WWF BACKGROUND BRIEFING PAPER

MANAGING FLOODS IN EUROPE: THE ANSWERS ALREADY EXIST

More intelligent river basin management using wetlands can alleviate future flooding events

26 September 2002

WWF Danube-Carpathian Programme
WWF Living Waters Programme – Europe

Elbe river floods near Dessau (Germany), 15 August 2002 Bernd Lammel

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I. Introduction

Flooding is a natural phenomenon not a new problem: Only between 1971 and 1995 more than 150 major floods occurred in Europe. Since then, our newspapers and television screens have been filled almost every year with harrowing pictures of the damages and human tragedies floods have inflicted upon people from across the continent. WWF, the conservation organisation, believes that answers already exist for managing Europe's repeated and intensifying catastrophic flooding events, in the form of Integrated River Basin Management (IRBM) all the way from river source to the sea. We believe that the legal framework is already in place namely the EU Water Framework Directive (WFD), EU nature conservation legislation, and international conventions (e.g. Ramsar Convention on wetlands). Furthermore, the WFD's full implementation must not be jeopardised by governments seeking to maintain the „status quo" and that, in particular, strategies are needed to manage floods in an ecological manner, by improving catchment land-use and preventing rapid run-off, and utilising the natural water retention and storage capacities of both upland wetland and lowland floodplain areas. Only in this manner will floods be better managed on the one hand, and the WFD`s key objective of securing „good ecological status" for waters be achieved on the other.

II. Floods in Europe – Yet Again

Once again, floods have hit Europe and once again European governments are counting the cost of damages to private property, transport infrastructure, businesses and communications. Initial estimates place the total costs of this summer at a minimum of 20 billion Euro. The total cost of floods between 1991-1995 alone are estimated at around 100 billion Euro. Since then, Hungary, Czech Republic, Poland, Slovakia and Ukraine have suffered enormous hardships as a result of almost annual flood catastrophes on the Tisza, Morava, Odra, Vistula and Danube rivers, often including significant loss of human life and impacts upon health. Now, Austria and Germany have also suffered, as have other parts of Europe, including Belgium and France, while our television screens have again shown the acute damages experienced by the Czech Republic.

Climate change caused by burning of fossil fuels such as coal and oil is already contributing to the extreme rainfall events responsible for the floods. This requires immediate and renewed international attention. The Kyoto Protocol must be ratified and implemented by all nations. Furthermore, although rejected by an US- and OPEC-led coalition of countries in Johannesburg at the WSSD summit this summer, the global target of 10% new and sustainable renewable energy by the year 2010 must be re-endorsed. This target was, and still is, proposed by an alliance of NGOs and countries such as Brazil, Philippines, Norway and the Association of Small Island States. In the long run towards 2050, WWF promotes a cut of about 80% of greenhouse gas emissions in the industrialised countries in order to avoid the dangers of climate change.

Yet there are other actions which European governments could and should undertake – actions which seek to manage in a more intelligent manner the floods in order to minimise the catastrophic impact of these and future extreme rainfall events. In this paper we will focus on these actions and proposals.

According to the European Environment Agency (EEA), the main driving forces behind floods are "climate change, land sealing, changes in catchment and floodplain land-use, population growth, urbanisation and increasing settlement, roads and railways and hydraulic engineering measures"[1]. What

[1] European Environment Agency: Sustainable Water Use in Europe, Part 3: Extreme Hydrological Events: floods and droughts. Environment issue report number 21, Copenhagen 2001, pp.17-20.

can be done about these pressures, to reduce them and thereby avoid or better manage future flooding catastrophes?

III. The EU Response – More of the Same?

In its Communication of 28th August the European Commission sets out the action which it has taken or is proposing for responding to this summer's floods, which it describes as being of "unprecedented proportions"[2]. WWF welcomes the speed of the Commission's response, although concrete actions proposed relate almost exclusively to merely repairing damages, with no proposals as to preparing for the future or learning from past mistakes.

The Commission proposes allocating existing but unused EU funds through existing Community laws and instruments, particularly in the fields of the Structural Funds, agriculture or aid to candidate countries, to which EIB loans could be added, in order to make emergency repairs to transport infrastructure damaged by flooding – including those originally built as part of the Trans European Network for Transport (TENS-T). Additionally, the Commission has mobilised new resources as shown in the proposed Regulation on "The EU Solidarity Fund" (for decision by the European Parliament and Council) amounting to 500 million in 2002 and 1 billion afterwards.

Damages to vital communications links and other infrastructure clearly need to be repaired. Yet it also needs to be recognised that in many areas transport corridors are themselves factors which have amplified the catastrophic impact of these floods in the first place, and so merely patching up the damage will nor reduce the likelihood not the magnitude of repeat events in future. In fact - according to the EEA report - it will do just the opposite.

Also worrying is the proposal from the Regulation that these funds will be used to "safeguard security infrastructures such as dams". As we have seen all across Europe this summer, one key danger of using dams and dykes for flood protection is the false sense of security they give to those populations and properties "encouraged" to locate on surrounding floodplains. For in the case of such extreme rainfall events, the security design of the structure is exceeded, and the losses are so much greater than would otherwise have been the case. In fact, we can see that as the dams and dykes are built higher and higher, it seems, the floods get higher and higher as well.

