WORLD BANK

GLOBAL ENVIRONMENTAL FACILITY PROGRAMME

GEF – NUTRIENT REDUCTION PROJECT

STUDY TOUR 2009

A WESTBOUND TRIP

Transfer of Knowledge

The Study Tour

The Implementing Agent and the Beneficiaries arrange a observation/study tour to Germany and France to study experience and best practices of wetland management and rehabilitation, which is also the focus of Part B of the GEF Nutrient Reduction project.

The Institutions delegate staff to participate in the study tour, and in turn share their experiences with colleagues: the transfer knowledge is at the focus of this activity. The Institutions will make necessary arrangements well in advance. The Water Directorate will pick up contact with relevant agencies, institutions and/or park directorates, and ask for their help to facilitate this study tour. This way, the visiting company would have the permission for visiting the particular sites (with professional guidance). Further, through the pre-arranged reception, they could meet experts working in similar areas that face similar challenges in managing wetlands, and exploring wetland rehabilitation. This would provide a unique opportunity to discuss the advantages and disadvantages of the applied methods.

Objectives of the Study Tour

The overall objectives of the study tour may be summarised as follows:

- to visit national and nature parks with similar ecological conditions to the DDNP;
- to develop contacts with relevant organizations and agencies working on wetland management and rehabilitation;
- to gather knowledge about methods and solution in use in Western Europe;
- to have consultations with experts with hands-on experience in wetland rehabilitation;
- to share knowledge gained through participating in the study tour;
- to lay the foundations of a future study tour for the representatives of the organizations to see the developments in the DDNP as a result of the GEF Project.

Study Tour Questions

Partcipants of the study tour aimed to find out how the reduction of nutrient removal is measured, and what kind of impact evaluation methodologies were used (i.e. monitoring system).

Fot this reason, the study tour questions may be formulated as follows:

- measurement of the reduction of nutrient removal, impact evaluation methodology of the development (monitoring systems);
- measured impacts on the environment resulted of the implementation/operation of nutrient removal (intervention);
- environmental impacts of nutrient removal (positive and negative) and ways to limit or address the negative impacts;
- complementary interventions to help reduce nutrient loads in river systems such as the Danube;
- to discuss and evaluate the result of the technical and other interventions carried out for the purpose of revitalisation and nutrient reduction;
- environmental impacts – esp. on forestry – of the interventions;
- altered conditions affecting the land usage, opportunities;
- stakeholder involvement; cooperation with authorities during project implementation; PR activities to further the acceptance of interventions;
- artefact and works maintenance, operations;
- functioning of the monitoring system;
- ideas for the development of the system.

Participants

MOEW:

- Ms. Ildikó Székely-Kulinyi

Duna-Dráva National Park Directorate:

- Mr. Balázs Trócsányi
- Mr. Endre Sztellik

Water Management Directorate:

- Mr. József Schubert
- Mr. László Márk
- Ms. Britta Hadinger

Detailed Programme

Day 1 – Departure: Pécs–Budapest–Stuttgart.

Day 2 – Meeting with officials/representatives of the Polder Altenheim: introduction, presentations, question&answer sessions.

Day 3 – Field-trip to the Altenheim polder (Germany).

Day 4 – Meeting with officials/representatives of the Erstein nature reserve: introduction, presentations, question&answer sessions.

Day 5 – Field-trip to the Erstein nature reserve and a short visit to the polder de la Moder water pump system (France).

Day 6 – Home journey: Erstein–Stuttgart–Budapest–Pécs.

The Study Tour took place from July 13 through July 18, 2009.

There was only a minor modification to the above schedule: the visit to the polder de la Moder water pump system was brought forward to day 4, in order to allow more time for the planned programme on day 5, which covered a larger tract of land and also to utilise the fine weather, since it is rather changeable in the region.

But the weather was rather favourable and it did not interfere with the programme, although much of the site visit to the Polder Altenheim was done in light rain.

