



focus



Water for life - LIFE for water

Protecting Europe's water resources

Water



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The contents of the publication "Water for life - LIFE for water: Protecting Europe's water resources" do not necessarily reflect the opinions of the institutions of the European Union.

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Since its launch in 1992, the European Commission's LIFE Programme has generated a significant mass of knowledge concerning many different aspects of environmental activity. This information remains highly relevant as a learning resource for stakeholders throughout the EU and in neighbouring countries.

Making sure that there is enough water and it is of suitable quality is one of the biggest challenges facing society in the coming years. DG Environment's thematic conference "Water for life – LIFE for water" proved to be an excellent opportunity to disseminate the results of projects supported by the LIFE Environment strand of the LIFE programme in order to facilitate the replication and exchange of good practices in water protection amongst relevant stakeholders. More than 150 delegates from across Europe attended the event, which took place on 14-15 October 2009 in Brussels, including LIFE project beneficiaries, national and international water authorities, NGOs and the media.

The main objective of the event was to examine the role of LIFE Environment as an instrument to support the implementation of the EU Water Framework Directive and the Marine Strategy Framework Directive alongside other EU water-related legislation and policies. The thematic sessions provided a platform for a discussion on, and a dissemination of the results of, some successful projects. This will allow us to find transferable outcomes from projects and to mainstream good practice for the future implementation of LIFE+.

The programme began with a plenary session examining the challenges in water policy. This was followed by thematic sessions addressing four key areas: adaptation to climate change – how can intelligent water resource management help fight water scarcity?; hydromorphological alterations – how can technical interventions in rivers be linked to ecological river restoration?; the Marine Strategy Framework Directive – how can proven collaborative governance techniques help in implementing the MSFD?; and eutrophication – how can diffuse sources of nutrients and remaining point sources be tackled effectively?

Finally, the closing plenary session brought together the lessons of the workshops and looked at potential 'next steps' in water policy. This publication aims to give a flavour of some of the insights gained at the conference.



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LIFE Environment and EU water policy

One in every nine projects co-funded by LIFE Environment has dealt with water-related issues. And, as keynote speaker Gustaaf Borchart explained at the 'Water for life - LIFE for water' conference, LIFE+ will continue to act as a "research lab" to develop solutions and best practices for achieving the "good ecological status" of Europe's waters.

The Financial Instrument for the Environment, LIFE+, replaced the LIFE III programme at the end of 2006. With a budget of €2.143 billion (for the period 2007-2013), LIFE+ is a limited but focused funding instrument providing specific support for the development and implementation of EU environmental policy and legislation, in particular the objectives of the 6th EAP (Decision 1600/2002/EC) and the resulting thematic strategies. It comprises three components:

- LIFE+ Nature & Biodiversity
- LIFE+ Environment Policy & Governance
- LIFE+ Information & Communication.



THE SCOPE OF THE PUBLICATION

The following pages include an introduction to key EU policies for protecting the quality of Europe's water resources, as well as useful background information about the achievements of the LIFE Environment programme to date and its continuation in LIFE+. Each of the four thematic sections highlights expert recommendations of best practices for LIFE Environment projects. These are summarised in the "Closing speech from the conference" by Soledad Blanco, Director of International Affairs, DG Environment.

"LIFE projects bring added value to Member States when implementing the programme of measures and addressing a wide range of issues, such as integrated management of water resources in river

basins at various hierarchical levels, and in particular in urban water management, industrial wastewater treatment, river basin monitoring, improving groundwater quality, combating eutrophication, and others," stated Gustaaf Borchart, Director of the Water, Chemicals and Biotechnology Unit in DG Environment, in his keynote speech at the Brussels conference.

Figure 1: Number of water-related LIFE Environment projects per funding period



Source: LIFE project database

LIFE AND WATER: SOME NUMBERS

Of the 1 615 LIFE Environment projects co-funded by the EU between 1992 and 2007, some 177 (11%) deal with the water-related themes highlighted during the sessions of the 'Water for life - LIFE for water' conference. Figure 1 (below) gives a breakdown of the number of



water projects as a percentage of total LIFE Environment, LIFE Nature and LIFE Third Countries projects from LIFE I through to the first batch of LIFE+ projects from 2007. Under the LIFE III programme, more funding went to projects related to water issues. This trend is continuing under LIFE +, since 17% of all funded projects are water-related.

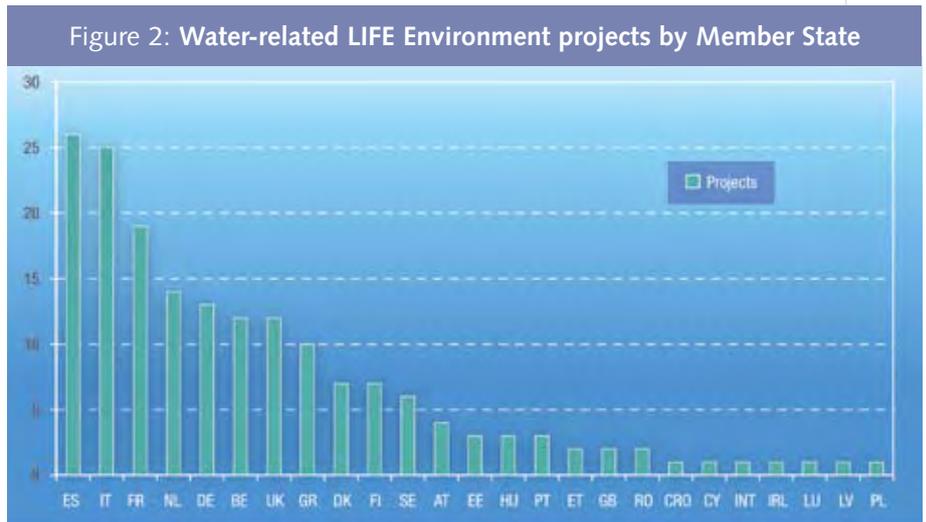
Some 45% of the 177 projects have dealt with the issue of eutrophication, 23% with marine issues, 20% with water scarcity and the remaining 12% with hydromorphological alterations.

An analysis of where the money for water-related projects has gone reveals that – excluding projects on water scarcity, which have focused on Mediterranean countries – funding has been allocated fairly evenly among Member States. Spain has had 26 LIFE Environment projects on the conference's water-related themes, followed by Italy (25), France (19), The Netherlands (14), Germany (13) and Belgium and the United Kingdom (12 each).

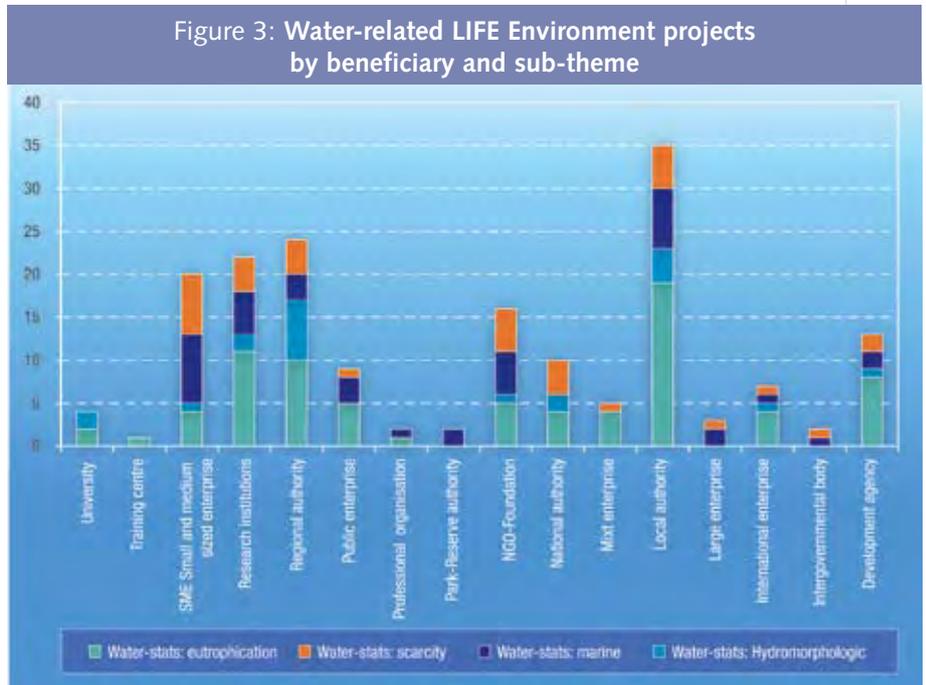
As Figure 2 (below) illustrates, the beneficiaries of LIFE Environment co-funding for projects relating to the themes of 'Water for life – LIFE for water' have been local authorities (35 projects), followed by regional authorities (24 projects), research institutions and SMEs (both with 22 projects).

LINKING LIFE AND THE 6TH ENVIRONMENT ACTION PROGRAMME

According to Mr. Borchardt, two of the three strands of LIFE+ – namely LIFE+ Environment Policy & Governance and LIFE+ Information & Communication – have significantly supported and continue to support the implementation of EU water policy. "The objectives of LIFE+ are closely linked with those of the 6th Environment Action Programme (EAP), including climate change, quality of life, natural resources, environment and health linked with EU water policy legislation, sustainable development, and adaptation to climate change," he explained at the conference in Brussels.



Source: LIFE project database



Source: LIFE project database

Mr Borchardt identifies three key roles for the LIFE programme with regard to water policy: "LIFE+ is firstly a kind of 'research' laboratory for finding good solutions for achieving 'good ecological status'. Secondly, it is a database of results of experiences to be shared with others at EU level. And thirdly, it is a platform for co-operation for all kinds of water managers in Europe."

The contributions made by LIFE projects "show solutions to challenges the Member States are facing when implementing EU water legislation to save and restore our waters. The importance of dissemination and sharing these measures and

good practices across Europe should be underlined," believes Mr. Borchardt. "The Water Information System for Europe (WISE) can play an important role in this by serving as a platform for information exchange on the implementation of EU water policy and LIFE+ projects in order to support water managers all over Europe. This way we can provide good examples and practices for the implementation of the programme of measures," he adds.

In order to make best use of the many benefits that LIFE projects have had for Europe's rivers, lakes, coastal and marine waters, concludes Mr. Borchardt, "More work lies ahead of all of us."

Challenges in water policy

Almost two in three of Europeans consider that the quality and quantity of water in their country is a serious problem, with industrial and agricultural activities seen as producing the greatest environmental impact. For this reason the Commission has adopted the Water Framework Directive (WFD) (2000/60/EC) and the Marine Strategy Framework Directive (MSFD) (2008/56/EC), which set out targets for Member States to achieve, and has co-ordinated these actions with other EU measures. Water issues transcend national boundaries and concerted action at the level of the EU is necessary to ensure effective protection.

In his opening speech at the LIFE Environment conference in October 2009, Gustaaf Borchartd, Director of the Water, Chemicals and Biotechnology Unit in DG Environment, stated that: "Protecting the quality of Europe's water resources has been a high priority for the European Union (EU) since it started adopting legislation in the area of environmental protection." The 6th Environment Action Programme (EAP) had set out a number of measures in order to ensure the integral implementation of the WFD but also other complementary policies such as the Nitrates Directive, the Urban Waste Water Treatment Directive, the Bathing Water Directive and the inclusion of the protection of the quality of water in agricultural and regional policies.

WATER POLICY AND THE WATER FRAMEWORK DIRECTIVE

The framework directive on water foresees how water should be managed in an integrated way throughout EU territory within river basin districts, obliging neighbouring countries to work together to improve

¹ Directive 2000/60/EC of the European parliament and of the Council of 23 October 2000 establishing a framework for Community action in the field of water policy.

² Directive 2008/56/EC of the European Parliament and of the Council of 17 June 2008 establishing a framework for community action in the field of marine environmental policy (Marine Strategy Framework Directive).



Ms Anne Louise Friedrichsen, Deputy Head of Unit and Mr. Hervé Martin, Head of Unit (LIFE Environment and Eco-Innovation Unit) at the opening session of the conference

water quality in cross-border areas where they share the same river basins. In order to assist WFD implementation, the EU Member States and the Commission developed the Water Framework Directive Common Implementation Strategy

(WFD CIS), which was agreed in May 2001. Member States were encouraged to contribute to working groups responsible for developing analysis of pressures and impacts and best practice in river basin planning. It is here that many LIFE projects

Timetable for WFD implementation

Year	Action
End 2003	WFD transposed into national law/ River Basin Districts identified
End 2004	Analysis of pressures/impacts and economic use completed
End 2006	Establishment of monitoring network/ Start of public consultation
End 2008	Presentation of draft River Basin Management Plans
End 2009	Publication of River Basin Management Plans, including programme of measures
End 2010	Introduction of pricing policies
End 2011	Programme of measures operational
End 2012	Environmental objectives achieved





have been particularly influential – promoting the key activities of the strategy namely: the sharing of information; management of information and data; development of guidance on technical issues; and the application, testing and validation of guidance.

RIVER BASIN MANAGEMENT PLANS

With the River Basin Management Plans (RBMPs) due to be published by the end of last year, the WFD is now entering the crucial phase of implementing the programme of measures to reach the main objective, “good ecological status” of European waters by 2015.

The plans should provide a clear indication of the way the objectives set for the river basin (ecological status, quantitative status, chemical status and protected area objectives) are to be reached within the required timescale. They will include analysis of the river basin's characteristics, a review of the impact of human activity on the status of waters in the basin, estimates of the effect of existing legislation and the “gap” that must be bridged in order to meet these objectives; as well as a set of measures designed to bridge the gap. Furthermore, an economic analysis of water use within

the river basin must be carried out and all concerned parties should be fully involved in this participative process.

LIFE projects have been influential in developing best practice in river basin planning and management



Photo: LIFE02 NAT/A/008518

MAIN ELEMENTS OF THE WFD

- Aims for ‘**good status**’ for all ground and surface waters in the EU and provides a framework for the co-ordinated implementation of all other water legislation. It maintains existing commitments of Member States under the Nitrates Directive (91/676/EEC) and Urban Waste Water Treatment Directive (91/271/EEC).
- **Integrated river basin management** is the framework within which measures for achieving ‘good status’ are to be implemented. The idea is that management by the river basin – the natural geographical and hydrological unit – is the most efficient model for water management as opposed to administrative or political boundaries.
- **River Basin Management Plans** must be developed with transboundary basins requiring joint management between two or more Member States (and possibly with countries outside the Union).
- **Pollutant emissions and discharges** into surface waters are controlled using a ‘combined approach’, based on the overall quantity of a given pollutant and on its concentration in the receiving aquatic environment.
- **Higher risk pollutants** are subject to specific controls on a priority basis, with progressive reduction, phasing out, and/or cessation of emissions.
- **Water pricing** is to be introduced by 2010 – acting as an incentive for the sustainable use of water resources and helping to reduce unnecessary consumption.
- **Public participation** Article 14 of the Directive obliges Member States to ensure that draft river basin management plans are published for public consultation and comment one year before the start of the period to which the plan refers.

WATER SCARCITY AND CLIMATE CHANGE

In the years to come, climate change will likely have impacts on the frequency and severity of floods, droughts and other disturbing effects on the water cycle. The most recent reports by the Intergovernmental Panel on Climate change (IPCC) conclude that “water and its availability and quality will be the main pressures on societies and the environment under climate change.” Taking account of climate change impacts is a major challenge for water management in the EU, especially as the effects are likely to be different in northern and southern Europe.

The WFD places the integrity of freshwater ecosystems at the core of water management. Measures to prevent and alleviate water scarcity are thereby entirely appropriate within its context. In particular, the directive's river basin approach to water management – centred on the review of RBMPs every six years and on the principle of flexibility – establishes a



Photo: LIFE08 NAT/P/005275



The Marine Strategy Framework Directive aims to achieve “good environmental status” of all marine regions and sub-regions in Europe by 2020

mechanism that should allow for adaptation and mitigation measures. Planning the necessary measures for addressing drought and flood risks will also be an integral part of this system. This was recognised in the white paper on adapting to climate change, adopted by the Commission in April 2009. One of the three working documents accompanying the white paper is devoted to water issues, and a guidance document is being developed on water management in the context of a changing climate.

HYDROMORPHOLOGICAL ALTERATIONS

The term ‘hydromorphological alterations’ summarises changes in the quantity and dynamics of water and changes to the shape of the surface water. The ‘WFD and Hydro-morphological Pressures’ policy paper¹ states that hydromorphological pressures and impacts are one of the most important risks of failing to achieve WFD objectives. The main pressures, which derive from a range of uses and interests that frequently overlap or compete in rivers and coastal waters (i.e. hydropower, navigation and flood protection), are taken into account by the WFD, since it includes the requirement to assess water quality not only according to

chemical parameters, but also according to biology and hydromorphology (which represents the physical characteristics).

At policy development level, one way to ensure a better integration between different policies, such as hydropower and navigation development, is an increase in transparency in decision-making. At programming and planning level, the River Basin Management Plans will need to include restoration measures to address these hydromorphological pressures that, in some cases, may translate at the international river basin scale. In the future, these plans will also have to ensure that new modifications will be carried out in such a way that they serve the objectives of the WFD. Finally, stakeholder dialogue and co-operation processes can also contribute to better policy integration in the field of hydromorphology and this

should be taken into account, especially at project level.

THE MARINE STRATEGY FRAMEWORK DIRECTIVE

The European Commission included in the 6th Environment Action Programme a commitment to develop a strategy for the protection and conservation of the marine environment with the overall aim being “to promote sustainable use of the seas and conserve marine ecosystems”.

The **Marine Strategy Framework Directive (MSFD)**, adopted in 2008, has the ambitious aim of protecting the marine environment across Europe. Building upon the experience gained with the WFD it follows a similar approach and calls on EU Member States to ensure



INTERNATIONAL AND REGIONAL TREATIES

- United Nations Convention on the Law of the Sea (UNCLOS)
- Convention on Biological Diversity (CBD)
- OSPAR Convention for the North-East Atlantic
- Helsinki Convention (HELCOM) for the Baltic Sea
- Barcelona Convention for the Mediterranean Sea
- Bucharest Convention for the Black Sea
- The International Convention for the Prevention of Pollution from Ships (MARPOL)

¹ http://ec.europa.eu/environment/nature/legislation/habitatsdirective/docs/2007_07_im.pdf



Photo: Fin Fathey

Approximately 45% of all LIFE Environment water-related projects have dealt with the issue of eutrophication

the “good environmental status” of all of Europe’s marine regions and sub-regions is reached by the end of 2020.

The MSFD establishes European Marine Regions on the basis of geographical and environmental criteria. Each Member State – co-operating with other Member States and non-EU countries within a marine region – is required to develop strategies for their marine waters. These marine strategies must contain a detailed assessment of the state of the environment, a definition of “good environmental status”, where possible at regional level and the establishment of clear environmental targets and monitoring programmes.

Each Member State must then draw up its marine strategy, a programme of cost-

effective measures. All proposed measures must undergo an impact assessment, including a detailed cost-benefit analysis. Where Member States cannot reach the environmental targets specific measures tailored to the particular context of the area and situation will be drawn up.

