DANUBE.RIVER.LIFE

PROGRAM
&
BOOK of ABSTRACTS

36th International Conference
International Association for Danube Research
September 4 - 8, 2006 Klosterneuburg & Vienna

50 years IAD - 30 years AC-IAD

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D A N U B E

The ribbon that ties together the West, the Centre, and the East of Europe. A river that unites the greatest number of nations found in any river basin in the world.

R I V E R

Engraving its course into a continent of change. Seas and lakes long vanished, but the Danube still shapes its course.

L I F E

Organisms travelling along the river's course. Finding refuge when displaced in the adjacent landscape by man.

AIM AND SCOPE OF THE CONFERENCE

The River Danube, the geographical and historical link between the Central and South East European countries, and its catchment are the backbone of past and future activities of the International Association for Danube Research (IAD). Founded in 1956, the IAD formed the interface between science, administration and water management in its widest sense. Triggered by the common water policy of the EU, best represented by the Water Framework Directive (WFD) of the European Communities, the IAD has a wider field than ever to which it can contribute its knowledge and expertise, not to forget its role in bringing together people and organisations from the whole Danube basin. The 50 years anniversary of IAD is a forum for presenting and discussing recent developments in WFD-related activities, of presenting up-to date research in the catchment focused on biodiversity, river restoration, and water quality. The explicit aim of the conference is to link institutional experience and scientific expertise for the challenges in future, as one of the successful basic principles of IAD since its foundation. Moreover, concepts will be worked out during this anniversary conference to take advantage of existing long-term investigations, and those to be initiated, as a strategic guideline for the future ecological, conservational and economic development of the River Danube.

36 th International Conference – 50 Years of IAD

DANUBE.RIVER.LIFE

INTERFACING THE PAST AND THE FUTURE OF ECOLOGY AND WATER MANAGEMENT IN A LARGE EUROPEAN RIVER

Vienna – Klosterneuburg
September 4 – 8, 2006
www.oen-iad.org/conference

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PROGRAM

Day 1: Festsaal der Raiffeisenkasse Klosterneuburg

Rathausplatz 7, 3400 Klosterneuburg

7.45 am		Registration
9.00 am	9.05 am	Welcome by the President of the conference, G. Janauer
9.05 am	9.10 am	Welcome by the President of the IAD, I. Teodorovic
9.10 am	9.15 am	Welcome by the Mayor of Klosterneuburg, G. Schuh
9.15 am	9.30 am	Opening of the 36th International Conference of the IAD by a representative of the Federal Ministry of Agriculture, Forestry, Environment and Water
9.30 am	10.00 am	Press Conference / Coffee break and Registration

sponsored by

10.15 am	10.45 am	„50 Jahre IAD – Rückblick und Perspektiven“ Lecture by T. Tittizer
10.45 am	11.10 am	„A glance into the future“ President of the IAD, I. Teodorovic
11.15 am	11.35 am	„100 years Reinhard Liepolt – Founder of IAD“ W. Kohl
11.35 am	11.55 am	Presentation concerning the role of the City of Vienna in the Danube River Basin Representative of the City of Vienna
11.55 am	12.15 pm	Presentation concerning the role of the Nationalpark “Donau-Auen” for the Danube River Basin Representative of the Nationalpark Donau-Auen
afterwards till 2.00 pm		Lunch break
2.00 pm	2.20 pm	Presentation concerning the role of the ICPDR in the Danube River Basin Representative of the ICPDR
2.20 pm	2.40 pm	“Comparative assessment of Potamoplankton and primary productivity in the River Danube” Institute for Limnology, Austrian Academy of Sciences, M. T. Dokulil
2.40 pm	3.00 pm	Presentation concerning the importance of the WFD in the Danube River Basin Representative of the Federal Ministry of Agriculture, Forestry, Environment and Water, V. Koller-Kreimel
3.00 pm	3.20 pm	„Research activities of Verbund in point of view to the Water Framework Directive of European Union“ Representative of VERBUND – Austrian Hydro Power, H. A. Steiner
3.20 pm	3.50 pm	Coffee break, sponsored by

3.50 pm	4.20 pm	Presentation concerning the importance of the Danube River Representative of the Federal Ministry of Transport, Innovation and Technology
4.20 pm	4.40 pm	„The ecological status of the Danube River with special reference to its fish fauna“ Department of Freshwater Ecology, University of Vienna, F. Schiemer
Evening program	6.00 pm	Reception by the Mayor of Klosterneuburg G. Schuh Vinothek Stift Klosterneuburg, Rathausplatz 24

Day 2: Vienna – Centre for Ecology Althanstraße

Althanstraße 14, 1190 Wien
Lecture Hall II, 2nd floor

8.30 am	8.40 am	Introduction and welcome by the Dean of the Faculty of Life Sciences C. Noe
8.40 am	10.40 am	Session 1 - “Management of a large river in a changing environment” (6 contributions) Chairs: T. Hein, M. Pannonhalmi
10.40 am	11.00 am	Coffee break, sponsored by
11.00 am	12.30 pm	General Assembly of the IAD
12.30 pm	2.15 pm	Lunch break
2.15 pm	4.15 pm	Session 1 continued (6 contributions) Chairs: T. Hein, M. Pannonhalmi
4.15 pm	6.30 pm	Poster session and coffee and snacks sponsored by

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Day 3: Exkursion

8.10 am	Meeting Point: Ramp opposite tram station Line “D”
8.30 am	Departure
	Busses are sponsored by

Verbund
Austrian Hydro Power

Federal Agency for Water Management / Institute for Land and Water Management Research – Petzenkirchen
Presentation on Water Management in Austria
Lunch break
Tour in the Hydroelectric Power Plant “Ybbs-Persenbeug”
VERBUND – Austrian Hydro Power
afterwards Coffee and Snacks
Returning to Vienna through the scenic and famous Wachau Valley

Day 4: Vienna – Centre for Ecology Althanstraße

Althanstraße 14, 1190 Wien
Parallel Sessions
Session 2: Lecture Hall II, 2nd floor (follow signs)
Session 3: Lecture Hall 7, 2nd floor (follow signs)

8.30 am	10.50 am	Session 2 - “The role of macrophytes in large rivers” (7 contributions) Chairs: W. Schuetz, G. Janauer
parallel		Session 3 - “Challenges in fish ecology in large rivers” (7 contributions) Chair: H. Waidbacher
10.50 am	11.20 am	Coffee break, sponsored by FDG AUSTRIA fuzzy development GROUP www.exler.at
11.20 am	12.20 pm	Session 4 – “The role of algae in large rivers” (3 contributions) Chair: K. Teubner
12.20 pm	2.30 pm	Lunch break
2.30 pm	4.10 pm	Session 5 – “Invertebrates: key riverine community and bioindicators” (5 contributions) Chairs: N. Oertel, M. Leichtfried
4.10 pm	4.40 pm	Coffee break, sponsored by FDG AUSTRIA fuzzy development GROUP www.exler.at
4.40 pm	5.20 pm	Session 5 continued (2 contributions) Chairs: N. Oertel, M. Leichtfried
5.20 pm	18.40 pm	Session 6 – “Miscellaneous” (4 contributions) Chair: J. Bloesch
Evening program	8.15 pm	Reception by the Mayor of Vienna, M. Häupl Heurigen “Fuhrgassl-Huber”, Neustift/Walde 66, 1190 Wien

Day 5: Vienna – Centre for Ecology Althanstraße

Althanstraße 14, 1190 Wien
Lecture Hall II, 2nd floor

8.30 am	8.45 am	Opening
8.45 am	10.25 am	Session 7 – “Microbial communties in large rivers” (5 contributions) Chairs: G. Kavka, D. Kasimir
10.25 am	11.00 am	Coffee break, sponsored by

11.00 am	12.40 pm	Session 8 – “Water quality aspects: nutrients and toxic substances” (5 contributions) Chairs: I. Teodorovic, M. Zessner
12.40 pm	2.30 pm	Lunch break
2.30 pm	3.30 pm	Session 8 continued (3 contributions) Chairs: I. Teodorovic, M. Zessner
3.30 pm	4.00 pm	Coffee break, sponsored by

4.00 pm	5.00 pm	Mini-Workshops "Natural Heritage" and "Functional Processes of aquatic and terrestrial transition zones"
5.00 pm	5.30 pm	Closing of the conference

BOOK of

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WATER QUALITY ASPECTS: NUTRIENTS AND TOXIC SUBSTANCES

50 Jahre IAD – Rückblick und Perspektiven

T. Tittizer

Die Donau, Europas zweitgrößter Fluss mit den zwei schwarzen Enden (die Quelle im Schwarzwald und die Mündung im Schwarzen Meer), trennt als Grenzfluss und verbindet zugleich 14 europäische Staaten. Die Erforschung dieses mächtigen Stromes, der auf 2.850 km langen Strecke durch 9 Länder fließt, wurde zwar schon lange begonnen, doch dies geschah ohne engere internationale Zusammenarbeit. Im Rahmen des 13. Kongresses der Societas Internationalis Limnologiae (SIL) wurde die Gründung einer wissenschaftlichen Organisation beschlossen, die sich mit der Erforschung der Donau und ihrer Nebenflüsse befassen soll. Auf diesem Beschluss wurde 1956 die Internationale Arbeitsgemeinschaft Donauforschung (IAD) gegründet, deren 50-jähriges Bestehen wir heute feiern.
In den Zeiten der Teilung Europas erfüllte die Internationale Arbeitsgemeinschaft Donauforschung eine, über die politischen Schranken hinweg, wichtige völkerverbindende Rolle. Manche der zwischen den einzelnen Donauanliegerstaaten aufgetretenen Konflikte konnten durch fachlich-wissenschaftliche Kontakte der IAD-Mitglieder gelöst werden.
Durch den Zusammenbruch des Ostblocks eröffneten sich der IAD neue Chancen und Perspektiven, zugleich aber wuchsen auch ihre Verpflichtungen. Die IAD musste ein neues, wissenschaftlichen Profil gewinnen. Nach jahrelangen intensiven Bemühungen ist es ihr gelungen, einen festen Platz in der Koordinierung internationaler Aktivitäten zum Schutz und Renaturierung der Donau zu erlangen und somit auch ihr Weiterbestehen zu sichern.