Itineraries of the Study Tour

Floodplain of the River Rhein (French–German border):

Two sites to study on the banks of the River Rhine: one has been exposed to floods, the other having been protected from floods for over 30 years. It may serve as a basis for comparative study of nutrient flows and ground water conditions.

Host institutions:

1) Regierungspräsidium Freiburg, Abteilung Umwelt Referat 53.3 – Integriertes Rheinprogramm Bissierstraße 7, D-79114 Freiburg i.Br.

   Contact person: Dr. Ulrike Pfarr, Hr. Herbert M. Staeber

2) Service Navigation de Strasbourg / VNF DIR Strasbourg, Cité Administrative, 2, rue du Maréchal Juin, 67084 Strasbourg Cedex,

   Contact persons: M. Frédéric Doisy

   Hosts: M. Alain Roberjot, M. Florent Fever and M. Michel Denes

Background Information

(a) Altenheim, Germany – Polder Altenheim (Oberrhein):

The general restoration of natural morphological and hydrological conditions as a means to improve habitat variety and to reduce downstream flooding is being carried out Southwest of Strasbourg in Germany, in the Polder Altenheim. The Polder Altenheim is in the former floodplain of the Rhine and is a piece of former low-lying land that had been protected from flooding by dams. The dams were configured in a way to divide the land into two sections. It was possible to restore flooding to the area by redirecting water from the main stream of the Rhine to an old arm. Since 1987, the area has been subjected to regular flooding during both times of extremely high water and moderately high levels to mimic the river's natural drainage system.

In the Polder Altenheim, elements of the Rhine floodplain that had almost completely disappeared have begun to reappear due to the return of a semi-natural hydrologic regime and the general improvement of water quality.

(b) Erstein, France – Polder Erstein::

On the French side of the river Rhine there are two polders in operation: Polder Moder (inaugurated 1992) and Polder Erstein (inaugurated 2004). The Polder Erstein covers an area of about 600 ha and is mainly forested. These forests are owned by public (state forest or parish forest) and private enterprises. About 375 ha of the forests are protected as Forêt de protection, which means that deforestation is forbidden. Another 180 ha of the forests are protected as Natural reserve. Since 1963 (date of building of hydropower of Gerstheim), when the canalisation works were finished, the forests have not been flooded anymore. The river Rhine heritage still consists on deposits of silt, sand and gravel. Groundwater level at 1 m depth now is characterized by low amplitudes (about 0.5 m) and by a hydrological network of former lateral arms without any connection with the river itself.

The Rhine in the French alluvial plain has been deprived of the main parts of its flooded areas. One of the consequences is the high level of nitrate in groundwater due to intensive agriculture except under forested areas.

Day One

Participants of the study tour were transported to the airport by the travel agency. The choice of flight did not favour colleagues starting out from Pécs or neighbouring towns, but the company was happy to meet at the airport at 7am, and start out on a trip to Germany.

The flight was short and uneventful, followed by a pleasant car-ride to a hotel near Offenburg, where the travel agency booked accommodation.

The rooms came with a view to the mountains and warm meals in the evening with refreshing variety.

All locations to be visited were within a thirty-minute radius, and a minibus was at the disposal of the company from 9am to 5pm on Tuesday through Thursday.

Day Two

Kulturwehr Kehl/Starssburg

9:30	Welcome and introduction of participants
10:00	Introduction of the WD and the GEF Programme
10:30	Introduction of the DDNP and the Directorate
12:00	Break for lunch
13:30	Discission and exchange of ideas
15:30	Visit to the control unit on the Rhine

The WD and the DDNPD held presentations introducing their institutions, the GEF programme and the planned intervention, the habitats in the DDNP and interventions carried out so far to rehabilitate the wetlands. In return, Dr. Pfarr held a detailed presentation about the so-called 'Integrated Rhine Programme'.