EUTROPHICATION

European policy has consistently identified eutrophication as a priority issue for water management since it is crucial for achieving good ecological status as foreseen by the WFD² and the

² http://ec.europa.eu/environment/nature/legislation/habitatsdirective/docs/2007_07_im.pdf

MSFD . Two other pieces of legislation regulate the main sources (diffuse or point source) of pollution that cause eutrophication:

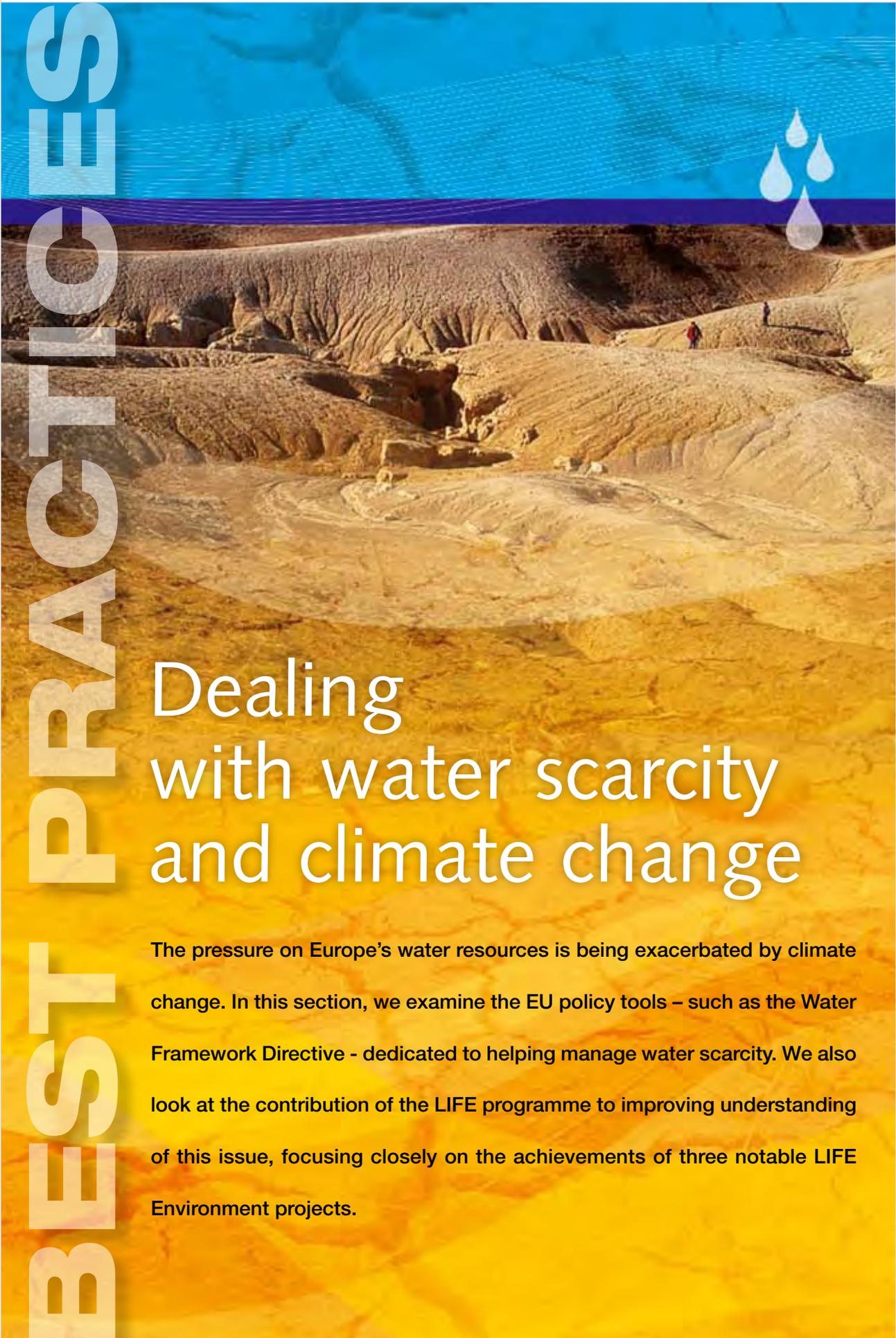
- The **Nitrates Directive (91/676/EEC)** aims to reduce and prevent water pollution caused by nitrates from agricultural sources. Member States are obliged to designate vulnerable zones of all known areas of land in their territories that drain into water bodies – including groundwater – which are, or are likely to be, affected by nitrate pollution. Such waters are those, among others, which contain a nitrates concentration of more than 50 mg/l or are likely to contain such concentrations if measures are not taken. The link with groundwater policy is clear in this respect, i.e. nitrate concentrations in groundwater should not exceed the trigger value of 50 mg/l. Nitrate pollution promotes eutrophication, particularly in estuaries, and may exceed the thresholds for human consumption set by the **Drinking Water Directive (80/778/EEC)**, revised as 98/83/EEC which forms an integral part of the WFD.
- The **Urban Waste Water Treatment Directive (91/271/EEC)** requires Member States to invest in infrastructure for collecting and treating sewage in urban areas. The UWWTD has contributed significantly to nutrient reduction, but more efforts are needed, also for reducing eutrophication in the sea.



EU WATER-RELATED DIRECTIVES LINKED TO THE WATER FRAMEWORK DIRECTIVE

- Groundwater Directive (2006/118/EC)
- Drinking Water Directive (80/778/EEC, revised as 98/83/EC)
- Directive concerning the protection of waters against pollution caused by nitrates from agricultural sources (91/676/EEC)
- Urban Waste Water Treatment Directive (91/271/EEC)
- Discharges of Dangerous Substances Directive (76/464/EEC)
- Bathing Water Quality Directive (2006/7/EC)
- Birds Directive (79/409/EEC)
- Habitats Directive (92/43/EEC)
- Environmental Impact Assessment Directive (EIA) (85/337/EEC)
- Strategic Environmental Assessment (SEA) (2001/42/EC)

BEST PRACTICES

The background image is a landscape photograph of a dry, eroded valley. The sky is a vibrant blue with a subtle pattern of white lines. In the upper right corner, there is a graphic of four white water droplets of varying sizes. The foreground and middle ground show the rugged, brownish-yellow earth of the valley, with a few small figures of people visible in the distance.

Dealing with water scarcity and climate change

The pressure on Europe's water resources is being exacerbated by climate change. In this section, we examine the EU policy tools – such as the Water Framework Directive - dedicated to helping manage water scarcity. We also look at the contribution of the LIFE programme to improving understanding of this issue, focusing closely on the achievements of three notable LIFE Environment projects.

Water scarcity: **running dry**

Climate change is altering precipitation patterns and therefore availability of water. At the same time, demand for water is rising as population growth increases. Water resources are therefore under pressure across Europe, especially in drier countries, and this situation is likely to exacerbate as climate change intensifies.

The scientific consensus is that rainfall will increase globally, but this will disguise regional variations. Broadly speaking, according to Philippe Quevauviller, Scientific Officer in the European Commission's Directorate-General for Research, extremes will increase and drier areas will become drier and wetter areas will become wetter. On a regional level, further scientific research must be done to better understand the changing patterns, but, because of climate change, it is already clear that water scarcity is likely to become an even greater problem than now for southern European countries such as Portugal, Spain and Italy, which are threatened by desertification.

Despite the scientific knowledge gaps, decisions on water management policy have to be made now, Quevauviller observes. The European Union's overarching policy instrument in this area is the Water Framework Directive (WFD), which was adopted in December 2000 and requires Member States to establish management plans for river basin districts, some of which will cross national frontiers, meaning countries must cooperate in ensuring best use of their water resources.

Mr Philippe Quevauviller, Scientific officer - DG Research, opening the session on water scarcity and climate change



Photo: Gabriella Camarasa



Photo: Wlo G.

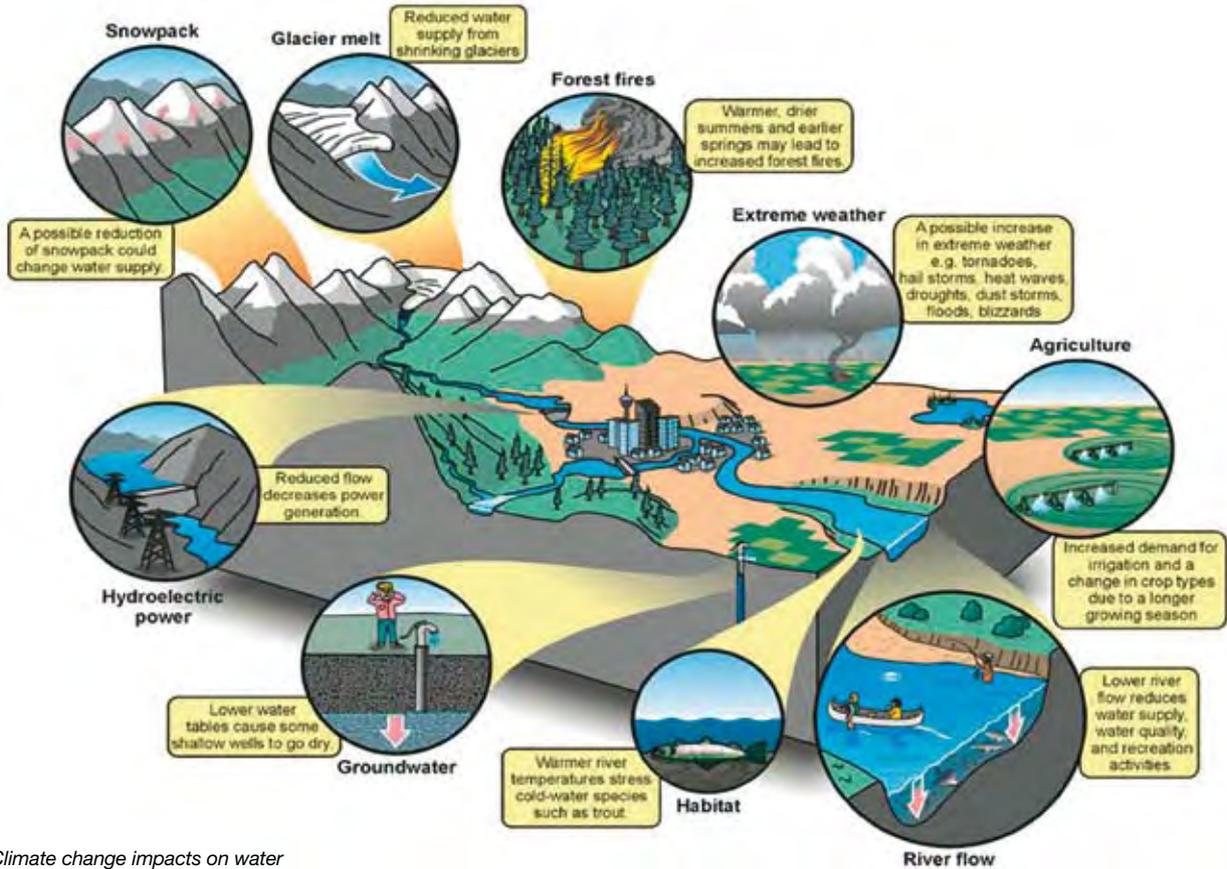
The LIFE programme has helped build knowledge about the effects of climate change on water resources

Programmes of measures arising from the management plans are due to start in 2012, with the ultimate objective of achieving "good status" for water resources. These programmes will cover a wide range of issues. River basin management plans should have clear objectives, and be a platform for management of all the pressures on water resources. As such they will touch on a number of other EU policy instruments, such as legislation on chemicals and pesticides, industrial pollution, water quality, environmental impact assessments and habitats and ecosystems. To be effective, plans must also be based on partnerships, and will need to link with flood-risk and land-use planning, which remain largely within the remit of Member States.

Quevauviller notes that the preparation and execution of management plans will help build knowledge about the effects of climate change on water resources,

and LIFE and other relevant programmes can play a role in this. In 2015, progress under the directive will be reviewed, and a second planning period will begin. By this time, the impact of climate change on water quantity and quality may be better understood. Work on adaptation to climate change will also be more advanced, with, for example, drought management plans or action plans on desertification providing support for the river basin management plans.

"The policy and science link needs to be closer," believes Quevauviller, in order to better understand the impact of climate change on water supplies. Policymakers should ideally build into their planning processes an "operational science/policy interface" for transferring scientific knowledge into the decisions made at different administrative levels. If this is done, existing knowledge will not be overlooked, and gaps where more research is needed can be identified.



Source: European Environment Agency (EEA)

Climate change impacts on water

LESSONS FROM A DRY LAND

Concerning the particular issue of water scarcity, one region from where valuable lessons can be drawn is the Middle East. According to Gidon Bromberg, Israeli Director of EcoPeace/Friends of the Earth Middle East, water scarcity is “truly felt” in countries such as Israel, and some important fundamental conclusions can be highlighted for countries afflicted by scarcity and desertification.

The first of these is that efficiency in water use does not equal sustainability. Israel has a highly efficient system involving water recycling, desalination, and other approaches. For example, 80% of Israel’s ‘grey’ water is re-used for agriculture. However, the water levels in the country’s rivers and lakes continue to decline. The lesson from this is that management plans should place limits on water extraction so that sustainable water levels are maintained. This is likely to require significant changes to consumption patterns in semi-arid countries, and may require tough political decisions to be made. Meanwhile, solutions such as desalination have their own costs, in particular high energy consumption.

Water management must embrace demand management, says Bromberg. The Water Framework Directive does this by introducing a general principle of water pricing. However, grey water and salt water could be more widely used. Israeli houses, for example, have saline water taps providing water for non-drinking uses, such as showering. Agricultural patterns also need to change, as water-intensive crops are presently being grown in places suffering from water scarcity.

The LIFE programme can make a contribution by carrying out demonstrations in some of these areas. However, LIFE Third Countries, the non-EU strand of LIFE, has stopped. “Many people outside Europe are hoping that the Commission will reinstate LIFE Third Countries,” says Bromberg.

FOCUSING ON SCARCITY

Countries suffering from water shortages have concerns about limitations in the Water Framework Directive, which is sometimes perceived as being more concerned with water quality than with water quantity, says Iacovos Iacovides, a water specialist from Cyprus. Nor

does the WFD contain measures explicitly dealing with climate change, though it does include a general provision to consider “long term forecasts of supply and demand for water.”

These points could be addressed when the management planning process is reviewed in 2015, notes Iacovides. He says that the emphasis of the Water Framework Directive on “good ecological status” is not helpful in places that have less fresh water, such as Cyprus. In such places, controlling/monitoring the status of water bodies is practically impossible as there is no flow in many cases.

Iacovides proposes that Cyprus could become a laboratory in this respect, exploring issues relevant to a semi-arid country, such as if the WFD’s time horizons are too restricted for achieving good status of waters in areas where rivers and streams run dry for much of the year, or if full water pricing is appropriate if extensive infrastructure has to be constructed to deal with shortages. Issues such as these, and increased understanding of climate change, are sure to inform the development of water management plans in drier countries in the years ahead.





Photo: LIFE04 ENV/IT/000500

LIFE and **water scarcity**

LIFE projects have made a significant contribution to improving understanding of the consequences of water scarcity, and how to better manage water resources in conditions of scarcity. The findings of these projects are particularly relevant to southern European Union countries – those with a Mediterranean coastline – and to non-Member States in the Mediterranean neighbourhood. Climate change means that these countries are likely to face more severe water shortages, with consequences especially for agricultural production.

LIFE projects have built on decades of experience in countries where water is in short supply. From Portugal and Spain in the west to Greece and the Middle East at the other end of the Mediterranean, countries have long experi-

ence of coping with scarcity. Speakers at the conference said that, for example, Greece has suffered from serious droughts since at least the mid-1980s, and has had to learn to cope. Jorge Garcia Gomez of the Almond Pro Soil LIFE

project explained that in Spain many good practices have been developed, and that consequently water quality was sometimes a more challenging issue for semi-arid countries than water quantity.

The conference identified a number of areas on which LIFE projects or similar initiatives could concentrate in the future, especially considering the likely impacts of climate change. LIFE projects could make a contribution to reviewing or revising the Water Framework Directive (WFD). This key piece of legislation provides a framework for water management policy in the EU, but is primarily concerned

Member States with river basin districts that cross national frontiers, must co-operate when adopting management plans



Photo: pizzodisave (doing TENS for pain)

with water quality, and as such does not directly address scarcity issues, or the possibility of increased scarcity brought about by climate change. Southern European countries feel that the WFD was designed more for central and northern European countries than it was for them.

FILLING THE POLICY GAPS

Iacovos Iacovides, a water specialist from Cyprus has identified what he calls the main policy gaps:

- The WFD treats water scarcity as an extreme phenomenon that can justify exemptions from its implementation. It contributes to tackling drought but not as a principal objective;
- The WFD does not sufficiently take into account the variability of the climate, and of rainfall, in some areas of Europe, such as southern European countries that may experience reasonable rainfall in winter but almost none in the summer. Increased climate variability is likely to lead to more difficulties related to water scarcity, but also to flooding;
- The WFD prioritises environmental conservation, though in countries such as Cyprus and Malta, water scarcity can lead to what are seen as necessary compromises over environmental protection. Public acceptance of the WFD could be undermined if it leads to limiting of projects to secure the water supply because of what are perceived as marginal environmental concerns.



Photo: LIFE04 ENV/IT/000500

LIFE funding has helped improve water use efficiency in agriculture especially in southern European countries where climatic conditions can lead to serious water scarcity issues

LIFE projects could contribute to the resolution of these issues, ahead of 2015, when the WFD will be reviewed. One possibility might be a split of the WFD into northern European and southern European versions, so that

countries' different circumstances can be better taken into account. For example, for the north of Europe, water management needs to focus on flooding, while in the south, scarcity is the main concern.

Better understanding of the overlap between water management policies and soil protection policies is fundamental in areas afflicted by water scarcity



Photo: LIFE05 ENV/E/000288





Photo: LIFE04 TCY/SLO/979

A long-term view for the management of water resources is needed as a way to prevent the effects of climate variability and to mitigate the strong negative impacts of droughts

OVERCOMING THE CHALLENGE OF WATER SCARCITY

The Brussels conference identified several other ways in which LIFE projects can help the EU overcome its water scarcity challenges:

- Quantifying and better understanding water resources: the CAMI project (LIFE04 ENV/IT/000500) showed a way forward in this respect by setting out a model for low-cost and efficient mapping of aquifers;
- Understanding the impact of climate change on water resources: the point was made that while scientists understand the broad impacts of global warming, its effects will be felt locally in particular river basin districts. Work needs to be done to model these impacts for different circumstances, and to better understand the overlap between, for example, water management policies and soil protection policies in areas afflicted by water scarcity;
- Inevitably, water demand will have to be addressed. The Water Agenda project (LIFE 04/ENV/GR/000099) did this in a broad sense by setting out a water protocol under which demand would be addressed through the use of water pricing. However, Water Agenda's protocol combined demand management measures with other one-off measures to increase water availability, such as construction of reservoirs and dams. The crea-

tion of a public consensus around the measures for water conservation also played an important role in the success of the project;

- Dealing with droughts: future projects could work on early warning systems for droughts and mitigation, and on better defining optional supplement-

tary measures that are allowed in this respect by the WFD.

In addition to these specific directions, LIFE projects would benefit from better platforms to communicate their results. Projects carried out by river basin authorities have had difficulties communicating vertically with other levels of government, especially national government. At the same time, horizontal information sharing between different authorities could be improved. Jorge Garcia Gomez of the Almond Pro Soil LIFE project called LIFE "a factory of good ideas," but commented that the ideas were not spread widely enough. One suggestion was that the best LIFE projects could be given follow-up funding specifically to transfer and extend their results. Another idea was the creation of more forums to meet up with other, similar projects for the exchange of information and knowledge. Many LIFE projects have worked effectively on water issues but more needs to be done before the EU as a whole can enjoy the benefits.

Future LIFE projects should focus on mitigation measures and early warning systems for droughts



Photo: LIFE04 TCY/IL/000027

Italy: Going underground with CAMI

The LIFE CAMI project tested a suite of techniques for mapping underground water resources, finding that they were more effective, and less expensive, than prospecting for water by drilling wells.

In countries where the water supply is affected by scarcity, and where this may be even more of a concern as the climate changes because of global warming, it is important to know exactly what water resources are available, and to have information on their quality. The LIFE Environment CAMI project (LIFE04 ENV/IT/000500) developed a set of techniques that can be used to create an inventory of water resources, in particular of aquifer systems. The project borrowed methodologies from different fields, such as oil-prospecting.

In this way, CAMI was designed to support the Water Framework Directive (WFD) by using a new, integrated approach to assess and manage a river basin. It aimed to create a model that could be transferred to other river basin areas, and had four main goals:

- Provide a basis of information that would enable allocation of water resources for different uses (domestic, agricultural and industrial);
- Provide evaluation methods for modelling the impact of new industrial and housing developments on water resources;
- Quantify groundwater resources; and
- Provide data for research into management of water ecosystems.

Michela Giustiniani of Italy's National Institute of Oceanography and Experimental Geophysics, which was the beneficiary for the CAMI project, explained at the LIFE Environment conference that the achievement of these goals would help the target region offset some of the main risk factors for its water resources. These risks result from both climate change and

an increase in the human population. Because of the former, water distribution is changing and there is a risk of salt water intrusion in coastal areas, while the latter is leading to rising demand and potential conflict over water, as well as increasing pollution.

COMING DOWN FROM THE ALPS

CAMI took place in the Tagliamento river basin in north-eastern Italy. The Tagliamento originates in the Italian Alps and flows into the sea between Trieste and Venice. Its gravel bed has been relatively unaffected by human activities, retaining the dynamic nature and morphological complexity that must have characterised many Alpine rivers in the pristine stage. In general, water quantity is not a problem for the area

because of high rainfall. However, water quality is an issue, with concerns about pollutants entering aquifers.

To map the test area's aquifer system, CAMI carried out two types of analysis: geophysical studies in the test area, and hydrogeochemical studies along the entire river basin. Geophysical data were gathered using a variety of techniques, such as thermal imaging, which allows a picture to be built up of underground water resources based on their thermal characteristics, and use of ground-penetrating radar. Seismic imaging, or directing intense sound waves into the ground to evaluate sub-surface conditions, was also used to build up two- and three-dimensional pictures of subterranean areas.

This below-ground mapping led to the discovery of previously unknown

Characterising aquifers using the CAMI approach is more cost effective than traditional techniques





CAMI's geophysical and hydrogeochemical studies along the Tagliamento river basin led to the discovery of unknown underground aquifers

aquifers in the test location. Their existence was revealed by the seismic imaging, which indicated that there were areas at a depth of about 480 m compatible with loose sand-gravel formations saturated with fresh water. To confirm this finding, a well was sunk to a depth of 500 m, and indeed aquifers were identified at around 300 m and at around 500 m. However, the water in the 300-metre deep aquifer was not drinkable.