Now, insurance companies are understandably becoming concerned about offering coverage to businesses and people located behind these ineffective structures. The numbers involved are huge: The International Commission for the Protection of the Rhine estimates that properties and businesses worth 1,500 billion Euro are located on potentially floodable areas along the Rhine alone[3].

Not surprisingly then – perhaps – Germany has recently proposed an end to building on floodplains and the removal of some dykes and flood defences. They are also halting inland waterway transport developments until a complete review of environmental consequences has been carried out.

Germany is recognising that the ferocity of these floods is the result of past and present mistakes. All of Europe must recognise this also, for until we begin to manage our river basins sustainably – including the restoration and conservation of wetlands and floodplains as natural controllers of flood waters – we will continue to suffer from the effects of flooding.

Likewise, the Commission must also act and honour its statement[4] underlining the need to examine the extent to which "inadequate land-use and water management policies" have contributed to these problems, by quickly proposing ways of carrying out this assessment. Alleviation of future flooding events, especially since the very existence of the Emergency Fund pre-supposes that these events will in fact occur, must be based upon an approach of treating the causes rather than only the symptoms.

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[2] European Commission Communication to the European Parliament and the Council COM(2002) 481 The European Community Response to the Flooding in Austria, Germany and Several Applicant Countries Brussels 28th August 2002.

[3] International Commission for the Protection of the Rhine (ICPR), 1998, Action Plan on Flood Defence, http://www.iksr.de/hw/icpr/11uk7.htm

[4] See footnote 2

Only in this way will we avoid further losses of human life, more costly damages, more negative impacts upon health, and more lost time in seeking a sustainable solution.

IV. Integrated River Basin Management and the Role of Wetlands – Natural Flood Control

Traditional ”engineering” solutions to land and water management are increasingly being questioned, and indeed exposed, as the recent floods highlight only too tragically. Instead of providing protection, modern large-scale dam and dyke structures can actually increase the scale of damage, partly because people living in floodplains are prone to overestimate the level of protection provided, particularly when rainfall events exceed 100-year events, as has recently been the case in many places.

In contrast, ecological flood control works with nature in order to enhance soil conservation, increase natural water retention capacities, and uses the ability of wetlands and floodplains to alleviate flood impacts in a number of ways. Most obviously, floodplains provide natural reservoir space for floodwaters – but only if the floodplains are not dyked up and artificially disconnected from the river channel, as has become increasingly the case in Europe. Wetlands which receive floodwaters then release the water back again much more slowly – often recharging underground aquifers as well - thus reducing flood peaks and acting as natural “sponges”. Examples below, such as those from the Elbe in Germany and the Danube/Morava in Slovakia, highlight the ways in which wetlands – or the absence of wetlands – influenced the recent floods.

Yet actions to increase natural storage capacities are often only appropriate in lowland, downstream areas. Much evidence exists concerning the need to also address flood mitigation strategies in upstream, upland, areas also. Controlling rapid run-off from smaller tributaries upstream is in fact the first point in a sensible, integrated, flood management strategy. Stopping deforestation and instead introducing more holistic catchment planning – including environmentally appropriate agriculture and the use of buffer zoning and strips - utilises soil retention capacities upstream to prevent floods at source. An example is given below for an upstream catchment in Slovakia. In fact, a combination of actions to increase retention capacities in upland areas on the one hand, and storage capacities in lowland areas on the other, is in practice what the WFD (see below) calls for: Integrated River Basin Management (IRBM).

Such natural approaches also provide a wide range of additional benefits in the form of maintaining biodiversity, areas for recreation, cleaner water for drinking, opportunities for tourism and so on, with the net result being that strategies which include wetland restoration and conservation tend to be much cheaper than traditional, harder, capital- and infrastructure-intensive engineering solutions. These approaches also need to be taken into account when deploying Structural Funds and when planning for transport networks - for example TENS-T investment projects – especially on floodplain areas and in inland waterway development - should not be allowed to take precedence over sound IRBM principles. In the Danube river basin alone, many potentially damaging transport projects have surfaced, encouraged by the river`s designation as Transport Corridor C7 for the extension of the TENS-T to central and Eastern Europe. WWF expects that such projects - including the canalisation of the Danube stretch between Straubing and Vilshofen in Germany – will now be revised in order to assess their compatibility with ecological flood control.

Ecological flood control (and human safety) also demand that settlements need to be removed from watercourses, floodplains, and river banks. This is the most effective risk reduction method in the long-term, and by far the most economic. Total damage costs in the event of a severe flood are almost certainly higher than investments needed for ecological flood control. According to the Ministry for Environment of the State of Baden-Wurtemberg in Germany, investments for long-term, integrated, flood defence (including ecological flood control) have been estimated at 500.000 million Euro whilst up to 6 billion Euro could be needed to cover the costs of damage by a flood that exceeds the capacity of existing flood defence systems.

V. The Water Framework Directive - Part of the Solution

In WWF's opinion, the legal instruments for alleviating future floods already exist. The ambitious Water Framework Directive (WFD) sets the scene for integrated and international river basin management across Europe, aiming at ecological objectives which will deliver water quality and environmental quality improvements for the whole continent. In fact, part of the "purpose" of the WFD, as set out in Article 1(e), is to "contribute to mitigate the effects of floods"[5], therefore achieving the final objective of the Directive - good ecological status - must mean developing ecological flood control.

