projects, discussion forums and seminars. At Reispavillon Hanover you can inform yourself, exchange experiences and promote environmentally friendly tourism in your wetland or lake region.

www.reispavillon-online.de



ECOTRANS: Background information and positive examples

The non-profit organisation ECOTRANS was founded in 1993. Today 25 non-governmental organisations and consultants from 12 European countries are members of the European network to exchange information and experience and to develop common projects. Under www.ecotrans.de, you will find an overview about European projects on sustainable tourism, studies, publications and a link to the database eco-tip with more than 300 concrete sustainable tourism initiatives in Europe.

Ecolabels for tourism: many certificates - limited effectiveness

In 2000/2001, the World Tourism Organisation (WTO) commissioned ECOTRANS, a global study on voluntary initiatives for sustainable tourism. More than 100 ecolabels, awards and self committing initiatives were studied in the first comparative

analysis worldwide to assess the history, development, objectives, requirements, procedures and effectiveness of every initiative. The study found that many ecolabels are struggling to survive and to meet the promises they made to their certified businesses in terms of significant cost savings and increased consumer demand.

Diversity of tourism - diversity of ecolabels

By 2004, there are more than 50 environmental certificates and awards in Europe covering all types of tourism suppliers, including accommodation, beaches, marinas, protected areas, restaurants, handicrafts, golf courses, tour packages, and various other tourism-related activities. More than 40 schemes certify accommodation services: hotels with or without restaurants, camping sites, youth hostels, farm houses, alpine huts, holiday houses, guest houses, bed and breakfast lodgings, and others.

Further information:
www.eco-tip.org

Besides the successful Blue Flag International certificate for beaches and marinas, in 2003 the long list of ecolabels for accommodation certified about 4,000 hotels, camping sites or similar services in Europe - all together not more than 1% market share. Only a few schemes - e.g. in Scotland or Denmark - can offer a choice of 10% or more.

To change this situation and to increase market share, ten of the most important ecolabels in Europe started co-operation with the VISIT Initiative to work on a common basic standard regarding the organisation, contents and procedure of their ecolabels and to collaborate intensely in the fields of marketing and promotion of the products awarded with an ecolabel.

In 2002, the UN Year for Ecotourism, the VISIT image campaign was launched under the motto: "Caring for the environment ... is caring for the visitor". This slogan connects environmental quality with the quality of the product and experiences.

Further information: www.yourvisit.info



EU Ecolabel "EU-Flower"

The European Ecolabel for tourist accommodation service was created in May 2003 to reward accommodation services and tourists that respect the environment. It signals environmental good performance as it is an added-value quality when consumers are choosing a resort. Enterprises bearing the Flower logo have officially been distinguished as being amongst the most environmentally friendly in their area.

The group "tourist accommodation service" shall comprise the provision of sheltered overnight accommodation in appropriately equipped rooms, including at least a bed, offered as a main service to tourists, travellers and lodgers. The provision of overnight accommodation may include food services, fitness activities and green areas. The criteria are divided into two main sections, the mandatory criteria and the optional criteria. The competent body, which is the national organisation responsible for the application of the EU Ecolabel in every EU Member State, gives information on the application procedure, distributes the application pack and is responsible for the verification of compliance prior to the awarding of the Ecolabel. The criteria for camp sites are under development.

http://europa.eu.int/comm/environment/ecolabel/product/pg_tourism_en.htm

EMAS - European Eco-Management and Audit Scheme

The EU Eco-Audit, also called EMAS, is a voluntary management system for businesses and organisations that wish to improve their operational environmental protection measures on a continual basis beyond the practices called for by law. The revised EMAS II includes all the aspects of the international ISO 14001, but in some respects has higher requirements, for example employee participation and the publication of an environmental report.

All organisations participating in EMAS regularly draw up an environmental statement for the public. In it, the organisational environmental policy and its environmental programme with concrete environmental goals are established in connection with a complete description and evaluation of as much quantitative data as possible. All the relevant environmental aspects that the company or organisation is able to influence must be taken into consideration. Among these are to be numbered indirect aspects as well, such as investments, administrative and planning decisions, the range of products produced or the environmental balance of contractors and suppliers.

Each environmental statement must be evaluated by an independent, government-certified environmental verifier. If it meets the requirements of the EU eco-audit ordinance, the environmental auditor declares the environmental statement to be valid. The organisation is then registered in the official EMAS-Register of the country - under the condition that the applicant has not previously violated the relevant environmental legislation. The audit process must be repeated at least every three years.

Numerous certifications, especially in the hotel business, prove that the environmental management system EMAS is well transferable to the tourism sector. It is a good instrument to accelerate the improvement of the environmental quality. Every tourism establishment - hotel, restaurant, leisure operators, camping grounds - is competing with businesses of the same ranking - companies which have already implemented environmental protection measures as well as enterprises which have not yet tackled this problem. Each hotel owner defines his environmental goals. It is important to integrate environmental protection into the management structures taking into consideration all phases of the management i.e. planning - implementation - controlling - revising.

During the first years an environmental management scheme can comply with cost saving measures by reducing the consumption of energy, water, cleaning agents and waste volume. Later on creativity is needed to further reduce, step by step, the environmental burden.

Further information: <http://europa.eu.int/comm/environment/emas>



ECOCAMPING - Environmental management for camping sites

ECOCAMPING is an association founded by German camping federations and environmental organisations, such as Lake Constance Foundation, ECOTRANS and GNF. The association has been active since 2002. Before, ECOCAMPING was a project of the international Lake Constance Foundation.

What is the aim of ECOCAMPING?

The most important aim is the improvement of environment protection, nature conservation, safety, quality and qualification of the entrepreneurs and their staff, as well as an image improvement in politics and the Civil Service. Ultimately, ECOCAMPING aims to help the whole business to be more successful.

Where has ECOCAMPING been active so far?

There have been ECOCAMPING projects at Lake Constance, at Lago Maggiore, in Baden-Wuerttemberg and Bavaria, with a total of 55 participating campsites. Currently, ECOCAMPING runs working groups in Schleswig-Holstein, Lower Saxony, Brandenburg and Bavaria, with more than 50 participating campsites each. ECOCAMPING is also a partner of the Living Lakes Network.

What does ECOCAMPING include?

The aims of a regional working group are the introduction of environmental and quality management on campsites. The participants are campsites in the respective region, who attend six workshops on environmental management, waste, energy, water and cleaning, site design and safety. Each campsite receives, at least twice, individual on-site consultancy. The workshops and the counselling ensure that each campsite can introduce an appropriate environmental management. The qualification is concluded by the awarding of the campsites and admission into the ECOCAMPING network. Certified campsites are promoted through brochures, the internet and presentations at fairs.

Who can participate?

Every campsite can participate. A successful participation does not

depend on size, number of permanent campers, type of business or previous activities in environmental and quality management. ECOCAMPING does not require costly investments, but responds flexibly to the possibilities of the entrepreneur. The consultants make suggestions, but the campsites decide if, when and how they implement these.

What are the costs?

Consultancy, workshops and public relations cost €4,000-5,000 per participating business. Normally, 60-70% of an ECOCAMPING project are funded by public subsidies, and only 30-40% have to be paid by the entrepreneur. So far the average prices for the complete qualification have been €1,100 for small campsites, €1,500 for medium-sized, and €2,000 for large campsites. At the moment, ECOCAMPING is the cheapest possibility of introducing an environmental and quality management.

Advantages for a campsite

- > Improvement of image and acceptance, also with public authorities
- > Improvement of the overall organisation, through environmental and quality management
- > Enhancement of customer satisfaction
- > Cost reduction (energy, water, waste)
- > Improvement of work safety
- > Qualification of managers and staff through ECOCAMPING workshops
- > Enhanced publicity through ECOCAMPING public relations
- > Exchange of experience with other camping businesses
- > Competitive advantage through ECOCAMPING award.

10 Examples of Measures >>



Photovoltaic facilities on campsite Klausenhorn



Architecture of solar passenger ferry "Helio"



"Helio" operates between the Swiss and the German border of Lake Constance

Good visitor management makes it possible to combine recreation and sports with nature conservation.

Advantages for guests

- > Linking of environment protection and convenience
- > Cost reductions keep prices stable
- > Environmental education and nature experience programmes
- > Natural site design and maintenance enhance quality of the stay
- > Guest information (timetables, leisure activities, etc.)
- > Health protection (e.g. avoidance of automatic air freshener sprays)
- > Guest surveys ensure close contact to the customers and help to enhance the quality of the stay.

Advantages for camping associations

- > ECO-CAMPING facilitates dealing with politics and public authorities, also ministries
- > Strengthening of the position of the association within the overall tourism context
- > Enhancement of own public relations through use of subsidies and public relations of ECO-CAMPING
- > Better satisfied members, because ECO-CAMPING is an attractive service for them
- > Topics from the workshops can also be used to improve attractiveness of association meetings.

Sports activities in the Steinhuder Meer Nature Park

The Steinhuder Meer Nature Park, located near Hanover, is a highly frequented recreation area with attractive possibilities for various sports activities. At the same time it is an important birds habitat with many endangered species.

Good visitor management makes it possible to combine recreation and sports with nature conservation.

Development

The park was founded in 1973. The visitor management was built up from the mid-seventies and has been continuously adapted to the growing demands. Its leading principle is to facilitate intense experience of nature and at the same time to keep the most sensitive areas free from use.

The lake itself, parts of the lakeside and the adjoining bogs are a "Wetland of International Importance" and will be part of the Natura 2000 system.