WATER-MAPPING PROTOCOL

Having demonstrated how an innovative mix of approaches could be used to map water resources, CAMI developed a "guide protocol" on sustainable use of aquifers. The aim of this was to promote exploitation of water resources based

on fuller information and integrated management. The protocol sets out a hierarchy of techniques for assessing underground water bodies, and demonstrates how methodologies such as seismic mapping are less damaging than the drilling of boreholes, which, if done carelessly, can lead to the introduction of pollutants into aquifers.

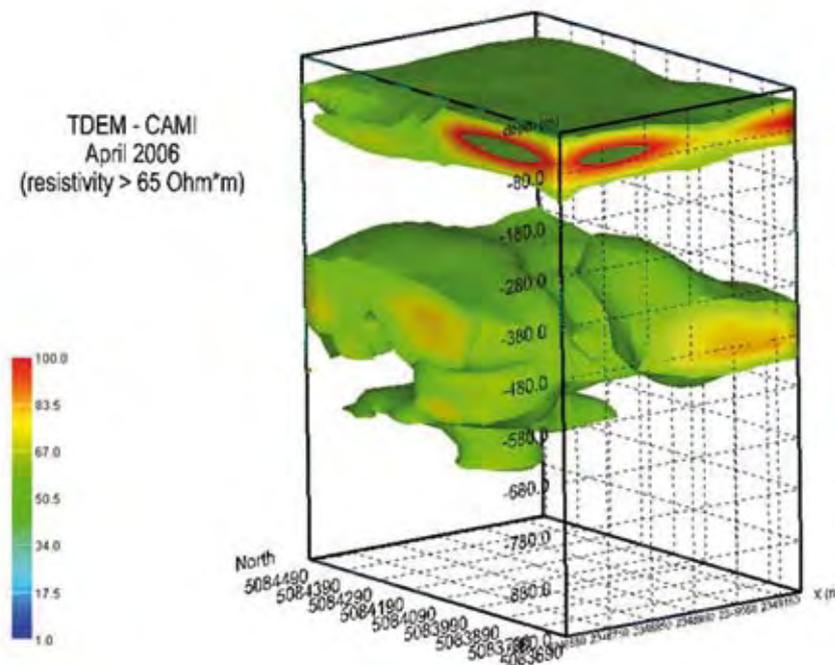
The CAMI approach also saves money, as the techniques it advocates are less expensive than sinking boreholes. In one example given in the protocol, aquifer characterisation using the CAMI approach costs less than half of what would be spent drilling wells.

In addition to the protocol, the data produced by the many scientific dis-

ciplines working in the project were integrated into a Regional Geohydrological Information System (REGIS), a computer-based system developed by the beneficiary. Groundwater flow data for much of north-eastern Italy were fed into a software modelling system and simulations were run using different scenarios. Results provide an important aid to evaluating use of resources and the effects of further groundwater extraction.

The CAMI approach is highly transferable, especially to regions facing water shortages as a consequence of climate change. Thus, communication activities were important to the project, and Michela Giustiniani expressed the hope that it would be possible to bring managers of similar LIFE projects together to network and share experiences both at national and European level. The project organised events for technicians and local government officials and policy-makers. CAMI also sought to carry out educational activities on the general benefits of using water resources carefully and not wastefully. For this, the general public, and especially children and young adults, were targeted.

TDEM - CAMI
April 2006
(resistivity > 65 Ohm*m)



ITALY

Project number: LIFE04 ENV/IT/000500

Title: Water-bearing characterization with integrated methodologies

Beneficiary: Istituto Nazionale di Oceanografia e di Geofisica Sperimentale – Italian National Institute of Oceanography and Experimental Geophysics

Period: Dec-2004 to May-2007

Total budget: €1 173 000

LIFE contribution: €561 000

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Greece: Planning for **the future**

The Water Agenda project established a comprehensive water management plan for an area of north-eastern Greece, based on a transparent consultative approach.

Greece's Anthemountas river basin, an area with a high development rate hosting in parallel primary and secondary sector activities and large urbanised areas, has a basic problem: more water is being taken out than is being replenished by natural systems. It is a problem shared by river basins in many Mediterranean countries, and it is likely to be made worse by climate change. The Development Agency of Eastern Thessaloniki has calculated that current consumption in the Anthemountas basin is 19.6 million m³/yr - or about 16.9 million m³/yr more than it should be to stay within sustainable limits. Underwater aquifers in particular have been heavily exploited as demand has grown.

Finding a solution to this problem is crucial. To this end, the Development Agency of Eastern Thessaloniki carried out the LIFE Environment Water Agenda project (**LIFE04 ENV/GR/000099**), the objective of which was to put in place an integrated water management plan for the river basin. The over-riding aim was to define an approach that would turn the current water balance from negative to positive, or at least to equilibrium.

According to Sokratis Famellos of the Development Agency of Eastern Thessaloniki, water pricing would be at the heart of the management plan. This is in accordance with the Water Framework Directive (WFD) but would be a "very difficult" issue for Greece, in particular for farmers who have not had to pay for water before. Therefore, it was considered essential to develop the management plan in a transparent way, with fair allocation of costs between water users based on cost recovery, and a social justice element so that the poorest would not be unfairly penalised. One of the main principles was to "open the dialogue to everybody," says Famellos.

To consider the possible outcomes, Water Agenda created a model that analysed three possible scenarios for the development of the area in the next 20 years: business-as-usual; engineering; and hand in hand (co-operation). In the first of these, water availability would be regulated mainly by the natural, hydrologic processes of the basin. The engineering approach foresaw a number of works to increase the availability of water, such as construction of reservoirs

and dams, and upgrading of wastewater treatment to produce water suitable for irrigation. The co-operation, or hand-in-hand approach, also encompassed engineering and construction works, but in addition considered extensive application of sustainable water policies, new agricultural practices and water pricing under the WFD.

WORKING HAND-IN-HAND

Based on this modelling, Water Agenda found that the Anthemountas river basin could only hope to achieve balance in water supply and demand if the hand-in-hand approach was applied. In principle, in the best case scenario, this could turn the area's current water deficit into a surplus of 900 000 m³/yr by 2020. This compares with a worst case scenario by 2020 of a negative balance rising to 20 million m³/yr under the business-as-usual approach, taking into account issues such as urbanisation pressures and climate change.

In order to work through these issues in an open way, Water Agenda emphasised public participation. This meant identify-



ing the relevant social partners, including political parties, interest groups, farmers' co-operatives, chambers of commerce, and relevant public organisations, research groups, academics and citizens. These groups were invited to a number of forums, the aim of which was to achieve a social consensus that would lead to the formulation of a social local agreement on water resources management.

The project also established a consultation committee or river basin council, with working groups focusing in particular on agriculture and on public education on water issues. Agriculture is a crucial issue for the Anthemountas river basin, as the greatest water consumption comes from farmers who need water for irrigation. This uses up around 14.2 million m³ of water annually, compared with 3.5 million m³/yr for domestic use.

THE SCOPE OF THE WATER PROTOCOL

The final outcome of these consultation processes was an agreement on water policy and a published protocol. This covered the following issues

- Protection of water quality;
- Management of natural water hazards (e.g. flooding);
- Appropriate water management infrastructure;
- Rational water resources management and increasing water availability;
- Managing water resources in the context of urbanisation;

The Water Agenda project should help turn the Anthemountas river basin water deficit into a surplus of 900 000 m³/yr by 2020



Public participation led to changes in behaviour towards conservation and use of water resources and facilitated common agreement on policy

- Cost analysis and pricing of water services - principles and application;
- Monitoring of water resources;
- Public participation in water policy;
- Establishment and operation of a water management body;
- Monitoring and evaluation of the application of the water policy.

According to Famellos, the benefits of the Water Agenda approach were that the policy was commonly agreed, and that, because of public participation, there were "attitude changes" towards conservation and use of water resources. "We have a change in the culture of water management," he says, something that could in principle be transferred to other areas that follow the Water Agenda approach.

The policy defined by Water Agenda is for the long term, and the next step is to implement it, says Famellos. LIFE could help with this by supporting follow-up projects, which could deal with issues such as encouraging pilot actions and environmental works, and multiplying the impact of the Water Agenda approach in other areas and sectors. But the critical issue in the area is the policy of the regional and local authorities, as they have to implement the water protocol in co-operation with the public bodies. They have to find finance for essential infrastructural water works, to support the change of habits in water management and consumption and to introduce pricing principles for agricultural water users. Unfortunately, Greece's national environment ministry has had little involvement so far in Water Agenda, which could be a barrier to spreading its lessons throughout Greece.

Famellos explains that water pricing is being introduced slowly in Greece. The principles of metering have been agreed but farmers need incentives and control bodies to close boreholes that drain underground reservoirs. In parallel, decisions have been made on setting up wastewater treatment facilities that will provide treated water for irrigation and will prevent underground aquifer pollution. Water Agenda's protocol is in place. Full implementation is now a question of political will.



GREECE

Project number: LIFE04 ENV/GR/000099

Title: Development and implementation of integrated water resources management policy to a river basin, through the application of a social wide local agreement, based on the principles of Agenda 21 and the provisions of WFD 2000/60/EC

Beneficiary: Development Agency of Eastern Thessaloniki

Period: Sept-2004 to Oct-2007

Total budget: €1 403 000

LIFE contribution: €688 000

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Spain: LIFE counters desert threat

The Almond Pro Soil project showed how organic almond tree cultivation can help semi-arid regions deal with the threat of desertification.

For countries such as Spain and Italy, climate change means that warmer and drier times lay ahead. Creeping desertification already threatens areas such as Murcia in southern Spain, with consequences for soil quality and water availability. Farmers in such areas need to have highly effective management approaches if their lands are to remain productive.

The Almond Pro Soil project (**LIFE05 ENV/E/000288**) addressed these questions by considering the impact of soil degradation on farming in areas where desertification is occurring. Specifically, the project set out to show how the cultivation of new varieties of almond trees could help protect soils in the Mediterranean basin and similar areas, where there is a high risk of soil degradation because of topographic and climatic conditions.

The context for the project, which ran from October 2005 to October 2008, was rising temperatures and reducing annual rainfall in Italy, Spain and neighbouring countries. Almond Pro Soil project man-

Climatic and topographic data were analysed in order to select representative orchards with endangered soils



In Southern Europe, 75% of the soil analysed has a low or very low organic matter content, which also indicates reduced biodiversity

ager Jorge Garcia Gomez, of beneficiary CARM-IMIDA (*Instituto Murciano de Investigación y Desarrollo Agrario y Alimentario – Consejería de Agricultura y Agua de la Región de Murcia*), illustrated this by showing graphs of the long-term precipitation and temperature trends for Murcia. In both cases, data have been collected since 1863, and while there is a clear decline in the volume of rainfall, temperatures show a clear increase. Murcia's annual rainfall is now around 300 mm – “almost nothing,” as Mr. Gomez notes.

He adds that farmers have already responded to declining precipitation, and have developed many good practices to cope with lack of water. Desalination is used, and integrated water management is widespread. Water pricing is accepted in southern Spain, and water is therefore an economic resource for which farmers must compete with industry and households. Pricing has encouraged efficient use of the resource. Currently, water qual-

ity, rather than quantity, is the most pressing problem for semi-arid areas such as Murcia, according to Mr. Gomez.

DEGRADED SOILS

Despite the good practices presently being employed, soils in Mediterranean areas remain under threat, and climate change is likely to lead to more soil degradation. Erosion is also a major problem, in particular for areas with steep slopes that suffer dry periods followed by heavy rain, such as the Mediterranean regions. According to Almond Pro Soil, 75% of the soil analysed in Southern Europe has a low or very low organic matter content, which also indicates reduced biodiversity.

The project carried out pilot actions in Murcia, and in the Basilicata and Puglia regions of Italy. The first step was to analyse climatic and topographic data to select representative Mediterranean orchards with endangered soils. Follow-





Organic farming of the new almond varieties increased the water holding capacity of the soil thus reducing the water use for irrigation

ing this new almond varieties that had been laboratory- and greenhouse-tested cultivated in the pilot areas as these species are suited to areas of poor soil, need very little water, can withstand quite extreme wet winter and hot summer climates, and are particularly resistant to disease and parasites, thus reducing the need for pesticides.

This activity enabled the project to compare the capability of the new almond varieties to grow, bloom and produce fruit in the selected orchards, under both traditional and organic farming systems, and in different slope-gradients. The effects of the different combinations (variety – slope gradient – farming system) on soil quality were assessed using physical, chemical and biological methods. Guidelines and policy recommendations were derived from the lessons learned by the project.

BENEFITS FOR FARMERS, SOIL AND WATER

The project's main outcome was a demonstration that organic farming of new varieties could have a positive impact on soil status, and thus could be a tool to cope with changing climatic conditions. The new almond varieties that were tested, which were extra-late blooming to avoid late frosts (almond trees bloom in February or early spring), and self-pollinating, performed better than traditional varieties. The project also showed the

inadvisability of using very steep-sloped areas for cultivation, as this has a negative impact on soil quality, and can lead to the destruction of wooded areas.

The benefits of organic cultivation methods remained evident one year after cultivation of the test almond varieties. There was a reduction in water use for irrigation, thanks to an increase in the water holding capacity of the soil. This also helped reduce the number of floods and landslides. Another benefit was a decrease in run-off of pesticides and fertilisers, causes of eutrophication of water bodies.

Mr. Gomez highlights the fact that the project showed farmers the benefits of organic cultivation, and provided results that should encourage changes to subsidy schemes so that they do not promote cultivation on higher slopes, and focus more on better soil conservation. Mr. Gomez emphasised that it is important to take steps such as this now, because climate change will make farming in semi-arid areas less competitive.

The project created an excellent website in English, French, Italian and Spanish, and shared its results with a list of 784 stakeholders. The project also produced an After-LIFE communications plan, which identifies some of the ways in which the lessons learned by the project can be transferred. For example, the project provides a knowledge-base for

restoring Mediterranean soils affected by desertification using almond-tree cultivation, and notes that this would be relevant for countries such as Greece, Morocco, Tunisia and Turkey. The project showed that almond trees are particularly useful for re-vegetation as a strategy to protect soils and conserve water in Mediterranean countries, and this can feed into desertification action plans being prepared by affected countries under the United Nations Convention to Combat Desertification.

Summarising the findings of the project, Mr. Gomez said that it showed the need to "recover the lost multi-functionality of agriculture in Mediterranean areas." In other words, agricultural policies and practices should provide more benefits for a region than commercial benefits alone. Environmental protection, preserved landscapes, rural jobs and food grown for local communities should also be the goals of farming, especially as climate change leads to greater threats to soils and water supplies. Almond Pro Soil showed a way forward by demonstrating how carefully-managed cultivation of particular almond varieties can produce incomes for farmers while combating soil degradation.



SPAIN

Project number: LIFE05 ENV/E/000288

Title: Soil protection in Mediterranean areas through cultivation of new varieties of almond tree

Beneficiary: CARM (part of the Regional Government of Murcia's Council for Agriculture and Water)

Period: Oct-2005 to Sept-2008

Total budget: €1 654 000

LIFE contribution: €818 000

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Addressing hydromorphological alterations

Man-made alterations to rivers can have an adverse impact on their geomorphological stability. The EU's Water Framework Directive requires that Member States draw up river basin management plans so that the effects of hydromorphological alterations can be monitored and minimised. A number of LIFE projects have aimed to reduce the impact of hydromorphological interventions and restore the natural conditions of water courses in Europe.

We profile three of them in this section.

Hydromorphological effects are among the biggest obstacles for achieving the goal of good status for EU waters by 2015 as set out by the Water Framework Directive. These pressures were highlighted in the risk assessments carried out by Member States in 2005.



Photo: Apete Romane Vasile Bolan

Reducing the impact of river alterations

The main risks identified were agriculture, flood defence, urbanisation, navigation and hydropower. Other important driving forces that may affect water quality are water supply, fisheries and recreation. Though EU legislation targets these hydromorphological pressures, Member States have a degree of flexibility. The WFD recognises that river uses and their environmental considerations are often competing and overlapping. Thus, it allows countries to set different objectives for particular water bodies in accordance with their environmental, social and economic priorities.

While other policy areas can influence water management decisions, they must

also take into account environmental objectives in order to increase synergies. For example, the construction of hydropower works should consider its impact on the quality of the river. In his presentation at the water conference in Brussels, Philip Weller, International Commission for the Protection of the Danube River (ICPDR), highlighted how the Danube is seriously altered in its entire course leading to interruptions in river and habitat continuity and disconnections in adjacent wetlands and floodplains.

According to Weller, implementing WFD will mean reconnecting these floodplains – potentially more than half a million hectares. But future infrastructure projects

could harm river systems even further, and Weller said that it is vital to co-ordinate such projects with flood protection programmes and WFD requirements.

More transparency in decision-making is one way to achieve better integration of policies. Transparency can be improved by the promotion of dialogue and co-operation processes among competent authorities, NGOs, experts and stakeholders.

The WFD also obliges Member States to draw up river basin management plans. These plans are subject to a period of public consultation. River basin management takes place on a six-year cycle, with the first plan published 10 years after adoption of the WFD, and reviewed and updated every six years thereafter to take account of further measures needed to meet the directive's environmental objectives for any particular water body.

According to the WFD timetable, river basin management plans were due to be drafted in 2008 for public consultation and finalised in 2009. Implementation and adjustment will follow until 2027.

HEAVILY MODIFIED WATER BODIES

The Water Framework Directive requires the achievement of good status in all water bodies – good chemical status and good ecological status (GES). If a body, however, is designated as a Heavily Modified Water Body (HMWB)

LIFE projects have helped reduce hydromorphological pressures and restore the natural conditions of water courses in Europe



Photo: Nicholas Paul James

because of a sustainable use for which no alternative exists, such as navigation, then the target of good ecological potential can be pursued instead of GES. The WFD defines HMWBs as “bodies of water which as a result of physical alterations by human activity are substantially changed in character and cannot, therefore, meet GES. In this context, physical alterations mean changes to e.g. the size, slope, discharge, form and shape of river bed of a water body.”

Member States may designate a body of surface water as artificial or heavily modified, when the changes to the hydromorphological characteristics of that body which would be necessary for achieving GES would have significant adverse effects on:

- The wider environment;
- Navigation, including port facilities, or recreation;
- Activities for the purposes of which water is stored, such as drinking water supply, power generation or irrigation;
- Water regulation, flood protection, land drainage; or
- Other equally important sustainable human development activities.

In addition, it has to be proven that the bodies designated as HMWBs when the beneficial objectives served by the artificial or modified characteristics of the water body cannot, for reasons of technical feasibility or disproportionate costs, reasonably be achieved by other means that are a significantly better environmental option. Such designations and the reasons for them should be mentioned in the river basin management plans and reviewed every six years.