Day Three

Polder Altenheim: site visit – 'taking a turn in the wilderness'

Dr. Ulrike Pfarr led the visitors through the fields of the polders at Altenheim, showing interventions, result of the Integrated Rhine Programme (IRP) as well as damage of flooding to the woods.

As a result of the regulation of the Rhine, the velocity of the water flow increased, erosion appeared and fields along the Rhine suffered from decreasing ground water levels.

The IRP is aimed to be the right concept for flood control and the restoration of the former floodplains. The Polder I and II of Altenheim have demonstrated their positive impact among flood protection measures, and floodplain communities are re-appearing.

Day Four

C.A.R.I.N.G. at Gambsheim:

9:00	Welcome and Introduction of Participants
9:30	Presentation about the river regulation, history of the Rhein
12:00	Break for lunch
13:00	Visit to the the control unit
15:00	Ride along the polder

The WD and the DDNPD shortly introduced themselves and summarised the aims of the GEF project, and the planned interventions. M. Florent Fever held a presentation about the history of the Rhine.

After the lunch break, the company visited the control unit as well as inlets and outlets of the polder.

Day Five

The representatives of the French host institution were meeting the colleagues at C.A.R.I.N.G, and took them on a site visit to the Polder de la Moder.

It was probably the most exciting day of the entire study tour: but the hosts and guests had to overcome the language barrier. Yet, looking at the interventions the engineers were speaking Technology's Universal Language...

Since they were not hindered by bad weather, and could cover all the stops within the planned time, they had an hour to spare hour and went to see the most prominent sights of Strasbourg.

Day Six

The travellers got up early since they had a flight to catch in Stuttgart. They stole through the night, with pre-packed lunch bags rustling in their bags and suitcases heavy with brochures and catalogues collected from the offices of host institutions.

They arrived well on time at Stuttgart Airport, and were ready to leave with for home.

Summary of Findings I.

Germany (Polder Altenheim)

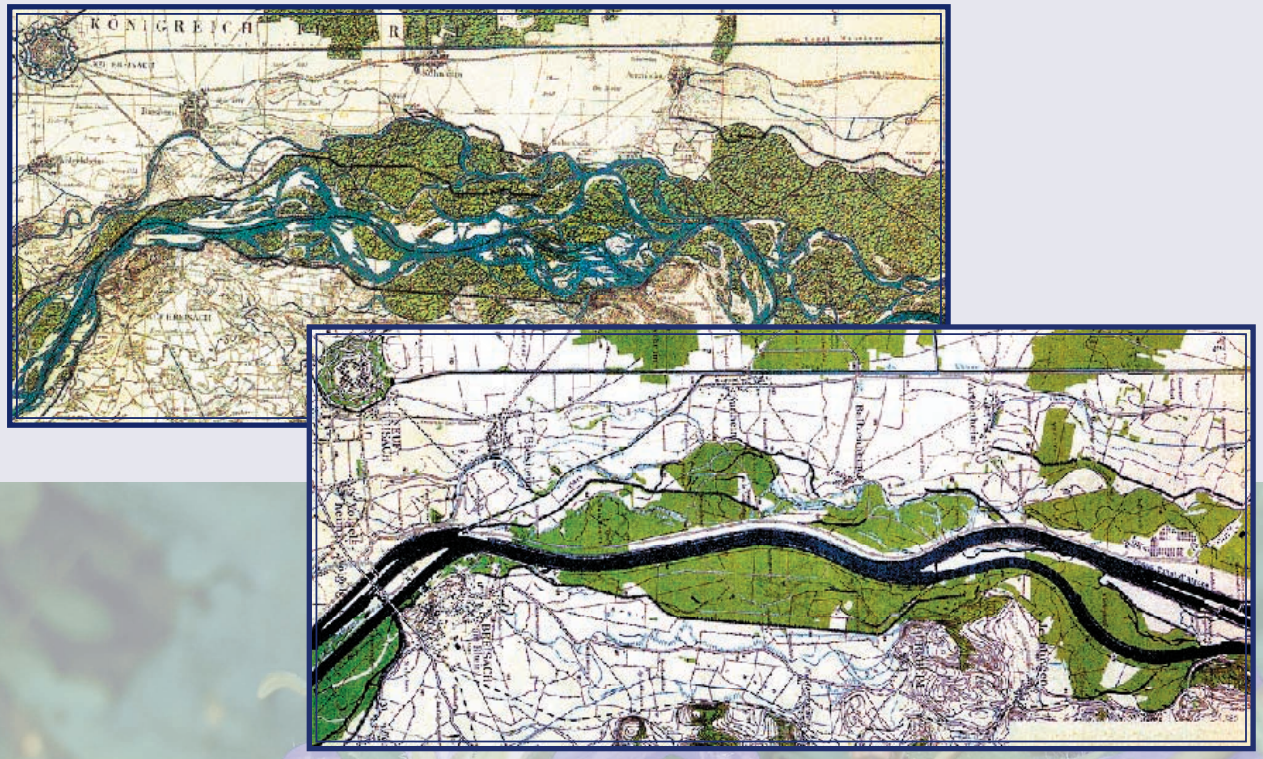
Integrated Rhine Programme, Baden-Wuerttemberg:

Southern Upper Rhine Valley belongs with Freiburg; whilst the Northern Upper Rhine Valley belongs with Karlsruhe.

Main duties of the institution:

- maintenance of main channels
- natural development of water channels
- flood prevention and flood protection
- management of flood protection facilities
- administrative water- and watershed authority
- groundwater protection
- water monitoring
- **Integrated Rhine Programme**

The Rhine in the 1830s and from the 1960s:



Consequences of river regulation:

- loss of floodplains along the Upper Rhine;
- severe erosion with dykes being built higher exposing areas lower down the river increased flooding;
- construction of hydroelectric plants;
- decreasing grounwater levels.

Far-reaching effects:

River channel straightening in combination with the construction of dykes and hydroelectric plants caused faster flowing flood waves. As a result, flood waves of the Rhine now meet the tributary flood waves, causing severe erosion of river bed as well as decreasing groundwater level. For this reason, artificial irrigation plants for agricultural use coupled with highly increased danger of flood catastrophes.

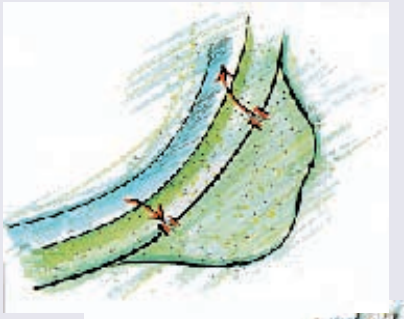
Solutions:

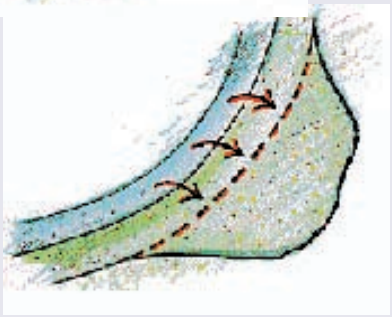
Further reinforcement of the dykes had to be ruled out, and floodplains need not be protected as in the past: but ecological floodings must be introduced, which also means:

Critical floods peaks may be brought under control and the land along the Rhine may once again resemble the times when it frequently was inundated, and a near-natural floodplain could re-appear with its rich flora and fauna.

In order to turn land into floodplains, human activities need to be reduced, the effects of such activities reversed and agricultural and industrial applications must be removed from the area.

The following pictures show the necessary moves to create floodplains where dykes exist.
In the first picture, a polder is created with an inlet and an outlet. In the second picture, the dyke is relocated (shifted to the edges of the polder).





Polder may be flooded via the inlets, it does not disrupt the flow in the riverbed, and flood water evetually return to the Rhine. The timing of the ecological flooding as well as the retention time may be planned and executed to the planned effect.