Measures

- > Zoning: concentration of recreational activities at two areas of the lakeside
- > Constructing an attractive, well marked circular route around the lake for hiker and cyclists
- > Relocating paths and observation facilities from sensitive to less sensitive areas
- > Designation of two lakeside areas where windsurfers have access to the lake
- > Fencing off protected lake areas by buoy chains
- > Limiting water sports to the period from 1 April to 31 October
- > Working out a voluntary agreement on ballooning routes in the nature park area
- > Intense co-operation with different stakeholders.

Effects

- > Protection of wetlands and bird habitats
- > Offering attractive opportunities for sport, recreation and experience of nature.

Biolandhaus Arche - The ecological concept

The hotel Biolandhaus Arche (bio-inn Arche) with a capacity of 25 beds has operated for 15 years and offers a very special kind of holiday, such as hiking trips along the Noric panorama trail, wholefoods, and information on Celtic heritage. Guests interested in sports can go horse riding or explore the fascinating world of caverns and grottos. The eco-concept of the bio-inn Arche which has been implemented since 1991 aims at linking tourism with environmental protection and agriculture.

Measures

Energy: Use of wood stoves (thermoelectricity with an efficiency of 90%), tiled stoves (optimal use of the raw material wood which is directly supplied by local farmers) and solar cells on the roof (for heating of 1,500 l water combined with a buffer reservoir of 1,000 l). The owners of the bio-inn pay a special price for the firewood.

Nature/Landscape: Natural design of the entire house installation with indigenous wood, non-asphalted natural paths, garden, and instead of mowing every week, lawns are maintained with sheep grazing and the use of scythes.

Information: Offering bus and train schedules, free pick-up and drop-off service to encourage guests to use public transportation. Co-operation with nearby food stores (for example farmers' shops, Demeter farms, cheese factory) to reduce truck traffic.

Products: Organic vegetarian whole food cuisine using home-grown, natural and organic products.

Building: Natural paints and colours, furniture made entirely of indigenous wood and brick construction.

Culture: Active regional cultural work, smooth and intelligent tourism

concepts in harmony with nature (launch of the "Noric inn-keeper" committed to meet ecological standards and the use of regional products).

Energy: Despite the increasing number of guests, the annual energy consumption (wood, electricity, gas) could be constantly reduced thus contributing to the increased positive image of the bio-inn among tourists and the hotel business. The local farmers benefit from the additional income from the sale of firewood.

Waste: The amount of refuse was reduced by using recyclable beverage packaging, no plastic packaging.

Waste separation: paper, glass, general waste. Use of recycled products.

Water: Reduced water consumption, protection of the drinking water by the use of environmentally sound cleaning agents, reduced water flow velocity. Own spring water. Improved image due to the fact that the tap water is drinkable (unlike in many other places). Protection of headwaters, oligotrophic grassland.

Comments: The bio-inn Arche is the first hotel in Carinthia which is co-operation partner of Bioernte Austria (eco-products Austria). Bio-inn Arche received several awards for its eco-concept: "Grüne Haube" (Green Bonnet), 1st prize for exemplary implementation of an integrated concept by Envirotour 1993, the Environmental Label of Carinthia as well as the Raiffeisen award. It was also awarded - as first Austrian eco-hotel - the eco-certification.

Lake Constance solar boat network

Lake Constance region offers appropriate climate conditions for the use of solar energy. In the past years numerous solar power systems and collectors have been

installed on roofs of residential buildings as well as on factories and churches. And solar power is also used by the Bodensee-Solarschiffahrt gGmbH (Lake Constance Solar Navigation Ltd) to operate a fleet of currently seven solar-powered ferry boats on the western part of Lake Constance since 1998. Along with the regular ferry service, they are also in use for special round trips and excursions. Furthermore these exceptional boats can be chartered by anyone for special private activities and events.

A particular feature co-ordinated by Bodensee-Stiftung (Lake Constance Foundation) is an environmental education programme. The solar ferry "Helio" serves as floating classroom, where young students can experientially learn about the local natural characteristics (see also chapter 10.7).

One of the economic partners of Global Nature Fund, the medium-sized company Kopf AG has constructed solar boats of capacities ranging from 2-120 passengers. Solar powered boats work by harnessing electric energy gained from photovoltaic cells and therefore feature several advantages. Because of their soundless movement and equal-zero-emission engines, they provide an opportunity to experience the undisturbed pleasure of the beauty of nature. They do not pollute the water with toxic residues and therefore are particularly suitable for vulnerable waters.

Meanwhile this sustainable technology has spread to several German cities, where solar-powered ships are in use as solar taxis, pleasure boats or research vessels. In 2000 the solar technology was transferred to England: a solar catamaran is now also used in the Broads, the British Living Lakes partner.

www.bodenseesolarschiffahrt.de
www.solarschiff-netzwerk.org



Information European Charter for Sustainable Tourism

EUROPARC

The European Charter for Sustainable Tourism in Protected Areas is a valuable and practical tool for ensuring that tourism development in Europe's protected areas is sustainable. In becoming members of the Charter, protected areas demonstrate that they are co-operating to a high level with local stakeholders and tourism partners to address strategic tourism issues, and receive official recognition for their achievements in this field.

At the same time, in joining the Charter, they are making a 5-year commitment to further that co-operation, to implement agreed joint actions with their partners, and to continue striving for excellence in the management of tourism in their regions. The European Charter is thus neither a conventional quality label, nor a conventional partnership agreement, but combines elements of both to encourage and support a truly sustainable development of tourism in Europe's protected areas.

The European Charter belongs to the EUROPARC Federation, the umbrella organisation of protected areas in Europe. The Federation brings together a membership of some 500 national parks, nature parks and biosphere reserves. The Charter builds on the recommendations of the 1993 EUROPARC study "Loving Them to Death?" Up to now, 17 members implemented the Charter and 14 protected areas are in the process of implementation.

The purpose of the Charter is to encourage good practice by identifying those parks and

protected areas which are meeting agreed requirements for the sustainable development and management of tourism.

The Charter is for individual protected areas of all kinds. They are invited to apply for recognition by the EUROPARC Federation as meeting the requirements of the Charter. These requirements include:

- > A permanent structure for working in partnership with others
- > A strategy for sustainable tourism
- > A set of actions which address identified sustainability issues
- > A development and management plan that involves all those implicated by tourism, in and around the protected area.

The Charter recognises that park authorities should not work alone in the management of tourism, if it is to be successful and sustainable. A permanent forum, or equivalent arrangement, should be established between the protected area authority, local municipalities, conservation and community organisations and representatives of the tourism industry. Links with regional and national bodies should be developed and maintained.

Strategic approach: To prepare and implement a sustainable tourism strategy and action plan for the protected area. The strategy should be based on careful consultation and be approved and understood by local stakeholders. It should contain:

- > A definition of the area to be influenced by the strategy, which may extend outside the protected area

- > An assessment of the area's natural, historic and cultural heritage, tourism infrastructure, and economic and social circumstances; considering issues of capacity, need and potential opportunity
- > An assessment of current visitors and potential future markets
- > A set of strategic objectives for the development and management of tourism, covering: conservation and enhancement of the environment and heritage, economic and social development, preservation and improvement of the quality of life of local residents, visitor management and enhancement of the quality of tourism offered
- > An action plan to meet these objectives with an indication of resources and partners to implement the strategy
- > Proposals for monitoring results.

Addressing key issues: Each protected area is different. Strategic priorities and action programmes should be determined locally, using the approach described above. However, the Charter requires that the following key issues should be addressed:

- > To protect and enhance the areas of natural and cultural heritage, for and through tourism, and to protect it from excessive tourism development, by:
 - > Monitoring impact on flora and fauna and controlling tourism in sensitive locations
 - > Encouraging activities, including tourism uses, which support the maintenance of historic heritage, culture and traditions



Information European Charter for Sustainable Tourism

- > Controlling and reducing activities, including tourism impacts, which adversely affect the quality of landscapes, air and water
- > Controlling and reducing the use of non-renewable energy and unnecessary waste and noise
- > Encouraging visitors and the tourism industry to contribute to conservation
- > To provide all visitors with a high quality experience in all aspects

of their visit, by researching the expectations and satisfaction of existing and potential visitors, meeting the special needs of disadvantaged visitors, supporting initiatives to check and improve the quality of facilities and services

- > To communicate effectively to visitors about the special qualities of the area, by ensuring that the promotion of the area is based on

authentic images, and is sensitive to needs and capacity at different times and in different locations, providing readily available and good quality visitor information in and around the area and assisting tourism enterprises to do so.



Further information: www.europarc.org

Adventure biking tours at Lower Lake Constance

The 120 km "Adventure cycle track Lower Lake Constance" connects 44 places and destinations under the aspects of agriculture, nature protection and gastronomy. Together with the Model Case Study Constance and the Untersee Tourism Association, a comprehensive brochure was established. In co-operation with the supervisory authority of Baden-Wuerttemberg, a special topographic map was developed.

Both publications, as well as information brochures of the project partners Tourismus Untersee e.V. and AG Hegau, are being sold as a "package" via the book trade and the tourism information offices of the Lower Lake Constance communities with the title "Adventure cycle tracks Western Lake Constance, Hegau and neighbouring Switzerland".

Initially 15,000 booklets were printed. Additionally, a special signpost system for the biking tracks was developed and installed. Meanwhile a travel agency specialising in biking tours uses the

adventure cycle track as a basis for package tours. During the first season already more than 500 bookings for "overnight stays in straw" were made. Then the internet site www.erlebnisradeln.de was set up. Meanwhile, the second edition of the whole package is being sold.

A central factor for success is the close and constructive co-operation of representatives of agriculture, nature conservation, tourism and gastronomy.