EXEMPTIONS

The WFD allows for exemptions according to time and expense. Article 4.4 states that Member States can claim exemptions should they “determine that all necessary improvements in the status of bodies of water cannot reasonably be achieved within the timescales set out in that paragraph for at least one of the following reasons”:

- The scale of improvements required can only be achieved in phases exceeding the timescale, for reasons of technical feasibility;

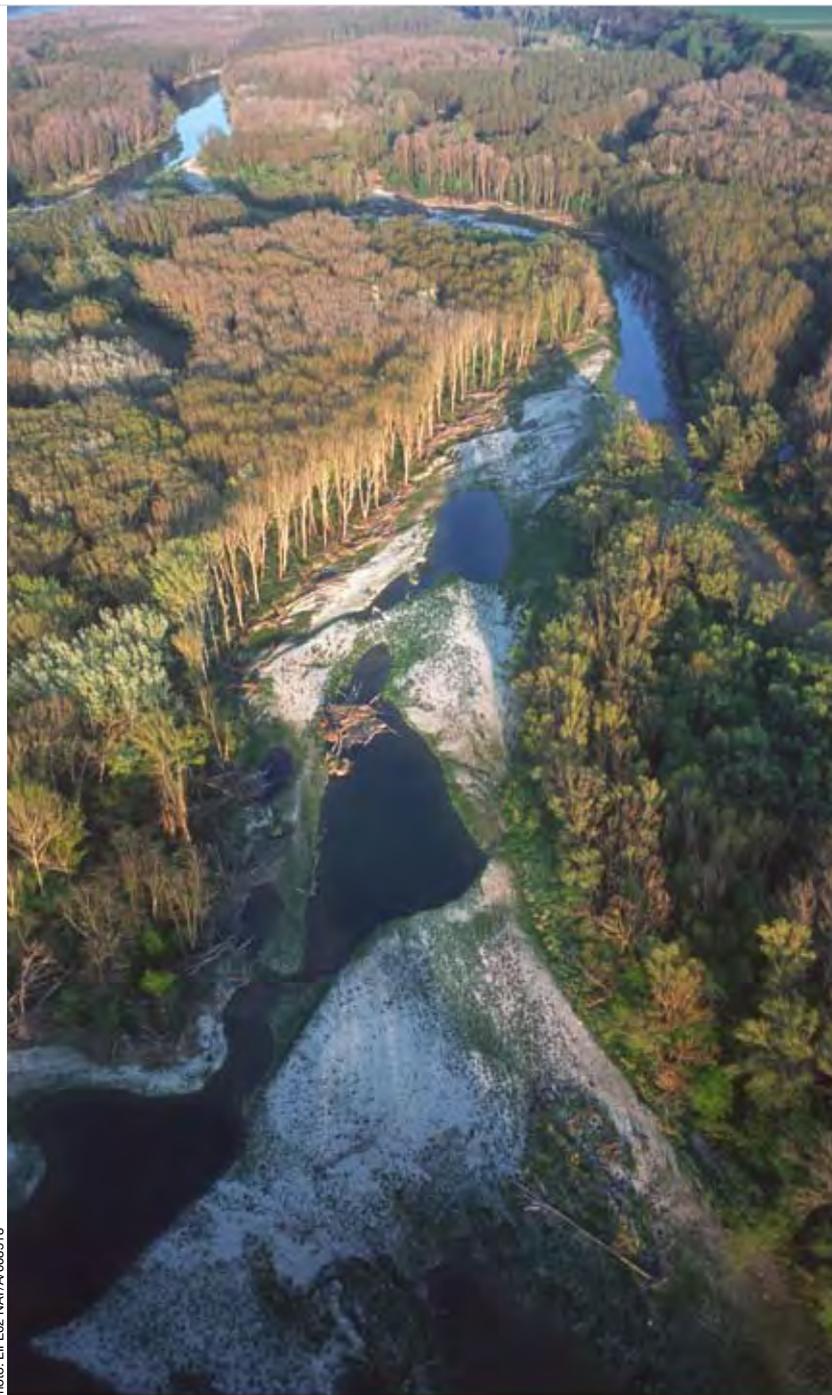


Photo: LIFE02 NAT/A/008518

The River Danube's watercourse is altered leading to interruptions in river and habitat continuity and disconnections in adjacent wetlands and floodplains

- Completing the improvements within the timescale would be disproportionately expensive;
- Natural conditions do not allow timely improvement in the status of the body of water.

Implementation of the directive can also be phased as a result of disproportionate costs or technical infeasibility. Article 4.5 states: “Member States may aim to achieve less stringent environmental objectives than those required under par-

agraph one for specific bodies of water when they are so affected by human activity, or their natural condition is such that the achievement of these objectives would be infeasible or disproportionately expensive.”

Member States are also not deemed to be in breach of the directive, according to article 4.7, when failure is a result of new modifications to the physical characteristics of a surface water body or alterations to the level of bodies of groundwater,





Photo: Stuart Pinfold

Dams impede the continuity of sediment transport that is essential for the preservation of river ecosystems

or the result of new sustainable human development activities. Despite these exemptions, the Commission expects there to be delays in implementation, according to Marieke van Nood (Water Unit, DG Environment).

MODIFICATIONS

The WFD allows for deterioration of rivers by new modifications under the following strict conditions:

- When no better environmental options are available;

- The project is of overriding public interest that outweighs water protection benefits;
- All mitigation measures are taken;
- The project and the reasons for it are reported in the river basin management plan; and
- Other water bodies are not affected and other objectives are not impaired (i.e. those set down in article 6.3 of the Habitats Directive).

River basin management plans should include assessments of new modifica-

tions, using WFD monitoring data and/or expert judgement. Alternatives should also be assessed and the overriding public interest outlined.

Dams are a common example of river modification. For the preservation of river ecosystems, the continuity of sediment transport is essential and dams impede this flow. Also, overexploitation of the river as a water source can result in dry stretches becoming temporary barriers. At the conference, Diego Garcia of the New Water Culture Foundation said that as well as preventing fish migrations, these barriers may lead to the disappearance of diadromous species (e.g. eel, salmon, sturgeon) and a reduction of the distribution area of large endemic cyprinids.

His presentation used the example of River Guadalquivir in Spain to demonstrate the impact of hydromorphological alterations. The reservoirs built act as huge sediment traps and waterways below dams have lost all their sediments, Garcia explained. Such an imbalance between water and sediments produces channel incision and homogenous habitats. The effect over time is "induced geomorphological instability of the river along its continuum," he said.

LIFE funding has helped to construct migration aides in barriers to facilitate fish migration and to avoid the disappearance of diadromous species



Photo: LIFE04 NAT/GB/000250

LIFE and **hydromorphological alterations**

Several LIFE projects have aimed to reduce the impact of hydromorphological interventions and restore the natural conditions of water courses in Europe. They have demonstrated measures and management plans that could be implemented in other river basins and have yielded useful information for the better control of flood plains, water use and protection of valuable ecosystems.

Projects have also demonstrated how the requirements of the WFD and the Habitats Directive can be met regarding hydromorphological alterations. Philip Weller, International Commission for the Protection of the Danube River (ICPDR), told delegates at the Brussels conference that LIFE cannot do everything that is needed but can be an important catalyst for action.

LIFE has demonstrated how integrated management that takes into account

conflicting needs can be achieved. River alterations have occurred to cater to the needs of many different interest groups and stakeholders. Simple restoration of the river to its original status will disturb the balance of interests, and as a result it is vital to bring together different stakeholders. LIFE projects have shown that such dialogue creates successful synergies, he said.

In the Danube – the river on which Weller's organisation focuses – organic

pollutants no longer represent a serious threat to migrating fish, such as the sturgeon. But they are impeded by dams and hydropower stations and consequently migration aides have been constructed in barriers. Such dialogue among stakeholders is foreseen in the WFD and is an important aspect of the LIFE programme.

Another area where LIFE has a role to play is the establishing of priorities from the objectives set out by the WFD.

Ecological and hydromorphological impacts of navigation can be minimised by implementing restoration measures based on the understanding of river processes



Photo: F. Lamiot





According to Weller, establishing priorities highlights “the key issues to spend money on, that can be also picked up from the LIFE programme in view of future projects.”

One outcome of the hydromorphological session at the LIFE conference was the need for LIFE projects to provide a cost assessment of the benefits that had been generated, as required by the WFD. Ulrike Goldschmid, who led the LiRiLi project to restore a stretch of the river Liesing in Vienna, said that social benefits were hard to express in monetary terms. It is a quality of life issue, she said. The local population uses the river for water sports and recreational purposes such as picnics, and children can now safely walk to school. One solution would be to hire experts in the project to determine the benefits and translate them into financial terms.

The subject of using experts was further discussed in the context of development plans. Weller said that it was necessary to include ecologists in plans that affect rivers to avoid repeating the mistakes of the past. Such a goal was “realistic”, he added. Diego Garcia of the New Water Culture Foundation also said that experts were needed to provide environmental assessments, which so far have not featured highly in LIFE projects.

Irrigation farming is another major morphological factor that could be addressed by LIFE projects. Irrigation accounts for 80% of water use, a percentage that Garcia said must be reduced. The high use of freshwater for agricultural purposes is a particular problem for the south of Europe, Hans Jerrentrup, Society for the Protection of Nature and Eco-Development told the session. He pointed to the example of the Nestos river in Greece where it was planned to use more water than available. Public administrations do not co-operate with local stakeholders and ecologists, he said.

However, LIFE projects, which are widely publicised in the media, can have a far-reaching impact by demonstrating how various interests groups and stake-



Photo: Monika Ketterer

LIFE has demonstrated how integrated management of river basins can improve stakeholder dialogue and lead to successful synergies

holders can interact with one another to achieve sustainable levels of water use and restoration, according to Garcia.

He also recommended that river engineering should only occur when absolutely necessary and that EU funds dedicated to hydraulic works be “carefully controlled”. “Impacting infrastructures, not used or economically unreasonable, should be removed from rivers,” he added.

LIFE AND MANAGEMENT PLANS

Discussions at the hydromorphological session also covered the extent to which LIFE projects have aimed to implement the requirement of the WFD to produce river basin management plans. Philip Weller said that concrete measures for management plans still needed to be identified and that LIFE projects had a role to play in this process.

Moreover, he suggested that future LIFE funding could be linked to its applicability to the river basin management plan's framework.

Marieke van Nood agreed that these plans should be emphasised in future

LIFE projects. She said that LIFE offers examples of good practice that could be learned from. Policy implementation is an important consideration of LIFE. The conference session featured three projects (see following pages) that addressed gaps in implementation – for example, the requirement of the WFD that “maximum ecological potential” is achieved for heavily modified and artificial water bodies and that good ecological status is attained.

The discussions, however, also highlighted concerns that some LIFE projects don't always work towards the implementation of the requirements of the WFD. In some cases, the construction of dams has favoured some species at the expense of others and interventions have conflicting results. Projects should address the priorities set out in the directive, it was emphasised, and gaps in policy implementation should be earmarked for future LIFE projects.

But several participants expressed their belief that conferences were the best way of spreading good practices. Knowledge sharing is not simply a matter of creating a website, but of making active contact through workshops and conferences.



The ecological status of water in the Karjaanjoki river basin in Finland has suffered in recent years as a result of several hydro-morphological alterations. A power station in the downstream area and several minor man-made structures have affected the flora and fauna and contributed to sedimentation. However, a LIFE project, INNOWA, (LIFE00 ENV/FIN/000668) aimed to introduce sustainable management of the river.

Finland: Partnership protects a river basin

The 2050 km² Karjaanjoki river basin features lakes, including the large lakes Lohjanjärvi (92 km²) and Hiidenvesi (29 km²), rivers and brooks of various types and sizes, which together cover 12% of its area. The watercourse accommodates rare birds, freshwater mussels and has a natural stock of trout, but some lakes are nutrient-poor and eutrophic. In addition, the upstream parts of the catchment are largely covered with forest and attractive logging areas, while downstream areas are used for agricultural purposes. Both activities disturb the ecosystem.

The LIFE INNOWA project created a network of 27 partners and five co-financiers as well as NGOs and interested individuals in order to develop novel and effective methods of water management and protection. Communication with such a large group was a major challenge, but one the beneficiary says that it overcame. Although improvements in the ecological status of the surface waters should be judged over a longer time frame, positive tendencies were noted at the close of the project.

The project consisted of seven closely-connected sub-projects:

- Ecological restoration of running waters to restore the river basin continuum;
- Improving the functional value of Lake Lohjanjärvi;

- A master plan for the Mustionjokilaakso river valley;
- Water pollution control methods in agriculture in order to improve the use of fertilisers and to develop a self-monitoring procedure for farmers for environmental management;
- Water pollution control methods in forestry;
- Planning of sustainable recreational use of the Karjaanjoki river basin; and
- Development of river basin monitoring systems that correspond with the requirements set out in the Water Framework Directive (WFD).

Surveys of small streams and brooks, trout stocks and barriers for fish migration yield necessary information for river catchment restoration. As part of the Lake Lohjanjärvi sub-project volunteers helped with transparency measurements and algal monitoring. (More than 80 volunteers took part in monitoring and more than 2 500 measurements were recorded by the volunteers.) Along with mathematical modelling and remote sensing, such monitoring pointed out where restoration activities should be directed. The main aim was to focus restoration activities on the upper river basin area.

Four wastewater surveys were carried out in the Lake Lohjanjärvi area for applying the wastewater management act for

scattered settlement. This work led to the development of an effective method based on questionnaires and field work. A novel monitoring method based on remote sensing was also trialled, though it proved not to be as useful as hoped.

More than 80 volunteers monitored the Lake Lohjanjärvi to determine the sites where restoration activities were to be implemented





The LIFE INNOWA project produced surveys on trout stocks and barriers for fish migration as necessary information for river catchment restoration

IMPLEMENTATION OF THE WFD

The project is a good demonstration of how the WFD, and to a lesser extent, the Habitats Directive, can be implemented in Finland. The seventh sub-task, which concerned the development of river basin monitoring systems, achieved the following results:

- Monitoring of water pollution and the state of surface waters. Current monitoring methods were evaluated;
- Classification of surface waters according to the requirements set out by the WFD (e.g. based on biological data);
- Production of information for the application of the WFD at a national level;

- Investigation into the possibilities of bringing together the surface water monitoring requirements of the Water Framework and Habitats directives;
- Assessment of the availability of information and suggestions for improvements – for example, Hertta, an online database of the environmental administration, was developed further; and
- Elaboration of a plan for surface water monitoring, co-operation and reporting of results.

Management of the river basin and the implementation of the WFD was planned to continue after the end of the project through the co-operation of the project partners and the beneficiary.

Integrated monitoring of the requirements of the Water Framework and Habitats directives were investigated



While the project attracted much media attention nationally, dissemination activities were limited to Finland for the most part. Though the results and recommendations of the project are on a local and regional scale, the project has the potential to serve as a good example of a multi-purpose water management exercise on a wider scale.

The project created an extensive website (www.lohja.fi/karjaanjokilife/), which is available in three languages – Finnish, Swedish and English. The beneficiary committed to updating the website for two years after completion of the project with relevant information and developments regarding the watercourse. It also published a 230-page book, "Karjaanjoki Watercourse. Long Live the Water" (*Karjaanjoen vesistö Eläköön vesi! / Svartåns vattendrag Leve vattnet*), in Swedish and Finnish. The publication, which contains a 12-page English summary, is good overview of the project and is aimed at professionals and those that have some understanding of water ecology and the objectives of the WFD. Well-attended seminars also helped publicise the project's activities.



FINLAND

Project number: LIFE00 ENV/FIN/000668

Title: Integrated river basin management - a network for optimized water management, rehabilitation and protection of aquatic ecosystems in Karjaanjoki area

Beneficiary: The city of Lohja, in the region of Western Uusima

Period: Apr-2001 to Mar-2005

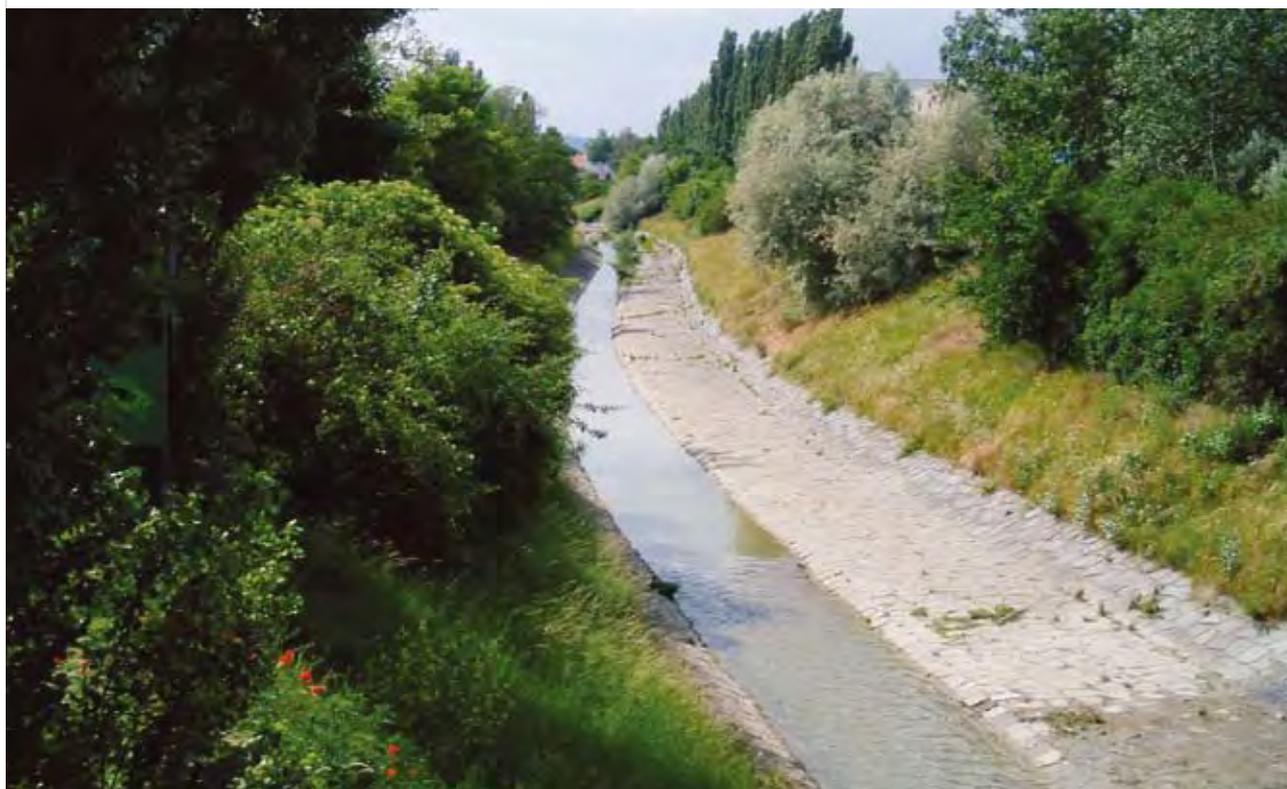
Total budget: €2 298 000

LIFE contribution: €1 063 000

Website: www.lohja.fi/karjaanjokilife/

Contact: Sanna Helttunen

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Austria: **River restoration in an urban area**

The river Liesing in Vienna has been heavily modified as a result of flood protection measures, its use as a watercourse for a water treatment plant, and a growing riverside population. However, the LIFE LiRiLi project, which focused on 5.5 km of the river in an urban area, formed part of a large-scale restoration effort for the entire river.

The project beneficiary, the river engineering department of the city of Vienna, had already implemented a similar project on the river Wien. The objective of the Liesing project was to maximise its “ecological potential”, in accordance with the Water Framework Directive (WFD) and specifically with regard to “heavily modified water bodies” (HMWB)

The stretch of river that the project focused on was a canal-like concrete channel that was re-designed into a semi-natural river meeting the relevant flood protection requirements.

Restoration of the river bed was achieved with a gravel substrate, while the steep banks were flattened and partly enlarged and are now protected by bioengineering measures (willow fascines, wattle fence). At the ‘LIFE for water – Water for life’ conference, Project Leader Ulrike Goldschmid explained that the gravel layer should be at least 30-70 cm thick according to the river size and flow velocity and that “wherever possible the riverbed was widened and the straight river course was broken up.”

Bed drops were replaced by loosely structured bed sills (15-20 cm) to ensure

the continuity of the river and allow for the uninterrupted passage of fish and other riverine animals. The river bed was also lowered in some places to create deeper scouring areas and various bed structures such as groynes and root stocks were used to create different flow velocities, pools and eddies.

A common hydromorphological factor is the discharge of sewage into the river. Therefore, as part of the project's attempt to restore the Liesing, a new sewer system was constructed and all discharge points to the river were closed. All wastewater now goes to the main



The LiRiLi project restored the natural flora and fauna of the riverbank by replanting indigenous tree and bush varieties

treatment plant in Vienna. Together with the other actions to restore the river's continuity and different flow conditions, this measure helped improve the water quality from class IV to class II - III of the saprobic system and to restore the natural flow capacity of the Liesing. Other revitalisation activities included the restoration of former meanders, which was helpful to elongate the river length and reduce the flow velocity.

Actions were also taken to restore the natural flora and fauna of the riverbank. Existing mesoxerophytic grassland was replanted following the construction work, and indigenous trees and bushes were used as part of the landscape design. Bushes of the different alluvial forest types were planted, whose blossoms and seeds are not only a pleasing sight for visitors, but also provide food for bees and birds in the winter months. A pathway and a riverside child's playground were also constructed.

The project was accompanied by intensive PR activities including the construction of an information centre to tell interested parties about the river. The centre hosted numerous events aimed at creating a dialogue with local residents, who were also invited to visit the building site during the project. Bicycle tours were another means of informing the public about the aims of the project.

LESSONS FROM THE LIESING

At the LIFE conference in Brussels, Ms. Goldschmidt concluded that the project demonstrated that interdisciplinary planning teams of hydraulic engineers and river ecologists performing environmental assessments are essential for river restoration. Furthermore, efforts at local and at EU level should be directed towards facilitating stakeholder dialogue and LIFE projects such as LiRiLi have provided good practices in enabling this. A clear political will is also needed to change the situation of heavily modified water bodies. River restoration of this type is expensive: for the Liesing project, the cost worked out at € 600 per metre, although this was also inclusive of the installation of a new sewage system. Benefits are difficult to express in monetary terms, although prices of real estate did rise and the quality of life of the area surrounding the river Liesing also improved. It may be helpful if future LIFE projects concerning river restoration focus more on cost-benefit analysis and on translating social benefits into economic terms.

For sustainable results, she argues that management and maintenance concepts should be based on the monitoring results. As a result of the project, species diversity in the river increased

from 2.0 to 3.2 (Shannon-Wiener-Index). The number of macrozoobenthos (MZB) organisms increased by some 20-40%. Moreover, the first colonies of dragonflies appeared following the construction work. However, isolated stretches remain vulnerable and colonisation with MZB will take longer.