Through da, relocations, the Rhine would have an expanse of land, and it can safely overtop its banks.

Further, retention volume may be utilised in a targeted way. For this purpose, weirs may be installed, and the water flows regulated in a predefined manner.
Thus, a hydrological balance is achieved that is typical of floodplains, and flood protection is in harmony with nature.
These interventions need to be complemented with other measures: plants cannot adjust hastily to altered flood conditions, and floodplain communities need to be created.
On the left: Polder Altenheim I. and II.

Highlights of the 'Questions & Answers' Session:

Q: How is the water quality in the Rhine and the polder I. and II.?

A: The monitoring is looking for long term result, within two years there are no significant changes. There are also wells installed to avoid flooding of residential areas.

Q: How are the wells operated?

A: The system is semi-automated, it switches on at times of heavy rainfall.

Q: Are the wells available for public use?

A: Municipalities may use it at their own expense.

Q: What is the extent of ecological flooding?

A: Water comes from the channel system, although it would be better to have water from the Rhine.

Q: What is the tree composition of forest?

A: Flood tolerant trees are brought in.

Q: What is the purpose of the forested areas?

A: the aim s to bring it close to natural conditions; but it is not a Natura 2000 area.

Q: Who owns the land?

A: The communities.

Q: Is there a high-level of sedimentation?

A: Sediments (silt and mud) are usually flushed out.

Q: Does the area need regular maintenance, esp. dredging?

A: Water flows in near the bottom of riverbed, it does not bring substantial amount of sediments.

Q: Are there nutrient or other types of pollutant entering the area?

A: There is a low level of pollutants, the water from the Rhine is "pure". The catchment area in the Alps is not exposed to high agricultural use, so the water is clean.

Q: What is the speed of the inflow? Is it stable all round the area?

A: It depends on the location of the inlet, whether it is in close to the bypass channels, where the hydroplants are located. But the Altenheim inlet is a slow flowing section

Q: Are there any difficulties with game management?

A: There are animal rescue hills (as high as 6 metres), so that is no public upheaval that animals drown during ecological floodings. But these do not belong to alluvial plains. Yet, the forest is very rich, games can hide easily.

Q: Do you experience problems with natural regrowth?

A: Yes, it is indeed a problem, It is necessary to keep cleaning the area.

Summary of Findings II.

France (Polder Erstein and de la Moder)

Past and Present of the Rhine:

On the first day in France, the Hungarian team was received by a group of engineers. They held a presentation about the history of the Rhine, starting from the civil works of the 19th century, emphasising the works of J.G. Tulla above all. Regardless of the history of 150 year of river regulation, the Rhine still floods the land.
The Grand Canal d'Alsace was constructed, and electricity is produced in hydroplants. There are several bypasses along the river (Marckolsheim, Rhineau, Gertsheim, Strasbourg), otherwise the plants could not produce electricity. Ecological concerns were voiced on the German side; yet, hydroplants are not only a source of electricity but pride as well.
Notwithstanding, France and Germany agreed to participate in a programme, in a so-called 'action plan for the Rhine' (financed by the EU from the LIFE-framework). The programmes is aimed at reconnecting ancient arms and create suitable habitats for beavers, wild grape and turtles.
Since salmon breeds in the river, fishpasses were constructed at Gambsheim and Iffezheim (more planned at Strasbourg, Gerstheim and Rhineau). The fishpasses have to be set to attract fish (minimum flow). At certain locations, the fishpass offers a route to the fish that is unnatural: the riverbed itself is lower and fish need to be transferred by elevators; when they are heading for the breeding places they are willing to swim only upstream. It shows that salmon is valued, and efforts are made to protect their breeding habitats and facilitating their travel upstream.
The channels, bypasses and other waterways are maintained. However, the relocation of dredged material poses a problem, since sediments are polluted.