It is also very important to define from the very beginning which institution will take over which services and products that will be developed and who is going to market them. Only then it is guaranteed that the signposting of the bicycle tracks and home page will be maintained, so the tourist will find well tended cycle paths and an updated homepage.

10.7 Examples of environmental education

EPO's environmental education activities in the Nestos area

Eleni Daroglou, EPO

While the results of environmental education with adults are ordinary, with children and young people the success can indeed be spectacular if environmental education projects fulfil basic principles of integrated projects such as:

- > To attract and keep the interest of the children by stimulants
- > To provide knowledge
- > To secure active participation of the children and
- > To give possibilities for further activity and publicity of the subject.

Methodology

It is ascertained that practical contact of children with nature has direct and better results than any theoretical lesson. Hence the EU project consist of four parts:

10 Examples of Measures >>



Workcamp at La Nava lagoon



Summer Camp in St Lucia Wetland Park, South Africa



Summer Camp at Lake Baikal, Russia

The Summer Camp experience will enhance the environmental awareness and affects both their personal development and working life.

- 1 Presentation of the project with slide shows about the Nestos Delta and the wider area, videos, information leaflets, posters, photos.
- 2 Guided tours to the biotopes of the Nestos Delta.
- 3 Work relative to the subject done by the pupils, such as an exhibition, any construction, theatre play, painting etc..
- 4 Presentation to the public.

For the integration of every project the necessary particular activities are carried out as following:

- > Preparation of leaflets
- > Selection of slides, video, photos etc.
- > Contact with the schools and teachers
- > Presentation in the schools, discussion with pupils and teachers
- > Excursions to the biotopes
- > Painting or text writing related to the subject by the children with prizes for the best
- > Invite children to bring materials and tools
- > Presentation of the work to the public.

Collaborations

For successful implementation of any EU Project the collaboration with relevant bodies and services is very important. In Greece, EPO collaborates with:

- > Ministry of Education and the departments of first and second level of education in the prefectures of Xanthi and Kavala
- > Ministry of Youth
- > The Environmental Education Officers for Basic and High Schools of every Prefecture
- > Basic Schools, High Schools and Universities, especially with the University of Aegean, School for Environmental Sciences

- > National Welfare Organisation (KEFO Kavalas)
- > Cultural NGOs.

Contents

Main aim of the environmental education project in the framework of the LIFE project is to raise public awareness of the lakes and lagoons of the Nestos Delta. Thus, the contents focus on the natural characteristics of the lakes and lagoons, the problems, the works and activities in the frame of the Life Programme that may give solutions to some of the problems of the ecosystem of Nestos Lakes and Lagoons.

Six environmental education components have been prepared for the presentation of the Lakes and Lagoons in the schools and for the guided school classes:

- 1 Brief sheet about the project with information about the goals and activities of the Life project.
- 2 Information leaflet about the Nestos Lakes and the Delta including information about their natural characteristics, biotopes, problems, needs etc..
- 3 Information leaflet about the Ramsar convention.
- 4 Information leaflet about wetlands in general.
- 5 List of animal species of the lakes and lagoons.
- 6 Slide series about the lakes, lagoons and the surroundings.

The first four listed publications are given to the teachers and pupils during the presentation in the school together with leaflets about EPO, the Living Lakes network, posters, calendar, and stickers. The list of the animal species is circulated during the excursions. The slide series and a video about the Nestos Lakes and Lagoons are used for presentations.

Results

From the beginning of the present LIFE Environment Project in June 2001 until June 2004, 52 schools have been visited for presentations, and 2,073 pupils plus 119 teachers have participated in the presentations and excursions. In 50 schools events have been carried out with final presentations of the work of the classes.

Floating Class Room at Lake Constance

Several years ago the "Floating Class Room" was established at Lake Constance, Germany. A solar powered boat was equipped with laboratory facilities, such as microscopes and binoculars. School classes and youth groups use the floating lab for investigation tours on the lake, e.g. to take water samples and observe the life that exists in water. They learn about algae growth, measure the ph-value of the water, and water quality. Here environmental aspects are packed in a very attractive and exciting way.

Workcamps in La Nava

Antonio Guillem, Fundación Global Nature

For the past decade, Fundación Global Nature has been carrying out workcamps with young people from Spain and other European countries. To the surprise of the local population, in the beginning, young people from all over Europe came to spend their holidays and actively participate in the conservation work of "their" steppe lake. Today, workcamps take place on a regular basis in Fuentes de Nava every summer. Two to three groups of 20-25 young people each spend a fortnight within the region to contribute towards the protection of nature, but also to learn about the country and culture. The programmes are always a balanced mixture of

conservation work, culture and leisure time. A football game with local youth or an evening discussion with the mayor and council is part of the workcamp just like visiting the numerous romanic churches in the region.

However, it is important that all conservation activities are meaningful and a helpful contribution to the work on the site.

A typical workcamp programme comprises the following details:

- > Field trips to the steppe lakes with explanations on the restoration measures: which drainage channels were filled and why, where is the water of La Nava coming from, which problems have to be solved, etc.
- > Bicycle tours around the different ecosystems to get to know the area
- > Assistance during bird ringing activities (identifying bird species, measuring and weighing, marking of birds)
- > Bird observation; studying the typical flora
- > Collecting litter
- > Construction of observation platforms or setting up signs along nature trails
- > Afternoon with games and handicrafts together with children from a local school.

All activities have to be assessed concerning potential dangers for the participants. The workcamp has to be registered at the competent regional authority (Consejería de Familia e Igualdad de Oportunidades) and the programme has to be agreed with.

Due to the lack of accommodation facilities within the municipality and its region, the groups are accommodated in the information centre of Fundación Global Nature. It fulfills the standards of Spanish Youth

hostels and is registered as such. Moreover, Spanish law demands liability insurance for each participant and their supervisor.

Besides the requirements of the law, regulations for the daily living, such as precise rules of the house or scheduling of kitchen duties and other activities, which have to be taken on by the group, are crucial.

At least two supervisors (with 13 participants per supervisor at the most), specially trained as group leaders for the environmental field, are in charge of the group 24 hours a day. Their professional input has to be considered in the planning process of the programme. In terms of guaranteeing a smooth organisation and giving professional advice during field trips, they are assisted by staff of the Fundación.

A cook with adequate qualification is employed for the workcamp, but some meals are organised in restaurants to benefit local gastronomy. To add a nice detail, the participants from different countries sometimes take turns cooking a typical meal for each other.



Summer Camps with DaimlerChrysler and Lufthansa

Bettina Jahn, Global Nature Fund

Nature Summer Camps offer young people the opportunity to gain experience in practical nature conservation work, together with locals, during a stay of one to four weeks. This experience will enhance the environmental awareness and affects both their

10 Examples of Measures >>



"Heatwave" Puppet Show



Children watching the Puppet Show

Using puppetry and drama to explain often complex ecological problems or environmental conflicts to a non-specialist audience has proved amazingly successful.

personal development and working life. It is also an intercultural exchange with the chance to improve language skills.

A good possibility for organising a Summer Camps is a co-operation between companies and NGOs. Based on the experience with Summer Camps carried out in co-operation with DaimlerChrysler in 2003 and 2004, young employees and children of employees show great interest in this kind of holiday. The benefit for the company is the motivation of its employees and an image enhancement.

The co-operation offers numerous advantages for the NGO. In large companies one can accomplish the support from different departments concerning the marketing for the Summer Camp and the arrangement of project details. At DaimlerChrysler, GNF got access to all available media to announce the Summer Camps, e.g. newspapers, intranet, e-mail-lists. It is advisable to contact the communication department for their assistance, because they know the best ways to get in touch with the employees. For the Summer Camps a brochure with detailed programme descriptions for all offered camps including work plan, timeframe and costs should be produced. The flyers and posters should be displayed at central locations like canteens, secretariats, meeting points and on blackboards.

A long application period is crucial because people need time to make their decisions. It is important to arrange a hotline and an e-mail contact in order to allow interested people to gather further information on the Summer Camps. In addition to completing an application form, the applicants should write a motivation letter with the following points: why they want to take part in a Summer Camp, why they decided on the special Summer Camp, interests,

skills and commitment and, last but not least, what they expect from the Summer Camp participation.

This provides important information for the selection of the Summer Camp participants: motivation, language skills and expectations. The size of each Summer Camp group should be between 10-20 participants. The participants should be at least 18 years old. It is advisable to fill the Summer Camp with people of similar age to avoid conflicts of interests.

A seminar in advance is very helpful. The participants have the possibility to get to know each other and to receive detailed information about the host country, living conditions, the Camp programme as well as useful travel and flight information. You may also show some pictures of the area, the working sites and accommodation facilities. It is important to inform the participants about cultural aspects, particularly if they do not have much travel experiences. Good opportunities are working groups for each Camp during the seminar. They may solve a fictitious problem in the group, for example to prepare a short presentation about their forthcoming Summer Camp and introduce it to the other Summer Camp groups. This will support the evolvement of group dynamic.

A wide range of working activities can be done with the help of the participants during a Summer Camp. Depending on your field of activities, the volunteers can be a useful support for large projects, which need a lot of manpower.

The following aspects are helpful for planning a Summer Camp:

- > Allow extra time for the preparation of the Summer Camp. It can be very time consuming to arrange details like timetable, camp programme, application procedure, legal advice, insurance and visa.