IAD's 50th Anniversary in 2006: Re-defining the scientific profile

I. Teodorović[1], J. Bloesch[2]

[1] IAD President, University of Novi Sad, Faculty of Sciences, Dept. of Biology and Ecology, Trg Dositeja Obradovića 2, 21000 Novi Sad, Serbia and Montenegro, teodorovic@beocity.net

[2] IAD Ex-President (1998-2004) and Commissioner, Stauffacherstrasse 159, CH-8004 Zürich

In 2006, IAD - the oldest truly basin-wide professional limnological association within the Danube River Basin turned 50. It is time to celebrate and retrospect the achievements, and there were many, during the last five decades. However, it is also an occasion to evaluate the overall scientific performance of IAD and to assess its impact on water management, protection, conservation and restoration policy and practice. Could IAD be described as a rather "old-fashioned" association still sticking to "gathering and hunting" so that it simply lost pace with modern trends in limnology and environmental science? By presenting a comprehensive summary of recent, on-going and planned IAD projects that identify actual limnological concepts and promising applied research we develop a strategy by which our Association should re-define its scientific identity.

for notes

Comparative assessment of potamoplankton and primary productivity in the Danube River

M.T. Dokulil

Institut für Limnologie, Österreichische Akademie der Wissenschaften, A-5310 Mondsee, Mondseestrasse 9

A review will be presented on the composition, abundance, biomass, chlorophyll-a concentration and primary productivity of the potamoplankton along the river corridor of the River Danube. Data are compiled and summarised using information from the literature and own observations. The different stretches of the Danube will be characterised using available information on nutrients, phytoplankton and photosynthetic rates. Whenever possible, phytoplankton data from the back-waters of the adjacent flood plains will be provided.

Research activities of Verbund in point of view to the Water Framework Directive of European Union

H.A. Steiner

BR h.c. Dipl.-Ing. Hubert A. Steiner: Representative of Environment, 2. Vice President of AC-IAD, VERBUND-Austrian Hydro Power AG (AHP), Vienna, E-mail: hubert.steiner@verbund.at, www.verbund.at

Verbund, Austria's leading electrical utility, was founded in 1947. It provides about 50 % of Austrian power requirements by means of its 108 hydro-electric and 4 thermal power plants. Approximately 90 % of Verbund´s electricity comes from hydro power. Half of them are produced in 9 run-of-river plants at Danube River, the most important river in Austria.
The electricity is generated with the greatest possible consideration for the environment. So, scientific investigations, specially in aquatic and semi-aquatic living space, have a long tradition in Verbund. This investigations get a new dimension in 2000, when the Water Framework Directive of European Union (EU-WFD) was putting into effect.
In Verbund, together with authorities and national communities of interests, estimations to minimize the influences were carried out. The report will show, what initiatives were taken place and what advances Verbund could bring into the actual discussions. With presentation of studies and pilot-projects the efforts under regulations of EU-WFD were documented, to minimize the effects to guarantee the further full operation of power plants, specially at Danube river system.

for notes

The ecological status of the Danube River with special reference to its fish fauna

F. Schiemer

University of Vienna, Faculty of Life Sciences, Department of Freshwater Ecology, Althanstr. 14, A-1090 Vienna, Austria

The ecological status of the Danube River and its fisheries prior to 1988 has been summarised by Bacalbasa-Dobrovici (1989), since then the situation has changed in many ways: the trends of river–floodplain disintegration initiated by the major river regulation schemes in the 19th and early 20th centuries accelerated. Moreover, further hydropower dams were built along the course of the river and its major tributaries, further reducing the ecological integrity of the river-floodplain systems in several stretches. On the other hand, a number of mitigation schemes were initiated e.g. in Austria, Hungary and Romania in order to compensate for the continuing losses of riverine landscapes. The measures taken to control water pollution were partially successful and water quality along the river has shown a general improvement.
The main focus of river management in several of the riparian countries is on the conservation of riverine biota, a stronger incorporation of ecological aspects in river engineering and the development of restoration programmes. Several international schemes have been proposed to undertake concerted action to improve the overall situation. New concepts for commercial and recreational fisheries as well as floodplain restoration were developed. The present contribution synthesises recent developments in fish ecology and fisheries of the Danube and concentrates on key management issues.

for notes

MANAGEMENT OF A LARGE RIVER IN A CHANGING ENVIRONMENT

15 years of UNDP/GEF interventions in the Danube River Basin: The Conclusion

P. Whalley

UNDP/GEF Danube Regional Project, Vienna International Centre, PO Box 500, A-1400, Vienna, Austria

The Danube Regional Project (DRP) is the last Danube basin-wide intervention by the Global Environment Facility (GEF) and UNDP after 15 years of active involvement. Together with a parallel programme on the Black Sea and targeted support on nutrient reduction from the World Bank, approximately 100 million USD has been applied by GEF to a wide range of activities in both the Danube and Black Sea basins. Significant DRP support to the Danube countries and to the International Commission for the Protection of the Danube River (ICPDR) include strengthening their institutions, providing detailed technical guidance on the implementation of the European Union (EU) Water Framework Directive, developing and implementing environment-friendly agricultural practices, and encouraging the active involvement of civil society through multiple public participation and communication programmes. The maturity of the ICPDR and the progression of the EU accession process within the basin have led to the view that further GEF support will not be required at this level after 2007. This presentation will provide a brief summary of the scope of UNDP/GEF activities with key lessons learnt and prospects for the future in the Danube River Basin.

Institute for the Danube Region and Central Europe (IDM)(Institut für den Donauraum und Mitteleuropa)

S. Milford

IDM: Hahngasse 6/1/24, A–1090 Wien/Vienna, Tel.: (+43 1)319 72 58, Fax: - 4, e-mail: idm@idm.at, www.idm.at

The IDM - founded in 1953 - is an Austrian scientific institution, which received new impetus in its work and extended its activities to all countries of Central and Southeastern Europe under its chairman Prof. Dr. Norbert Leser and his successor Dr. Erhard Busek. It sees its role in carrying out research projects on current topics concerning the Danube region, Central and Southeastern Europe. The Institute's educational activities, events and publications serve as a means to make research knowledge available to a specialized audience and to interested persons among the general public. In doing so, the IDM places particular attention upon its role as the clearinghouse for all matters relating to the Danube region, Central and Southeastern Europe.
The Institute is funded by the Austrian Federal Ministry of Education, Science and Culture, the Austrian Federal Ministry for Foreign Affairs, the Austrian Federal Chancellery, the Austrian provinces, individual cities, by professional associations, the Austrian National Bank and private sponsors.

for notes

Hydroecological problems of the Ukrainian part of the Danube River basin

V.D. Romanenko, V.I.Yuryshynets

Institute of Hydrobiology NASU, Kyiv, Ukraine

On the territory of Ukraine Danube River basin includes the Carpathian tributaries (Tissa, Prut etc.) and Delta water objects (Kilian Delta and Lower reaches Lakes). Each of these regions has a special complex of hydroecological problems. Danube River and its inflows are trans-boundarian water objects for Ukraine. That is why for harmonized solutions of different problems, including water quality, trans-boundarian countries should apply estimative approaches proposed by EC Water Framework Directive 2000/60. Ukrainian scientists have good outputs in application of these European approaches. Estimation of the water quality of Transcarpathian inflows of the Danube River with application of biotic indices has been elaborated. It is revealed that evaluation of the water quality in Carpathian rivers has to take into account biological processes of maintenance of fresh-water communities. In the Danube delta constant monitoring of the water ecosystem state, including biological parameters (saprobic index, biological diversity), is carrying out. The international scientific cooperation with Institutions of Danube countries develops on this field of activity.

The water quality of Prut River, an important - Danube tributary

S. Stirbu

State Hydrometeorological Service of the Republic of Moldova

The Prut river is a water channel of vital importance for the Republic of Moldova and one of the main Danube tributaries. Its water is used for drinking water supply and irrigation purposes. The following sites on the Prut River are included in the transnational monitoring network: Sireuti, Leova and Giurgiulesti on the Danube river. Observations in the transnational monitoring network are monthly performed by the State Hydrometeorological Service and the water quality is estimated with respect to 40 chemical ingredients: oxygen regime, heavy metals, physical, biogenic and 5 biological parameters.
The Convention on the Danube River Protection was signed by the Republic of Moldova at 29 June 1994, at the same time when the Accident Emergency Warning System basis was initiated.
During the last years the quality of the Prut river water remained at the third quality class which indicates a moderate pollution.
A detailed and more qualitative evaluation of surface water quality is possible only within a complex study and parallel hydrochemical and hydrobiological analyses, and will need as well the correlation of individual results achieved.

for notes

A comprehensive concept for an eco- hydrological assessment of large scale restoration programmes of floodplain rivers

M. Schabuss[1], F. Schiemer[1], H. Habersack[2], M. Liedermann[2]

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The paper outlines the conceptual framework of a scientifically based monitoring concept developed for the "Integrated River Engineering Project", a large scale restoration programme of the Austrian Danube downstream of Vienna. The project aims to combine three major objectives i) a stop of the ongoing degradation and incision of the riverbed; ii) an improvement of the ecological quality of riverine and riparian habitats and the related functional processes; iii) an improvement of navigation. In order to reconcile the three main aims an integrative planning approach with a close cooperation between geomorphologists, hydrologists, ecologists and water engineers was necessary. Our conceptual framework is based on a hierarchical cause-effect chain with a focus on the improvement of hydro-morphological processes (fluvial dynamics) defining the dynamic equilibrium of habitat distribution with their characteristic biota. The implementation of the project will be carried out in successive steps and involves an adaptive approach with feedback loops between the eco- hydrological monitoring and the engineering measures. This requires the development of prognostic tools to predict the reactions of the ecosystem to the river engineering measures. The paper outlines the principal structure and integrative approach of the monitoring programm.

Correcting the mistakes from the past – remediation of riparian areas on the Danube floodplain between Neuburg and Ingolstadt (Bavaria/Germany)

B. Cyffka

Prof. Dr. Bernd Cyffka: Director of Floodplain Institute Neuburg, Platz der Deutschen Einheit 1, D-86633 Neuburg a.d. Donau, bernd.cyffka@aueninstitut-neuburg.de

During the first half of the 19th century, work started to embank the main parts of the Upper Danube completely. Since that time, the river flows in dikes, normally without any contact to its floodplain and the wet riparian areas. Nowadays, the floodplains experience a revival in the way of thinking of people. Unfortunately, many parts of vulnerable riparian areas have diminished. The Bavarian Floodplain Programme started 2002 to search for suitable (floodable) areas. The largest joint part was found with the riparian forests between Neuburg and Ingolstadt. In November 2005, the Bavarian minister for environment dug the first turf to start an 11 million Euro pilot project named "Remediation of riparian areas on the Danube floodplain between Neuburg and Ingolstadt". In future, about 2,100 hectares of forests are used for both, artificial man-controlled flooding to improve biodiversity in the riparian forest and in the flood meadows, and to serve as a flood storage in case of disastrous floods.
The newly founded Floodplain Institute Neuburg carries out the scientific attendance. The future task of this institute is to spread the results on national and international levels. Apart from the mentioned benefits, the pilot project is scientifically unique. It is a large zoological, botanical and morphological field experiment, which can serve as a model for other remediation projects.

for notes

Hydro-Ecology and River Habitats Project at the Mosoni-Danube

M. Pannonhalmi

North-Transdanubian Environmetal Protection and Water Management Directorate, Győr, Hungary

The primary objective of the project was to analyse the habitats of Mosoni-Danube which have a significant effect on the sustainable development of Győr and Mosonmagyaróvár regions. The restoration and rehabilitation of disturbed habitats is of crucial interest for everyone, and these will be based on the the results of the research according to the EU Water Framework Directive. During the research period and the processing of the project results, new opportunities for cooperation were opened for experts in the fields of water management and ecology. Main activities in the project were research on ecological continuity components over the full length of the river as well as in detailed reaches as regards macrophytes, macrozoobentos and fish, water flow modelling at different levels of detail, and water quality assessments in longitudinal transects.Visions for the future development will be presented.