Flooding is not only one issue which needs to be incorporated – of course - into planning and decision-making processes of river basin management, it is also an extreme example of the types of problems which occur when existing forms of land and water management fail. These failures include:

- Inappropriate land-use planning
- Upland deforestation
- Channelised and straightened rivers for navigation (as proposed by TENS-T)
- Drained wetlands and floodplains as a result of agriculture, transport, and settlement
- Increased soil impermeability through the sealing of land due to transport infrastructure and urbanisation
- Disconnected rivers from side arms and floodplains.

Reduced absorption and faster run-off means increased and quicker flooding, but dyke construction to ever-higher levels has been unable to keep pace with the ever-higher flood events.

The WFD provides the organisational and planning platform for us to introduce newer, more creative, sustainable forms of water and land management. It provides for the integration of sectoral planning so that industrial, agricultural, transport, and navigation impacts on water can be lessened and managed sensibly. It provides for international co-operation and planning, and the involvement of the public. It allows us to work with nature and not against it, by for example restoring and conserving wetlands and floodplains, which are not only central to the delivery of good water status but which also help protect us from catastrophic flood impacts.

VI. Working Together – The WFD Common Implementation Strategy

For the first time, EU environmental legislation has an accompanying plan of action: the WFD Common Implementation Strategy (CIS), a unique partnership of the European Commission, Member States, stakeholders (and from September 2002) Candidate Countries as well. This welcome innovation is necessary not only because of the complicated and ambitious goals of the WFD, but also because the WFD does not at times itself provide full guidance on what is actually required (for example: on flooding) to achieve the objectives.

One key activity of the WFD CIS has therefore been the development of a series of Guidance documents, aimed at assisting governments and river basin authorities to implement the WFD according to "Best Practice". WWF and other stakeholders have enthusiastically participated in the technical groups charged with delivering these Guidance documents, but have been disappointed to find that what is being produced is sometimes not "Best Practice" guidance but rather the "lowest common denominator" reflecting the different Member States' different interpretations of what the WFD actually requires, thus risking a dilution of its provisions once transposed into national legislation.

Furthermore, wetlands and floodplains may be at risk of disappearing from some CIS activities and the Guidance documents altogether, just as they have progressively disappeared from our river basins. In the Danube basin, for instance, more than 80% of all wetlands and floodplains have been drained or destroyed in the last 100 years. Despite their importance for river basin management and ecological quality, wetlands are being treated at best neutrally by the CIS process, at worst as a kind of unwelcome

[5] Directive 2000/60/EC of the European Parliament and the Council of 23 October 2000 establishing a framework for Community action in the field of water policy, OJ No. L327, 22.12.2000

complication. Opportunities are being missed. Thankfully, at the next Strategic Coordination Group of the CIS on 30th September, a paper on wetlands will attempt to begin to integrate the management of wetlands and floodplains into overall river basin management strategies. This paper, written by environmental NGOs at the forward-thinking request of the EC, reflects an issue which has never been more timely given the role wetlands could play in solving the flooding question, thereby saving billions of Euro in European taxpayers' money.

On the ground, despite many model projects that demonstrate good practice in wetland – and therefore flood – management, many governments remain sceptical about these environmentally appropriate approaches. Mainstream "development" pressures of intensive agriculture, urbanisation, and especially transport and navigation continue to drive wetland loss. Member States are not taking advantage of legal, policy, and funding opportunities presented by the WFD, EU nature conservation legislation, the Ramsar Convention on wetlands, and others in order to restore and conserve wetlands – so that the wetlands will protect society against the worst impacts of the future floods.

The reason for this reluctance might be that, faced with the choice between investing in preventative, long-term actions and short-term reparations, governments – concerned with short 4 or 5 years terms of office - opt for the latter. NGOs, as well as progressive river basin secretariats such as the International Commission for the Protection of the Rhine (ICPR) and others, look to the longer term in proposing strategies which seek lasting solutions. Now – in theory – so should governments charged with implementing the WFD. Despite some positive examples and isolated river restoration projects in different parts of Europe, the signs are not good, especially if the attitude of a country towards the WFD CIS can be taken as an indicator of future WFD implementation performance. WWF believes that governments must begin to take preventative actions in upland and lowland wetland and floodplain areas, if future flooding catastrophes are not to repeatedly re-occur.

The WFD really does offer potential for working with nature rather than against it. Perhaps the catastrophes we have recently experienced will finally convince governments of the importance (and cost-effectiveness) of using ecological flood control instead of the failed traditional, hard engineering solutions. The following case studies highlight the ways in which wetlands influenced the recent floods, and from these practical examples recommendations are made for developing management strategies which will alleviate the harmful effects of future flooding events.

VII. Examples:

Negative Example – Why were the Elbe river floods worse then ever? (Germany)

Location and background
The Elbe river has the biggest "river" biosphere reserve (the river-landscape in the Middle Elbe with more than 250.000 ha). Most river sections and existing floodplain areas are designated as IBAs (Important Birds Areas after the EU Birds Directive) and listed as Natura 2000 sites after the EU Habitats Directive.

Nevertheless, the Elbe river and floodplains share much in common with many river basins in Central Europe: 80 % of all natural floodplains are cut off from the river behind dykes. More than 1,300 km of dykes are situated alongside the main river channel itself. Nor is it only in Germany that the Elbe is so heavily regulated. One third of the total catchment is in the Czech Republic, composed of two major rivers, the Elbe/Labe and the Moldava, with the latter contributing more than 60 % of the mean flow. There are 7 major dams in the Moldava river, of which 3 are very large and form an almost closed chain upstream of Praha. On the Elbe/Labe river in the Czech Republic, more than 20 major river barrages are in place, but with low damming effect and almost no flood protection dykes. Two additional barrages are planned just upstream of the German-Czech border. In the Upper Elbe/Labe catchment part there are just a few large dams.