- > Be aware that all participants are individuals and some people need more support and help than others.
- > Hand out a mandatory registration form, which the participants must sign if they intend to participate in the Camp.
- > Accommodation should be basic but clean, comparable to a youth hostel.
- > The participants may bear costs of travel, accommodation, food, and transport themselves. It is a good idea to give advice for travel arrangements. Accommodation, food and transport on site should be arranged by the organiser of the Summer Camp.
- > Co-operation with local companies could offer the possibility to ask for financial support for organisation and preparation the Summer Camp programme.
- > Keep in mind that it can be sometimes difficult to prepare the local population, supposed to be working together with the workcamp participants. The NGO has to act as a mediator between participants and local people to avoid disaffirmation and scepticism.
- > It is advisable to accompany the participants during the Summer Camp. At the beginning of the Camp, the participants should get an introduction in the field of work and the project area. At the end of the camp, all work activities should be carried out as they were planned. It means a great benefit for your organisation, and the young people feel that their participation was reasonable.
- > During the Summer Camp you should offer a mix of work, cultural activities and leisure time. The participants are also interested in discovering the host country and the surroundings of the Camp area. On weekends, day trips to historic sites or other places of

interest or some outdoor activities like cycling or canoeing can be organised.

- > After finishing the Camps you should offer a final meeting for all participants. It is a good opportunity to summarise the Summer Camp activities and results. Each group can give a lecture with photos of the Camp and report on their experiences.
- > It is helpful to document your experience with the participants and the Summer Camp organisation for further Camps. You can carry out a survey to get feedback from the participants.

Check list for Camp participants:

- > Clothing
- > Climate & time zone
- > Currency & exchange rates
- > Acceptance of credit cards & traveller's cheques
- > Visa requirements
- > Health requirements & vaccination
- > First aid kit & emergency numbers
- > Communication
- > Tourist guides & contact address.

Nutmeg Puppet Show tour of the Broads

Rachael Miller, Broads Authority

Every year the Broads Authority organises a programme of public events called 'Fun in the Broads' to encourage understanding and enjoyment of the Broads. The events programme includes walking, sailing and canoeing. The Nutmeg Puppet Show tour of the Broads has become an integral part of this programme.

The puppet shows have evolved during the long-running working relationship between the Broads Authority and Nutmeg Puppet Company. The theme of the annual

show is decided through joint discussions about current Broads Authority projects, problems or conflicts in the Broads, or global environmental issues. Research on the selected topic is carried out by Nutmeg Puppet Company, then a storyline and script are produced. Nutmeg Puppet Company tour approximately 15 villages in the Broads area performing on village greens and other public open spaces. The audience, usually made up of families, can watch the show for free. Although many parents bring their children to watch the show they become involved with the entertaining storylines themselves and often end up as transfixed as the children, and hopefully take away a message too!

2003's show - 'Heatwave!' - was performed at the Living Lakes conference which was held in the Broads. It was a very appropriate title for an exceptionally hot summer! The puppet show told the tale of global warming on a local level, and how rising seas would affect not only the wildlife but also the human inhabitants of the Broads. Also included were suggestions the audience could take away to reduce fossil fuel emissions, for instance turning down heating and cycling instead of using the car.

The annual tour of the Nutmeg Puppet show has a strong local following and provides a good way for the Broads Authority to interact with local communities. Nearly 2,000 people saw the 'Heatwave!' show during its three week August Tour. Using puppetry and drama to explain often complex ecological problems or environmental conflicts to a non-specialist audience has proved amazingly successful. The shows, as part of the wider events programme also provide an important addition to local tourism, which is the main industry in the area.

Management: Structure, Documentation, Communication

Once targets and procedures have been established for the participation of all interested parties and a plan of action has been decided upon the situation must be avoided where participants sit back and allow the projects to become moribund. It is essential to keep the projects alive and to this end the organisation needs to keep a check by asking for regular reports and arrange periodic meetings with the role players in order to ensure results and make modification where necessary.

Competent management saves time and money so it is important to make use of any existing organisation that can be integrated into the new plan and create an efficient operation.

Key elements for management

> Leadership and management representation

Responsible leadership creates responsible management so the leader should have the necessary knowledge and authority to ensure that discussions are carried out in accordance with the management plan.

Detailed job descriptions for the various participants are essential to ensure the implementation of the action plan.

There must be regular reports between the members and the management. The leader and organiser of the Environmental Management System (EMAS) should be obliged to carry out an internal audit at regular intervals and keep management advised of the results.

> Management Environmental Team

A permanent environmental committee should co-ordinate the various initiatives. Team work is essential and cannot be emphasised enough and the committee must consist of people sufficiently motivated to ensure success. If outside businesses and NGOs can be drawn into the plan it will likely increase the potential for creative ideas and more ambitious targets. However the number of committee members should be kept as low as possible in the interests of efficiency.

The environmental team must act in an advisory capacity co-ordinated by management. This task should be to elaborate on the action plan, modify where necessary and see to the carrying out of functions. They should supply and interpret information for the internal audit and monitor the situation. Their meetings, which must be held 1 - 2 times a year, must be minuted.

> Communication and documentation

It is known from experience that field workers do not devote much time to writing reports and keeping records. For this reason management should keep its documentation to the minimum while making it as informative as possible. Records should however be explicit showing by whom, for whom, when it was produced and where it can be found. A simple and complete index will help efficiency and contribute to transparency. Environmental data comprises:

- > Environmental texts of laws and regulations
- > Legal documents such as licences
- > Reports, files and plans
- > Instructions
- > Minutes of all meetings
- > Reports of management representation

> Relevant studies and analyses (water, bird counts etc.)

> Public Relation work scheme

> Reports on Public Relation measures.

All staff members should have access to this information, preferably in the form of a handbook. Someone must be appointed and made responsible for the updating of all records and information.

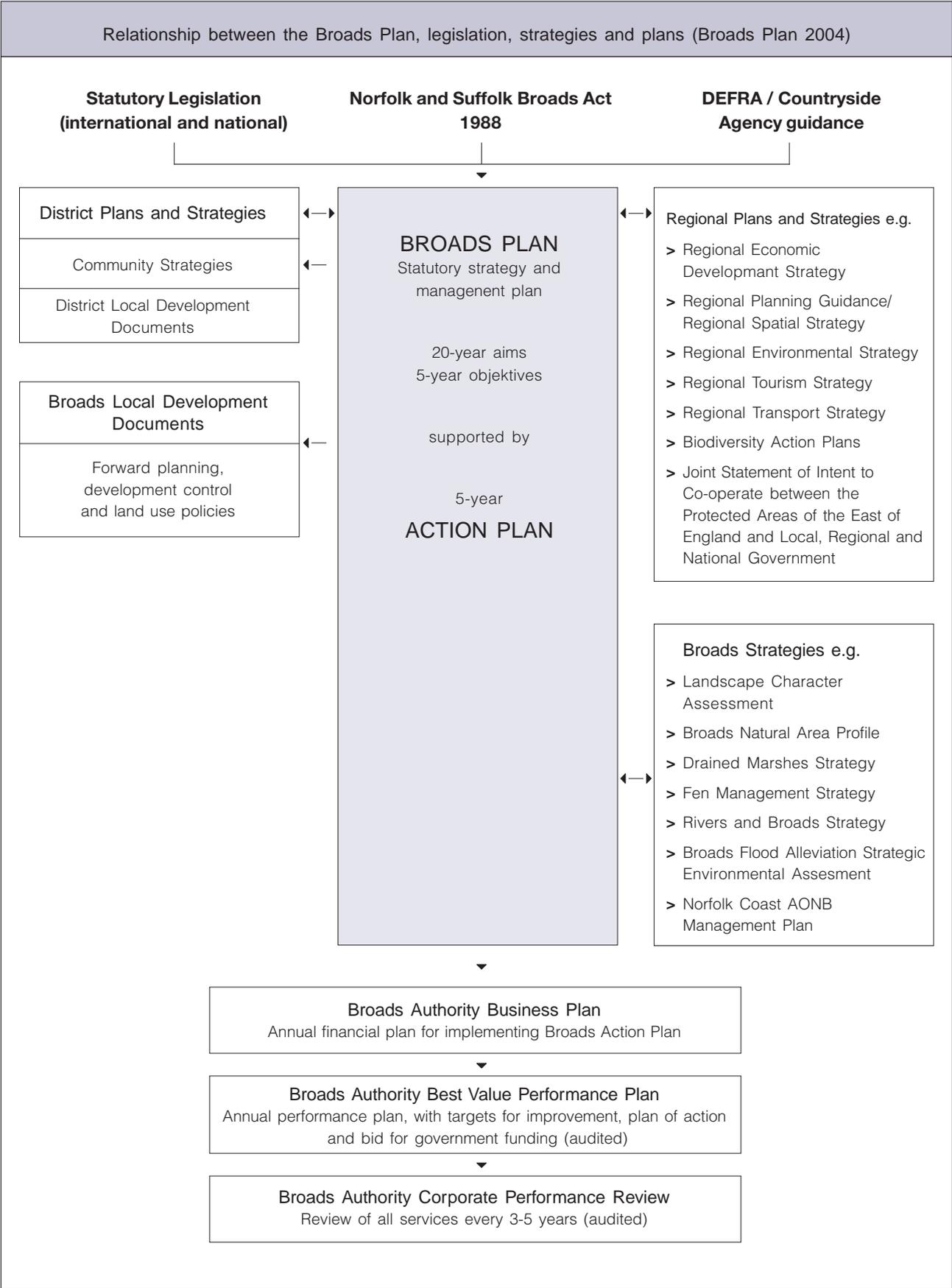
> Staff training

The action of staff directly influences the environment where they work and can have a positive or negative effect. Well trained employees are more motivated and will make better decisions. Management should emphasise the importance of good training for its field staff and insist on good communication.

Management should clearly define who is responsible for the dissemination of information to the staff and how it should be relayed. Management must also appoint a suitably qualified trainer and see that all staff review suitable training for their tasks.