The River Mures ecosystem - scientific background information as the basis for a catchment approach

C. Sandu[1], J. Bloesch[2]

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[2] IAD Ex-President (1998-2004) and Commissioner, Stauffacherstrasse 159, CH-8004 Zürich

The Mures River covers 10,800 km of water course and a catchment of 28,310 km^2, and features a mean annual discharge of 184 m^3/s (at Mako, rkm 24.3, 1961-1990). It originates in, and flows across, Romania, but the lowermost part downstream of Arad (28 out of total 789 km) flows in Hungary before entering the Tisza River. We compiled basic catchment and river information, including geology and geography, river morphology, aquatic flora and fauna, chemical pollution, and land use. While the river and main tributaries (such as Aries, Tarnava Mica and Mare) are moderately regulated but ecomorphologically classified near-natural, pollution from cities, single industries and many mining sites are significant. This work is aimed at initiating a new phase of IAD activities, after a long period of "gatherers and hunters", to jointly work on the complex ecosystem function, limnological concepts and new methods (e.g. biomonitoring) in order to get a holistic catchment view and the implementation of river basin management. Our data analysis shows that the applied focus is on floodplain conservation and hydrology, mitigation of pollution by heavy metals and nutrients, and responding biota.

for notes

Managing the New Danube in Vienna (Austria): the importance of plant nutrients and aquatic macrophytes

G. Wolfram[1], N. Kreuzinger[2], A. Farnleitner[3], U. Wychera[4], U.H. Humpesch[5]

[1] Donabaum & Wolfram OEG, Consulting Engineers of Ecology, Vienna
[2] Institut für Wassergüte und Abfallwirtschaft, TU Vienna
3 Institut für Verfahrenstechnik, Umwelttechnik und Technische Biowissenschaften, TU Vienna
[4] Aquatic, Kritzendorf; [5] Austrian Academy of Sciences, Institute of Limnology, Mondsee

The New Danube is a 21-km channel constructed in the 1980s to protect eastern parts of the city of Vienna from floods. It is divided by a weir into an upper 12-km impoundment and a lower 9-km impoundment, held between weirs and flood-gates that are opened (infrequently) at times of high discharge in the main river. Water levels in the two impoundments are normally relatively stable and the channel resembles a stillwater canal, although there is a continual flux of groundwater between the Danube and the impoundments via an aquifer beneath Danube Island. As groundwater percolates through the gravel down hydraulic pressure gradients it transports plant nutrients from the River Danube into the New Danube. By processes of filtration, sedimentation, chemical change and precipitation, Danube riverwater is partially altered as it moves through the Danube Island aquifer, and further processes occur in the surface (channel) water of the New Danube. In the latter, water quality is therefore partly dependent on that of the River Danube and has to be rigorously managed because, apart from the occasional but primary function of flood control, the flood-relief channel is used for a variety of other purposes: as a recreation area for thousands of people, for the provision of drinking water, for maintaining and controlling water levels in neighbouring wetland areas, and increasingly as a linear wildlife habitat in the environs of a large city.

Does the fully automated groundwater management system lastingly influence the water quality in the 2nd and 20th district?

S. Schuster[1], W. Picher[2]

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The 2nd and 20th metropolitan districts of Vienna (30 km² area) are enclosed between the Danube River and the Danube Canal, an old branch of the main river. The groundwater aquifer in this area is of importance as it is used periodically to feed the city water works. After the construction of the hydro power plant at Freudenau in Vienna, in order to maintain the groundwater regime in the 2nd and 20th districts unaltered a groundwater management system has been developed. An extensive doubled walled sealing system was constructed along the right river bank of the Danube which is 13 km long and extends up to 12-40 m depth. The groundwater flow is regulated with the help of withdrawing and recharging wells placed on either side of the walls. The direct infiltration of contaminants from the Danube is prevented through continuous control of the water quality and regular monitoring in an elaborate net of ground water wells. After 10 years of full operation (1996 to 2006) changes of the affected ground- and surface water system can be pointed out by direct comparison of two periods (before (1992-1996) and after impoundment of the Danube River (1998-2002) using statistical methods like direct correlation or cluster analysis. The management procedure causes positive developments in the surroundings of the right river bank of the Danube through maintenance of pollution prevention in the aquifer. There is no infiltration of inorganic or organic pollutants. Clustering of all monitoring stations before and after starting up the management system based on predefined expressive parameters and further visualization of similarities reflects the based on a two dimensional groundwater model expected groundwater flow through the whole project area.

for notes

Water enhancement scheme Lobau - a backwater system in Vienna (Austria)

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The Lobau is a former floodplain of the river Danube which has been highly degraded since the regulation of the Danube in 1875. Due to the altered water regime, important ecosystem processes, like sedimentation and erosion, have been changed. The Lobau, nowadays, represents a groundwater-fed and back-flooded floodplain lake system which still harbours a diverse mosaic of aquatic, semi-aquatic and terrestrial habitats, and which plays a central role in the landscape water balance. However, the reduced hydrological connectivity with the main channel results in declining groundwater levels and an increasing loss of aquatic habitats.
On behalf of the city of Vienna a controlled water enhancement scheme of the Lobau system with water from an artificial side-arm of the Danube River has been established. The aim is to sustain the present diverse mosaic of habitats by stabilizing the groundwater level and to increase the nutrient output of the backwater system.
The project has been divided in two phases. Phase I concentrated on an enhancement scheme for the upstream area of the Lobau and resulted in an official notification after a five years test phase. Phase II intends to extend the water enhancement to the downstream area of the Lobau and to re-connect the floodplain with the main channel. This phase is currently in preparation.

Nutrient Balance of two protected areas in the Prut River Basin

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In 2005, field work in the protected areas "Prutul de Jos" and "Padurea Domneasca" in the Prut River Basin was carried out to substantiate a systematic nutrient analysis of statistical material. Lake sediments featured an organic nitrogen and phosphorus content of 0.2-0.4 % and 0.06-0.09 %, respectively. In contrast, soils were enriched with organic N (91-96 %) and P (62-84 %). Aquatic reeds accumulated nutrients more efficiently (by 25 %) than agricultural crops. Nutrient load to lakes by superficial runoff amounts to 80 % of the total nutrient input and significantly enhances eutrophication. However, wetland restoration in the catchment can decrease nutrient load by 70 %.
The main aims of this study were to evaluate N and P flux in agriculture, to identify reference conditions for certain eco-regions according to the EU Water Framework Directive, to harmonize monitoring activities, and to provide recommendations for integrated river basin management in a transboundary perspective.

for notes

THE ROLE OF MACROPHYTES IN LARGE RIVERS

Macrophyte Habitat Profiles, River Restoration, and the WFD: making use of the MIDCC data base

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During the Multifunctional Integrated Study Danube: Corridor and Catchment, 2001 – 2005 physical parameters were recorded in macrophyte habitats, which provide a knowledge base on the conditions different species select for growth. When planning river restoration the opening of oxbows is an appropriate measure to enhance hydrological dynamics. Predicting the fate of macrophyte vegetation growing there at present is best based on the knowledge how species will cope with the changed flow, sediment and nutrient conditions. Knowledge on habitat conditions also helps in re-constructing reference conditions *sensu* WFD, which are needed for determining the good ecological status and the good ecological potential with respect to rehabilitation measures triggered by the monitoring results under the regulations of the WFD.

Inventory of water vegetation of the Danube river branches

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This study was carried out in the periods of optimum vegetation development between 2002 and 2004 within the framework of the international project Macrophyte Inventory Danube: Corridor and Catchment (see: www.midcc.at). The macropyhte vegetation was assessed in five large branches of the Danube, covering a length of 951 km in total. The methodology followed the European Standard EN 14184, which is recommended for assessing the aquatic macrophyte vegetation in running waters (with an emphasis on work related to the European Water Framework Directive – WFD) and follows the principles described by Kohler (KOHLER ET AL. 1971, KOHLER 1978, KOHLER and JANAUER 1995). Simultaneously the main physical habitat parameters, were evaluated. Our results can be used for the assessment of reference conditions *sensu* WFD and the intensity of anthropogeneous impact. Significant differences were found between the individual river branches in terms of species composition, and distribution, growth forms variety, ubiquitous species, national and international protection state. These differences are related to the location of the branches, either outside or inside the Danube Delta, and to the environmental parameter setting. These results are supported by diagrams and statistical methods.

for notes

Quality of aquatic environment and macrophytes in Slovenian watercourses

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Slovenia is characterised by heterogeneous geomorphology with carbonate rocks presenting over 40 % of its surface. The same hold true for climate ranging from Mediterranean to continental, resulting in the gradient of precipitation rate. These influences along with antropogenic activity determine the properties of different watersheds and consequently the quality of the environment in watercourses. The research comprises the surveys of rivers Kolpa, Sotla, Krka, Ižica, Ljubljanica, some watercourses of karst region and watercourses of lowlands along river Drava. The environmental condition of watercourses was assessed using a modified River, Channel and Environmental (RCE) inventory proposed by PETERSEN (1992). The survey of macrophytes was performed following the methodology of KOHLER and JANAUER (1995) and European Standard EN 14184. In whole about 600 km of watercourses was examined. The results revealed worse environment and lower macrophyte diversity in watercourses with intense anthropogenic activity in the watershed and heavily modified riverbeds as was the case of the river Sotla. The best status and the highest macrophyte diversity were estimated in karst streams of Notranjsko podolje. Great variety of habitats also supported high plant diversity in the river Krka. The river Kolpa exhibited good status of enviroment, but macrophyte diversity was rather low.