Summer 2002 floods in the Elbe river
In August 2002, 90 % of the flood volume leaving Czech territory came from the Moldava catchment, where dams make up a total reservoir volume of about 3 billion cubic meters. This proportionately high outflow was because the management of these dams is optimised for (peak) hydropower production with therefore limited retention capacity, since the reservoirs were all already almost full. Additionally, strong pressure comes from recreation activities, which demand low water level fluctuations, further reducing the potential flood retention capacity in the reservoirs. In the August 2002 flood, some retention volume was already filled up by a first severe rainfall in the Bohemian mountains but not released in time. Problems for downstream sections were aggravated by emptying of reservoirs ahead of the second wave

accelerating the floods downstream into Germany, combining with other flood peaks in major tributaries (e.g. Mulde) entering the Elbe river.

In the German part of the Elbe, the shortening of the riverbed by more than 25 % on the most critical section, after the Elbe river enters the wide plains some 50 km north-west of Dresden, accelerated the flood flow downstream to the confluence with some major tributaries (e.g. Mulde and Saale). This straightening is one of the major causes of the on-going incision of the riverbed on about 100 km, which accelerated the flow even further. The risk of superposition of floods from Elbe and its tributaries is permanently increasing.

Elbe river flood near Dessau, 15 August 2002 *Bernd Lamme*

The major driving forces for the Elbe floods were agriculture and navigation. In the former floodplains, wetlands were drained, and widely used as arable land. More and more, even after the lessons learnt of the Odra river flood of 1997, new settlements and industrial properties were developed in low lying areas, the so-called risk areas. Mainly these new areas were affected by unforeseeable dyke breaches. In general the sensitivity for floods of the population living in risk areas is very poor. Many historical inland waterway navigation has led to the straightening of river channels, leading to accelerated flood waves by shortening of the river course and deepening of the river bed. Additionally, costly damages could have been limited, by safe installation if not avoidance of oil tanks in cellars, and by not building in former floodways.

Uplands have also significantly contributed to the flood disaster. Although quite a number of tributaries in the Erzgebirge are well known for frequent flood catastrophes, no significant changes in housing and infrastructure development patterns have taken place. Once again these valleys suffered the biggest damages. Main reasons are not only extreme rainfalls, which are said to be triggered by climate warming effects, but also historical deforestation, arable land use in all upland areas, even on steep slopes and less permeable loess soils, and settlements all along the small water courses in steep valleys directly on river banks.

Floodplain restoration: The way forward

Along the Elbe river, flood protection was not given sufficient attention during the 1990s because authorities and the population were lulled into a false sense of security as a result of the engineering structures, especially the network of reservoirs upstream of Praha. In addition, navigation along the Elbe was given greater priority than flood management. However, as some States along the river still have the Oder/Odra flood of 1997 in mind, any measures to increase the traditional flood defence would have been unrealistic, as almost no structure can be designed for such extreme floods as those experienced this summer. Flood damages from August 2002 are said to be around 22 billion Euro, many times higher than any large flood action programme that would have been ever planned.

By contrast, ecological flood protection (including floodplain restoration) as proposed in the Rhine basin, advocates a strategy of risk reduction e.g. no further increase in dyke heights or length and no additional construction on floodplain areas, as well as enhancing the natural values of the hundreds of thousands of floodplain areas. Such a strategy is urgently needed in the Elbe.

Current projects for restoration and conservation of floodplains are mainly initiated and financed by nature conservation institutions and NGOs (WWF, BUND/Friends of the Earth), partly by compensation measures for infrastructure development, and only to a limited extent by water management authorities (which concentrate on reconstruction of existing dykes).

The International Commission for the Protection of the Elbe River (ICPE) has just presented a first draft of an action programme for flood protection and, even if basic assumptions were not prepared for the recent flood, a first analysis has shown significant deficits even for major settlements – including Praha (where current flood protection levels are sometimes below a 50-year flood). However, the ICPE still does not accept NGO participation in their working groups, just one public hearing per year is organised. This wastes opportunities to utilise local expertise and locally held

knowledge for flood protection. The dissemination of information is also inadequate.

"Lessons learnt:
WWF welcomes the German government's response to the floods in proposing a 5-Point Action Plan for Flood Control, which includes ecological flood control using river and floodplain restoration, and risk reduction including the use of non-structural measures. However, at the international river conference to be held by Germany in 2004 to discuss guidelines for flood management WWF wants to see concrete action on ecological flood management.