> External communication

Depending upon available funds there are many ways of spreading information. The official responsible for news releases must be clearly identified to the public and be always available to answer queries, accept recommendations and field any problems and objections that need to be dealt with.





Stakeholder participation in Upper Swabia

„Sustainable development is not just about the environment, it is about the future of society as a whole. Sustainable development is not just the responsibility of a small group of people or institutions. It is the responsibility of us all.“

Margot Wallström

Participation and Communication

"Sustainable development is not just about the environment, it is about the future of society as a whole.

Sustainable development is not just the responsibility of a small group of people or institutions. It is the responsibility of us all". With this appeal Environmental Commissioner Margot Wallström opened the Green Week 2004 in Brussels.

Environment is still an important issue of the civic society. According to a Eurobarometer survey of 2003 the most important fears of the Europeans were:

- > 79% threats and violence
- > 66% health
- > 65% unemployment
- > 56% poverty and social exclusion
- > 48% drugs
- > 46% damage to the environment
- > 40% non respect of human rights.

But how can environmental rights of citizens such as the right to clean air, drinkable water or biodiversity be covered? How can citizens be more involved in policy-making?

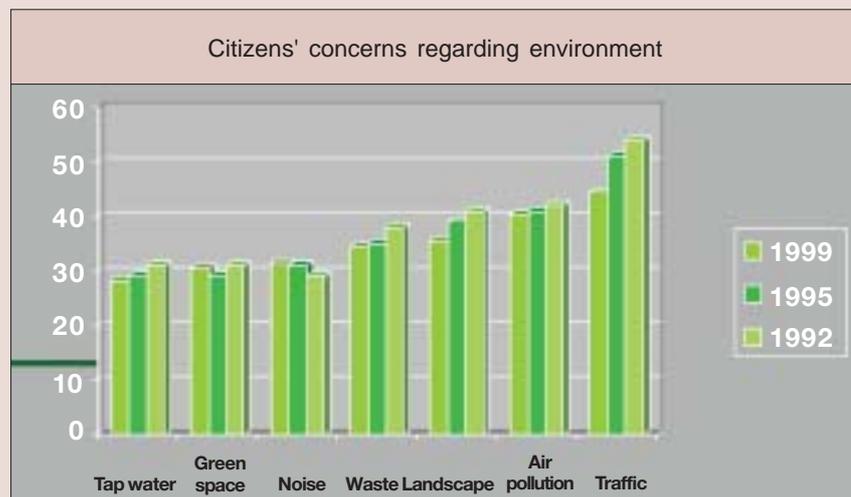
Answers to these questions are not only crucial at European, national

and communal level but also for the successful management of a wetland or lake. The management plan must contain a structure for the incorporation of citizens and stakeholders as well as a structure for efficient information to the public.

Communication and participation are very much related. Before making any decision or an qualified input - whether on a personal basis or on behalf of the company or local authority - citizens need to have the right information. Information that covers the issue from all different angles and that offers all possible solutions. Only then they can make an informed choice.

Local Agenda 21

Local Agenda 21 is the name of an action plan for sustainable urban/communal development which is established and implemented by the local authorities in co-operation with the different local actors. According to chapter 28 of Agenda 21, the global initiative for sustainable development which was adopted during the UN Conference on Environment and Development (UNCED) in Rio de Janeiro in 1992, all local authorities in each country should be encouraged to implement Agenda 21.



Source: EU DG Environment

During the past 10 years cities and communities have established work groups on the topics traffic, construction, living, education, consumerism, etc. where common targets and project proposals for the future of the city or community are developed by representatives from the local government, local enterprises, associations and private households.

Competent moderation of all initiatives from the parties involved (work groups, professional process management by the local government and continuing incorporation of all local Boards - Town and Municipal Council) is

crucial for a good local Agenda 21 process

Agenda 21 goals and approaches should be integrated into the management plan for the wetland and lake. If there are already active Agenda 21 groups in the region, then they should actively participate in the implementation and further development of the management plan.

Further information: <http://www.un.org/esa/sustdev/documents/agenda21/index.htm>

<http://www.unep.org/Documents/www.agenda21.de> (German)

Water management and participation

Article 14 of the EU Water Framework Directive requires that Member States encourage the active involvement of all interested parties in the implementation of the Directive. Member States are required to carry out public information and consultation in the development, review and updating of River Basin Management Plans (RBMPs). This includes access to background documents and information used for the development of the draft plan.



Information Aarhus Convention

The Aarhus Convention (1998) establishes a number of rights of the public (citizens and their associations) with regard to the environment. Public authorities (at national, regional or local level) are to contribute to allowing these rights to become effective. The Convention provides for

- > The right of everyone to receive environmental information that is held by public authorities (access to environmental information). This can include information on the state of the environment, but also on policies or measures taken, or on the state of human health and safety where this can be affected by the state of the environment. Citizens are entitled to obtain this information within one month of the request and without having to say why they require it. In addition, public authorities are obliged, under the Convention, to actively disseminate environmental information in their possession.
- > The right to participate from an

early stage in environmental decision-making. Arrangements are to be made by public authorities to enable citizens and environmental organisations to comment on, for example, proposals for projects affecting the environment, or plans and programmes relating to the environment, these comments to be taken into due account in decision-making, and information to be provided on the final decisions and the reasons for it (public participation in environmental decision-making).

- > The right to challenge, in a court of law, public decisions that have been made without respecting the two aforementioned rights or environmental law in general (access to justice).

The main instrument to align Community legislation with the provisions of the Aarhus Convention on public access to environmental information is the Directive 2003/4/EC on public access to environmental information. This new Directive obliges the Member

States of the European Union to have their legislation in place at the latest by 14 February 2005.

Directive 2003/35/EC aligns Community legislation with the provisions of the Aarhus Convention on public participation. The Directive updates provisions on public participation in the permitting procedures at national level under legislation on environmental impact assessment and integrated pollution prevention and control, and it introduces rules on access to justice. Furthermore, it contains rules on public participation in the preparation of a number of environmental plans and programmes under Directives on waste, air pollution and protection of waters against nitrate pollution. Member States are obliged to adopt their laws and other provisions to comply with this Directive by 25 June 2005 at the latest.

In addition, the Commission has adopted a proposal for a Directive to fully address the requirements of that Convention on access to justice in environmental matters.



Example Stakeholder forum Nestos

Hans Jerrentrup, EPO

Up to now in Greece top to bottom processes in administration are rather common and do not usually involve the public. In the frame of the LIFE project it was decided to work with round tables to multiply the involvement of stakeholders into the project and its benefits from the measures in a step-by-step strategy. The stakeholder groups that were identified to participate in the procedure for the management plan should be capable of informing and involving a broad public as well as following crucial target groups:

- > Development Agency AENAK (civil servants)
- > Prefecture of Kavala (communities, mayors and the public)
- > Department of Agriculture of the prefecture of Kavala
- > Department of Livestock (farmers and cattle dealers)
- > Department for Fisheries (fishermen and traders)
- > Department of the Environment (wardens and landowners)
- > Forest Service of Kavala (forest owners and hunters)
- > Fisheries Research Institute (INALE)

- > Prefectural Tourism Committee (tourism service providers)
- > EOT (Greek National Tourism Organisation)
- > Local Authority of Hrysoupolis and Keramoti
- > Agricultural co-operatives
- > Hotel and tourism association of Kavala.

Working groups

Two working groups were installed: one to discuss the wetland and agricultural issues and a second group to discuss the tourism-related issues. The tasks and objectives of the working groups are defined as follows:

- > Discussion of the measures in the LIFE Environment Programme ENV/D/000351
- > Management plan and maps
- > Proposals for collaboration
- > Guidelines for activities
- > Recommendations for actions and for the government (in the tourism sector also the investors).

Within the LIFE project, the project partner EPO in cooperation with AENAK developed a draft management plan for four of the Nestos lakes and the Vassova and Erateino Lagoons. The draft

comprises: Biotope and Water Management, Restoration, Agricultural Extensification and Sustainable Tourism/Visitor Management. The two stakeholders, working groups met on a regular basis in order to review and refine the draft.

The Working Group on Agriculture, Nature and Water Management - under the auspices of AENAK and EPO developed the agricultural part of the management plan with the aim to agree on voluntary measures to support the extensification and foster a long-term improvement of agriculture and to ensure the environmental quality of the area.

The Tourism Working Group developed the part regarding tourism development of the area.

After a reviewing phase of the written proposals and comments of the different stakeholders the final management plan for the selected Nestos areas has to be approved and will be signed at a public event.

The awareness raising and participatory processes for the management plan contributed to the improvement of the communication between authorities, NGOs and the local population.

>>

While public participation is a fundamental part of the WFD, there are additional legal tools citizens and NGOs can use to ensure they are involved, including the 'Convention on Access to Information, Public Participation in Decision-Making and Access to Justice in Environmental Matters' (Aarhus, 25 June 1998), which has been partially 'transformed' into a set of EU Directives.

To meet the requirements of the EU Water Framework Directive they must be brought down to local level; that means to the area for which a management plan should be worked out and implemented.

Questions which have to be clarified within the scope of the management plan:

> Who is going to inform and how?

Regular newsletter, lectures, exhibitions, interviews, articles in trade magazines, etc.

> Who should be involved in the elaboration and further development of the management plan?

Representatives of the relevant economical sectors, local administrations, private environmental organisations and other NGOs

> How should they be involved?

Working groups or other forums, timetable, additional possibilities for feedback

> What happens with the results of the participatory involvement?

Only if you are well informed will you have a say. Often scientists and experts are not able to convey their widespread knowledge to the public.