Macrophytes as phytoindicators and potential phytoremediators in aquatic ecosystems

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The content of macronutrients (N, P, K, Na) and heavy metals (Fe, Mn, Zn, Cu, Ni, Pb, Cd, Co) in sediment and plant samples of dominant aquatic macrophytes (*Ceratophyllum demersum, Phragmites australis, Trapa natans, Hydrocharis morsus-ranae, Nymphaea alba, Nymphoides peltata, Salvinia natans*) from the river Jegricka (Serbia) is presented. Samples were taken from four localities, positioned in each of the three different levelled basins of 65 km long River, in two consecutive years of research. Jegricka used to be a typical natural lowland watercourse. During the 19th and 20th century, river was adapted and today its water regime is artificially synchronized as regulated part of Danube-Tisa-Danube Hydrosystem network. Surrounding area is under intensive agricultural influence with no larger industrial polluters in direct contact with the watercourse. Macronutrients content in plant tissue indicate to substantial availability of those elements, pointing out to typical eutrophic environment. Results did not showed any clear locality dependent pattern of element concentrations. Chemical tissue composition varied in relation to plant species. Some species turned out to be more successful bioaccumulators for certain elements, therefore showing high potential in possible use as environment phytoremediators for those elements.

for notes

Habitat and Plant Species Diversity along the Danube River in Serbia

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The Serbian reach of the Danube River is 588 km long. During the survey of aquatic macrophytes (period: 2002-2005), 93 plant species and related habitat parameters were recorded in 588 survey units, each one river-km long, and also in adjacent backwaters. The statistical analyses of habitat parameters showed that the course of the river could be divided in four different sections: upper course; run-of-the-river reservoir Djerdap I; run-of-the-river reservoir Djerdap II; and the lower course. Each section was characterized by a unique plant species diversity, frequency of occurrence and distribution pattern: species diversity ranged from low in the upper reach to high or very high in the impoundments, and decreased in the lower reach. Helophytes showed a different pattern in some sections. With this study, a basis has been provided to study in more detail the influence of large power plant impoundments on the aquatic and helophyte vegetation of rivers.

The Links between the Semi-Aquatic Vegetation and the Main Habitat Characteristics of the Ponjavica River(Serbia and Montenegro)

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This paper discussed the links between the present status of semi-aquatic vegetation and the main habitat characteristics of the River Ponjavica. It is essential that the rapid spread of emergent vegetation in these water bodies is tracked by appropriate long-term monitoring of hydrology and biology. This will provide information on the relationship between aquatic plant communities and trophic status, as well as on the impact of river regulation. Field survey should be complemented by limnological data derived from the echoes generated from the hydroacoustic signal (Ultra Eagle Texas sonar) to provide an indication of the nature of the substrate (structure and texture). Field studies should cover a comprehensive range of vegetation characteristics to ensure that the impacts of regulating the River Ponjavica are adequately monitored. The Weshoff-Maaler method is the most suitable (WESHOFF, V. and MAAREL, E. VAN DER, 1973); this is based mainly on the Braun-Blanquet floristic-phytocenological approach (BRAUN-BLANQUET, J. 1964). Application of this technique allows vegetation succession to be recorded, whilst a combination of plant data and habitat features can be used to classify a site according to the 'B' and 'C' criteria of the IPA (Important Plant Area) standards.

for notes

The aquatic vegetation of the Upper Danube river

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Two vegetation surveys were conducted in recent years (1988/89 and 2003/04) encompassing the aquatic and the bankside vegetation of the Danube between the confluence of the source rivers Brigach and Breg and the influx of the Iller. Additional floristic inventories of oxbows and brooks in the Danube valley provide a good overview over the present status and the historical development of aquatic vegetation. At present, most sections of the river course harbour aquatic vegetation, consisting of 25 vascular plants and seven mosses. The most abundant species are *Ranunculus fluitans* and *Fontinalis antipyretica.* Although vegetation dynamics proved to be high at a small scale little changes occurred in the past 15 years at a large scale. However, an examination of herbaria material embracing a time span of 100 years revealed a decrease in many species. The impoverishment of aquatic vegetation could be linked to extensive channellisation carried out about 100 years ago and the onset of severe pollution and eutrophication in the 1960´s. Moreover, a strong decline in number and extension of oxbows has led to a loss of suitable habitats for aquatic plants. Aquatic and riparian vegetation were successfully re-established in some stretches by recent restoration measures.

for notes

CHALLENGES IN FISH ECOLOGY IN LARGE RIVERS

Past and current status of sturgeon in the Serbian part of the Danube River

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Serbian part of the Danube River was originally inhabited with six sturgeon species. Nowadays, Atlantic sturgeon (*Acipenser sturio*) has disappeared, ship sturgeon (*Acipenser nudiventris*) is very rare, stellate sturgeon (*Acipenser stellatus*) and Russian sturgeon (*Acipenser gueldenstaedtii*) are endangered and protected, while catch of beluga (*Huso huso*) and sterlet (*Acipenser ruthenus*) still exists. Beluga catch is regulated by CITES quota and there are credible data about beluga catch in last three years. Even for the Danube section near Belgrade, the last reported big catch of sturgeon species are from the start of XX century. Credible sturgeon catch statistical data for Serbian part of the Danube River exists only for period 1958-1996. State hatchery was built near Kladovo after construction of "Djerdap I", but it is not currently in function, due to political and economical changes in country. Private hatchery started to work in 2003 in Kusjak, place just upstream from "Djerdap II". Though all sturgeon species are commercially important and decrease of their population in Serbian part of the Danube River is evident, they have not yet been object of broad scientific research.

Past and present status of sturgeons in Hungary

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Sturgeons had played an important role in the history of Hungarian fisheries, but due to over fishing, followed by extensive river regulations and deterioration of water quality decrease in their populations has led most of them to the verge of extinction in the middle Danubian basin. Stellate sturgeon (*Acipenser stellatus*) and great sturgeon (*Huso huso*) are probably vanished from the Hungarian waters. Russian sturgeon (*A. gueldenstaedtii*) and ship sturgeon (*A. nudiventris*) has sporadic occurrences and they are critically endangered. Sterlet (*A. ruthenus*) is only common species, it is caught for commercial and recreational purposes. Its population has increased since the second half of 1970s presumably due to restocking activities and improving water quality. The stocking program of the sterlet or passive legal protection of the other sturgeon species is rather doubtful tool for their conservation. Development and implementation of an action plan involving rehabilitation of large rivers for sturgeons is required in Hungary.

for notes

Present state of Sturgeon stocks in the lower Danube river, Romania. A review

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Following 11 years of unregulated fishing of sturgeons (1990 - 2000) Romanian fishery and CITES management authorities implemented during 2001 – 2005 adaptive management of sturgeon stocks, including setting of regionally agreed precautionary catch quota, reduction of number of fishing licenses from 1,040 to 800, compulsory marking and reporting of biometrics characteristics of all fish landed (posted on webpage since 2003). Catch quota was reduced from 56 tons in 2002 to 40 tons in 2005, while catches decreased from 37.5 tons to 11.8 tons. Abundance of young of the year born in the Danube River and age structure of adults monitored annually were used to evaluate the effects of adopted catch quota. Natural spawning and annual recruitment varied in beluga sturgeon and sterlet in natural limits and were alarmingly low in Danube sturgeon and stellate sturgeon. Consequently, in 2005 supportive stocking programmes were started for these last two species. Ten thousand young stellate sturgeons obtained by artificial propagation, using an effective number (N_e = 14) of broodfish which assures the preservation of genetic diversity, were raised to average TL of 15cm, individually tagged using CWT and released at four different locations in the Danube River. Age structure survey showed lack of first time spawning Danube sturgeons already since 2002 and deficit of first time spawning beluga sturgeon since 2004. Considering the long-term evolution (1920 - 2005) of catches and the multispecies character of traditional sturgeon fishery in Romania, a ten-year moratorium of commercial fishing was recommended in January 2006.

The ultimate need for implementation of sturgeon protection in the Danube River Basin - a view of 2006 and call for actions with the Sturgeon Action Plan under the Bern Convention

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The well known threats to, and decrease of, sturgeon populations in the Danube River and the Black Sea came recently to a level that makes fears of their extinction a realistic scenario. There is evidence of new scientific research (referred to in this conference) that implementation of urgent measures in stopping over-exploitation, poaching and caviar black market must be achieved in line with CITES quota or even by bans of fishing. In parallel, the problem of migration barriers of the Iron Gates and Gabčíkovo dams must be tackled, and habitat restoration/conservation in the frame of floodplain and morphological restoration programmes (and in opposition to plans for navigation channels and hydropower stations) must be realised. This paper presents a short summary of the Sturgeon Action Plan that was initiated by IAD and WWF and adopted in a recommendation by the Standing Committee of the Bern Convention under the Council of Europe in December 2005. The Plan's ultimate goal is formulated as follows: "Through national action and international cooperation, to secure viable populations of all Danube sturgeon species and forms by sustainable management and by restoration of their natural habitats and migratory movements."

for notes

The invasive *Neogobius* fishes (Perciformes, Gobiidae) – how are the incomers doing outside their country of origin?

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Four species of fish of the genus *Neogobius* (Perciformes, Gobiidae) are known to have expanded upstream from their previous (native) distributions and invaded the upper sections of the River Danube.
To obtain information on recent distribution and relative density of *Neogobius* spp., Slovak (yr. 2004), Austrian, Croatian and Bulgarian (yr. 2005) sections of the Danube were sampled using electrofishing and beach seine in autumn terms. The collected fish were measured, sexed and bottom substrate was recorded.
The presence of all four *Neogobius* species – *N. kessleri*, *N. fluviatilis N. melanostomus*, and *N. gymnotrachelus* was confirmed in Bulgaria and Croatia. Though the latter 2 species did occur in Croatia, we found them to be very rare in comparison with their occurrence in Austria and Bulgaria. Thus our results support the hypothesis of disjunctive spreading from the place of introduction in Upper Middle Danube. *N. gymnotrachelus*, though previously known from Slovak stretch of Danube, was not recorded during our survey in Slovakia and *N. fluviatilis* in Austria. The highest density of *Neogobius* spp. (571 inds/km) was achieved in Austria, the lowest (56 inds/km) in Bulgaria. *N kessleri* and *N. melanostomus* reached significantly higher standard length in non–native range than in their native range (Bulgaria).
The project was supported by Centre of Excellence LC 522 and Bulgarian Science Fund, Project B-1510/05.