WWF has some additions to this strategy, which are intended to link short-term flood alleviation measures (e.g. repair of dykes and infrastructure, restoration of buildings) to long-term measures to reduce future flood risk: These include:

- Additional increases of floodplain areas
- Change of reservoir management to flood retention as a priority (instead of hydropower, recreation uses) especially in the upper catchment where many reservoirs are found
- Reconstruction of destroyed buildings on territories safe from flooding i.e. away from the river
- Change of land use in upland – especially steep-sloped – territories, including increase of forest cover
- Restoration of small water courses in mountainous areas

How can Water Framework Implementation help?
Changes in river basin management are also needed as parts of a long-term strategy to mitigate floods, including:

- Strengthening of the International commission for the Protection of the Elbe River (ICPE) and thus international cooperation between bordering countries
- Establishment of public participation at all working levels of river basin management, including the ICPE
- Active support for ecological flood risk reduction measures in the development of River Basin Management Plans

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Positive Example - The Danube floods are dissipated by the Morava river floodplains (Slovakia)

Location and background
The Morava River is a middle-European watershed and is one of the Danube's largest tributaries. The biggest tributary of the Morava is the Dyje river. The Morava is a border river – it flows through three countries, Czech and Slovak Republics and Austria and it forms the border between the Slovak Republic and Austria in the lowest part, and between the Slovak and Czech Republics in the middle part. The lower section of the Morava River floodplain is located in the most western part of Slovakia and is situated along the former "iron curtain". The whole floodplain area was under strong military protection and local farmers had only limited access for mowing of meadows. Since 1989's political transformation, the Morava River floodplain is now open to the public and it has experienced massive changes and now constitutes both a popular recreation and an important economic resource.

Human impact
During the 20th century, more than 90 % of the river's course has been regulated, including dike construction, canalisation, and eliminating all major meanders. In the study site the river's length has been shortened from 97 to 79 km on the supposition of flood protection. This move resulted in the shrinking of the naturally inundating floodplain to only 24 % of its former area, and a deepening of the channel bed. In spite of these facts, the Morava river still keeps in its lowest section a wide floodplain area – more than 3 km – something exceptional in Central Europe.

Summer 2002 floods in Slovakia
During this summer flood events, the last 30 km section of Slovak-Austrian part of river created lake of 5,000 ha area. The retention capacity of this part of the floodplain is more than 100 millions m^3 on (comparing with the retention volume of Gabcikovo dam- the biggest dam in Central and Eastern Europe- which is only 35 millions of m^3).

Wetlands catch (absorb) surges of flooding water, thus slowing down the running water. The captured water is than slowly released. In the lower river part the flow dynamics are strongly influenced by the Danube water level regime that creates a backwater effect upstream of the Morava river confluence. The length of the impounded river section depends on the actual discharge combination, however the maximum backwater length can reach up to about 30 km. Thus, this part of the river floodplain used to be flooded more frequently than the other parts, particularly during the spring period, not only as a result of high water level in the Morava river but also due to high discharges in the Danube. Comparing the situation in Austria and Germany, the consequences of the Danube floods were minimal; some houses were flooded in Devin on the confluence of Morava and Danube.

Morava floodplain – Existing dike is 3 km from the river bank

Morava river near confluence with Danube river

Daphne Institute for Applied Ecology

Floodplain restoration

In 1996, the Task Force of Environmental Programme for the Danube River Basin approved Daphne's Institute for Applied Ecology project idea "Floodplain Meadow and Forest Restoration in the Lower Dyje/Morava River". In 1997, a respective project proposal was subject to and approved by the European Commission, thus resulting in an assignment agreement between the Phare Environment Consortium, and WWF as sub-consultant, representing the local sub-consultant Daphne Institute for Applied Ecology. During the project "Restoration and Management Species-Rich Meadows in Morava River Floodplain", methodology for large-scale floodplain meadow restoration was developed. During the first phase of EU Phare Multi-country Environment Programme, 130 ha of arable soil were transformed back into the native meadow ecosystem and a management plan for the Ramsar grasslands was prepared. The Phare – Cross Border Co-operation Programme, approved in 1998, secured the continuation of restoration activities.

"Lessons learnt"

Bratislava was protected by the Morava river floodplain because the river regulation project prepared in 19th century had proposed a wide floodplain area. Retention volume is almost three times bigger than the reserve volume of the biggest dam on the Danube (Gabcikovo). Floodplain wetlands adapted to pulse flood conditions are bringing added value to flood protection as water purification, biodiversity, recreation etc.

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Positive Example - Floodplain restoration in the Upper Drava river (Austria)

Location and background

The Drava is one of Austria's largest rivers with an average water flow of more than 100 m3 per second. As a typical alpine river it was once a wild river with side arms, gravel banks, islands and oxbows. It hosted large populations of typical fish species e.g. the Danube salmon and other animals like the King-fisher, Common sandpiper or the Eurasian otter. Its floodplain area was inundated regularly. Today, there exist only remnants of this original landscape and species populations. Since the last century the river has been systematically regulated which has changed its character considerably. But even today large areas of the valley are under water, during a 10-year flood about 1.900 hectares are inundated. In summer 2002 there was only a very small flood in the Drava valley, because it did not rain that much in that part of the Austria.

Situation before restoration

Increasing pressure from agriculture and housing let to the regulation of the Drava river in the first half of the 20th century. The consequence was an enormous loss and degradation of the natural freshwater habitats including alluvial forests, oxbows and natural river stretches. On the long run the channelling also caused a deepening of the riverbed by 2 cm per year and an increased flow velocity, which caused a lowering of the groundwater level. The deterioration of natural flood retention capacity also enhanced the flood risk for the whole area.