The management's ultimate ambition must be complete and clear information to the public. Glossaries of technical terms, graphics, photos, these elements help raise interest and understanding. Have your notes and reports written or at least corrected by a journalist. Meanwhile there are a lot of methods to involve citizens and stakeholders. An experienced moderator may play an important role and prove a good investment. A short questionnaire with questions on the information content of the event, moderation, discussion offer etc. should be displayed. Encourage citizens and stakeholders to send you a feedback and handle them with care.

See also chapter 11: Management structure, documentation and communication.



Stakeholder meeting in Greece



Water quality monitoring

Monitoring and Evaluation - A cyclical Process

Dr Michael Green, Broads Authority

Effective management

Management is a cyclical process involving planning, allocation of resources, implementation, monitoring and evaluation, and feedback. Monitoring and evaluation is crucial to effective management because it ensures that:

- > The management body is held accountable to its stakeholders
- > Management is adapted, as necessary, in order to address changing circumstances, be they new knowledge, priorities, threats or opportunities and
- > Lessons are learnt to improve future management planning.

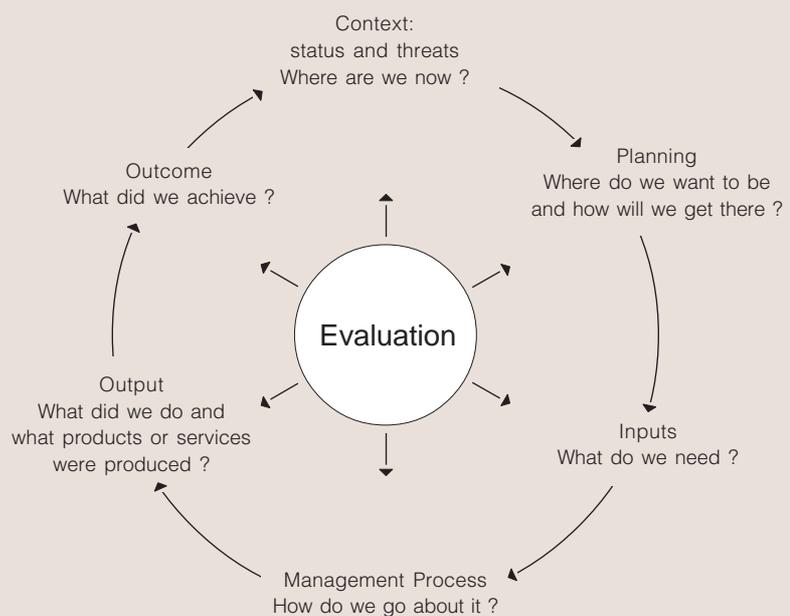
Management involves six distinct stages. Its evaluation involves examining:

- > Design issues about the context and planning of a site;
- > The adequacy and appropriateness of inputs and management processes; and
- > The delivery of management objectives in terms of outputs and outcomes.

Assessments of planning and inputs are concerned principally with the economics of management, those of processes with efficiency and those of outputs and outcomes with effectiveness. Each of these stages is considered in Table 1.

Consideration of all stages in the management cycle is important but, although often the most resource intensive, evaluating outcomes provides the most meaningful measure of management effectiveness. For example, restocking a water body with fish may achieve the objective of increasing the population of fish-eating birds but, depending on the species of fish re-introduced, might result in a less desirable

Consideration of all stages in the management cycle is important but, although often the most resource intensive, evaluating outcomes provides the most meaningful measure of management effectiveness.



Management cycle and its evaluation (Source: Hockings et al., 2000)

Framework for assessing management effectiveness (Hockings et al., 2000)

(Table 1)

Management stage	Description of assessment
Context: status and threats	Assessment of the importance of the site and status of its features, the broad legal and policy environment to which it is subject, and threats and opportunities facing it.
Planning	Assessment focused on the appropriateness of national legislation and policy, the design of the site in terms of the integrity and status of the resource, and the more detailed management plan and objectives that may affect achievement of the vision planned for the site.
Inputs	Assessment of the adequacy of resources in relation to management objectives, based primarily on measures of staff, funds, equipment and facilities.
Management process	Assessment of the suitability and adequacy of management processes, mechanisms and systems to deliver the management objectives for the site.
Outputs	Assessment of the extent to which actions have been implemented and targets achieved.
Outcomes	Assessment of the extent to which management has been successful in terms of objectives being achieved.

outcome of higher algal densities, reduced water clarity and a consequent decline in aquatic plant populations.

Use of indicators

It is not practical or even possible to measure directly all the attributes that relate to the management of a site and, therefore, it is necessary to select a number of representative indicators. These should be chosen on the basis of their ability to provide information about:

- > The extent to which key management objectives are being achieved
- > The condition of the most significant conservation values (natural and cultural)
- > The level or extent of perceived threats, pressures or risks to significant values
- > The resolution of important, complex or controversial management issues

- > The outcomes of big programmes and expenditures on management.

Indicators for measuring management effectiveness should meet the following criteria:

- > Have an unambiguous, predictable and verifiable relationship to the attribute being assessed
- > Be sensitive to change in the attribute being assessed
- > Reflect enduring environmental change across the site
- > Reflect changes and processes of significance to management
- > Reflect changes at spatial and temporal scales of relevance to management
- > Be cost-effective in terms of data collection, analysis and interpretation
- > Be simple to measure and interpret
- > Be able to be collected, analysed and reported in a timely fashion.

Monitoring and evaluating beyond boundaries

The integrity of wetlands is particularly dependent on their being fed with adequate supplies of good quality water, which, in turn, is a consequence of land management, water abstraction and water discharge practices within the catchment. Thus, management authorities should consider developing some indicators that reflect the environmental status of the catchment within which a wetland is located.

Who should be involved?

Can a manager responsible for a site assess the effectiveness of its management objectively? While every manager has a responsibility for continually evaluating their area of responsibility, there are benefits in involving others from within and outside the management authority. As a rule, long-term monitoring and evaluation programmes should give

13 Monitoring and Evaluation >>

a central role to staff, involve partners (both statutory and non-governmental organisations) and provide opportunities for local community participation.

Case Study: Monitoring and evaluating implementation of the Broads Plan

The Broads national park management plan comprises a Strategic Plan, based on a set of 20-year aims, and a supporting Action Plan with 5-year objectives (Broads Authority, 2004). Costed actions from the Action Plan are incorporated in the annual Business Plan according to their respective priorities and availability of resources.

Implementation of the Broads Plan will be monitored in terms of inputs and outputs through the annual business planning process and evaluated in terms of outcomes by means of a set of indicators.

Progress with the 143 actions (outputs) in the Action Plan will be monitored according to a simplified version of the status codes

developed by the World Commission on Protected Areas. Each action will be rated in terms of being: not started, in progress or completed (Table 2).

A core set of performance indicators is under development to monitor progress towards the 20-year aims (outcomes), some of which are illustrated in Table 3. A number of these indicators have the potential to be used at a landscape and/or catchment scale. This is particularly important given the dependence of the Broads as a wetland on its catchment. Others have the potential to reflect economic and social values, both within the national park and beyond its boundaries.

Responsibility for some of the monitoring falls within the remit of other organisations, including some within the non-governmental and corporate sectors (Table 3). This reinforces the partnership approach to managing the Broads. The Broads Authority is in the process of establishing a representative panel of partner organisations to oversee

the monitoring and evaluation. This approach adds credibility to the independence of the evaluation; and it provides a mechanism for sharing and learning from successes and failures among partners.

System for rating implementation of actions in the Broads 5-year Action Plan, adapted from WCPA status codes (Hockings et al.) (Table 2)		
WCPA status code	Implementation of actions	Broads Plan status code
Not started		Not started
Reactive work only		In progress
Planning in progress		
Policy/planning complete		
Planning complete: work started		
Substantial progress		
Completed		Completed

Potential performance indicators for evaluating outcomes of the Broads Plan

(Table 3)

Outcome	Potential performance indicator	Monitoring agency
Living landscapes		
> A long-term vision for the Broads is developed.	> Sustainability of vision > Degree of consensus among stakeholders	> Broads Authority
> The character of the Broads landscape is maintained.	> Extent and percentage of flood plain maintained as open water, fen, grazing marsh or open space > Extent and percentage voluntary uptake of Environmental Stewardship schemes within the Broads and its catchment	> Broads Authority > Rural Development Service
> A planning policy framework that is socially, economically and environmentally sustainable is developed and implemented.	> Percentage of appeals against planning decisions that are upheld by Planning Inspector > Percentage of new homes built on previously developed land	> Broads Authority > Broads Authority
> Flooding is managed.	> Number of properties damaged by flooding	> Environment Agency
Water, habitats and wildlife		
> 'Good' status for all water bodies, in line with the European Water Framework Directive, is achieved.	> Percentage of length of rivers and of number of broads in 'good' status within the Broads and its catchment	> Environment Agency
> Biodiversity is conserved and enhanced.	> Percentage of Sites of Special Scientific Interest in favourable condition within the Broads and its catchment	> English Nature
> Fens are managed sustainably in ecological and economic terms.	> Total area of fen under appropriate management	> Broads Authority
Tourism and recreation		
> Risks associated with boating are 'Low as Reasonably Possible' and boats meet minimum safety standards.	> Number of incidents resulting in serious injury or death per year	> Broads Authority
> The boating holidays industry provides a quality service that is economically sustainable.	> Mean number of weeks per year that cruisers are hired > Percentage of hire boats accredited under Quality Grading Scheme	> Broads Hire Boat Federation > Broads Authority
> The design and use of boats causes minimal damage to the environment.	> Percentage of boats that meet a set of criteria concerning wash, exhaust emissions, noise etc. > Percentage of boats violating speed limits, based on standard monitoring	> Broads Authority > Broads Authority
> Appropriate forms of good access to land and water are available for all to enjoy the Broads.	> Percentage of public rights of way easily accessible to the public > Length of footpaths accessible to those with disabilities	> Broads Authority > Broads Authority
> Visitor services, facilities and associated infrastructure meet minimum quality standards.	> Number of catering establishments accredited under the Broads Quality Charter	> Unicorn Tourism
Understanding the Broads		
> The Broads is well known as a national park and its purposes are understood by all sectors of society, including young people, those from urban areas, ethnic minorities, and those with disabilities.	> Percentage of residents and visitors aware of Broads' national park status, based on standard monitoring > Composition of visitors to the Broads	> Broads Authority > Broads Authority
> Stakeholders, including partner organisations, local communities and the public, are engaged with the Authority.	> Number of organisations and community groups actively implementing Broads Plan	> Broads Authority