Polder Erstein:

In the afternoon, the group paid a visit to the pumping station of Erstein. The hosts showed maps of the area, and explained the activities taking place throughout the year:
Polder Erstein is flooded fully once a year in an effort to rid the area of plants that do not belong there: species invading the floodplains. The floodings require smooth communications between expert on both sides of the border as well as at lower and higher sections of the river.

The French practice dynamic retention along pre-defined retention rules. If there are two peaks in the flood, then they drain the area and fill it up again. They do not use the term 'ecological flooding', and the area is under water only if it eases the Rhine and complements the existing flood protection system (the dykes in particular). But they admit that the flooding has the beneficial side effect: they replenish water in the area.

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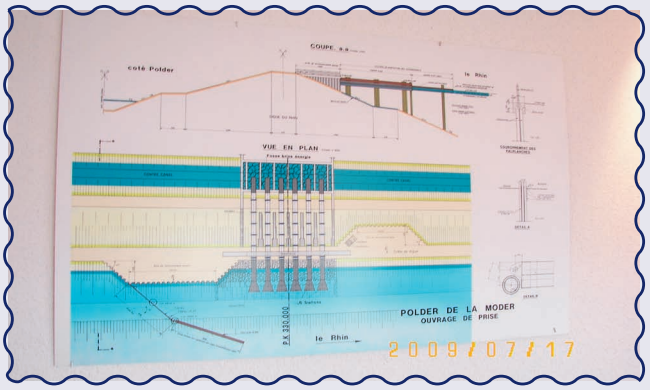

Polder de la Moder

The group met at Gambsheim in the morning on Day 5, and took a short ride to the edge of the Polder de la Moder. Visit to this polder was included in the programme through the recommendation of M. Doisy, and Hungarian team was overwhelmed by the hospitality of the French:

There is a 6-cylinder syphon installed on the Rhine transferring water from the Rhine to the polder. The hosts started all syphons to show them in operation, and explained when these are switched on.

The Polder de la Moder functions as water storage at times of extremely high water levels: some 5.6 million cubic metres in 15 consecutive days when the Rhine flows with some 3,500 cubic metres per second. The syphons have a capacity of 160 cubic metres per second in twelve hours,

In order to construct syphons of this magnitude, stakeholders (scientists, local nature conservation activists, anglers' and hunters' associations, representatives of citizens and factories) and decision makers had to be brought together and they all had to agree to the intervention.

Conclusions

Comparison of the Interventions and Counter measures:

In comparing the intervention and counter measures in Germany and France, we see evidence of major differences between the assessment of the Rhine regulation, the need for countermeasures and the overall evaluation of the situation arisen.

In Germany, active measures are taken to control the effects and consequences for nature: they have realised that intervention of the past damaged the nature, and these effects must be reversed. Of course, the river Rhine is regulated beyond full repair, but land nearby could still bear resemblance to the old times. Polders were created in an effort to cease constructing higher and higher dykes, and give a valid alternative to former practice. Areas were set aside for polders and ecological floodings were introduced, closely resembling the natural alluvial conditions.

In contracts, hydropower plants are being built on the same section of the Rhine and bypass channels are constructed to support the system. Due to historical reasons, France is entitled to the entire amount of electricity produced. Most likely, it is the underlying reason why Germany has other incentives in dealing with the Rhine: in their view, hydropower plants are useless, they disturb nature and the bypass channels are to the detriment of the river and surroundings.

Measures with Immediate Value for Component B

Overall, the measures taken in Altenheim resemble the planned intervetions in the DDNP. These measures include: dam relocation; discharge regime of the upper Rhine; tributaries restored; restoration of natural habitats; drained or dry areas reconverted into wetlands; remaining alluvial forest protected. Although the ecological floodings increased the ground water level (which is an effect feared by the Forestry and Gaming Co. in Gemenc and Béda-Karapancsa), it introduced a dynamism natural to alluvial plains and land nearby. But these floodings do not have far-reaching effects, they only replicate the natural course of events. In order to maintain the system, the channels need to be cleared and wood debris have to be removed (blocking the waterways).