The LIFE Project „Upper Drava-river valley“
Project period: 1999 – 2002
Beneficiary: Water Management Authority of Carinthia
Partners: WWF Austria (co-financing and preparation)
Federal Ministry of Agriculture, Forestry, Environment and Water Management
Budget: 6,3 Mio Euro
Because of the above mentioned problems the Water Management Authority and WWF Austria developed a LIFE project to work on a 57 km-long section of the Drava river in Carinthia, Federal State of Austria. Co-financed by the EU it is one of the largest river restoration projects in Europe. The main aims of the project are to:

- Maintain and improve the (natural) flood protection and the river dynamic processes
- Improve natural habitats and the populations of typical species

The emphasis lies on restoring 3 ecological „core zones“ that make up 7 km of the river by widening of the river bed and the reconnection of former side-arms to improve the overall ecological value of the river stretch. An additional focus lies on the recreation of the natural floodplain forests. Another focus is the protection of endangered species and creating a combined biotope system along the whole valley.

Situation after restoration

- Better flood prevention: On 200 hectares natural flood retention capacity improves by 10 million cubic meters!
- Reduced flow velocity: The speed of the flood wave will slow down by more than one hour!
- More space: 50-70 ha more natural alpine river- and floodplain habitats like islands, gravel banks, steep banks with their typical species (Danube Salmon, Common Sandpiper, Kingfisher...);
- Stoppage of river bed deepening or even raise of river bed;
- Fish population has doubled, e.g. the greyling population.

The Drava before.... ***and after restoration***

Water Management Authority of Carinthia/Thichy

“Lessons learnt”
The lessons we have learned are that the “theory” of river restoration as a strategy to improve the flood protection really works out. And you get much more: It is sustainable, in the long run, it is cheaper, it increases the biodiversty and it improves the recreation value for the people. “Old fashioned” river-engineering measures like channelisation or flood protection with dykes cause huge long-term problems like river bed deepening and the loss of natural flood retention capacity. On the Upper Drava the Water Management Authority together with WWF is working on a “follow up” project to restore other regulated parts of the river in order to fulfil the objectives of the WFD.

Austria and implementation of the Water Framework Directive (WFD)
The Drava is a good example to show how Austrian river management works: Good restoration projects only happen if there is EU funding. However, without international financial support, restoration projects are very rare and limited. In general, the implementation process of the WFD is running "behind the curtains" without public participation, e.g. involvement of NGO´s. Another negative point is that Austria tries to get as many `heavily modified´ river stretches as possible in order to reduce the challenges of WFD implementation and its efforts to reach the Directive's goals. An integrated river basin management approach does not exist so far across Austria.

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Upstream land-use Management – How to reduce upland run-off (Olsavica, Slovakia)

Location and background
The Olsavica river basin is located in Levocske vrchy Mts. (Eastern Slovakia) and encompasses a total area of 11 km^2. Traditional agriculture developed in this region was based on use of extensive pastures and mosaic of small strips of arable fields and meadows with many terraces.

Human impact
The collectivization period resulted in the removal of terraces, extensive drainage and integration of arable soil into large blocks. In the early 90`s the negative effect of agricultural practices culminated in severe flood damages in the Olsavica village. This summer floods were the outcome of combined heavy rain and very high soil erosion. The current landscape structure in the region consists of 29% of forests, 28% of arable soil and 37% of grasslands. Arable soil is located in the flat upper part of the valley with the village at the bottom.

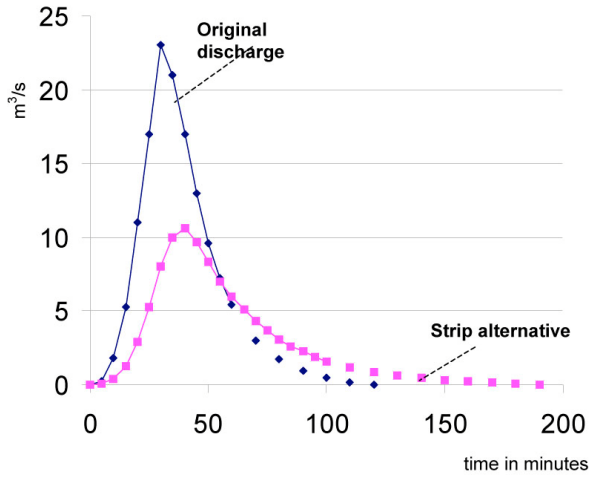
Summer flood in Olsavica *Daphne Institute for Applied Ecology*

Solution: Cooperation
The Olsavica basin was included as a pilot area into the project "Central European Grasslands – Conservation and Sustainable Use", financed by the World Bank/GEF and implemented by DAPHNE – Institute of Applied Ecology. The first step of the project was a detailed mapping of the landscape structure together with the preparation of digital terrain model on the base of aerial photographs. At the same time intensive discussions with the main stakeholder groups was initiated and several workshops were held with representatives of the local community, agriculture cooperative farm, regional water management and agriculture bodies. The next step was involving water management experts for analysis of the hydrological parameters of the basin, evaluation of existing hydro-technical measures in the basin, river channel and its tributaries, and existing drainage systems as well as the intensity of soil erosion.

Grasslands against floods and erosion
As a result of all analyses a proposal to change land use in the upper part of the valley and create 80-m wide strips of grasslands combined with strips of arable soil was made. Following from this proposal, one third of the area of arable soil should have been transformed into grasslands. The effect of protective strips on change of soil erosion intensity was also calculated. This led to the decrease from 3 to 5 times of annual soil loss. The possible increase of retention capability expressed by runoff coefficient of the Olsavica basin was estimated. A hydrological model was used to evaluate

proposed changes in land use. At the moment reliability of the flood protection of the Olsavica village is estimated for 10-years return period of flood wave. Proposed creation of grassland strips could increase the return period to 40 years.