Information Evaluation system for lakeshore conservation

Professional evaluation system for lakeshore conservation and water body protection

Survey of the Arbeitsgruppe Bodenseeufer (AGBU) for Lake Constance Foundation and GNF, Radolfzell

The shore and the shallow water zone is the most diverse, and at the same time, the most endangered part of the ecosystem of Lake Constance. Here the conflict between protection and the interests of users is particularly great. As a result, it is also a major focus of interest for water pollution control and nature conservation. Since the 1960s the work of water pollution control has focussed on the reduction of the over-fertilisation of the lake. The declaration of protection areas in the shore zone was the major focus of nature conservation. In the last years a change of circumstances has become apparent. This is characterised by the fact that the free water body has been successfully restored, as a result of new guidelines from the EU, but also through the continuing intensification of use of the lakeshore zone.

This survey investigates and presents the overall importance of the lakeshore zone for nature conservation and water pollution control in light of the EU Water Framework Directive (WFD) and the Natural Habitats Directive or the Natura 2000 network system.

Final recommendations of the survey are:

- > **Integration of the objectives of professional nature conservation and water pollution control**

A better integration between water management and conservation objectives is urgently required. A stronger commitment of nature conservation, and here in particular also more involvement of the private conservation sector on regional and local levels in the implementation process of the WFD should be achieved. The aim is to increase the involvement of conservation objectives in all implementation steps, starting with survey and evaluation as well as monitoring of water bodies.

> Development of an evaluation procedure for lakeshores on the basis of the WFD-concept

In water pollution control there are many multimetric, water body type-specific evaluation procedures, which are currently being developed and tested. They use the potential close-to-natural condition as a reference, and the multimetric distance between the as-is-condition and the reference as an evaluation measurement. However, evaluation methods used for riverine and lakeshore wetlands, should be incorporated into this structure, as far as this is advantageous for the mutual interests of water management and conservation. Integrative environmental protection is needed, and synergies, which can arise through the evaluation of water bodies in practice, justify the efforts. The WFD and its CIS-guidance documents offer a wide-reaching, integrative approach. However, in view of the special features of the lake shore zone they are not detailed enough. Status description and evaluation systems for the lakeshore can benefit from the conceptual guidelines of the WFD,

as well as from concepts for the evaluation of trophic status and from the evaluation of hydromorphologic status of running waters.

> Realization of public participation during the implementation of the WFD on Lake Constance

The earliest possible participation of interested parties in the implementation process of the WFD can have positive effects on the quality of status surveys and monitoring programmes. Public participation can be access to background information for the "wider public" and "interested parties", consultation of "interested parties" (=the lowest level), and active involvement of "interested parties" (=higher level). "Interested parties" are not only professional organisations from the public sector (e.g. NGOs) and the private sector (economic and industry groups, research institutions), but also local, non-professionally organised groups with locally bound interests. The advantages of increased public participation may occur on a wide scale on national level and on the level of river catchment areas as well as on regional level of partial catchment areas and river basin districts.

An important first step for a better co-operation between all nature protection organisations active around Lake Constance could be the joint formulation and implementation of a lakeshore evaluation procedure.

Further information:
www.bodensee-ufer.de



Natural shallow water zones belong to the most important development goals for Lake Constance

Project Partners and Supporters

Germany, Lake Constance

Lake Constance is located between Germany, Austria and Switzerland. It is the second largest freshwater lake in Central Europe with a surface area of 540 km² and a maximum depth of 252 m. 2.2 million people live, work and relax in the Lake Constance region and up to 4.5 million people are dependent on Lake Constance drinking water.



GNF - Project co-ordination

Global Nature Fund (GNF) is an international non-governmental and non-profit organisation, registered in Berlin, Germany. GNF was founded in 1998 and with it the Living Lakes network. A principal task of the foundation is the co-ordination of Living Lakes, an international network for the protection of lakes and wetlands and sustainable development in the lake regions.

Global Nature Fund

International Foundation for Environment and Nature

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www.livingwetlands.org;

www.livinglakes.org;

www.globalnature.org



Bodensee-Stiftung - Project partner

The Bodensee-Stiftung (Lake Constance Foundation) in Germany has been working on demonstration projects for sustainable development

in the Lake Constance region since 1994. It deals with issues like organic agriculture, transportation, sustainable tourism, visitor management and restoration of rivers. The Lake Constance Foundation contributes knowledge gained from their own experiences in the field of extensive farming, tourism, visitor management and sewage treatment and carried out two training courses at Lake Constance in May 2002 and June 2004.

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E-mail: info@bodensee-stiftung.org

www.bodensee-stiftung.org

Great Britain, The Norfolk and Suffolk Broads

The Broads National Park, located about 200 km north-east of London, is one of Britain's finest wetlands with a surface area of about 300 km². The National Park consists of shallow lakes, the Broads, interconnected by rivers, and associated wetland habitats and is one of Europe's most popular inland waterways. In terms of staying visitors, there are around one million trips to the Broads and a further 1.3 million trips made by day visitors.



Broads Authority - Project partner

The Broads Authority is the statutory agency for the Norfolk and Suffolk Broads National Park, responsible for the conservation and management of the National Park, local planning and navigation. The Broads Authority has expertise and 20 years' experience in the restoration and management of shallow lakes

(including biomanipulation of fish populations), fens and grazing marshes and provides this knowledge to the project. It carried out two training courses in the Broads in June 2002 and April 2004.

The Broads Authority

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Fax +44-1603-765710

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www.broads-authority.gov.uk

Spain, Lagunas La Nava and Boada

The lagoons La Nava and Boada are shallow steppe lakes located in north-western Spain on the Tierra de Campos Plateau near Palencia. They cover an area of about 4 km², but most of the water evaporates in summer, leaving behind big pastures for grazing livestock. After decades of drainage the Fundación Global Nature started to revitalise a part of the completely dried out Laguna La Nava in the beginning of the 1990s, whereas Laguna Boada was restored in 1998. The wetland complex La Nava and Boada meanwhile has become a very important nature reserve and resting place for migratory birds.



Fundación Global Nature - Project Partner

The Fundación was founded in 1994 and works in the protection and restoration of habitats and species in Spain and the exchange of experience with organisations in South and Middle America. Fundación Global Nature co-ordinates projects to protect the dehesas (oak forest) in Extremadura, the tortuga mora turtle

in Murcia or the restoration of the Villacañas wetlands in Castilla La Mancha. It runs the La Nava Information Centre "Centro de Estudios Ambientales Tierra de Campos". The Fundación Global Nature was responsible for the co-ordination of the measures in the project area La Nava and Boada in Spain.

Fundación Global Nature
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Fax +34-979 84 23 99
E-mail:lanava@fundacionglobalnature.org
www.fundacionglobalnature.org



Fuentes de Nava - Project partner

The community of Fuentes de Nava owns the parts of the area at the La Nava lagoon where the restoration measures were carried out. The community was actively involved in the installation of the buffer zones, the elaboration of the management plan and the dissemination of the project results.

Ayuntamiento de Fuentes de Nava
Mayor Plaza Calvo Sotelo, 1
E-34337 Fuentes de Nava, Spain
Ph +34-979-84 24 11



Boada de Campos - Project partner

The small community Boada de Campos is owner of the area of the Boada wetland. The community was actively involved in the installation of the buffer zones, the elaboration of the management plan, the development of the interpretation trail and the dissemination of the project results.

Ayuntamiento de Boada de Campos
Mayor, Plaza José Antonio, 1
E-34305, Boada de Campos, Spain
Ph +34-979-11 80 08

Greece, The Nestos Lakes and Lagoons

The 18 small Nestos Lakes and 8 brackish Lagoons are part of the large Nestos Delta, located in north-east Greece, about 200 km to the east of Thessaloniki. The Nestos Lakes lie within a 200 km² complex mosaic that includes wetlands, dry meadows, hedges, small Mediterranean bush forests, and small-scale agricultural fields. The lakes and wetlands of the Nestos Valley have survived thousands of years of human history, but now are confronting unprecedented challenges, primarily from industrial methods of agriculture, careless waste, and governmental neglect. Selected by the Government of Greece two decades ago for recognition as a Wetland of International Importance under the Ramsar treaty.



EPO - Project partner

EPO, the Society for the Protection of Nature and Ecodevelopment is responsible for the local co-ordination and implementation of the demonstration project in Greece. EPO was founded in 1988 in Hrysoupolis (Kavala District, Greece) and is a non-governmental nature conservation organisation. EPO has worked in the Nestos area since 1988 on sustainable management of wetlands and lakes, environmental education and ecodevelopment. This includes issues like eco-tourism, ecological farming and monitoring of fauna and flora. EPO has collaborated in many studies and activities with the Greek Ministry for Environment, the Ministry of Youth, the Greek Biotope and

Wetland Centre and regional authorities and has organised and carried out many long-term seminars and environmental education projects.