Fish ecological investigation of anthropogenic shore line structures in the impoundment of the run-of-river power station at the Danube in the heart of Vienna

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In the last 150 years many heavy impacts by river regulations have been done in the Danube, e.g. river and river bed straightening, bank stabilisation, flood controlling constructions, shipping, run-of-river power station… Due to this many river engineering works at the Austrian Danube system, the river system in the Vienna area is heavily modified relating to morphological, hydrological and ecological components. This abovementioned works has a large-scale influence at the fish faunal elements of the Danube in this area.
In the course of the construction of the power station KW Wien/Freudenau several compensatory measures are been done. The previously straight shoreline of the Danube Island was reconstructed by creating backwaters, coves, gravel banks and pools. Nine different shore line structures and one gravel bank at the head of the impoundment are been constructed on the right bank of the Danube Island. For the verification of the ecological integrity of the shore line structures, different fishing methods and afterwards multivariate statistical analyses are used. The results of this investigation give us important basic information about the management of such habitats in a large heavily modified river. These are very important for the implementation of the Water Framework Directive (WFD).

for notes

Seasonal Migration patterns of Nase and Barbel in the Danube and its Tributaries

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The seasonal migration patterns of nase (*Chondrostoma nasus*) and barbel (*Barbus barbus*) in large rivers and the importance of tributaries as spawning and foraging habitats for large river populations are widely unknown. From June 2002 to August 2003 we studied migration patterns of nase and barbel within a 58 km long section of the Austrian Danube.
The only tributary within this part of the Danube providing substantial spawning grounds is the river Pielach. Fishes (25 barbels and 25 nase) were tagged with coded radio transmitters by surgical implantation and immediately released. Tracking was done by boat in the Danube and along the shore in the tributary.
Migration patterns and habitat use of nase differs clearly from those of barbel. While the majority of nase stayed within the free flowing Wachau, only 3 barbels could be registered repeatedly within this area. Most of the barbels obviously moved downstream to the impounded area where they could be recorded in riparian areas. 30.4 % of all nase and 52.2 % of all barbel returned to their spawning grounds in the river Pielach. This study highlights the strong homing tendencies of these cyprinids and the importance of an undisturbed river continuum.

for notes

THE ROLE OF ALGAE IN LARGE RIVERS

Phytoplankton of lower stretch of Sava river through Serbia & Montenegro

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Sava River is the right side tributary and by the amount of water the richest tributary of Danube river, which joins it at Belgrade. Republic Hydrometeorologic Service of Serbia carries out water quality examinations on the localities of Jamena, Sremska Mitrovica, Sabac and Ostruznica. This paper presents the results of the monthly analysis of the physico-chemical characteristics and seasonal (four times a year during the vegetation period) examinations of phytoplankton community in the 2003-2004. The results of physico-chemical water analysis, according to ICPDR classification, show that the majority of examined parameters matched the first and the second class of water quality. Supersaturation has been occasionally noted during the summer period, and rarely oxygen deficit. Nitrite, orthophosphate and total phosphorous concentrations, occasionally matched the criteria for the third class, specially on the locality of Ostruznica. Heterogene phytoplankton contents has been noted, 170 taxa from 7 algal divisions. Representatives from Bacillariophyta division are dominant, and those of Chlorophyta are subdominant. In the quantitative way, phytoplankton poverty has been concluded. That was probably due to Sava water regime (abrupt increases of water flow), lower nutrient concentrations and occasional increase of suspended solids in water. Saprobity indices values matched the second class criteria.

Impact of hydrological connectivity on primary production patterns of large river floodplains

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Floodplains connected to the main stem of the river are important areas for the biogeochemical cycling in fluvial landscapes. The hydrological retention in such areas is associated with lower flow rates and increased transparency of the water column and, combined with high nutrient contents, exhibits higher rates of carbon processing compared to the main channel. The availability of resources and the distribution of algae and macrophytes and therefore the potential productivity in floodplain waters are determined by the frequency and intensity of surface water connectivity. Main focus of the study is to depict the relevance of hydrological connectivity to aquatic primary production patterns in the Lobau, a significantly altered floodplain of the River Danube (Austria). Therefore, basic information on habitat structure, surface and groundwater dynamics, and estimates of nutrient and light availability will be combined with biomass measurements to develop dynamic biomass models of pelagic and benthic algae, as well as of macrophytes. We hypothesize that macrophytes will dominate in the most isolated segments of the floodplain. The relative contribution of pelagic algae to the total aquatic production will be increasing with higher hydrological connectivity and after flood events. Benthic algae should attain maximum production at intermediate levels of connectivity.

for notes

Phytoplankton communities in the Danube-Tisza-Danube canal Banatska Palanka – Novi Becej (S & M)

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Phytoplankton analyses (diversity, chlorophyll *a*, enzyme phosphatase activity) in the assessment of the ecological potential and possible use of the resources were carried out throughout 2003 and 2004. The temperature of the water caused seasonal succession of phytoplankton communities. 60 % of species, which were diatoms, indicated mesotrophic condition in the water that was in accordance with chlorophyll *a* content. In the middle of the canal, the abundance of alpha-mesosaprobic bioindicators such as *Cyclotella meneghiniana, Melosira varians, Nitzshia palea*, *Rhoicosphenia abbreviata* and *Surirella ovalis* was found. Halophyllic diatoms such as *Entomoneis paludosa* and *Bacillaria paradoxa* were detected, too. The decrease in algal diversity in waters in Southern HS DTD sector was due to the suspended solids load and the influence of erosion. The enzyme activity level indicated the highest nutrient recycling in water near the entrance of the small Vrsacki canals and near the river Moravica. We propose the use of total coliforms for the estimation of true ecological potential and the assessment of human impacts. Therefore, our analyses pointed out the moderate ecological potential.

for notes

INVERTEBRATES: KEY RIVERINE COMMUNITY AND BIOINDICATORS

Typology of the Danube River based on top-down and bottom-up approaches

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The application of the Water Framework Directive's (WFD) methodology to assess the ecological status of rivers needs to be based on a typological classification of river types. To develop a typology of the Danube River as part of a general spatial typology fails as large rivers show a self-contained development and a more individual character. Therefore a separate stream section typology for the Danube has been developed in a top-down process based on eco-geographic criteria. In a bottom-up procedure the performance of this top-down classification system was validated by the biota. To describe the relationship of the benthic invertebrate communities of different sites a „non-metric multidimensional scaling“ was performed. To quantify the classification strength the differences between mean-within-class and mean-between-class similarity were used. The results were crosschecked in co-operation with experts from the Danube River Basin countries. In total ten Danube River Section Types could be distinguished: Upper Course of the Danube, Western Alpine Foothills Danube, Eastern Alpine Foothills Danube, Lower Alpine Foothills Danube, Hungarian Danube Bend, Pannonian Plain Danube, Iron Gate Danube, Western Pontic Danube, Eastern Wallachian Danube, Danube Delta.
The survey was funded by the UNDP - GEF Danube Regional Project.

Distribution and structure of Trichoptera assemblages in the ecoregion Hungarian lowland in Slovenia

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Data of 163 samples collected at 33 sampling sites between 1998 and 2002 were used to study relative occurrence and environmental requirements of 67 taxa, 62 were determined to the species level. Only fourth to seventh order streams (after Strahler) of catchment areas between 173 km^2 and 15379 km^2 were considered. Approximately 90 % of 62 species were found in less than 10 % of samples, but only *Hydropsyche pellucidula* and *H. incognita* in more than 50 % of samples. The taxa distribution was related to environmental variables using canonical correspondence analyses. In general, taxa distribution was correlated either with periodical summer dry rivers with muddy bottom (argyllal) and low carbonate hardness concentrations (range and maximum), or along the pollution gradient represented by non-carbonate hardness, total phosphorus, BOD_5, COD and maximum sodium concentrations.

for notes

Evaluation of predicting models of larval chironomid assemblages from environmental gradients in a large river

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Assemblages of larval chironomids in a free-flowing section of the River Danube, east of Vienna, were examined over three years. Relationships between community attributes and environmental factors in the first year were used to predict assemblage characteristics for the subsequent two years. The predominant factor influencing the assemblages of larval chironomids seemed to be sediment turnover, which especially affected total abundances, but also to a lesser degree spatial resource widths, evenness and β-diversity. Predictability of community attributes from environmental factors was at best intermediate, whereas relationships among community attributes were much higher. The latter suggests that environmental factors mainly influenced the absolute abundances and that these densities are responsible for the spatial structure of the assemblages. Differences between observed and predicted values were often due to changes in absolute values between the years, especially those concerning the dominance structure and patterns of aggregation, rather than to differences in the general relationship.

Aquatic macroinvertebrates of the Veliki Rzav catchments area (Serbia, the Danube Basin) – the preliminary results

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The paper presents preliminary results of the study of aquatic macroinvertebrates performed in the Veliki Rzav catchments area. The study has been performed in the period 2003-2005. The investigations involved the Veliki Rzav River (six sampling sites) and four tributaries (the Mali Rzav, the Katusnica, the Bela Reka and the Ljubisnica rivers - one sampling site each). Investigated watercourses belong to small to medium sized hill-mountainous streams. The area has been poorly hydro-biologicaly investigated in the past. During the investigation, a total of 95 macroinvertebrate taxa, belonging to 13 groups, have been identified. The most diverse groups were Ephemeroptera with 32 species and Trichoptera with 20 taxa. The most frequent and abundant species was *Baetis rhodani* (Ephemeroptera). Composition of aquatic macroinvertebrates of investigated streams is typical for hill-mountainous watercourses in Serbia.

for notes

Section types in the Hungarian reach of the River Danube according to the macroinvertebrate communities

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Macroinvertebrate communities of the littoral zone of the Hungarian Danube and the adjacent wetlands (Szigetköz and Gemenc) were investigated in 62 localities during 1998 and 1999. On the basis of this coherent data series an attempt is made to establish whether are there any differences among the separate water bodies regarding the size and composition of macroinvertebrate communities with special emphasis of the Water Framework Directive of the European Union. The inland waters of the Gemenc Landscape Protection Area separated throughout from all of the other water bodies. In the Szigetköz side-arm system there were no significant differences among the main arm section, active alluvial floodplain and protected area. A process to uniformity could be established in the spatial distribution and composition of the macroinvertebrate taxa due to the different water supply measurements. Three sections could be detected in the main arm of the Danube. Only one, the section above Gönyű is identical with the first section classified by the EU WFD. The section between Gönyű and Mohács could be divided in two parts, one lasting from Gönyű to Budapest and the other from Budapest to Mohács.

Development of the zooplankton community in the Srebarna Lake (North-Eastern Bulgaria) along the process of ecosystem rehabilitation

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The ecosystem of Srebarna Lake, located on the right Danube bank between river-km 393 and 391, has been strongly affected by the cutting off the water exchange with the river. Regular observations on the species diversity and quantity of zooplankton community were carried out since 1998 when a recovery of the aquatic ecosystem was noted as a result of the restored feeding of the lake by the Danube.

For the last 7 years a tendency to increase of the total number of zooplankton species occurs, the Rotatoria being predominating group in terms of species richness. In 1999 some eulimnoplankton species reappeared and became permanent component of the plankton community in the lake during the next period. The observed changes of both the species structure and the quantity of the zooplankton for the period of investigations reflect the influence of quite variable environment at constant eutrophic state of the water body. The indirect effect of the flooding regime (through hydrochemical, hydrological and biological parameters) is identified the main environmental factor responsible for the long-term succession of the zooplankton community after 1999. Fish predation is defined the main biotic factor limiting both the total ability and size structure of crustacean plankton.

for notes

Trematode fauna in species *Rana* kl. *esculenta* (Linnè, 1758) from Petrovaradinski Rit Marsh

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Total of 83 individuals of the species *Rana* kl. *esculenta* were colected from Petrovaradinski Rit Marsh. Trematode fauna of lungs, digestive tract and bladder was analysed. Nine species and one subspecies were recorded. Edible Frog is a new host for metacercarias *Neodiplostomum spathoides* and *Paralepoderma cloacicola*, which one, also was for the first time recorded from our country. In total semple, infestation extenziti was 43.37 %, there was recorded low infestation intenzity, and dominant fluke species was *Opisthioglyphe ranae* (50 %).

for notes

MISCELLANEOUS

Changes of habitat types through several decades in the Danube region in Serbia - The case of Veliko ratno ostrvo island near Belgrade

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Aquatic habitats are among the world's most valuable environments. Wetlands are not only the hotspots of biodiversity, but they also provide tremendous socio-economic benefits.
Having in mind the importance of aquatic habitats, the main goal of our present research is the surveillance of habitat type changes along the Danube course in Serbia through several decades by use of multitemporal remote sensed data.
This paper presents a part of the investigation that is focused on the Veliko ratno ostrvo island near Belgrade. Habitat types for different periods were defined according to the revised edition of the EUNIS Habitat Classification from the year 2004. They are incorporated in GIS database, statistically analyzed and presented in cartographic form.