The proposal for change of land use was endorsed by key institutions for water management, agriculture and nature conservation and it has helped to achieve agreement with the cooperative farm which is operating in area. The implementation of the restoration plan will start in spring 2003.



Comparison of current and post-restoration flood peaks in the Olsavica catchment
Daphne Institute for Applied Ecology

"Lessons learnt"
Change of land use management has surprisingly a large effect on the retention capacity of mountain landscape. Flood management has to start in the upstream section of river. Improvement of watershed management needs close cooperation and coordination of experts from different fields (water management, ecology, agriculture etc) as well as support from the deciding authorities. For implementation of the proposed measures its necessary to involve all key stakeholders from the early stages of the process.

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Current plans for flood reduction in the Meuse/Maas river (Belgium) – Time to make them happen both downstream and upstream

Location and background
The Meuse is a transboundary, rain-fed river. The catchment area covers parts of France, Belgium, Germany, Luxembourg and the Netherlands. The Meuse rises in the north of France and eventually reaches the North Sea in the Netherlands, some 850 km further downstream. During the last two decades a lot of adaptations have been made to the river Meuse, especially to make the river navigable for ships or to reduce erosion. As a result of these adaptations, the original landscape changed or even disappeared. The Meuse is in addition mainly a rain-fed river; precipitation in the French and the Walloon part of the river basin directly affects the amount of water in the river. As a result water levels and flows in the Meuse can be very unpredictable.

The high water levels in the River Meuse in 1993 and 1995 have caused considerable social and economic damages. Since then, it was more than clearer that even higher dykes would not solve the problems: sufficient space for the river and a good international cooperation between the three neighbouring countries would be the main requirements to alleviate future flooding events in the river Meuse. The good news are that France, Wallonia, Flanders and the Netherlands *are* convinced of the importance and the need for more space for the river, the importance of wetlands and floodplains, but paradoxically, it has, up to now, remained as beautiful intentions and plans ….

The Grensmaas: Promises for flood reduction
The Grensmaas is a 45 km stretch of the Meuse, mainly a gravel bed river, which forms part of the boarder between Belgium and the Netherlands and which used to have much more space to meander.

Despite the various projects of environmental NGOs, among others WWF to restore natural areas[6], to propose and develop an integrated Grensmaas River plan, to link it with information activities to explain the local habitants about the objectives and the necessity of this plan, Governments have still not started with its implementation. Competitive relations between mining activities, nature and recreation, safety for the habitants, agriculture and water winning have seriously slow down the process.

As long as the governmental good intentions remain in plans, heavy rainfalls will continue causing severe damages. The high rainwater falls of last summer were mainly concentrated around the Scheldt river basin, and didn't for that reason increase considerably the water level of the Meuse. Damages were mainly caused within urban areas, due to the inappropriate water infrastructure in Belgian urban areas (see below).

Flooding in the Grensmaas, at Meers, 1993 *De Maaswerken*

<u>But flood control of the Grensmaas only is not enough to "hold" the Meuse river: Upstream action needed!</u>
Due to its rain fed and thus unpredictable character, the river Meuse definitely needs more than only an integrated Grensmaas management. Therefore, WWF initiated a new project to increase the retention capacities in upland areas. The upland area, mainly located in the Walloon and French regions exists of numerous small tributaries and wetlands. The better the functioning of this natural sponge upstream, the higher the amount of rainwater that can be retained, the higher the chance that a rainfall period is finished before the sponge gets saturated. The magnitude of this sponge can be gigantic, much bigger than its actual size. By tens of small cheap measures in various small upper stream tributaries of the Meuse, like the Amblève, Ourthe, Semois, Sambre, Vesdre, etc.,it will be possible to retain the rainwater just long enough to avoid extreme water damages downstream. To achieve these objectives, collaboration with local environmental organisations have been established.

<u>Water Framework Directive's implementation in Belgium should help but there is still a lot of homework to do:</u>
The actions to increase retention capacities in upland areas on the one hand, and the storage capacities in lowland on the other, will still not be sufficient to solve Belgium's water crisis! The three Belgian political-administrative regions need to considerably improve their urban and land use water management.

- The Flemish region has already given a concrete kick off through its proposal for a decree for integrated water management. The decree, which reflects a strong and qualitative translation of the WFD, nevertheless still needs to be finally approved by the government. But the Flemish willingness to have a strong water law will probably surpass the remaining self-interests of some stakeholders groups

- The Walloon region on her turn believes that the "Contrat de Rivière", a voluntary agreement between *some* stakeholders to do *some* actions on a river basin approach, will sufficiently reflect the WFD, but in reality it has still a long way to go

The main problems to be tackled in the coming years are:

- *Complete restructuring of the administration <u>and</u> ministries*. E.g. In Wallonia, river basin management falls under the competence of the Ministry of Environment, while the sub-basins, including the "Contrat de Rivière", under the

[6] Through e.g. a LIFE project

Ministry of Agriculture

- *Impermeability of the soil*: Through an explosive urbanisation during the last decade, a high % of the Belgium soil remain impermeable, leading to an extreme fast run off of rainwater to surface water. Incentives for industry and household to disconnect rainwater pipes from waste water pipes and incentives to infiltrate rainwater were it falls are urgently needed