AUSTRIA

Project number: LIFE02 ENV/A/000282

Title: Living River Liesing - Demonstrative Ecological Reconstruction of a Heavily Modified Waterbody in an Urban Environment

Beneficiary: The River Engineering Department of the City of Vienna

Period: October 2002 to January 2006

Total budget: €2 005 000

LIFE contribution: €771 000

Website: <http://www.wien.gv.at/index/wasser.htm>

Contact: Wilfried Fellingner

Email: wilfried.fellinger@wien.gv.at

Though home to several important wildlife habitats, the Vezseny Bend floodplain of the Middle-Tisza has been damaged over recent decades. False indigo bushes (*Amorpha fruticosa*) have replaced native forests and vegetation, compromising the plain's ability to convey flooding of the river. A LIFE project, however, was carried out to improve the water management of the floodplain.

Hungary: Flood control in the Tisza river plain

The project implemented a range of habitat restoration activities including the creation of an ecological corridor, turf and forest restoration, the cutting back of invasive alien species and the enlargement of the habitats of native species. The project also launched extensive agricultural practices and animal husbandry.

Another key aspect of the project was the expansion of the floodplain's water retention capacity in order to reduce flood risks. The flood plain channels were excavated, higher parts of the channel bars were pulled down, channel entrances were opened, and the borrow pits – areas where material (usually soil, gravel or sand) has been dug for use at another location – were excavated. Some 20 900 m³ of earth was moved from the area, corresponding to an equivalent increase in storage capacity.



The Sumar project raised awareness among the local population by creating a 5.2 km-long nature trail

By excavating the channels of the flood plain, the project secured a water supply to the dry land areas. Moreover, special hydraulic structures were constructed for artificial water retention. These structures also led to the

regulation of the channel network along with adjustment to the run-off paths. The borrow pit restoration resulted in a various landscape consisting of wetland habitats and spawning ponds for diverse fish, amphibian and bird populations. In order to regulate the water in the borrow pits two clack valves and a culvert were constructed. The southern (250 m) and the northern (370 m) flood channels were dredged and cleaned of vegetation and now provide water to the area.

The rehabilitation of floodplain forests was a very important and challenging task. To this end, the project developed a silviculture that emphasises the conservation and maintenance of the indigenous soft- and hard-wood gallery forest and eliminated the invasive species. The characteristics of the floodplain and the dynamics of the river





The project secured a water supply to dry areas by excavating the channels of the flood plain

mean that many habitats and micro-habitats could evolve, thus increasing the number of species. Periodic inundations and extreme phenomena keep the healthy floodplain ecosystem young.

In accordance with the Water Framework Directive (WFD), monitoring was carried out in the pilot area for one year. This action was especially beneficial since there are no designated reference areas in Hungary with which the borrow pit conditions could be compared. By comparing the monitoring data of the four borrow pits of the pilot area and their assigned reference places it was possible for the water directorate to define the required interventions.

To raise awareness and attract visitors, a new 5.2 km-long nature trail was established on the pilot area. It was equipped

with a new outlook point, five rain shelters, 10 benches, 20 rubbish bins, two wooden bridges, 30 information tables and a portable toilet. A 200 m² parking lot was also built at the starting point of the nature trail.

The local population living along the river Tisza is highly affected by the conditions of the river and its flood plain, and so local people were made part of the decision-making process of the project, being involved in the development of plans and consulted through workshops, public forums and conferences. Up-to-date information was made available on the project website.

Finally, one of the biggest successes of the project was the numerous partnerships created with civil, conservation and sporting organisations. Three natio-

The floodplain's water retention capacity was expanded through the excavation of borrow pits and the opening of flood channels



nal parks also co-operated with the project's organisers. Furthermore, the project created employment opportunities in inlet management as a new, alternative land use method.

LESSONS FROM LIFE

Construction work was carried out at an unfavourable time of year. One lesson to be learnt from the project is that it is easier to carry out such activities in the autumn to winter season when the borrow pits and channels are dry and the trees and shrubs are leafless. Flood-free periods also would have favoured the construction work.

The project, however, was one of the first initiatives to combine nature conservation with flood control and can be readily transferred to other sites along the Tisza river. It suggested a common approach to local residents and offered opportunities for sustainable eco-tourism. Its experiences will be useful for the development of the new land use practices on the floodplains of the whole reach of the Tisza and will inform future planning. The success of the project was recognised at the 2008 Energy Globe Awards.



HUNGARY

Project number: LIFE03 ENV/H/000280

Title: Sustainable use and management rehabilitation of flood plain in the Middle Tisza District

Beneficiary: Middle-Tisza District Environment and Water Directorate

Period: Dec-2003 to Mar-2007

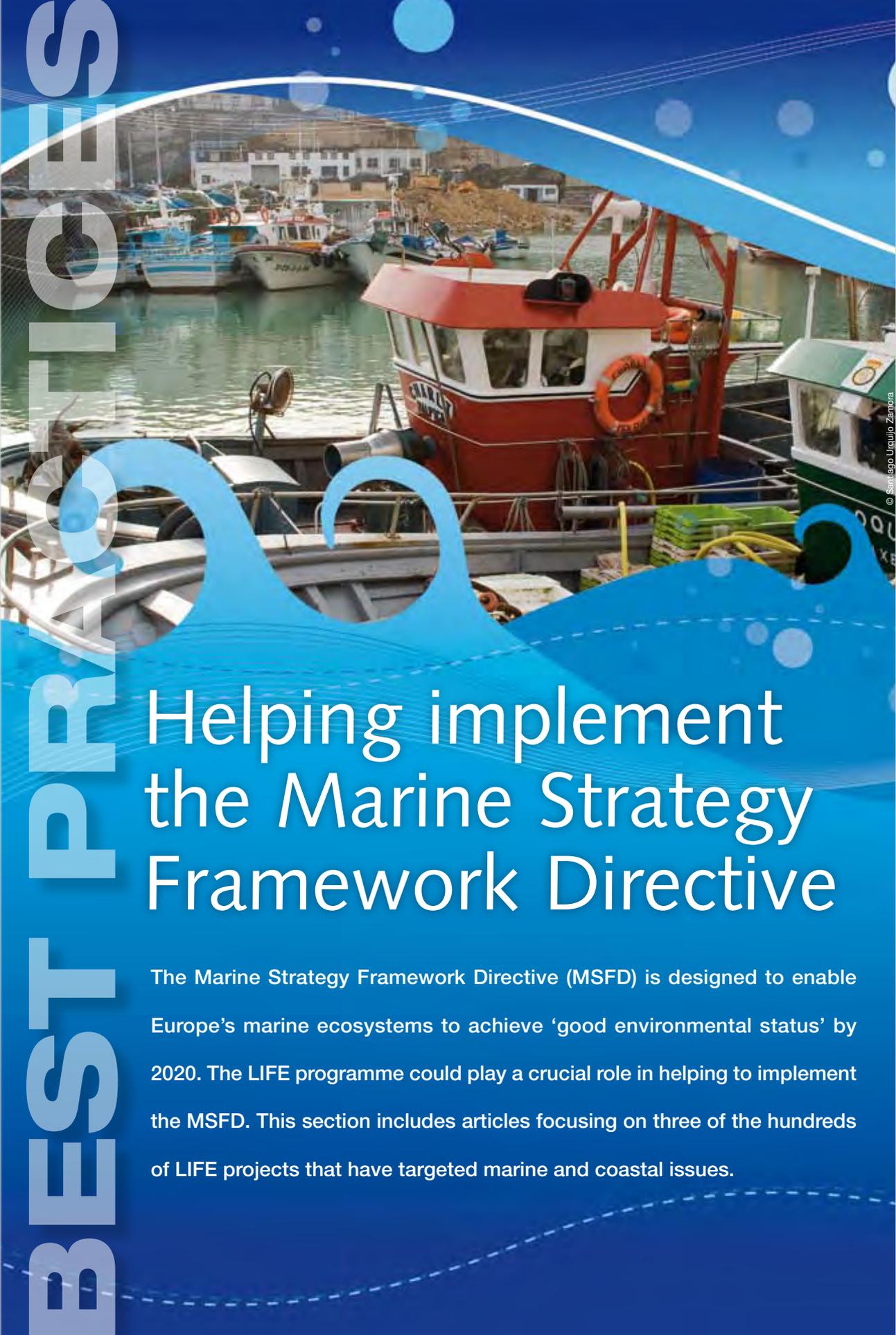
Total budget: €1 400 000

LIFE contribution: €692 000

Website: www.vituki-consult.hu/sumar/

Contact: Kata Szécsi

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Helping implement the Marine Strategy Framework Directive

The Marine Strategy Framework Directive (MSFD) is designed to enable Europe's marine ecosystems to achieve 'good environmental status' by 2020. The LIFE programme could play a crucial role in helping to implement the MSFD. This section includes articles focusing on three of the hundreds of LIFE projects that have targeted marine and coastal issues.



Photo: LIFE03 NAT/F/000104



Setting the scene: **Safeguarding the future of Europe's seas**

The EU's marine ecosystems are a vitally important public good. However, the marine environment faces many threats. As a key plank of the 6th Environment Action Programme, the Union has drafted the Marine Strategy Framework Directive (MSFD) with the aim of achieving a "good environmental status" for Europe's marine ecosystems by 2020.



Photo: Kjunstorm

Marine ecosystems perform a number of key environmental functions. They regulate the climate, prevent erosion, accumulate and distribute solar energy, absorb carbon dioxide, and maintain biological control.

The seas and oceans are our greatest source of biodiversity. They cover 71% of the Earth's surface and contain 90% of the biosphere. European marine waters

cover 3 million km² – equal to the total landmass of Europe; indeed, 50% of Europe's territory is under the sea. The marine environment is also a great contributor to economic prosperity, social well-being and quality of life.

THREATS TO THE SEAS

Europe's marine ecosystems face significant and widespread threats. Wide-

spread throughout Europe's seas, overfishing is affecting fish stocks across the continent, with catches that have been gradually falling in the last years for many stocks, in addition to impacts on non-target species and marine ecosystems. Another range of threats comes from land-based sources of pollution – for instance, point sources such as industry and intensive agriculture and diffuse sources. This pollution, including exces-



THE ECOSYSTEM APPROACH

The **Ecosystem Approach** to the management of human activities is enshrined in the Marine Strategy Framework Directive. It is intended to allow the sustainable use of marine goods and services, whilst giving priority to achieving or maintaining a **good environmental status** in the EU's marine environment, in particular by continuing to protect and preserve the marine environment, and also prevent its subsequent deterioration.

The adoption of such an approach implies that the management of activities that affect the marine environment will have to take account of their cumulative pressure on marine ecosystems. That way, their capacity to respond to human-induced changes is not compromised. Moreover, when the management of those activities is regulated by the European Union and/or its Member States (e.g. fisheries and transport), it should be done in a way that contributes to achieving good environmental status in the concerned region.

The approach also necessitates a large degree of **public participation** and flexibility. Strategic goals guiding the way towards good environmental status should be the result of societal choices. Environmental targets and programmes of measures to deliver them need to be both regionalised and adaptive in order to deliver them; i.e. they need to be able to cope with new circumstances (such as those induced by climate change) and to take account of scientific and technological developments.

sive nutrients and hazardous substances, can have direct effects on both human health and the health of aquatic organisms. Other threats come from offshore activities, including increased shipping, which can cause oil slicks and marine litter, as well as unintentionally carrying alien species to new destinations, with potentially disastrous consequences for native flora and fauna. Marine traffic is (along with oil and gas exploration) also a source of underwater noise, which can be harmful to sea life. Many of these impacts have cumulative effects on ecosystems. Climate change also raises further concerns, including for instance growing acidification of marine waters.

The importance of Europe's seas is reflected in the fact that the marine environment was one of seven thematic strategy areas proposed under the 6th Environmental Action Programme (EAP), adopted by the Council and Parliament for the period 2002-2012. The priorities of the 6th EAP are climate change, nature and biodiversity, health and quality of life, and natural resources and waste.

THE MARINE STRATEGY FRAMEWORK DIRECTIVE

Following an extensive stakeholder consultation in 2003 and 2004, the Marine Strategy Framework Directive (MSFD, 2008/56/EC) was adopted by the European Commission in June 2008. Its objective is to secure a common basis

for the protection and management of Europe's seas in order to ensure the "good environmental status" of marine areas by 2020 (see pp. 4-6). The European Union has set out the following timetable for the implementation of the directive:

- By 2012, each Member State with a coast (23 in all) to provide a description of the current environmental status of its seas (initial assessment) and to establish environmental targets;
- By 2014, a monitoring programme to be established;
- By 2015, a programme of measures to be adopted by each Member State;
- By 2016, the programme of measures to come into force; and
- By 2020, good environmental status to be achieved (or maintained if status is already good).

Ensuring good environmental status involves protecting marine ecosystems. A major priority is that marine biodiversity is maintained. The new directive states that fishing and other activities should not push the populations of commercially exploited fish and shellfish beyond their safe limits and that non-indigenous species should not affect ecosystems.

Good environmental status also requires physical, chemical and acoustic conditions that support healthy ecosystems. Noise from human activities should be

Overfishing is negatively affecting fish stocks across the continent with additional impacts on non-target species and marine ecosystems





Photo: Gabriella Cairns

Mr José Rizo Martin, Marine Unit-DG Environment, explains how sea exploitation must be carried out within sustainable boundaries

made compatible with the marine environment and its ecosystems.

Meeting these requirements will protect renewable marine resources and may require a change in a range of human activities and practices, such as ending the overexploitation of fish resources. However, as José Rizo Martin of DG Environment's Marine unit indicated at the LIFE Environment conference, implementing the MSFD may not be plain sailing, since "We cannot stop people using the sea; the sea has to be exploited, we have to accept that. But it must be done within sustainable boundaries."

The draft MSFD proposes that Europe be divided into the following four marine regions:

- The Baltic Sea;
- The North-East Atlantic Ocean (sub-divided into: the Greater North Sea – inc. the English Channel and the Kattegat; the Celtic Seas; the Bay of Biscay and the Iberian coast; and the waters surrounding the Azores, Madeira and the Canary Islands);
- The Black Sea; and
- The Mediterranean Sea (sub-divided into: the Western Mediterranean; the Adriatic Sea; the Ionian Sea and Central Mediterranean Sea; and the Aegean-Levantine Sea).

Since the EU's coastal countries share a number of marine regions and sub-regions, Member States will need to

work together to ensure that their marine strategies are consistent. They will also have to work with their non-EU neighbours with whom they share common seas. The existing regional sea conventions (e.g. HELCOM for the Baltic Sea) are well placed to provide the basis for the co-ordination of many elements of the marine strategies to be developed by Member States.

The Ecosystem approach allows the sustainable use of marine goods and services whilst ensuring the protection and preservation of the marine environment and preventing its further deterioration



Photo: LIFE08 NAT/P/00527/5

The new directive, which follows a similar approach to the Water Framework Directive (WFD), is important not only in its own right, but also because, together with other pieces of EU legislation, including the Habitats and Birds directives and the WFD, "[now] the whole water cycle is covered, from clouds to rivers to the sea," explains Mr. Rizo.

The MSFD will have to be implemented in the context of the reform of the Common Fisheries Policy, and the two processes should develop coherently on the basis of the ecosystem approach. The MSFD should also be seen within the broader context of the development of a new EU Integrated Maritime Policy. The vision is that of a Europe with a dynamic maritime economy in harmony with the marine environment. The MSFD will deliver the environmental pillar of the future EU Maritime Policy.

"We have the legal instruments in place, the regulatory framework exists," says Herve Martin, Head of Unit, LIFE Environment: "The challenge is the implementation of the MSFD."



Photo: Marzácas

LIFE and **the EU marine strategy**

While no LIFE projects have been specifically targeted at the implementation of the Marine Strategy Framework Directive (MSFD), there have been hundreds of projects focusing on marine and coastal issues. This article looks at the role the LIFE programme could play in the implementation of the MSFD.

The Marine Strategy Framework Directive may have only been introduced in 2008, but marine and coastal problems have been the focus of LIFE Environment, LIFE Nature and LIFE Third Countries projects for many years. A total of 144 projects (41 Environment, 81 Nature, and 22 Third Countries) have touched on marine issues, while 416 projects have had a coastal element.

A large number of these projects are collected in the LIFE Focus publication, *LIFE and the Marine Environment* (available to download at: http://ec.europa.eu/environment/nature/natura2000/marine/docs/appendix_4_life.pdf).

THE ROLE OF LIFE: DIFFERENT VIEWPOINTS

The marine session produced a healthy debate on the role of the LIFE programme in helping to implement the MSFD in particular and EU coastal and marine policy in general.

Vera Coelho, Policy Officer, Seas at Risk identified three areas in which LIFE could help:

1. Sustain projects that demonstrate how one can operationalise an ecosystem-based approach.
2. When it comes to environment policy, support programmes that foster the implementation of sectors and policies.
3. Increase stakeholder involvement.

Above all, says Ms. Coelho, LIFE should be geared towards action rather than data-gathering: "We don't need to know more, we just need to start doing things."

For Harm Oterdoom, Project Manager with Rijkswaterstaat, the executive agency responsible for constructing and maintaining waterways and roads in the Netherlands, LIFE should take a greater role in capacity-building in the various regional marine conventions (i.e. Helcom for the Baltic Sea, the Bucharest Convention for the Black Sea, the Barcelona Convention for the Mediterranean, and Oskar for the Northeast Atlantic) to bring experiences with the Water Framework Directive to the secretariates, so that the





MSFD is implemented more efficiently. Mr Oterdoom also believes that LIFE should make research into the effects of underwater noise a high priority, including the development and evaluation of mitigating measures.

Simon Goss, Communications Co-ordinator with the LIFE Nature & Biodiversity unit, DG Environment, believes that LIFE faces a number of challenges with regard to the marine strategy:

- The first challenge is to transfer existing knowledge. In addition to regular dissemination efforts, Mr. Goss pointed to the new LIFE Information & Communication strand, which is specifically designed for knowledge transfer;
- The second challenge is to adapt the WFD, Integrated Coastal Zone Management (ICZM) and marine experiences to the specificities of the MSFD and marine regions;
- The third challenge is to integrate and co-ordinate river basin management, ICZM and marine region management. "The sheer size of the marine regions is a problem for restoration, although it is not necessarily a problem for management," he explains.

APPLYING COLLABORATIVE GOVERNANCE TECHNIQUES

The Question & Answer session in the marine strand of the Brussels conference gave participants a useful forum for debating how collaborative govern-



© Santiago Urquijo Zamora

Marine traffic is a source of underwater noise, which can be harmful to sea life

ance techniques could help in the implementation of the MSFD. One delegate suggested that the ecosystem approach was not popular with all stakeholders, particularly fishermen, who think it is cutting them out.

John Pygott, Project Manager of the LIFE managed realignment project in the Humber Estuary (see pp. 43-44) highlighted a practical example of stakeholder resistance, indicating that while most 'setback' practitioners have been supportive of the project's recommendations, there have been difficulties engaging with the communities affected by the works.

Education and outreach were therefore identified as crucial practices when it came to engaging stakeholders, particularly in the new Marine Protected Areas (MPAs). "The first step is to find out who your stakeholders are, then you need to draw them in and explain to them that their input is essential," says Ms. Coelho of Seas at Risk. "Involve stakeholders from the beginning or the success of the MPA is compromised from the very start," she adds. "Look for individual leaders among stakeholder groups and make them advocates for your project," suggests Lynne Barrett of the Astrale LIFE monitoring team.

The LINDA project successfully involved stakeholders to calm tensions in the local fishing community over the Bottlenose dolphin



Photo: jwendland

Simon Goss highlights "Limitation to the negative interactions between dolphins and human activities" - LINDA (**LIFE03 NAT/F/000104**) in Corsica as an example of a LIFE project that successfully involved the local community. Good communication and regular meetings served to calm growing tensions within the Corsican fishing community over the Bottlenose dolphin, allowing the impact of the dolphin on fishing revenues to be assessed and practical fishing solutions to limit this interaction to be defined.

The following pages contain more examples of LIFE projects that have applied collaborative governance techniques to positive ends in marine and coastal areas.

Sweden: **developing ICZM in Baltic Sea woodlands**

This successful Swedish project laid the groundwork for the wider implementation of Integrated Coastal Zone Management (ICZM) in the coastal woodlands areas of the Baltic Sea.

The deterioration of coastal regions through constant pressure is a major environmental problem. The European Union is working to introduce a co-ordinated policy for coastal regions based around the implementation of Integrated Coastal Zone Management (ICZM) in Europe. Following a recommendation adopted by the Council and Parliament in 2002, each EU Member State was to develop a national ICZM strategy in consultation with all coastal stakeholders by early 2006.