Hydromorphological inventory and map of the Drava and Mura rivers (IAD pilot study)

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The study reviews hydromorphological assessment methods across Europe focussing on large rivers and highlights the European CEN Guidance Standard, which offers a methodological framework supporting also WFD requirements.The Drava and Mura Rivers were selected due to the already existing data for the upper river reaches in Austria and the good data situation for the lower reaches. The rivers are characterized by modified upper and middle reaches by chains of hydropower plants and still free-flowing lower stretches. Based on the reviewed methods, in particularly those for large rivers and the CEN standard from 2004 an adapted method was developed. In a next step morphological reference conditions were extracted based on fluvial-morphological parameters. During the summer 2005, over 350 river km of the lower Mura and Drava were surveyed continuously by boat, and additionally stretches along the middle and upper courses by surface. The results and evaluation show a high differentiation for the main parameter groups "channel", "banks/riparian zone" and "floodplain". The overall evaluation indicates that about 35 % of the entire river stretches fall into the class two or better (mostly along the lower stretches), whereas the remaining 65 % contributes to the classes 3-5 (over 25 % are completely modified).

for notes

Long-term changes in the clutch number of a *Rana dalmatina* population at the Danubian floodplain at Göd, north of Budapest, Hungary

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Floodplains are vital habitats and corridors for many species, such as amphibians. However, little is known on the survival and stability of such populations and the effect of hydrological changes even if there is a clear need for such information from an ecological as well as a conservational viewpoint. The dynamics of a *Rana dalmatina* population in a locally protected but anthropogenically influenced habitat at the floodplain of the Danube at Göd was followed since 1992. The sampling site included five cascading ponds fed by a seepage next to the floodplain of the Danube, approximately 60 m from the main arm. The individual number of reproducing *Rana dalmatina* females was not significantly affected by either the maximum water level or the length of water cover in the floodplain during the preceding 1.5 months. Water chemical parameters of the breeding ponds, namely the oxygen content of the water, slightly influenced the distribution of the clutches within the pond system but the population size remained stable. Consequently, such small-scale aquatic systems can be beneficial for floodplain amphibians long-term and thus, they can play a role in the maintenance and restoration of floodplain fauna.

New method for efficient determination of high flood risk areas

G. Möslinger

Grafotech was founded in 1990 and is engaged in the capturing, validation and processing of geo-data for Geographic Information Systems (GIS).
In 2001 the traditional domain of grafotech was expanded to include the field of flooding.
Climate experts expect an increase in the numbers of extreme weather conditions within the next years. We have to get ready for floods occurring with a higher frequency and at any season of the year. Floods can not be avoided. However by application of suitable planning instruments their impacts i.e. the measure of damage and their subsequent effects can be positively influenced.
With this background the demand on models providing information on high risk flood areas and water levels for floods of different probability will increase.
The following methods of flood modelling can be used:

- 1-d flood modelling
- 2-d flood modelling
- Geo_based_flood_model (innovation grafotech)

The grafotech company has developed a suitable and readily available instrument for competitive, simple and efficient determination of high risk flood areas and water levels. Data is processed in a way, so that the results can be visualized in a map view of a GIS, providing a good spatial context. The core of the method is the blending of a modelled water level with a digital terrain model. In order to be independent of statistically derived hydraulic flows, the water surface is determined by spatial interpolation between empirically observed level marks. From locally available (punctual) gauge information on geometrical basis a water level is generated and is intersected with the digital terrain model.

for notes

MICROBIAL COMMUNTIES IN LARGE RIVERS

Longitudinal Changes in the Bacterial Community of the Danube: A Whole River Approach

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Bacterial communities are an essential biological component in river systems. They are key catalysts for system metabolism and constitute a potential link to higher trophic levels. Appropriate knowledge on microbial processes at the whole river network scale is one of the prerequisites for the future development of limnological sciences as well as for future management decisions. Basic concepts of large river ecology such as the river continuum or the serial discontinuity concept focus on aspects such as resource availability, input of organic matter, autochthonous productivity as well as on the distribution of functional guilds of benthic metazoans in the longitudinal dimension. In contrast, scarce information about bacterial communities and their respective longitudinal dynamics in larger river systems is available yet – neither on an empirical data basis nor on the conceptual level. During the Joint Danube Survey (JDS) in 2001 over 90 water samples could be collected for molecular biological analysis for the whole length of River Danube and its major tributaries. For the first time a comprehensive snapshot on the bacterial population structure dynamics on a whole river scale could be generated by polymerase chain reaction based amplicon profiling and 16-rDNA sequencing. Bacterial communities, despite the influence of major tributaries, showed a continuous change in their populations along their longitudinal travel in the Danube river and internal river metabolism apparently had a strong influence on bacterial richness.

for notes

Hydrobiological differences in the Danubian water system with periodically connections with the Danube (Gemenc floodplain, Danube-Drava National Park -Hungary)

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Vén-Duna side arm and its connected water system (Cserta-Danube, Sárkány-fok, Nyéki-oxbow, Címer-fok) is situated in the Gemenc region of Danube Drava National Park, closed to the right bank of the Danube (1483 -1472 r.km), next to Baja. Changes in the main physical, chemical (Cl^-, NO_2^-, NO_3^-, PO_4^{3-}, SO_4^{2-}, HCO_3^-, CO_3^{2-}, NH_4^+, Na^+, K^+, Mg^{2+}, Ca^{2+}, chlorophyll-a, total salt concentrations, pH, electrical conductivity, alkalinity, chemical and biological oxygen demand, suspended matter) and biological (phytoplankton, zooplankton: *Rotatoria, Crustacea*) parameters of the water, were studied in the Vén-Duna side arm and in its connected water system in a disjunct phase, during the vegetation period (2003). Nyéki-oxbow, which is the furthest site from the Danube, has the highest habitat diversity, Crustacea species richness and density as compared to the other sites, from among the chemical parameters the HCO_3^-, Mg^{2+}, Ca^{2+} concentration showed the highest and the K^+ concentration the lowest values at this site. Differences between the plankton community of the side and main arm of the Danube are mainly due to the higher number of species richness and density of *Euglenophyta*, *Crustacea* and lower species richness and density of the *Rotatoria* in the side arm. The investigated sites showed remarkable differences from ecological and hydrobiological point of view.

Rivers, lakes and riverine lakes: the signature of microbial community turnover

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The sensitivity of microbial community structure to water retention time, seemed to be a major factor driving plankton dynamics in river and lakes. Our study on community turnover across a variety of aquatic systems with retention time from days and months to years will be accomplished by the relationship between similarity alterations of species composition and net change rates of successive samples. Nutrient availability played an important role in generating community turnover as assessed by the conceptual framework of ecological stoichiometry. The main focus of the study is to characterise riverine lakes as dynamic systems mediated by the physico-hydrological features of rivers and complex microbial community structures of lakes.

for notes

Testing the applicability of DNA based microbial faecal source tracking methods on a large scale in the River Danube and its important tributaries

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Faecal contamination of rivers is an impairnment to various water uses like abstraction for drinking water production, fishing and recreation. Classical faecal indicators like *E. coli*, faecal coliforms or *Enterococci* allow the detection of faecal contamination but do not allow any differentiation of the faecal source. In recent years, methods for microbial source tracking (MST) have become available. The aim of this study was to assess the applicability of two DNA based real-time PCR methods recently developed in our institute for the detection and quantification of human and ruminant faecal contamination markers. Tested were the methods with samples taken along the whole River Danube and its important tributaries. The results demonstrated the feasibility of the MST methods in large scale. Human marker sequences were detected everywhere in the investigated area, while the ruminant marker only in some tributaries. Those tributaries with positive marker detection (14 of 24 rivers) exhibited a high correlation of combined human and ruminant marker concentrations with faecal coliform data ($r = 0.85$). Human marker explains most of the variation ($R^2 = 0.70$).

Microbiological water quality of the River Danube (km 2581 - km 15): Longitudinal variation of microbial pollution as determined by standard parameters

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The examination of microbiological river water quality accordingly to technical standards is obligatory for use-related aspects such as for drinking water production, irrigation or recreation. Microbiological data for total coliforms, faecal coliforms, faecal streptococci and heterotrophic plate count were collected during the joint Danube survey 2001, organised by ICPDR, along the longitudinal stretch of the River Danube from the upper section (km 2581) to the Black Sea (km 15) and in main tributaries. Data were used for the assessment of the microbiological water quality along the course of the river and to establish a microbiological water quality map of the investigated river basin. In addition, observed microbiological water quality was compared with data from the Danube survey 1988, organised by IAD. Microbial pollution due to anthropogenic impacts, especially from large urban “hot spots”, were analysed and compared to biological and chemical data. The main sources affecting the microbiological water quality were raw sewage, discharges from wastewater treatment plants, impaired tributaries and impact by diffuse sources. Knowledge on microbial pollution in lotic aquatic environments appears essential for decision makers in order to take appropriate measures which result in acceptable river water quality and compliance with national and international quality standards and directives.

for notes

WATER QUALITY ASPECTS: NUTRIENTS AND TOXIC SUBSTANCES

Scenarios for future development of nutrient emissions and river loads in the Danube Basin

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The Danube River discharges into the Black Sea, which is a water body extremely sensitive to eutrophication problems. Mismanagement of nutrients in the Danube Basin has led to severe ecological problems, both in the catchment and in the receiving marine waters. In the 1990s, the Danube River nutrient loads have decreased, partly due to the collapse of the central and eastern European economies following 1989. The project "Nutrient Management in the Danube Basin and its Impact on the Black Sea" (EU 5th Framework Programme, acronym daNUbs, 2001-2005) has developed a number of scenarios for the future development of the nutrient emissions and the Danube River nutrient loads. The presentation will describes these scenarios and will formulate the conclusions towards the future nutrient management. It clearly can be demonstrated that economic and agricultural development in the Danube Basin may reverse the improvement of the quality of the ecosystem, if nutrients are not managed properly.