- *Stop construction in floodplains*: Construction permits are still approved by provinces and municipalities for constructions within flooding areas, although in some cases these areas are already been designated throughout the existing special plans for natural flooding areas

- *Halt non-environmental friendly agricultural practices*: Too often agriculture practices, like drainage encourage the runoff of rainwater to surface water instead of infiltration in the soil. In addition, the use of still heavier engines, compact the soil, and thus lowering the infiltration capacity of the soil

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VIII. Recommendations for an EU long-term strategy to mitigate the effects of floods

1. **Integration of EU policy objectives**. The EU needs to assess as soon as possible the extent to which "inadequate land-use and water management policies" have contributed to recent flooding problems in Europe (as stated in the Communication[7] laying down the EU's response to these floods), and act accordingly by ensuring that EU spending is made compatible with the integrated river basin management (IRBM) principles enshrined in the WFD, in particular wetland and floodplain protection and restoration. As a consequence, the EU needs to guarantee that:

   - The mid-term review of the Common Agricultural Policy, the mid-term evaluation of the Structural Funds and the interim revision of the Trans-European Transport Networks contribute to achieving the WFD's objectives of "good ecological and chemical" status in all European waters by the required deadline of 2015 (e.g. by halting and reversing the wetland and floodplain loss and degradation they cause).

   - Opportunities in the existing EU financial instruments are promoted to help with WFD implementation (e.g. cross-compliance, agri-environment), in particular to protect, enhance, and restore wetlands and floodplains. Further, the Commission should consider linking EU financial support to Member States to adequate implementation of the Water Framework Directive and the 11 water-related Directives[8] associated to it (as already done with the Nitrates and Habitats Directives).

   - Pre-Accession (ISPA, SAPARD, Phare) investment priorities are examined to ensure the integrity of floodplain functions and values in Candidate Countries, given that a high proportion of Europe`s remaining natural areas are found there. Special attention should be given to the potential impacts of proposed new road and waterway developments. The Commission should promote pre-Accession funding for WFD implementation as done via the "ISPA-WFD" workshops that took place in the Baltic and Danube basins over spring 2002.

2. **Proper implementation of the EU Water Framework Directive and related Directives**

   - As a matter of urgency, the European Commission must uphold the Water Framework Directive's "no deterioration" clause with regards the current ecological and chemical status

[7] European Commission Communication to the European Parliament and the Council COM(2002) 481 The European Community Response to the Flooding in Austria, Germany and Several Applicant Countries Brussels 28th August 2002

[8] Bathing Water Directive 76/160/EEC, Birds Directive 79/409/EEC, Drinking Water Directive 80/778/EEC as amended by Directive 98/83/EC, Major Accidents (Seveso) Directive 96/82/EC, Environmental Impact Assessment Directive 85/337/EEC, Sewage Sludge Directive 86/278/EEC, Urban Waste Water Treatment Directive 91/271/EEC, Plant Protection Products Directive 91/414/EEC, Nitrates Directive 91/676/EEC, Habitats Directive 92/43/EEC and the Integrated Pollution Prevention Control Directive 96/61/EC.

of wetlands and floodplains, and to ensure that the needs for protection and management of wetlands and floodplains for Natura 2000 designation under the Birds and Habitats Directives are realised.

- The European Commission and EU governments (including Candidate Countries) need to ensure a strong and ambitious WFD CIS and that associated guidance documents are about "best practices in IRBM", including provision of clear guidance on the functional roles of floodplain wetlands and how protection and restoration can be used to achieve the objectives of the WFD, including mitigating the effects of floods.

- The European Commission and EU governments (including Candidate Countries) must immediately promote and initiate public participation processes in all river basins in order to guarantee meaningful stakeholder involvement in the development of River Basin Management Plans including options for future flood control.

- European governments (including Candidate Countries) need then to ensure timely and efficient implementation of the WFD, and the 11 water-related Directives associated to it, in particular to integrate measures to achieve good ecological and chemical status of wetlands and floodplains in the development of River Basin Management Plans. The European Commission must work to ensure that this is the case and, otherwise, start infringement procedures.

3. **Learning once and for all that the flood-mitigation battle will only be won by working with nature instead of against it**: As part of WFD implementation, European governments need to divert investments away from heavy infrastructure for flood control to those designed to "make room" for rivers in floodplains, by:

   - Ensuring that existing wetlands and floodplains are able to function naturally and fully, as part of an integrated system, in order to play as full a role as possible in mitigating future flood events

   - Restoring degraded wetlands and floodplains, including river meanders, and especially re-connecting rivers with their floodplains

   - Removing obsolete man-made constraints on rivers as well as flood defences, and preventing further construction on floodplains

   - Setting up public awareness campaigns to inform the public about the risks of living in flood prone areas and combat the false sense of security provided by current dykes etc, which not always work.

4. **Strengthening international cooperation**. For example, all countries sharing the Danube river basin have to accelerate implementation of the agreements reached at the Danube Heads of State Summit in Bucharest in April 2001, aiming at securing a sustainable future for the region, especially in terms of shared approaches to river basin management and sustainable use of biodiversity.

5. **Tackling climate change**. As a first step, the EU has to adopt a 10% target for energy from new renewable sources by 2010 in order to reduce global warming pollution. In addition, strong measures are necessary for supporting energy efficiency on all levels of society to further reduce CO_2 emissions from fossil fuels.

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