ICZM is about managing coastal resources and coastal space by joining up all the different policies which have an effect on coastal regions. In areas such as the Baltic Coast, where woodland is such an important coastal feature, forestry policies are extremely important to coastal management.

The LIFE 'ICZM in woodlands' project, which ran from 2002-2007 under the aegis of the Swedish Forest Agency, was centred on the area between Norrköping and Kalmar on the South-east coast of Sweden, although some actions were relevant to coastal woodlands in Finland and Estonia as well. Its principal aim was to demonstrate how ICZM can be applied on the coastal zone of the Baltic Sea and to formulate specific recommendations for ICZM in forest areas.

Among the problems facing this particular stretch of coastline were the ongoing fragmentation of the forest landscape; a lack of semi-old oaks; the overgrowth of former grasslands and coastal meadows and of giant trees; the planting of spruce trees in empty fields in areas of oak landscape; declining fish popula-



The Coastal Woodlands project developed recommendations for an ICZM strategy connecting forestry and nature conservation issues by the Baltic Sea

tions and fish breeding rates; blooming algae; a lack of cattle for grazing; a lack of facilities for emptying boats' toilets; and a lack of efficient transport facilities for timber and woodchip.

CO-OPERATION THE KEY TO SUCCESS

The project succeeded in demonstrating new and innovative ways to include coastal woodlands in ICZM. In particular, it developed comprehensive recommendations for an ICZM strategy connecting forestry and nature protection issues by the Baltic Sea and established an Expert Advisory Group for the Baltic Sea Coastal Woodlands reflecting the need for cross-border co-operation on this issue.

Local stakeholder involvement was an important element of the project. Meet-

ings were held for coastal zone citizens and coast-dwellers were also polled on their environmental attitudes. New exhibitions and information boards were set up in frequently visited places along the coast and coastal excursions even arranged for recent immigrants to Sweden. In addition, new hiking trails were created with detailed information boards. Through these actions, and others such as workshops and study tours to Finland, Estonia, Latvia, Germany and Denmark, the project was able to obtain a good overview of the problems facing coastal forests and their possible solutions. Another incentive to local engagement was provided by Volunteer Environment Action Grants. "In our project there was really the whole community involved," explains Marja Gustafsson, the project's foreign advisory group co-ordinator and person responsible for all study tours and workshops abroad.





Photo: Henry Stahre

Forestry activities must be planned and carried out carefully by leaving broad zones along rivers, lakes and coasts

Surveys of the cultural, social and environmental value contained within the forests and studies of different forestry management activities led to the development of integrated inventories and maps. This fresh information on forest biodiversity and cultural, social and economic aspects of the coastal woodlands complemented the stakeholder consultations to inform a set of recommendations for ICZM in forests by the Baltic Sea. These developed many links between coastal management, forestry management, agriculture, tourism and development planning. "This management of coastal areas is very complicated," explains Ms Gustafsson. "There are so many interests."

The recommendations also provide a guideline of how to integrate the protection of coastal areas with the protection of forests and their natural biodiversity

and with social, cultural and economic interests. Specific examples include guidelines for forestry in eagle nesting areas and restrictions on new drainage systems in forests and farmlands. Improvements in the way timber and woodchips are transported was another positive outcome. Implementation and dissemination of the new guidelines for coastal zone forestry management is the important next step.

The project also demonstrated better use of legislation for nature protection and rural planning as well as good co-operation between the different authorities responsible for inventories of nature values. On-going certification of forestry led to the granting of formal protection to more than 1 600 ha of coastal woodland during the project period. This was aided by new surveys and ongoing management of

Guidelines on improving the way timber and woodchips are transported were developed



Photo: Henry Stahre

giant trees and better knowledge of the ecology of oak and pine. "It is important to plan sylviculture activities very carefully," notes Ms. Gustafsson. "You have to leave zones along rivers and lakes, select the right species, and note all the impacts of ditches."

SPREADING THE MESSAGE AND LEARNING THE LESSONS

One of the key tasks of the project was to disseminate its methods and models to other Baltic Sea Member States. This was successfully achieved, with the project able to develop effective linkages with other ICZM initiatives in the Baltic Sea region, including the regional "Sustainable Archipelago" programme. It promoted more environmentally conscious attitudes towards land use and disseminated information on the importance of coastal woodland sites across the target region (for instance, through exhibitions).

For Marja Gustafsson, the biggest lesson of the project is the importance of listening: "If you don't listen you don't communicate and you will never get any development."



SWEDEN

Project number: LIFE02 ENV/S/000355

Title: Integrated coastal zone management in woodlands by the Baltic Sea

Beneficiary: Skogsstyrelsen (Swedish Forest Agency)

Period: Jun-2002 to Mar-2007

Total budget: €2 432 000

LIFE contribution: €1 206 000

Website: www.skogsstyrelsen.se/episerver4/templates/SNormalPage.aspx?id=10566

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The LIFE MARECLEAN project in Normandy developed four transferrable decision-support tools that have reduced the pollution load in an area famous for its shellfish and bathing beaches. The project also has important lessons for the implementation of the MSFD.

France: **LIFE MARECLEAN** risk analysis to reduce pollution

As a result of the effects of point and diffuse sources of pollution (for instance, domestic wastewater), 13% of all EU coastal bathing waters fail to meet the standards set by the new Bathing Water Directive (2006/7/EC).

Tourism and demographic pressures in coastal areas are making it more difficult to reduce pollution, while at the same time increasing expectations of clean waters.

Conventional solutions for the management of faecal pollution in domestic effluents work well in dry weather conditions, but fail to manage efficiently the flow rates generated by heavy rainfall. In rural areas, the size of sewage systems presents additional difficulties.

France is one Member State that feels these problems keenly: some 20% of French coastal bathing waters are expected to be non-compliant with the Bathing Water Directive unless remedial action is taken.

The LIFE Environment MARECLEAN project was set up by the SMBCG Syndicat Mixte des Bassins versants des Côtiers Granvillais (SMBCG), a public entity created by local communities that tackles water pollution around Granville municipality in Normandy (northern France) and the Syndicat Mixte du Pays de Coutances (SMPC), which implements the ICZM recommendation in its territory. As well as having many popular sea bathing beaches, the MARECLEAN perimeter is the biggest shellfish produc-



The MARECLEAN project developed a pollution management plan for a 40 km stretch of coast with the aim of reducing point source pollution by 90%

ing area in France – on some days more than 10 000 people harvest shellfish recreationally on the tideland. Together, tourism and the shellfish industry contribute €200 million annually to the local economy. However, microbial pollution is having a detrimental effect on seawater quality – seven of the 39 beaches fail to meet the standards of the Bathing Water Directive, while fourteen of the 15 shellfish breeding areas will be rated ‘B’ and one ‘C’, which means processing is needed before consumption.

The project aimed to establish a long-term pollution management plan for a 40 km stretch of coast. The application of this plan would eventually lead to a 70% reduction of point source pollution, following a 20% reduction by the end of

the LIFE project. It was intended that as well as yielding long-term economic benefits, the management plan would avoid conflicts surrounding responsibility for pollution.

Long-term objectives of the LIFE MARECLEAN project included:

- Reducing the number of bathing sites rated “sufficient” according to the Bathing Water Directive from five to two and the number rated “insufficient” from three to nil;
- Upgrading the rating of the most polluted mussels/oysters production area from “D” to “C”, and improving an area rated “B” to an “A” rating. At the end of the project there will be five zones rated “A”, six zones rated “B” and one rated “C”.





The Granville municipality in Normandy is the biggest shellfish producing area in France, with more than 10 000 people harvesting shellfish recreationally on the tideland

MEASUREMENTS LEAD TO FRESH INSIGHT

The success or failure of the project would be based firmly on scientific measurements. To this end, more than 1 500 samples were taken to assess pollution loads, measuring continuous flow in nine rivers and sea water quality and velocity. From these measurements, the importance of short-term rainfall forecasts to pollution load became apparent.

Point and diffuse sources of pollution were identified, with the most significant found to be inland pasturing, followed by sewer overflow and salt marsh grazing.

Data gathered were used to model pollution risks as a function of weather and sea conditions. The MARECLEAN team developed both a watershed load model (MAREFLUX) and a sea dispersion model (MARS).

The project developed four transferrable decision-support tools:

1. A tool for management of pumping stations overflow (this included a map of the potential impact of overflows at different pumping stations and the critical duration of overflows at different points, so that repairs can be prioritised);
2. A tool for management of beach closures (the SAERS decision support system includes 32 scenarios for wet weather and 72 scenarios for infrastructure failures in dry weather);
3. A tool for prioritising investment in pumping stations (based on technical status and critical overflow duration); and

4. A tool for prioritising the protection of river banks (based on the state of the riverbank and the critical load).

In addition, MARECLEAN created and tested a transferable pollution reduction tool for real-time sewer management to prevent beach pollution. The tool is based on the principles of making full use of storage capacities and engaging in preferential discharge to less sensitive areas. The method used to achieve this is to command pumping according to storage status and the immediate rainfall forecast.

The project has also demonstrated to administrators the benefit of risk management for reducing water protection costs and has shown the importance of agricultural sources of pollution.

The decision-support tools can be used by water quality professionals elsewhere in the EU (particularly in tidal areas bordering the Atlantic and North Sea) for conducting risk assessments of faecal pollution in coastal areas, creating a local consensus on solutions and optimising environmental and economic benefits.

LESSONS FROM THE PROJECT

Georges Pottecher, research manager with (project partner) Groupe IRH Environnement told conference delegates that "MARECLEAN has demonstrated to administrations the benefit of risk management for reducing water protection costs. It has also shown the importance of agricultural sources (of pollution)."

Despite its successes, he identified three areas in which the project would have done things differently:

1. Partnership (by taking agricultural issues and stakeholders into account from the start);
2. Method (by putting more emphasis on source tracking); and
3. Communication (by better explaining the importance of modelling for evaluating progress in the state of the environment).

Mr. Pottecher added that it is important to include a stakeholder in any project who will take actions after LIFE. He also pointed to a 'weak coupling' between the LIFE programme and national governments. "Government services have to be aware that they can use LIFE."

There are also lessons from MARECLEAN relevant to the implementation of the Marine Strategy Framework Directive (MSFD), believes Mr. Pottecher. "Firstly, the economic value of water is a powerful driver for action; secondly, remedies to microbial pollution can be complex and require years to solve; thirdly, coastal river basins must be involved in decision-making and in funding."



FRANCE

Project number: LIFE06 ENV/F/000136

Title: Risk based reduction of microbial pollution discharge of coastal waters

Beneficiary: Syndicat mixte des Bassins Versants des Côtiers Granvillais (SMBCG)

Period: Oct-2006 to Dec-2009

Total budget: €1 569 000

LIFE contribution: €783 000

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United Kingdom: **Managed realignment** in coastal estuaries

This UK LIFE project was established to provide guidelines that will ensure that managed realignment schemes across the EU help to achieve the objectives of the Water Framework Directive (WFD).



Managed realignment in estuaries (also known as 'retreat' or 'setback', whereby sea walls are breached or neglected to allow land to become intertidal) is a favoured option for flood defence, as well as for replacing lost intertidal habitats. An increase in managed realignment is expected throughout Europe as a result of climate change and associated sea level rise.

Currently, guidelines are lacking to ensure that managed realignments help to achieve the objectives of the WFD while respecting the requirements of the Birds and Habitats directives. To bridge this gap, the UK's Environment Agency set up a LIFE Environment

project which has undertaken a critical review of the background, drivers, governance, design, implementation, management and monitoring arrangements at existing managed realignment sites in Europe, assessing similarities and differences within overall approaches.

In partnership with managers of realignments in estuaries, the project aimed to determine methods necessary to promote a good status of transitional waters. It also set out to develop and disseminate guidelines for experts creating and managing realignment. Another aspect of the project was an assessment of how managed realignments affect estuary ecology and hydro-morphology as a whole.

PROJECT ACTIONS

Following an initial meeting with a small team of British, Dutch and Belgian specialists in November 2007, a review was carried out to identify existing monitoring at 50 sites with a view to selecting potential demonstration sites for the LIFE project. Sixteen sites were chosen as being potentially suitable, with seven of the nine sites that responded eventually selected as suitable.

However, in the course of the project, the beneficiary found that many of the sites in other Member States (e.g. Belgium and the Netherlands) were not suitable, and either did not have a long enough history of detailed monitoring, or had a





monitoring programme that it was not possible to amend.

As a result, the project limited its monitoring work to two sites on Humberside: Paull Holme Strays and Alkborough. The Alkborough monitoring programme was designed by the project's Humberside monitoring working group and undertaken by the external consultant, IECS (University of Hull). IECS also produced a best practice monitoring report. The Paull Holme Strays monitoring programme, which had already been in place for five years, was reviewed and amended in light of the LIFE project.

KEY LESSONS FROM LIFE

Project Manager John Pygott has identified a number of key lessons for managed realignment projects that can be drawn from the experience of the MR Mo ToWFO LIFE project. Firstly, he says, understanding of the legal and policy drivers across Member States was not clearly established. "Better understanding of governance structures and roles would have been useful." He also pointed to difficulties in accessing future plans and strategies. "Established networks of practitioners would have helped the process."

He also noted that the long timescale for implementation and monitoring of sites led to significant problems. "Monitoring was not flexible and could not easily address new requirements," says Mr. Pygott.



Work on the Alkborough site helped determine the rate of invertebrate colonisation of new intertidal mud

Challenges for the project included the existence of very diverse governance structures and policy drivers and the fact that there are relatively few MR sites and these are concentrated in a handful of Member States. "Original objectives for site implementation were not always clear," explains Mr. Pygott. "There was great variation in all aspects of the processes that led to site implementation. Furthermore, little monitoring work has taken place on most of the sites we identified."

For Mr. Pygott, future guidance needs to be specifically targeted towards policymakers, stakeholders and practitioners. "The debate about giving land back to the sea and to estuaries has moved on," he explains, citing greater concerns

about, for instance, food security. "This means in future it will be more difficult to do similar work."

On the positive side, a good 'informal network' has been created with organisations in the UK, Belgium, The Netherlands and Germany, with good exchange of monitoring information. "I'd like to think that the network of stakeholders and practitioners that we've developed will persist in the future," says Mr. Pygott.

Sampling staff on site at the Alkborough realignment site, used a small hovercraft to access the mudflats



UNITED KINGDOM

Project number: LIFE06 ENV/UK/000401

Title: Managed Realignment Moving Towards Water Framework Objectives

Beneficiary: The Environment Agency

Period: Oct-2006 to Dec-2009

Total budget: €898 000

LIFE contribution: €417 000

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Reducing eutrophication

Run off of nutrients from agriculture and sewage treatment is the primary cause of eutrophication, a threat not only to water bodies but to animal and human health as well. Tools such as the Water Framework Directive provide a means of addressing this problem in a co-ordinated manner. To date, more than 40 LIFE projects have tackled eutrophication issues. Three of those projects are featured in this section.



Eutrophication: **setting the scene for nutrient reduction**

The European Union has been implementing measures concerned with nitrogen pollution in waters for more than 20 years. While initial directives mainly dealt with water for human consumption, more recent directives, such as those on nitrates from agricultural sources and urban waste water treatment have placed increased emphasis on the harmful environmental effects of excess nutrients, in particular eutrophication.

Eutrophication occurs when water bodies, in particular lakes and coastal waters, but also rivers, receive an excess of nutrients (nitrogen and phosphorous) that stimulate excessive plant growth commonly known as 'algal bloom'. The decomposition of the plants depletes the supply of oxygen, threatening animal and human health. The primary cause is run off from the land of nutrients from agriculture or sewage treatment. Problems linked with eutrophication – algal blooms (red tide¹, green tide²), fish kill³ etc – are found in some 40% of European rivers and lakes; and in the North, Baltic and Black seas and significant parts of the Mediterranean Sea. Attempts to reverse the process are usually difficult and expensive.

The Urban Waste Water Treatment Directive (UWWTD) requires countries to invest in infrastructure for collecting and treating sewage in urban areas. The Nitrates Directive requires farmers to control the amounts of nitrogen fertilisers applied to fields. Both directives were adopted in 1991 and are already contributing to improvements in water quality. In 2000,

¹ Blooms of a certain algae-like species that colour the water of seas or estuaries red. These result in toxins e.g. in shellfish, which can be poisonous if eaten by humans. action in the field of water policy.

² Invasive algae, *Caulerpa brachypus*, spread rapidly in high nutrient waters and reduce oxygen for fish.

³ The term 'fish kill' refers to a localised die-off of aquatic life.



WHAT IS EUTROPHICATION?

"...the enrichment of water by nutrients, especially compounds of nitrogen and/or phosphorus, causing an accelerated growth of algae and higher forms of plant life to produce an undesirable disturbance to the balance of organisms present in the water and to the quality of the water concerned."

Source: UWWTD Directive – [cf. Art. 2 (11)]

the EU adopted the Water Framework Directive (WFD), which is also aiming at the enhanced protection and improvement of the aquatic environment, through specific measures for the progressive reduction of discharges from point sources⁴, but also emissions and losses

from diffuse sources⁵. A key element of the WFD is the river basin management approach.

Thanks to these and other policies, the past decade has seen significant

⁵ Discharge of pollutants from widespread activities with no specific point of discharge, such as from natural areas and agricultural land, losses from paved areas, etc.

⁴ Discharge of pollutants from a specific point such as industrial effluent, fish farms etc.

Eutrophication of the Baltic Sea



Cyanobacterial blooms in the Baltic Sea
MODIS AQUA 2005-07-11, data from NASA
processed by SMHI



Photo: Lynn Betts

Run-off from agricultural land is the principal source of nitrogen pollution, contributing to 50-80% of the total load in European waters

progress in treating the sewage and industrial wastes that are being emitted into Europe's rivers, resulting in lower loads of organic waste and phosphorous nutrients, and a measurable improvement in water quality. Yet, regions with low population densities are still looking for cost-efficient and appropriate treatment to meet the relevant quality objectives. In addition, the agricultural sector has not made as

much progress. Diffuse pollution from fertiliser and livestock effluent still has a substantial negative impact. According to the EEA⁶, run off from agricultural land is the principal source of nitrogen pollution in European waters – contributing to 50-80% of the total load, a figure that has remained unchanged over the last 30 years.

⁶ EEA Outlook/ 2007

As stated by Director for Water, Chemicals and Biotechnology, DG Environment, Gustaaf Borchardt, in his keynote speech at the water conference: "Eutrophication is a clear pollution problem where inland and marine waters have to be managed in a co-ordinated way when addressing this problem." The necessary tools are in place, he said, adding that the challenge for water policy today is to identify the best ways of implementing them.

Eutrophication of European waters has significantly reduced thanks to EU policies on treating sewage and industrial wastes



Photo: jumpingspider

COMBATING EUTROPHICATION

The eutrophication session of the conference examined the different techniques, methods and approaches contributing to the decrease of eutrophication and the establishment of "good ecological status" of water by 2015. Participants heard how the WFD, the Marine Strategy Framework Directive (MSFD) and the earlier nitrates and urban wastewater treatment directives provide the overall policy framework for reducing eutrophication from point and diffuse sources.

● Key principles

According to Dr Ursula Schmedtje (DG Environment, Water Unit), some of the key principles of the WFD include: the overarching goals of protecting all



waters (surface and ground) and all impacts; the river basin approach to water management; and mandatory public participation in developing river basin management plans. Dr Schmedtje believes the directive is “ambitious and legally binding and enforceable on environmental ‘good status’ objectives, flexible on paths/tools to achieve these objectives.”

Participants were reminded of the key milestones, notably the end of 2009 deadline for Member States to finalise and publish their river basin management plans and to start the programme of mitigation measures, to be operational by the end of 2012.

● Political will

Pieter de Pous, Water Policy Officer for the NGO, the European Environmental Bureau (EEB), acknowledges that effective measures against nutrients were generally well known. However, he said very generous use of exemptions and a lack of clarity about the scope of the measures were a major cause of concern: “Dealing with eutrophication is largely a matter of political will and choice,” he says.

● Policy gaps

Prof Anna-Stiina Heiskanen, research



NITRATES DIRECTIVE: FARM MEASURES TO REDUCE EXCESS NITROGEN

- Crop rotations, soil winter cover, catch crops, in order to limit leaching during the wet seasons.
- Use of fertilisers and manure, with a balance between crop needs, nitrogen (N) inputs and soil supply, frequent manure and soil analysis, mandatory fertilisation plans and general limitations per crop for both mineral and organic N fertilisation.
- Appropriate N spreading calendars and sufficient manure storage, for availability only when the crop needs nutrients, and good spreading practices.
- ‘Buffer’ effect of non-fertilised grass strips and hedges along water-courses and ditches.
- Good management and restriction of cultivation on steeply sloping soils, and of irrigation.
- Diffuse pollution from fertiliser and livestock effluent

manager for the Finnish Environment Institute – and head of a research programme on eutrophication assessment and management of the Baltic Sea – identifies the following “gaps between policies” concerning eutrophication:

- Air quality – atmospheric deposition of nutrients;
- Natura 2000 – eutrophication impacts on aquatic biodiversity;

- Common Agricultural Policy (CAP) and effective implementation of agri-environmental schemes;
- Common Fisheries Policy (CFP) – impacts on aquatic food chain susceptibility for eutrophication.