EPO-Society for Protection of Nature and Ecodevelopment
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E-mail: Ecoconsult-epo@kav.forthnet.gr



AENAK - Project partner

The Development Agency of the Prefecture of Kavala (AENAK) is actively involved in the installation of the buffer zones, the elaboration of the management plan and the dissemination of the project results.

Development Agency of the Prefecture of Kavala (AENAK) S.A.
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The project is co-financed by the European Union:



EU LIFE Programme, DG Environment

The European LIFE Programme (the financial instrument for the environment) co-finances environmental initiatives in the European Union and certain third countries bordering on the Mediterranean and the Baltic Sea, and in central and east European accession candidate countries.

14 Project Partners and Supporters

Advisory Board

The Advisory Board helped to guide the project, through evaluation of the progress of the project together with the project team, provision of advice, relevant information and additional contacts, as well as to raise the profile of the project through their respective institutions and networks.

Members of the Advisory Board:

Prof Dr Gerhard Thielcke

(Honorary President of GNF, Germany)

After finishing his PhD in Zoology in Freiburg he lectured in Behavioural Physiology, Human Ecology and Environmental Conservation at the University of Constance. For 29 years he did research on bird voices, evolution and the fundamentals of environmental conservation at the Max-Planck-Institute. He is one of the founders of the Bund für Umwelt und Naturschutz Deutschland (BUND - German Federation for Environment and Conservation). He is also Honorary President of the Deutsche Umwelthilfe (DUH - German Environmental Aid).

Prof Aitken Clark

(Vice President of BTCV, England and Vice President of GNF)

He graduated in Architecture and Urban and Regional planning and researched in Government and Administration at LSE. Practised Architecture in London and Cambridge. Moved to academic positions in England and Italy for ten years. Returned to England to help build a team to engage in the restoration and management of the Broads, now Britain's Wetland National Park. Former President of the Federation of Nature and National Parks of Europe and Chairman of the European Habitats Forum. Currently Vice President GNF, a Vice President BTCV, Chairman Europarc Consulting and a member of IUCN's World Commission on Protected Areas.

Dr Tobias Salathé

(Senior Advisor of the Ramsar-Convention Bureau, Switzerland)

He received his MSc and PhD from Basle University and has worked with ICBP (now BirdLife International) and DG XI of the European

Commission, among other posts, and most recently with the Station Biologique de la Tour du Valat in Arles, France.

Dr Argyris Kallianiotis

(Fishery Institute INALE, Greece)

He is a Biologist (Ichthyologist) with a 20-year experience on mainly fishery related objectives. Starting from 1982 he was fisheries supervisor, responsible for fisheries activities in the port of Kavala, N.E. Greece and lecturer in practical training courses for fish skippers. After 1990 he obtained a position as a senior scientist in fisheries research programmes on demersal fish stock assessment, gear technology and fish resources management, projects carried out by the Laboratory of Fishery Research (University of Crete) and by the Institute of Marine Biology of Crete. Since 1995 he is director of the Fishery Research Institute of NAGREF, responsible of Fisheries Resources Department. In the last 10 years he has been responsible of research projects concerning to the exploitation of

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www.ethikbank.de

ROHNER Saeco





Training course at Lake Constance 2004: Prof Thielcke explaining the restoration project at the river Aach

fishery resources and the development of the fishery sector in various Greek locations.

He is the director of the State Fisheries Research Centre INALE in Xanthi, Greece and an expert in

lagoon management.

Dr Santos Cirujano

(CSIC Real Jardín Botánico Madrid, Spain)

He is an expert in aquatic plants and wetland vegetation and author of

numerous publications and studies about the inventory, evaluation and monitoring of Mediterranean wetlands.

Living Lakes Members & Associates



Member Lakes

- 1 60,000 humans share the **Columbia River Wetlands** in Canada with 100,000 mammals such as grizzly bear and elk.
- 2 **Mono Lake**, located in the Californian desert, is threatened by excessive diversion of water from its tributaries to the metropolis Los Angeles.
- 3 **Lake Chapala** in Mexico is in extreme danger of disappearing, having lost about three-quarters of its volume due to irrational human activity.
- 4 **Laguna Fúquene** is a shallow water lake situated in the Colombian Andes at an altitude of 2,500 m.
- 5 **Lake Titicaca** is the second largest lake in South America and the world's highest navigable lake, lying at 3,810 m above sea level.
- 6 The **Pantanal**, situated in the heart of South America, is the world's largest wetland.
- 7 **Mar Chiquita** in Argentina is a breeding place for up to 50,000 pairs of the Chile flamingo.
- 8 The **British Norfolk and Suffolk Broads** are a prime example for the restoration of lakes exposed to eutrophication.
- 9 Years ago the Spanish steppe lake **La Nava** was drained. Thanks to our Spanish partners it is a living lake again.
- 10 Five million people drink the water of **Lake Constance** (Germany, Austria and Switzerland). The idea of the solar boat originated from here.
- 11 **Lake Peipsi** connected by the Emajõgi river with **Lake Võrtsjärv** in Estonia, is the largest trans-boundary lake in Europe shared by Estonia and Russia.
- 12 **Lake Balaton**, a famous resort area in Hungary is also home for some 250 species of birds.
- 13 The **Milicz Ponds** in Poland, made by monks in the Middle Ages, are a paradise for birds.
- 14 The Greek **Nestos Lakes and Lagoons** are characterised by their outstanding biodiversity.
- 15 Kenya, Tanzania and Uganda share **Lake Victoria**. It is indeed Africa's largest freshwater oasis having a surface area as large as 68,800 km².
- 16 Eco-tourism creates jobs in the Greater **St. Lucia Wetland Park**, South Africa's oldest nature reserve.
- 17 No other lake in Turkey is covered with so many waterlilies as **Lake Uluabat**.
- 18 The **Dead Sea**, 417 m below sea level, is in severe danger of drying up.

- 19 The Kazakh steppe **Lake Tengiz** is the last intact steppe lake in the whole world.
- 20 **Lake Baikal** world's deepest lake and "pearl of Siberia", is the home of the Baikal seal.
- 21 The basin of **Lake Poyang** is one of China's most important rice-producing regions and a wintering place for the remarkable Siberian Crane.
- 22 Every year 24 million tourists visit **Lake Biwa**, Japan's largest lake.
- 23 The largest lake of the Philippines, **Laguna de Bay**, is highly threatened by the

untreated sewage of the metropolis Manila.

- 24 The Indonesian **Mahakam Lakes** are the home of the very rare Irrawaddy freshwater Dolphin.

Associated Partner Lakes

- 1 **Kolindsund Wetlands**, Denmark
- 2 **Lago Enriquillo and Lac Azuéli**, Dominican Republic and Haiti
- 3 **Lake Sapanca**, Turkey
- 4 **Salobrar de Campos**, Majorca, Spain
- 5 **Mindelsee**, Germany

- 6 **Labanoras Regional Park**, Lithuania
- 7 **Lake Uvs**, Mongolia
- 8 **Pulicat Lake**, India
- 9 **Lake Maduganga and Madampe Lake**, Sri Lanka
- 10 **Lake Bolgoda**, Sri Lanka

Living Lakes Honorary Member

- 1 An enigmatic **Lake Vostok** buried 4 km under the ice of Antarctica is the Honorary member of the Living Lakes network.

Living Lakes - An international Partnership for the Protection of Lakes and Wetlands

Living Lakes is an international network and partnership whose mission is to enhance the protection, restoration and rehabilitation of lakes, wetlands and other freshwater bodies world wide including their catchment areas. The Living Lakes network was introduced in 1998 by the Global Nature Fund, a non-profit NGO working for environmental protection. The partnership promotes voluntary, international collaboration among organisations that carry out projects benefiting water bodies, wildlife, and people.

Aim of the project is to promote sustainable development objectives at international level. Currently, there are 30 member lakes and wetlands spread across five continents. The partners provide a fantastic wealth of experience and expertise other. Although the types of assistance will be adopted to the local conditions, support will target the following goals:

- > Permanent protection of natural resources and lake watersheds
- > Environmentally friendly economic activities and structures
- > Co-operation among citizens, non-governmental organizations, government authorities, and businesses.

Bridge building to overcome the geographic and the stakeholder co-operation gaps is the underlying idea of the Living Lakes initiative. The overall intent of the International Lake Network is to prepare the ground for an on-going and sustainable international dialogue and co-operation between all private and public stakeholders involved in water issues. Objectives are to further the exchange of know-how and technologies (e.g. Green Filter or Solar Cell Technology) and experiences between environmental NGOs and other stakeholders of lake regions moving Agenda 21 objectives from paper to practice. Annual Living Lakes conferences are held to promote the exchange of experiences, formulate statements, co-ordinate single activities and agree on further steps for common activities. The Lake Network supports campaigns and activities

providing financial support from international conservation programmes.

Living Lakes partners will actively participate in a diverse programme of mutual support. Examples include the following:

- > Exchanging environmentally friendly technology for use by businesses and others
- > Sharing information and experience in raising awareness of the need for lake protection
- > Helping to secure financial and other support for lake programmes and
- > International political support for water body protection.

The Living Lakes network provides important infrastructure with respect to communication, co-operation and trust to the EU LIFE project "Sustainable Management of Wetlands and Shallow Lakes". All four "lake project partners" are members of Living Lakes. The concrete measures in the wetland areas in Spain and Greece have been successfully on the basis of the fundamental experience provided by the project partners in Germany and England.

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Links

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