The reason why some of these measures could be copied for the nutrient reduction project of Hungary: Germany and France draws on funds from local and EU sources as well, and the construction and maintenance of these artefacts and facilities are very costly. Further, the facilities do not blend into the scenery: In the national park, nature conservation is a top priority, and intervention should cause as little disturbance as possible. The facilties and artefacts need maintenance and operations that are not readily available at the DDNPD. It further strengthen the view that artefact need to be easy to operate and have low maintenace costs.

The Hungarian team could see severe impacts on the forests, since the floods and extended periods of water retention damaged hardwood trees. This problem was solved by compensating the forestry company for the loss, as well as allowing the composition of the fauna adjuts slowly to floodings.

Both the French and the German hosts emphasised that these changes could not be forced onto the communities: roundtable discussion, community programmes, open-air activities were necessary to build up support, and it is still an ongoing process. Protestors were marching up when small animals drowned during an ecological flooding and refused to accept the intervention.

Land usage is expected to change with time: alluvial plains should be maintained as such and residential areas as well as agricultural applications should withdraw from these areas. In the case of the DDNP, the area is protected; therefore problems of this sort may only be experienced to a smaller extent. But the system of monitoring wells in additiona to the drainage wells in Altenheim show how communities my benefit from integrated programmes.

The Objective and the Outcome of the Study Tour:

The group needed to look for nutrient removal methodologies, complementary interventions to help reduce nutrient loads in river systems. However, in the sites visited, nutrient removal is not the primary aim for a good reason: waste water treatment is advanced in France and Germany, rivers are polluted with nutrients to a lesser extent. Yet, the regulation of the Rhine brought on benefits that outweighed the problems; most of which was not even anticipated at the time. However, the ecological problems are rather similar to that of the DDNP.

The DDNP (with the Danube) bears resemblance to the situation in France and Germany along the Rhine. The sites visited are former alluvial plains, severed from the main riverbed, causing the areas to dry out and the typical habitats of floodplains to reduce. The major difference is that the regulation of the Danube was not carried to a similar extent, and wetlands were still maintained and attention has not shifted to dubious benefits. The floodplains (polders de la Moder, Erstein and Altenheim) all serve the purpose of admitting and absorbing water at times of high flood. These technical and other interventions (carried out for the purpose of revitalisation) bear some significance for nutrient reduction as well.

To sum up:

Floodplains have a unique character that must be preserved: the interaction between the duration, height and frequency of floods results in mosaic habitats, which have genetic potential, recreational value, a flood prevention function.

The most important message of this study tour is that human interventions (above all the regulation of the Rhine and the construction of bypasses and hydroplants brought on economic conditions that are not only hard to reverse, they are also expensive.

The current condition of the DDNP shows signs of the harmful effect of river regulation and the sinking of the river bed, but these effects are not near as severe as the group saw in Germany and France.

It seems that the revitalisation of the wetlands comes at a time, when former erroneous interventions may still be reversed, the effects will not spread further and they may be effectively mitigated.

The Tour in Pictures


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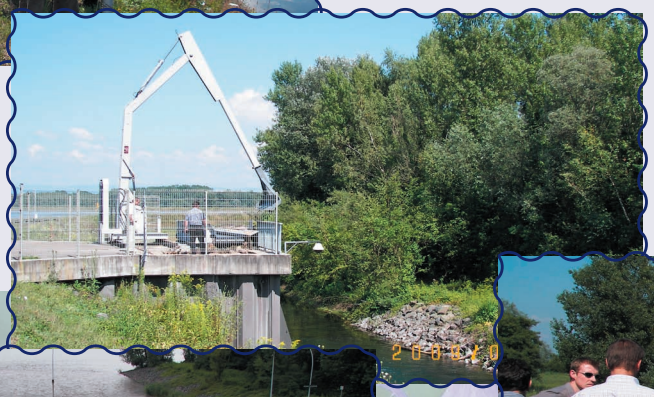


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