She also highlights “gaps in technology”. There are plenty of nutrient reduction techniques available for all industrial sectors and urban settlements, she believes, adding that there is also a need for cost-efficiency and cost-benefit analyses of these measures. Other challenges include a lack of public awareness and political willingness. “What would be the consequences of life-style changes of urban populations?” she asks, citing for example, less consumption of meat, which would mean less nitrogen, resulting in a lower carbon footprint.

Finally, Prof Heiskanen says that there is “room for improvement” in water quality monitoring. In particular, she notes requirements for impact assessment and an ecosystem approach; and long-term monitoring of sites to establish the impact of climate change versus the restoration effects on ecosystems. Key lessons learned include the effectiveness of environmental conservation measures and the role of the LIFE programme in supporting effective conservation and disseminating best practices for ecosystem restoration.

Problems linked with eutrophication, such as algal blooms, are found in some 40% of European rivers and lakes, in the North, Baltic and Black seas and significant parts of the Mediterranean Sea



Photo: Mikael Albrecht



Photo: splorp

Learning from LIFE

More than 40 LIFE projects have been implemented across Europe addressing the causes and sources of eutrophication of European waters – helping to contribute to the main WFD objective of achieving good water quality by 2015.

The LIFE project examples presented at the eutrophication session of the Brussels conference – from Denmark, Germany and Estonia – showed several effective methods for tackling eutrophication caused by agriculture and small municipalities. They demonstrated that the remaining nutrient sources and the resulting eutrophication problems should be addressed with tailored and cost-effective solutions in order to be acceptable at the local level. Consequently, LIFE actions at a local scale are necessary.

COLLABORATION

LIFE supports a collaborative approach bringing together the various stakeholders in order to focus on the main problems and to work to find common solutions. The LIFE programme has also played an important role as a multiplier of project results – encouraging transferable outcomes from projects, via networking and dissemination of results and helping

to raise awareness of eutrophication risks among decision-makers.

However, more lateral EU level collaboration among the European countries is needed in order to share experiences more widely. For example, a key lesson learned was that the best practice outcomes should be better disseminated to avoid duplication and to better implement environmental policies.

The LIFE programme has played an important role in implementing actions addressing existing EU water policy legislation (for example, the nitrates and urban wastewater directives etc). LIFE+ projects can continue to contribute towards reducing eutrophication in inland, transitional and coastal waters. The main priority areas of action are:

- Implementing the programme of measures drafted under the first river basin management plans for the WFD (due by the end of 2009);

- Integrating measures from existing EU water directives.

However, there was general agreement at the conference that LIFE+ projects also need to better reflect cross-cutting issues with measures to implement inter-linked

Speakers at the Eutrophication session of the Water for life - LIFE for water conference



Photo: Gabriella Camarasa



EU directives. This would help to address certain “gaps between policies” also referred to by Prof Anna-Stiina Heiskanen in the previous section.

Dr Violeta Vinceviciene says “synergies and integrated measures” should be strengthened and continuously enhanced in future LIFE+ projects between:

- Water and agriculture policy (examples include the Common Agricultural Policy (CAP) and effective implementation of agri-environmental schemes and implementing the Nitrates Directive);
- Water and biodiversity (for example, on protected Natura 2000 sites and with reference to the EU habitats and birds directives).

LIFE+ FUTURE RECOMMENDATIONS

A series of general recommendations were made concerning future LIFE+ projects and eutrophication issues:

- LIFE experiences and lessons have highlighted the need to link and integrate the WFD programme of measures with other EU policy implementation measures, especially addressing measures on cross-cutting issues in protected areas. There is clearly a need to go beyond the obvious implementation of WFD water policies, such as the nitrates and urban wastewater treatment directives, as those are only “absolute minimum measures” to be taken to achieve goals of good ecological status in surface waters by 2015;
- Future LIFE+ projects need to address: (1) the implementation of actions reported in the programme of measures of the river basis management plans for the WFD to combat eutrophication; (2) measures to reduce eutrophication of European seas – fulfilling goals of the Marine Strategy Framework Directive and achieving good ecological status by 2020; and (3) measures to combat eutrophication linked with the implementation of the Floods Directive (2007/60/EC);
- There is a need to enhance and increase an EU-wide database of good practices and proposals to support the implementation of the programme of measures of the river basis management plans for the WFD in a structured way;



LESSONS FROM LIFE

Co-operation and strong stakeholder involvement in measures to

reduce eutrophication linked with farming were crucial to the success of two of the LIFE project best practice case studies presented during the eutrophication session of the water conference.

Germany's WagriCo project (**LIFE05 ENV/D/000182**) illustrated new participation methods and technologies for reducing diffuse pollution from farms and strengthening water management capacity; while Denmark's **AGWAPLAN** project (**LIFE05 ENV/DK/000155**) showed how good agricultural practices and new integrated advisory services have combined with positive results to help reduce eutrophication in Danish watercourses.

Meanwhile, a third LIFE project showcased at the eutrophication session was Estonia's Estwaste project (**LIFE00 ENV/EE/000924**) demonstrating cost-effective and sustainable solutions for wastewater purification in Estonian small municipalities.

- LIFE+ co-funding for environment policy and governance could be linked with the programme's information and communication component and used to strengthen the use of project results and of project outcomes showing economic benefit and cost-effectiveness of measures; and to strengthen the dissemination of information on LIFE projects and their results in order to reach the different stakeholders and decision-makers at EU, regional, and local levels. One way of achieving this would be by creating an online EU-wide

internet portal for information of results on best practices for the implementation of EU water policies. For example, as an additional element of WISE – the EU's Water Information System web portal¹. Other initiatives could include disseminating project information via user networks, partnerships and electronic publications, and by various other means including workshops, seminars and broadcast media.

¹ <http://water.europa.eu/en/welcome>

LIFE projects have demonstrated how strong stakeholder involvement from the farming sector has helped adopt measures to reduce eutrophication





Denmark: LIFE addresses agricultural eutrophication

Good agricultural practices and new integrated advisory services have been combined with positive results by the LIFE AGWAPLAN project to help reduce eutrophication risks in Danish watercourses.

Water quality levels in many Danish lakes and rivers have been recorded at levels below the standards anticipated by the Water Framework Directive (WFD). For example, previous assessments by regional authorities found that only around 12% of lakes sampled were considered to have acceptable water quality conditions and approximately half of the streams analysed could not meet the authorities' required quality goals. Eutrophication linked with agriculture was judged to be a major contributory factor to the poor water conditions and LIFE funds were used to demonstrate how farm-led action can help improve the quality of Danish water resources.

Led by the project beneficiary, the Danish Agricultural Advisory Service¹, the LIFE AGWAPLAN (LIFE05 ENV/DK/000155) project demonstrated and quantified the impact of good agricultural practices (GAPs) on reducing nutrient content on surface and groundwater in three different pilot areas in eastern Jutland. This integrated approach was based on the participation of farmers, environmental authorities and agricultural advisors and researchers. It showed how farmers can work together with advisory services and municipalities to implement WFD objectives within a collaborative framework.

¹ Danish Agricultural Advisory Service – a non profit-making association representing around 80% of the country's farmers

Core aspects of the project involved demonstrating the potential of integrated approaches, and incorporating various targeted good agricultural practices for reducing eutrophication levels. These GAPs were developed by the LIFE project team through an extensive research exercise that brought together all available environmental knowledge relating to agri-eutrophication within a comprehensive GAP manual for farmers. Preparation of the manual covered a full range of Danish farm activities and took account of important commercial factors concerning productivity gains or losses from the different GAPs.

Following collation of the proposed GAPs, the AGWAPLAN project then tested its hypotheses in the three different pilot sites. Located relatively close

together in eastern Jutland, the areas were selected to provide comparative farm-based results and also allowed modelling of potential impacts on nitrogen (N) and phosphorous (P) levels in watercourses over a larger catchment scale. Each of the sites was carefully investigated to identify baseline data regarding eutrophication levels and associated use of farm fertilisers.

FARMER PARTICIPATION

Pilot versions of the GAP guidance were applied in practice on the test farms using the project's 'Integrated Advisory system'. This novel agri-advisory tool helped facilitate an agreed eutrophication management plan for each farm. The planning process proved particularly popular with farmers since it afforded equal priority to their eco-

The AGWAPLAN project quantified the impact of good agricultural practices on reducing nutrient content on surface and groundwater





In the Norsminde Fjord area a 20-25% reduction of total nitrogen leaching was achieved at farm level

nomic objectives and balanced business efficiency requirements against water quality aspirations.

Presenting the project findings at the eutrophication session of the conference, Project Manager, Irene Wiborg, a specialist advisor to the Danish Agricultural Advisory Service, said the project was "well received" in the project areas by farmers as well as the other stakeholders. One of the key findings, she says, is that "co-operation between the agricultural and the environmental sector is needed towards the implementation of the WFD."

Results from the pilots showed the farmers have reduced leaching of nutrients to a certain extent. For example, in one of the areas, Norsminde Fjord, it has been calculated that a 20-25% reduction at farm level of total N leaching was achieved. Ms Wiborg said this was a preliminary result, and eventual reductions of 50% are targeted under the WFD. Furthermore, she said the project had provided a platform for finding solutions at catchment level.

The reduction in N-leaching was achieved using integrated advising and the project's GAP advice (examples included using ammonium instead of

nitrate fertiliser, early sowing of winter cereals, catch crops, spring ploughing of grasslands, constructed wetlands etc).

However, the project findings also demonstrated that the WFD environmental goals could not be met in all places through voluntary initiatives. Farms and farming systems vary considerably between areas, as do the environmental challenges faced. The AGWAPLAN approach focused on making local, i.e. farm level, aspirations a central part in the process towards achieving the WFD objectives. The project concluded that in some places there may be a need for "additional measures" in order to reduce the leaching risk.

CHALLENGES

Two key questions were highlighted at the conference:

1. Is there sufficient knowledge and support in the EU to enable the AGWAPLAN integrated advisory system approach to be used at farm and catchment level?
2. Are the environmental authorities, and farmers themselves, prepared to invest in this integrated approach in order to find targeted methods for the implementation of the WFD and the Natura 2000 network?



Example of N reduction on farm level by using integrated advising and GAP manual

38 ha placed fertilizer x 1kg N/ha	= 38 kg N
162 ha ammonium instead of nitrate x 6 kg N/ha	= 972 kg N
57 ha early sowing of winter cereals x 4 kg N/ha	= 228 kg N
38 ha with catch crops x 25 kg N/ha	= 950 kg N
7 ha spring plowing of grassland x 37,5 kg N/ha	= 263 kg N
Farm level reduction (26 % of total N leaching)	2.451 kg N
A special constructed small wetland	xxxx kg N

Water for life - LIFE for Water
14-15 October 2009, Brussels



DENMARK

Project number: LIFE05 ENV/DK/000155

Title: Integrated Protection of Surface and Groundwater in Agricultural Regions

Beneficiary: Danish Agricultural Advisory Service, National Centre

Period: Nov-2005 to Mar-2009

Total budget: €1 982 000

LIFE contribution: €991 000

Website: www.agwaplan.dk

Contact: Irene Asta Wiborg

Email: iaw@landscenret.dk

Germany: Stakeholder participation key to reducing nitrogen pollution from farming

Strong stakeholder participation is the key to successful implementation of the Water Framework Directive. This was one of the main findings of an international participatory project targeting improvements in water quality by a reduction of diffuse pollution resulting from agriculture.

The LIFE WagriCo project (Water resources management in Co-operation with agriculture) concluded that with the support of farmers, selected measures can “considerably improve” the problem of nutrient leachate into groundwater and run-off from agricultural land. But the target levels of 50 mg per litre of nitrate in the groundwater - the limits set under the associated directive of the WFD, the Nitrates Directive – cannot be achieved in all areas.

Six pilot sites were selected to reduce diffuse pollution from agriculture and to promote sustainable water resource management. Three of the sites were in Lower Saxony, Germany and three in the South-West of England, and all were in important agricultural zones where intensive use of fertilisers and to some extent pesticides have resulted in a high level of groundwater pollution. In some areas, the nitrate concentration can reach 200 mg per litre. In Lower Saxony for example, approximately 60% of groundwater bodies are polluted with nitrate. Areas of farmland in England face similar problems and urgent action is needed to bring them into line with the requirements of the WFD.

The three-year project was managed by project beneficiary *Niedersächsischer Landesbetrieb für Wasserwirtschaft, Küsten- und Naturschutz* – now the Lower Saxony water management, coastal defence and nature conservation agency. It brought together a number of

stakeholders in both countries encouraging the active participation and support of local farmers and their unions and other project partners (agricultural researchers, environmental agencies and authorities and consultancies).

TARGET AREAS AND TESTING OF MEASURES

Not every area needs the same groundwater protection. The project therefore focused on pedologically sensitive areas where, according to calculation models, the leaching of nitrates and pesticides into soil seepage water is highest. Tar-

geting of these priority areas, mainly arable lands and high livestock density, was considered to be more effective than adopting a broad spread approach.

A list of measures for “results-oriented” water protection was then drawn up for the sites by the project partners in talks with local farmers. These innovative measures (see box) – supporting improvements in nitrogen efficiency at farm-level – were then tested on the pilot areas in co-operation with the farmers. For example, better fertiliser management, provided by the WagriCo farm consultancy service, can reduce nitrogen

Better fertiliser management, provided by the WagriCo farm consultancy service, reduced nitrogen excess on farms by 20-40 kg/ha





LESSONS FROM LIFE

Co-operation and strong stakeholder involvement in these measures:

Catch crops – sown in the early autumn after the grain harvest remove surplus nitrate from the soil, preserve it through winter, do not pollute the seepage water and then release the ‘rescued nitrogen’ with a fertilising effect on the following crop.

Greening of fallow land – provides similar protection, but over longer periods. It is much more expensive because of the loss of crops.

Close sowing of maize – results in better use of nutrients and water in the soil i.e. makes better use of the fertiliser applied.

No tilling in autumn – inhibits nitrogen release from plant residues from the preceding crop and from the soil humus store.

Accurate slurry application with specific techniques – for liquid organic manure, ensures low-loss application and contributes to substantial improvements in efficiency.

No slurry application in autumn – except for catch crops and rape, because all other crops can no longer make sufficient use of this slurry.

excess on farms by 20 to 40 kg/ha. The team also carried out an agro-economic analysis to assess the impact of the measures and to check their integration into the agri-environmental schemes that are a component of river basin management within the framework of the implementation of the WFD.

Different modelling systems were tested in order to compare estimated reductions with actual reductions. The conclusion was that selected results-oriented measures can improve the nitrate problem substantially – i.e. estimated reductions in nitrogen in the range of 10-15 kg /ha on average. Cost assessments for large-scale programmes of water protection measures were also carried out. These showed that agricultural assistance pro-

grammes can be amended to support the implementation of the WFD and that these measures could increase efficiency, thereby reducing overall costs.

The project also concluded that the target of 50 mg per litre in the groundwater cannot be achieved in every target area. In areas with high agricultural activity, only 15-30% of the targeted reduction in nitrogen levels can be achieved by conventional measures in Germany and less in the UK (5%-15%).

CONSIDERABLE N-REDUCTIONS

Presenting the WagriCo findings in Brussels, Technical Project Co-ordinator, Hubertus Schültken explained that

The WagriCo project concluded that with the support of farmers, selected measures can considerably improve nutrient leachate into groundwater



“considerable nitrogen reductions” had been shown by the application of the project’s ecological and cost-effective measures. But, he adds: “Reduction targets are not achievable by these measures alone and need to be supported by qualified consultancy services and efficient impact monitoring.” Other conclusions are that administrative constraints had a strong impact on the acceptance or otherwise of the measures; and strong stakeholder participation is crucial to the successful implementation of the WFD.

Mr Schültken believes the LIFE programme has provided invaluable support for this complex international project – encouraging Member States (via co-financing) to find national and international partners to work together to find common solutions to combat this major environmental problem. LIFE has also supported the national and international exchange of experts and stakeholders and contributed to a better mutual understanding of these complex issues.



GERMANY

Project number: LIFE05 ENV/D/000182

Title: Water Resources Management in Cooperation with Agriculture. Compilation and Implementation of Integrative Programmes of Measures According to the WFD to Reduce Diffuse Pollution from Agriculture

Beneficiary: Niedersächsischer Landesbetrieb für Wasserwirtschaft, Küsten- und Naturschutz – now the Lower Saxony water management, coastal defence and nature conservation agency

Period: Oct-2005 to Sept-2008

Total budget: €6 896 000

LIFE contribution: €3 448 000

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Estonia: **Sustainable and cost-effective solutions for cleaner water**

Successful Estwaste project trials demonstrated, for the first time in Estonia, the use of vegetation filters to treat municipal wastewater in two small rural communities. The methodology is of value to other small, rural municipalities in developing regions. It offers a sustainable and cost-effective solution to improving water quality and preventing or reducing eutrophication risk.

Following the collapse of the Soviet Union, most of the wastewater treatment systems in Estonian small municipalities (mainly rural communities) have been left without care and their purification has decreased so that currently the majority don't work effectively, if at all. The nitrogen (N) and phosphorus (P) content that is discharged as pollutants into the lakes and rivers present a serious environmental problem, not only in Estonia but also in neighbouring countries.

Water purification systems in Estonia have to be improved over the next few years to bring them in line with existing EU water quality standards and to meet

the requirements of the WFD. Wastewater treatment systems using vegetation filters offer a sustainable and potentially cost-effective solution: Aside from their efficient use of natural resources, this method is potentially cheaper than conventional chemical wastewater purification systems – a factor that makes it particularly attractive to small rural municipalities – many of which are struggling to fund the required water quality improvements. The vegetation can also be used for biomass production, providing a local renewable energy source.

The main aims of the LIFE Estwaste project were to design and build three

alternative wastewater treatment systems in two Estonian rural communities; and to present this innovative (for Estonia) and sustainable method as a way of solving local environmental and energy supply problems.

The project was run by the Estonian Agricultural University (EAU), the beneficiary, in partnership with the two rural communities, Kadrina in northern Estonia, covering the villages of Kihlevere and Vohnja; and Kambja in the south of the country. Estwaste achieved its objectives: the three pilot waste water treatment plants (WTTs) are functional and their future sustainability has been secured. In the



prototypes, the water quality in the out-flow meets the limits set for nitrogen and phosphorus according to national legislation - 15 mg N and 2 mg P per litre.

BEST PRACTICES

At the water conference, EAU project manager, Dr Katrin Heinsoo highlighted the benefits to small rural communities (i.e. those with a population of less than 1 000) and said the “comparatively cheap” technology (prototypes) could be successfully applied to other developing countries, although specific issues would need to be resolved on a case-by-case basis.

She noted that a key innovation was the use of willow cuttings (c. 20 cm) as vegetation filters (alders and poplars were also tested). The fast-growing short rotation willow plantations, mainly *Salix viminalis* and *S. dasyclados* clones, proved well-adapted to Estonian weather conditions. As well as representing a more efficient use of natural resources, this averted the costly second and third (aeration and chemical removal) stages of conventional treatment plants and would allow

Senior researcher Krõõt Aasmaa (Estonian University of Life Sciences) among the willow plantations that were used as vegetation filters



The Estwase project used vegetation filters to treat municipal wastewater in two small rural communities

small communities – with suitable locations for the plantations such as abandoned agricultural land nearby – to operate their wastewater purification systems more cost-effectively.

Other benefits highlighted at the conference included:

- Construction costs are in the same range as for conventional plants, but the running costs are much lower;
- There are no electricity costs for the second stage purification/aeration;
- Decreased costs for municipal sludge use; and
- Added value by increased biomass production.

CHALLENGES

Dr Heinsoo added that the LIFE programme was an “excellent tool” for this kind of demonstration project. However, she noted that implementing the project as an EU candidate country (Estonia became a member of the EU in the spring of 2004), was difficult because of factors unforeseen at the start of the project, such as a period of rapid inflation, VAT and other legislative changes. She called for more co-ordinated support, especially at the early stage of project implementation – for example for the creation of local, regional or general ‘round-table’ discussions with other LIFE projects to avoid possible project management mistakes that would be more difficult to correct at later stages of a project, as well as more support from desk officers and the LIFE

Monitoring Team during the latter stages of creating a project proposal. She also called for better information and dissemination of project findings (ongoing as well as closed) from the EU, for the new Member States.

Meanwhile, the project beneficiary is continuing its dissemination activities aimed at various target groups (e.g. environmental authorities; national policy-makers; international networking especially within the academic community; and local education establishments). Research and development is also continuing after-LIFE.