Long-term and seasonal variations of nutrients in the Lower Danube: Bulgarian-Romanian stretch

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The concentrations of soluble inorganic nitrogen and phosphorus compounds (NO1-3, NO1-2, NH1+4, PO3-4) were compiled from literature and from the routine monitoring program for the Danube River of Bulgarian Ministry of Environment and Waters. The emphasis in data collection was put on presenting at sampling sites at start and end of the Bulgarian-Romanian stretch. However, we are intending to include also the variations within the stretch. The data are relatively regularly available for a 10 to 25 year periods, which allows the application of time series analysis. The outcome should reveal the long-term and seasonal patterns of the nutrient concentrations. Some crosscorrelations of the obtained trends with other important variables, like temperature, water level will be calculated.

for notes

Isotope tracing of hydrological processes in large river basins: Danube study

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River discharge consists mainly of surface runoff and groundwater seepage and it is an important continent-to-ocean linkage in the global hydrological cycle. Isotope signals in river discharge can potentially contribute to better understanding of the continental portion of the hydrological cycle including information such as water origin, mixing history, water balance, water residence times, surface-groundwater exchange and renewal rates, as well as evaporation-transpiration partitioning. Coupled measurement of isotope fluxes and volumetric discharge is also useful for tracing progressive changes in basin hydrology related to climate or land use changes. The ^{3}H*) and ^{18}O high-resolution time series of the Danube at Vienna is the worldwide longest of a large river. It demonstrates that not only short-term signals but also long-term (interannual) changes of isotope ratios in precipitation are transmitted through the catchment and can be detected in the river water. Thus, stable isotopes - ^{2}H, ^{18}O - can be used as independent tracer to simulate transport processes in river systems. The different isotopic behaviour of rivers from different parts of the catchment area reflects differences in the geographical and hydro-meteorological parameters, like altitude of the drainage areas, spatial and temporal precipitation distribution, source of air moisture, infiltration characteristics, residence times of ground or lake waters in the drainage areas, evaporation processes and others. The long-term changes in the isotopic records (e.g. increase of $\delta^{18}O$ during the eighties) may help to trace hydro-climatic changes in these areas, which otherwise would be difficult to detect. The main reason for the increase of $\delta^{18}O$ during the eighties is probably an increase of the environmental temperature.

Cytogenetic methods in biomonitoring of surface waters

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The entry of toxic and radioactive substances into water bodies necessitates the development of methods for estimation of cytogenotoxicity of surface waters, especially with regard to strategical plans of actions on biodiversity conservation in water bodies such as Danube, Dnieper and other rivers exposed to intensive anthropogenic press.

At present two methods of water genotoxicity assessment are standardized – both on bacteria (ISO 13829:2000 and ISO 16240:2005). But the complex of standards on determination of the genotoxicity of water is under working out.

Proposed by authors method is based on determination of water cytogenotoxicity by functional and structural parameters of fish genome. Quantity and size of nucleoli in cell is the indicator of genome functional activity and the presence of chromosomes fragments forming micronuclei is the indicator of structural alterations.

Our investigations show that the epithelium of fish fin tail can be used in cytogenetic investigations. This tissue responds to genotoxic influence (radionuclides, heavy metal ions) similar to internal tissues (liver, glandular epithelia of gills, blood) and allows carrying out the routine in vivo monitoring of cytogenotoxicity of surface waters on fish.

for notes

Phosphorus dynamics and biological activity indicating the impact of an artificial water enhancement scheme on an urban floodplain area

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Due to human impacts, floodplains in urban regions are often multiple affected by eutrophication, loss of hydrological dynamics and even conversion of land use. In order to mitigate some of these effects in a heavily impacted floodplain within the city limits of Vienna, the Lobau, a water enhancement scheme was initiated. The major task of the presented study was to verify the reaction of two trophic distinct backwater pools on surface connectivity by establishing a phosphorus budget and the biological activity. The key question was to what extent the respective pools would shift from trophic controlled systems to primarily hydrological controlled ones.
This study indicates that one management measure can have similar effects in one backwater system with different trophic and morphological conditions. Eutrophication processes can be decelerated and also sedimentation. However sedimentation depends strong on the absence and presence of macrophytes. We conclude that already small amounts of water supply impact the P budget and physiological status of the floodplain water bodies.

Macrophytic nutrient and heavy metal accumulation ability as a parameter of pollutant remediation in aquatic ecosystems

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In this study the content of macronutrients (P and K) and content of heavy metals (Mn, Ni, Cu, Pb, and Cd) in rhizomes of *Phragmites communis* (emergent species), *Hydrocharis morsus ranae*, *Potamogeton natans*, *Myriophyllum spicatum*, and *Trapa longicarpa* (submersed and floating) was analysed. Sampling was performed at several sites along the Banat section of the DTD canal complex (Vojvodina Province, Serbia). The aim of this study was to use the chemical composition of dominant plant species as indicator of the degree of chemical load of water and littoral zone and to define the role of the macrophytic vegetation in the phytoremediation process, within a comprehensive monitoring of the ecological status of this particular aquatic ecosystem. Significant differences between the analyzed aquatics in chemical composition were evident. In addition, site dependent differences were also found. Concentration of the analyzed macronutrients and heavy metals was lower in rhizome of *P. communis* than in the remaining aquatics. The above data, however, do not minimize the role of the emergent species in remediation of water pollutants due to a dense growth of their rhizomes and roots in the littoral zone of the Canal. A high, site dependent variability of P content in rhizome of *P. communis* particularly emphasizes the importance of these investigations.

for notes

Effects of two heavy metals on photosynthesis and respiration processes in *Ceratophyllum sp.*

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University of Pitesti

To investigate the effects of two heavy metals on the photosynthesis and respiration processes in *Ceratophyllum sp.,* these plants were grown in the presence of $CdCl_2$ and $NiCl_2$. The concentration of heavy metals used in this study were 0; 0.003 ppm Cd^{+2}; 0.01 ppm Cd^{+2}; 0.03 ppm Cd^{+2}; 0.06 ppm Cd^{+2} and 0; 0.5 ppm Ni^{+2}; 1 ppmNi^{+2}; 1.15 ppm Ni^{+2}; 8 ppmNi^{+2}. Each treatment consisted of three replicates for statistical purposes.Plants were collected from the surrounding lakes of Pitesti city.
The 0.003 ppm concentration of Cd^{+2} and 0.5 ppm and 1.15 ppm concentrations of Ni^{+2} increased the rate of photosynthesis. The data show a reduction in rate of photosynthesis as metal concentration increases above 0.01 ppm Cd^{+2} and 1.15 ppm Ni^{+2}. All concentration of metals increased the respiration in *Ceratophyllum sp.*

The content of heavy metals in tissue of *Ceratophyllum demersum* L. from Danube-Tisza-Danube canal in Banat region of Vojvodina (Serbia and Montenegro)

P. Ilić, S. Pajević, S. Tepić

Monitoring of the aquatic environment by chemical analyses of dominant aquatic macrophytes from DTD (Danube-Tisza-Danube) canal indicating possible chemical contamination of water and littoral zone was surveyed. Twelve sampling sites from the canal reach in the Banat region of Vojvodina province were selected to assess the effect of anthropogenic activities upon the quality of the canal water and therefore upon plant world. Samples of the dominant aquatic plant species *Ceratophyllum demersum* were collected at plant maximum development stage in two years. Concentrations of Mn, Ni, Cu, Pb and Cd in the plant tissue were determined by standard methods using AAS. Extremely high concentrations of Mn in *C. demersum* in Novo Milosevo locality (1.25 %) were detected. The highest accumulation of Pb was detected in the Vlajkovac locality (23,0 μg/g). Localities Srpski Itebej and Klek were also loaded with heavy metals. Our investigations may contribute to the protection of areas undergoing strong impact due to human activities. The obtained results should also point out the role of macrophytic vegetation in pollutant (heavy metals and nutrients) phytoremediation.

for notes

MANAGEMENT OF A LARGE RIVER IN A CHANGING ENVIRONMENT (POSTER)

1-Correcting the mistakes from the past – remediation of riparian areas on the Danube floodplain between Neuburg and Ingolstadt (Bavaria/Germany)

B. Cyffka

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During the first half of the 19th century, work started to embank the main parts of the Upper Danube completely. Since that time, the river flows in dikes, normally without any contact to its floodplain and the wet riparian areas. Nowadays, the floodplains experience a revival in the way of thinking of people. Unfortunately, many parts of vulnerable riparian areas have diminished. The Bavarian Floodplain Programme started 2002 to search for suitable (floodable) areas. The largest joint part was found with the riparian forests between Neuburg and Ingolstadt. In November 2005, the Bavarian minister for environment dug the first turf to start an 11 million Euro pilot project named "Remediation of riparian areas on the Danube floodplain between Neuburg and Ingolstadt". In future, about 2,100 hectares of forests are used for both, artificial man-controlled flooding to improve biodiversity in the riparian forest and in the flood meadows, and to serve as a flood storage in case of disastrous floods. The newly founded Floodplain Institute Neuburg carries out the scientific attendance. The future task of this institute is to spread the results on national and international levels. Apart from the mentioned benefits, the pilot project is scientifically unique. It is a large zoological, botanical and morphological field experiment, which can serve as a model for other remediation projects.

2-Optima Lobau: The use of an interdisciplinary indicator set and a multi-criteria analysis to evaluate future scenarios of the floodplain Lobau, Austria

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The deterioration of riverine landscapes has led to increasing efforts in water management, also concerning rehabilitation and restoration activity. The Lobau within the city limits of Vienna for example have undergone severe changes by mainly altered ground- and surface water connectivity in the last 20 to 100 years which result in a change of habitat structure, distribution and vegetation cover. Without sustainable rehabilitation measures, a threshold towards lower biocomplexity will be passed. The Lobau also play a central role in the regional water balance, including flood retention and groundwater recharge, and for the socio-economy of the area (recreation, education). An innovative ecosystem management scheme needs to optimally balance between conservation and restoration objectives and to harmonize the partly contradicting ecological and socio-economical requirements. Therefore, we developed a project based on a multi-criteria Decision Support System. The strength and novel approach of such an interdisciplinary strategy will be to involve technical, natural and economic sciences to identify an indicator set, conceptual model approaches and a multi-criteria decision analysis (MCDA). Models in the fields of ecology, hydrology and geomorphology predicting the changes due to the potential water management measures will be analysed in an out-ranking MCDA. We present the approach and first results.

for notes

3-The state of the art of the Water Framework Directive implementation in Serbia – typology and type specific reference conditions