ESTONIA

Project number: LIFE00 ENV/EE/000924

Title: Sustainable wastewater purification in Estonian small municipalities

Beneficiary: Eesti Pollumajandusuelikool (Estonian Agricultural University)

Period: Jan-2002 to Dec-2005

Total budget: €711 000

LIFE contribution: €325 000

Website: www.zbi.ee/life

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Email: katrin.heinsoo@emu.ee

CONFERENCES

CONFERENCE

Water for life - LIFE for water



Brussels,
14-15 October 2009

Closing speech from the conference

SOLEDAD BLANCO



Photo: Michèle Luschi

Soledad Blanco, Director of International Affairs, DG Environment provided the concluding address at the 'Water for life - LIFE for water' conference. Ms. Blanco highlighted some of the conclusions from the individual sessions of the conference, the successes of the LIFE programme and the ways in which LIFE can be improved in years to come.

As the papers prepared have underlined, the EU believes that there are many untapped opportunities to save water and to encourage the reuse and sustainable management of water resources. Having this in mind and in recognising the importance of water, the EU has put in place several directives aimed at protecting it and guaranteeing its conservation for future generations, most notably the Water Framework Directive (WFD) and the Marine Strategy Framework Directive (MSFD).

LIFE projects make a useful contribution to the implementation of EU water policy through financing pilot projects that develop new technologies to improve water quality or demonstrate the technical feasibility of solutions. Moreover, LIFE projects increase awareness of environmental problems and solutions and the management capacity of various stakeholders.

The title of this conference – "Water for life - LIFE for water" – very plainly states the importance of water to our society, its environment and economy. Through this title we also of course highlight the importance of water-related projects to the LIFE+ programme and their role in supporting the EU's water-related policies. Indeed, both the opening and closing keynote addresses have covered the role of water policy in addressing the water challenge from the perspective of the European Commission.

The four main sessions (see boxes) clearly demonstrate the sheer breadth of water-related issues and their inherent complexity. Yet they also demonstrate that LIFE projects can offer practical and proven ways to overcome this variety of challenges and as such we can be satisfied by what has been achieved through the LIFE programme. Water is one of the 12 priority thematic areas under LIFE+, it is also one of the areas where the European Commission has funded most projects in the past: nearly 200 projects in 18 countries were funded on this theme from 1996 to 2006 out of a total of 1 076 LIFE Environment projects.

KEY OUTCOMES OF THE CONFERENCE

Outcomes are the end result or the consequence of some activity, and

often results or consequences can only be seen in the long-term. But for now I believe that this conference has several key outcomes that we can be sure of:

- Firstly - We have successfully highlighted the outstanding achievements (approaches, techniques, governance and collaboration issues) of LIFE supported projects in the area of water protection and sustainable water use; we can confidently say that eco-innovation is the key word for most of the LIFE projects, and not only on water issues;
- Secondly - The debate and discussion have helped to point out how such approaches can be valuable for the various water challenges we face and how they can be transferred elsewhere;
- And thirdly - By identifying the most pressing actions and projects that are needed now – and how they may be



Photo: Justin Toland

integrated into various water-related directives – important new directions for both policy-making and project preparation have been revealed.

Many of the projects significantly contributed to policy implementation and many new ideas will be used for the implementation of the new Marine Strategy Framework Directive. Our hope is that many future LIFE projects will contribute to the solution of the water challenges by building on the excellent results obtained up to now.

IMPROVING LIFE

Next to the positive examples, there are areas where the Commission already knows that there are possibilities for improvement, such as:

- Making the LIFE programme more widely known to potential applicants. This can be done through classical face-to-face communication; through greater motivation of the national contact points; and through both traditional media (e.g. newspaper adverts) and online (e.g. video clips on EU-tube);
- Simplifying the application process in order to allow more proposals to be selected. This can be done by constantly reviewing and updating the application material, and through rejecting fewer projects for formal reasons. We also need to talk more with the Member States as they play a great role in communicating the eligibility criteria to applicants. Furthermore, enriching our database and thematic publications with more concrete

Photo: Giuseppe Quattrone



LIFE projects should build on the excellent results obtained and contribute further to solving challenges in water issues

project examples can act as a catalyst, inspiring other possible applicants;

- Better monitoring of on-going projects should make reporting requirements less onerous and encourage more networking among projects;
- Dissemination can be at project level through the after-LIFE communication plan; at country level; and at EU level through conferences such as 'Water for life – LIFE for water'. The Commission should also finance more small-scale thematic conferences and generally focus more on dissemination efforts.

The Commission is working to introduce changes in the new LIFE regulation as we know that some ideas cannot be implemented within the current legal framework, LIFE+. Notably, we should strive to have a stronger thematic focus and significantly shorten the selection procedures.

I am particularly convinced that we must find ways to ensure that the achievements of LIFE projects are sustainable; perhaps

one way to do this is by linking them further into supporting the direction of overarching European or national policies. The project examples presented in this conference stand as a model and we will continue to communicate the innovative ideas and results of other LIFE projects that show how the LIFE programme contributes to policy implementation. We also shall strive to identify new directions and future prospects for LIFE+ and how the programme can be better linked with policy implementation. By making information on projects more readily accessible and by transferring experience to other regions with similar problems (spreading the word via conferences and other means) best practices can become widespread.

Therefore the Commission won't rest on its laurels and will look to further develop the responsiveness of the LIFE Programme, by ensuring that it can react to new challenges and support those projects that offer new and practical solutions.

WATER SCARCITY AND CLIMATE CHANGE POLICY CHALLENGES AND NEW DIRECTIONS

- Need for a closer interface between science and policy making;
- Demand-oriented approaches – more changes in basic consumption patterns rather than tools;
- Agriculture: Awareness-raising and public participation of farmers;
- Water and conflicts –need for effective consensus-building participation processes;
- More political support from national authorities. How can the EU help?
- WFD focus on quality; it needs to be adjusted to semi-arid areas/drought conditions;
- Integrate climatic uncertainty into RBMPs and monitoring programmes;
- LIFE/LIFE+ are and have been a "Good factory of ideas and tools";
- Need for more active networking regarding sustainable water management at national and international level - funding should include non-EU member states (e.g. LIFE Third Countries);
- Better strategy for dissemination and transfer of LIFE project results;
- Higher percentage of co-financing needed.



Photo: Mundooc



HYDROMORPHOLOGICAL ALTERATIONS

OUTCOMES, GAPS AND ISSUES FOR DISCUSSION

- Use integrated planning processes from the beginning (engineers and ecologists);
- Establish co-operation networks with stakeholders from various sectors/levels;
- Ensure maintenance of projects related to hydromorphology;
- Look at the river basin in a wider perspective, link to upstream/downstream stretches;
- Link flood protection projects and habitat restoration with improving hydromorphology and water status;
- More active role of the LIFE unit for passing on information and enabling networking;
- Can LIFE help to assess the benefits of river restoration?
- Can LIFE projects help to define the tasks of the national administrations dealing with the WFD?
- Could LIFE projects be used to identify concrete actions for River Basin Management Plans?
- Are there best practice projects for public participation in planning processes?

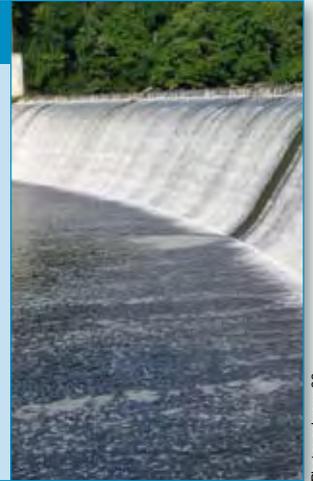


Photo: gsbrown09

MARINE

CONCLUSIONS AND FUTURE CHALLENGES

- Yes, LIFE can! LIFE projects have generated wide knowledge and experience that can serve as direct input for MSFD implementation;
- Experience gained with the WFD and ICZM is of high value for MSFD implementation, but innovation to integrate management of freshwater, coastal and marine water quality is needed;
- Need for a better understanding of economical, legal and policy drivers, and of new methods for more effective governance structures across Member States;
- LIFE is limited to EU countries while the MSFD necessarily requires transboundary collaboration and actions;
- More emphasis and tools for knowledge transfer (LIFE Information & Communication);
- Need for technology-based projects and Nature/Biodiversity projects;
- Need for demonstration projects with production of guidelines and practical tools, applicable at EU level; and
- Crucial importance of stakeholder consultation and involvement.



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EUTROPHICATION

REMAINING GAPS AND OPPORTUNITIES

- Solutions to eutrophication issues should be tailored to local stakeholder expectations and constraints;
- Techniques developed to minimise point source and diffuse pollution should be cost-effective in order to be easily taken up at local level;
- LIFE has helped to implement collaborative platforms that have enhanced partnerships and good practices, but it should facilitate the transfer of best practices between stakeholders and decision-makers at EU, regional, and local levels;
- Increase efficiency in nitrate use in farming through education and information;
- Wastewater treatment facilities for the removal of phosphorous should be more efficient;
- Identify and implement innovative farming measures. Facilitate their integration into the Common Agricultural Policy;
- Link the WFD with other EU policy and legislation, especially addressing measures on cross-cutting issues in protected areas: Nitrates, Urban Waste Water Treatment directives, Natura 2000 (Birds and Habitats directives), etc;
- Opportunities for LIFE Information projects: in disseminating proven and practical methods for ecosystem restoration and strengthening the use of results that demonstrate the economic benefits of such measures.



Photo: Fin Farley

Water for life - LIFE for water: projects poster session

In addition to those we have already featured, more than 30 LIFE projects were invited to take part in a poster session at the 'Water for life - LIFE for water' conference. The posters on display showed the breadth of water-related issues that the LIFE programme has helped to tackle, ranging from waste management plans to the conservation of priority bird species to an educational cartoon for children. The following pages include a selection of projects from the poster session in Brussels.



ES-WAMAR

LIFE06 ENV/E/000044

Environmentally-friendly management of swine waste based on innovative technology: a demonstration project set in Aragón

The project aims to improve the management of swine waste so as to minimise its environmental impact on soil, water and air. An integrated management model able of responding to different locations and circumstances will be developed and demonstrated at three sites in Aragón: Tauste, Maestrazgo and Peñarroya.

<http://www.life-eswamar.eu/>



EnvEurope

LIFE08 ENV/IT/000399

Environmental quality and pressures assessment across Europe: the LTER network as an integrated and shared system for ecosystem monitoring

Building on the FP6 Network of Excellence ALTER-Net, the EnvEurope project aims to provide an integrated management system for ecological data on the status and long-term trends of terrestrial, freshwater and marine ecosystem quality at European and lesser scales. It will supply relevant scientific support to EU environmental policy and conservation plans in an integrated ecosystem approach.



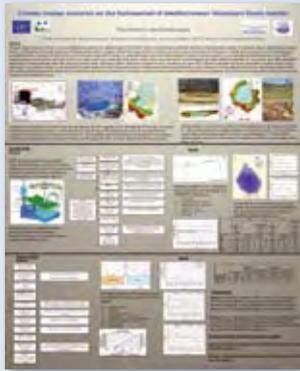
EMMA

LIFE04 ENV/IT/000479

Environmental Management through Monitoring and Modelling of Anoxia

The project developed a fixed monitoring station (E1 buoy) installed in the Adriatic Sea, in order to solves marine dynamics and biogeochemical fluxes, and a Decision Supporting System that supports the administrative and socio-economic subjects in the management of potentially critical situations deriving from the hypoxia/anoxia phenomena.

<http://emma.bo.ismar.cnr.it/?newlang=eng>

**MEDPONDS**

LIFE04 NAT/GR/000105

Actions for the conservation of Mediterranean temporary ponds in Crete

The project had the aim of restoring the Mediterranean temporary ponds habitat in Western Crete to a favourable status by implementing the following actions: restoring the natural hydroperiod of the habitats and reducing the negative impact of overgrazing by re-establishing a traditional grazing management system.

<http://www.life-medponds.gr/>

**Mikri Prespa**

LIFE02 NAT/GR/008494

Conservation of priority bird species in Lake Mikri Prespa, Greece

The project carried out actions that not only improved the conservation status of the Dalmatian Pelican and the Pygmy Cormorant, but it also benefited another 18 species covered by the Birds Directive. The main actions included the reconstruction of a sluice that channels water from lake Mikri Prespa into lake Megali Prespa, in order to improve water-level management of the former; the restoration of the wet meadows in Mikri Prespa, covering some 70 ha and; the monitoring of the avifauna and the vegetation of the managed littoral sites.

<http://www.spp.gr/>

**SASWMP**

LIFE04 TCY/IL/000027

Southern Arava Sustainable Waste Management Plan

The project took a regional approach to improve the management of agricultural waste on both sides of the border between Israel and Jordan. It is highly innovative, combining elements of research, monitoring and groundbreaking pilot programmes to achieve its goals. It includes trans-boundary training with Israel's Jordanian neighbours and a high school education program for Jewish and Arab Israeli pupils. The comprehensive goal was to develop a treatment strategy to handle agricultural waste generated in the region in the most effective and efficient ways possible using technology, education, co-operation and co-ordination.

<http://www.saswmp.com/index.htm>

**Mondego**

LIFE03 ENV/P/000523

Clean and recycle residual water from Municipal Waste Water Treatment Plants on the Lower Mondego Basin

The Mondego project demonstrated the use of new technologies for recycling water from municipal wastewater treatment plants (mainly submerged membrane bioreactors, tertiary treatment using microalgae photoreactors and an integrated monitoring system). This will also improve the environmental sustainability of the Mondego Lower Basin and Estuary.

<http://mondego.ineti.pt/>

**WALPHY**

LIFE07 ENV/B/000038

Design of a decision tool for hydromorphological restoration of water bodies in Walloon Region

The WALPHY project will develop a structured approach to the improvement of the hydromorphological quality of the River Meuse basin upstream of Andenne, near Namur. The aim will be for the pilot area to achieve 'good ecological status' as required by the WFD. The project will also develop a methodology for assessing the hydromorphological quality of river restoration projects and carry out restoration works on a significant scale on some of the water bodies in the part of the river basin under study.

www.walphy.be

**Water-Renew**

LIFE04 ENV/GB/000809

Water-Renew : Wastewater polishing using renewable energy crops

Water Renew is an approach to wastewater management that uses the high water and nutrient uptake capacity of fast-growing, intensively planted trees, and the filtration potential and microbial activity of the soil to remove potential pollutants from wastewater. The research project used five field sites across the UK to investigate the irrigation of fast growing coppice trees as an alternative to surface water discharge of effluent, reducing nitrogen and phosphorous levels in areas where this has been a problem in the past, and producing sustainable wood bio-fuel.

<http://www.waterrenew.co.uk/>

**INDEMARES**

LIFE07 NAT/E/000732

Inventory and designation of marine Natura 2000 areas in the Spanish sea

The main objective of the INDEMARES project is the protection and sustainable use of biodiversity in the Spanish seas through the implementation of the Natura 2000 network. To this end, the project will ensure that necessary studies are carried out to complete the identification of the most representative marine areas around Spain. It also proposes to add at least 10 sites to the Natura 2000 network. The results will support any future revision of the annexes of the Birds and Habitats directives and will contribute to the implementation and reinforcement of the marine international conventions applied in Spain – OSPAR and the Barcelona Convention.

<http://www.indemares.es/>

**EnviFriendly**

LIFE05 ENV/GR/000245

Environmental Friendly Technologies for Rural Development

The EnviFriendly project's objective was to integrate the results of environment-friendly technologies and socio-economic factors in an integrated management plan for the Evrotas River watershed and coastal zone. The project thus produced a "toolbox" of environment-friendly technologies able to minimise diffuse pollution originating from agricultural land.

<http://www.envifriendly.tuc.gr>





Available LIFE publications

LIFE-Focus brochures

LIFE among the olives: Good practice in improving environmental performance in the olive oil sector (2010 - 56 pp. - ISBN 978-92-79-14154-6 - ISSN 1725-5619)

LIFE and Europe's reptiles and amphibians: Conservation in practice (2009 - 60 pp. - ISBN 978-92-79-12567-6)

Getting more from less: LIFE and sustainable production in the EU (2009 - 40pp. - ISBN 978-92-79-12231-6 - ISSN 1725-5619)

Protecting Europe's Nature: Learning from LIFE (2009 - 68 pp. - ISBN 978-92-79-11635-3 - ISSN 1725-5619)

Breathing LIFE into greener businesses: Demonstrating innovative approaches to improving the environmental performance of European businesses (2008 - 60pp. - ISBN 978-92-79-10656-9 - ISSN 1725-5619)

LIFE and Europe's grasslands: Restoring a forgotten habitat (2008 - 54 pp. - ISBN 978-92-79-10159-5 - ISSN 1725-5619)

LIFE on the farm: Supporting environmentally sustainable agriculture in Europe (2008 - 60 pp. - 978-92-79-08976-3)

LIFE and endangered plants: Conserving Europe's threatened flora (2007 - 52 pp. - ISBN 978-92-79-08815-5)

LIFE and Europe's wetlands: Restoring a vital ecosystem (2007 - 68 pp. - ISBN 978-92-79-07617-6)

LIFE and waste recycling: Innovative waste management options in Europe (2007 - 60 pp. - ISBN 978-92-79-07397-7)

LIFE and Europe's rivers: Protecting and improving our water resources (2007 - 52pp. ISBN 978-92-79-05543-0 - ISSN 1725-5619)

LIFE and Energy: Innovative solutions for sustainable and efficient energy in Europe (2007 - 64pp. ISBN 978 92-79-04969-9 - ISSN 1725-5619)

LIFE-Third Countries 1992-2006 (2007, 64 pp. - ISBN 978-92-79-05694-9 - ISSN 1725-5619)

LIFE and the marine environment (2006 - 54pp. ISBN 92-79-03447-2- ISSN 1725-5619)

LIFE and European forests (2006 - 68pp. ISBN 92-79-02255-5 - ISSN 1725-5619)

LIFE in the City: Innovative solutions for Europe's urban environment (2006, 64pp. - ISBN 92-79-02254-7 - ISSN 1725-5619)

Integrated management of Natura 2000 sites (2005 - 48 pp. - ISBN 92-79-00388-7)

LIFE, Natura 2000 and the military (2005 - 86 pp. - ISBN 92-894-9213-9 - ISSN 1725-5619)

LIFE for birds: 25 years of the Birds Directive: the contribution of LIFE-Nature projects (2004 - 48 pp. - ISBN 92-894-7452-1 - ISSN 1725-5619)

The air we breathe: LIFE and the European Union clean air policy (2004 - 32 pp. - ISBN 92-894-7899-3 - ISSN 1725-5619)

Other publications

Environment Policy & Governance Projects 2008 compilation (2009, 107pp. - ISBN 978-92-79-13424-1)

Information & Communications Projects 2008 compilation (2009, 21pp. - ISBN 978-92-79-13425-8)

Nature & Biodiversity Projects 2008 compilation (2009, 87pp. - ISBN 978-92-79-13426-5)

Best LIFE Environment projects 2008-2009 (2009, 32pp.-ISBN 978-92-79-13109-7 ISSN 1725-5619)

Environment Policy & Governance and Information & Communications Projects 2007 compilation (2009, 92 pp.-ISBN 978-92-79-12256-9)

Nature & Biodiversity Projects 2007 compilation (2009, 67 pp. - ISBN 978-92-79-12257-6)

A number of LIFE publications are available on the LIFE website:
<http://ec.europa.eu/environment/life/publications/lifepublications/index.htm>

A number of printed copies of certain LIFE publications are available and can be ordered free-of-charge at:
<http://ec.europa.eu/environment/life/publications/order.htm>



LIFE+ “L’Instrument Financier pour l’Environnement” / The financial instrument for the environment

Period covered (LIFE+) 2007-2013.

EU funding available approximately EUR 2,143 million

Type of intervention at least 78% of the budget is for co-financing actions in favour of the environment (LIFE+ projects) in the Member States of the European Union and in certain non-EU countries.

LIFE+ projects

- > **LIFE+ Nature projects** improve the conservation status of endangered species and natural habitats. They support the implementation of the Birds and Habitats Directives and the Natura 2000 network.
- > **LIFE+ Biodiversity projects** improve biodiversity in the EU. They contribute to the implementation of the objectives of the Commission Communication, “*Halting the loss of Biodiversity by 2010 – and beyond*” (COM (2006) 216 final).
- > **LIFE+ Environment Policy and Governance projects** contribute to the development and demonstration of innovative policy approaches, technologies, methods and instruments in support of European environmental policy and legislation.
- > **LIFE+ Information and Communication projects** are communication and awareness raising campaigns related to the implementation, updating and development of European environmental policy and legislation, including the prevention of forest fires and training for forest fire agents.

Further information further information on LIFE and LIFE+ is available at <http://ec.europa.eu/life>.

How to apply for LIFE+ funding The European Commission organises annual calls for proposals. Full details are available at <http://ec.europa.eu/environment/life/funding/lifeplus.htm>

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