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The aim of this work is to present the state of the art in the process of EU Water Framework Directive (WFD) implementation in Serbia, with focus on typology and type specific reference conditions (REFCOND). Methodological approach in the typology and definition of REFCOND are discussed. WFD implementation in Serbia started 2004, with the objective to design the system of classification of ecological status/potential, that should be suitable for use in Serbia. Since that time, the system of typology has been proposed and applied on the rivers with catchments area greater than 500 km². For the same group of rivers, the water body delineation has been done, as well as definition of REFCOND for selected biological quality elements (BQE - aquatic macroinvertebrates) and community attributes. Our intent has been to propose holistic typology that includes selected abiotic parameters, as well as biological criterions. System "B" for typology of rivers and lakes, offered in WFD, has been considered to be suitable for classification of surface inland waters. WFD related activities in current phase are focused to development of typology and definition of REFCOND for rivers with catchments area smaller than 500 km², as well as to works on lotic ecosystems.

underlined: presenting author

4-A conservation programme for sterlet (*Acipenser ruthenus*) in the Bavarian Upper Danube River in Germany

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The sterlet is the smallest of the six sturgeon species native to the Black Sea/Danube River system. This potamodromous species migrates hundreds of kilometres within the freshwater riverine system. In the past, it was documented in the Danube River from the delta and upstream as far as Ulm in Germany (river-km 2,588). Nowadays, this species has almost vanished from the German Danube River with only two potential populations remaining in the Bavarian stretch, and on the Austrian-German border where migrations are confined by numerous barriers, respectively. In 2005, a conservation programme for the sterlet in its former German distribution area was initiated by the Landesfischereiverband Bayern e.V.. It focuses on the possibilities for the long-term and sustainable conservation, as well as restoration of viable sterlet stocks in the Bavarian Danube River and adjacent stretches.
The programme comprises several subprojects dealing with e.g. the historical and current stock status, river continuity, and habitat requirements during the life-cycle, habitat status as well as studies on molecular genetics of sterlets from different stretches of the Danube River.

for notes

5-Master Plan - support for sustainable development in Danube Delta Biosphere Reserve / Tulcea county (Romania) Logical Framework Analyse (LFA)

R. Stiuca, I. Nichersu

The Regional Master Plan for Danube Delta is focused on a limited development definition: to administrate the process of local and regional changes to accelerate economical increasing and improving of life quality in a sustainable way. It cover all the ecological aspects of preservation and also other element which have an impact on locals welfare, including infrastructure's development and social, cultural, social, local and environments aspects. All these aspects are imbedding in a sustainable development concept.
The Master Plan for Danube Delta Biosphere Reserve it propose firstly to identify the Danube Delta a changes and secondly to develop solutions to solve these problems and finally established the priorities for these solutions.
This process was realised with cooperation of local authorities including Danube Delta Biosphere Reserve Authority and Tulcea County Council. More then that had places direct meetings with the localities' mayors, with representatives of environment sector and also representatives of different economical sectors.
The applications of the Logical Structures was initiated within this process to make obvious the solutions and the problems for a constructive discussion and as advanced view the Master Plan structure reflect the results of these discussions.

6-Is water pollution a threat to native fish populations along the Danube River section bordering between Croatia and Serbia & Montenegro?

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Two important fish-spawning areas are located along the Danube River Section 1367.4 – 1425.5 rkm that actually presents the administrative border between Croatia and Serbia & Montenegro. Kopački rit (Croatia) with some 30,000 ha between the Drava and the Danube is one of the richest and most dynamic floodplains of the Danube River Basin and, after the Danube Delta, the second-best "hot spot" for fish reproduction in the entire Danube River Basin. Apart from being already designated as a Ramsar Site and a Nature Park it has been further proposed as part of a transboundary Biosphere Reserve along the Drava and Mura Rivers. Just opposite Kopački rit lies the wetland complex of Gornje Podunavlje (Serbia & Montenegro) with 19,648 ha of floodplain habitats, designated as Special Nature Reserve.
By analyzing a 10 years data set on hydrological and water quality parameters, we aim to challenge the hypothesis that, apart from habitat loss and fish migration barriers, water pollution presents a severe threat to native fish populations along the Danube River section bordering between Croatia and Serbia & Montenegro, and Kopački rit and Gornje Podunavlje floodplains, in particular. Hence, fish restoration programmes in this area must respect improvement of water quality.

for notes

7-The Floodplain Index – a new approach for assessing the ecological status of river/floodplain systems accroding to the EU Water Framework Directive

J. Waringer, A. Chovanec, M. Straif, W. Graf, W. Reckendorfer, A. Waringer-Löschenkohl, H. Waidbacher, H. Schultz

Here we describe a new method for assessing the ecological status of river/floodplain-systems. The approach is oriented towards the requirements of biological assessment laid down in the EU Water Framework Directive. The following indicator groups are integrated: molluscs, caddisflies, dragonflies, amphibians, and fish. These groups were chosen to describe species associations representative for all types of floodplain waters along the gradient of hydrological connectivity which ranges from eupotamic (floodplain waters connected to the main river upstream and downstream) to temporary (at least one dry-up period per year). Key element of the procedure is the Floodplain Index which is calculated for each site investigated on the basis of species-specific habitat values expressing the species' habitat preferences. As species compositions vary according to the hydrologic conditions, the water bodies of an investigation area can be characterised according to the index values. The distribution of the index values shows if and to which extent the degree of lateral connectivity is disturbed in the floodplain area. The assessment of the ecological status is based on a comparison between a river-type-specific reference condition and the status quo. The method is presented with an example from a Danube floodplain area in the north of Vienna (Klosterneuburger Au; Lower Austria).

for notes

THE ROLE OF MACROPHYTES IN LARGE RIVERS (POSTER)

8-Analysis of the spatial distribution and historical development of aquatic neophytes in the floodplain Lobau: first results

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The aim of this research is to reveal the historical development of aquatic neophytes in the floodplain Lobau, located within the city limits of Vienna, Austria. Aquatic neophytes are defined as non-indigenous aquatic plants (post 1500 AD), which were introduced in this area by human activity. The inventory of neophytes is based on literature data. The time before the regulation of the Danube River in the 1870s will be included as the first reference information. The analysed time sequences will range from the time after the major regulation scheme to today. The estimated species will be *Nymphaea alba, Najas marina, Elodea nutallii*, *Elodea canadensis* and *Vallisneria spiralis*. The existence of other potential neophytes will be verified for the investigated area. Data on plant distribution will be taken from literature and mappings since 1850. More detailed spatial analysis will be done for the Lobau from 1976 onwards. The goal of this study will be the description of the historical development of the neophytes in this area since 1850 and the spreading of these neophytes since 1976.

9-The influence of anthropogenic factors on the structure of aquatic vegetation in the Hurbanovský canal (South Slovakia)

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Aquatic macrophyte vegetation was surveyed in the heavily man-modified watercourse of the Hurbanovský canal (Danube lowland) in 2004. The main aim of the research was the analysis of changes in species composition, diversity, and plant mass of aquatic vegetation along the canal in relation to some anthropogenic factors (land-use type, the survey units distance from the town sewage plant, the distance from two small outlets of sewage water) and abiotic parameters (water depth and width, sediments size). The standardised Kohler's method (JANAUER 2003) was followed. The analysis of the significance of anthropogenic factors impacts was carried out using CCA gradient analysis with forwarded selection of environmental variables.
Eleven aquatic plants, 32 helophytes and filamentous algae were recorded in the canal. The total inertia in species data measured 2.408, 1.364 out of which could be explained by studied factors. The land-use type manifested the highest impact on the species data set variation in the canal (31.6 % of total variance), especially in case of the urban fabric, that provided 7.1 % of the total variance. The distance from the sewage water outlets explained 6.2 % and 5.8 % respectively and the distance from the sewage plant – 4.2 %. The arable land and transport units do not belong to significant factors.
Apart from Lemna minor, the mass (∑ PME) and diversity of all species decreased in the survey units downstream from the sewage plant and both outlets of sewage water. Conversely, the mass of L. minor even slightly increased here.

for notes

10-Breg and Brigach, source streams of the Danube: changes based on macrophyte surveys 1967, 1989, and 2004

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The Breg and Brigach streams are the head waters of the Danube, which is formed by their confluence in the town of Donaueschingen. The macrophytes of the two rivers were first assessed by BACKHAUS (published 1967), and later surveys were made by JUNG (1989) and JANAUER et al. (2004). Despite some difficulties the original investigation sites could be traced back by our team and a comparison of macrophyte species composition and abundance could be made. Results refer to macrophyte diversity and habitat types, reflected by water quality data.

11-Waterplants in the New Danube. The Influence of Floods on the Spectrum of Species

G.A. Janauer, U. Wychera, U. Humpesch

In the New Danube, Vienna´s flood control canal, macrophytes were observed for nearly twenty years. In the Lower Impoundment submerged water plants established very quickly and huge macrophyte stands grew up to the surface. Within a few years tons of standing crop biomass developed but the influence of floods on the normal succession of plants was clearly percieved. As no species with strong rhizomes like *Nuphar lutea* or *Nymphaea alba* occur in the New Danube, all plant stands can be easily uprooted, often together with their subtrate. Nevertheless some species spread every year again (e.g. *Myriophyllum spicatum*), but other species occurred only in some vegetation periods (e.g. *Potamogeton lucens, Najas marina*). Results presented here show details on flood impact and resilience of the aquatic macropyhte vegetation in the New Danube.

for notes

12-Aquatic fern communities at Apatinski Rit and Monostorski Rit wetland areas (Danube, Serbia)

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Phytocenological researches of the aquatic vegetation were carried out during the period from 1996 – 2005. according to the principles of the school Zuriche-Montpellier (Braun-Blanquet,1964). The nomenclature and syntaxonomic review are quoted according to Passarge (1996).
Plant communities of aquatic ferns are characterized as ass. gr. *Salvinietum natantis* Koch 1954 and ass.gr. *Azolletum filiculoides* Br.-Bl. 1952, from the alliance of *Lemno-Salvinion* Slavnić 1956 em. Schwabe. et Tx. 1981, order *Lemnetalia minoris* Koch et Tx. 1955, class *Lemnetea minoris* Koch et Tx 1955. The groups of associations were noted at several sampling sites in the region of Apatinski Rit and Monostorski Rit (parts of protected area Special Nature Reserve «Gornje Podunavlje»), which are the remnants of former wast wetland area of the Danube floodplain in Vojvodina (Serbia).
These communities belong to flotant unrooted type of aquatic vegetation. They are developed along the riverbank zone of marshes, in open stagnant or slowly fluctuating water of depressions and channels, in shallow and sunny water surfaces. Communities appear sporadically, accompanied by water lenses.

13-*Elodea nuttallii* – a competitive hydrophyte in the Romanian Danube river corridors

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The longest reach of the Danube river borders or crosses the Romanian territory. This reach is characterized by different types of hydrological corridors with a specific composition and distribution of aquatic vegetation. The macrophytes were assessed in 2002 – 2004, following the field survey method described by Kohler (KOHLER ET AL. 1971, KOHLER 1978, KOHLER and JANAUER 1995) and by the European Standard EN 14184. Special attention was given to the two *Elodea* species found it the Romanian flora: *Elodea canadensis* Michx., a long-established hydrophyte, and *E. nuttallii* (Planchon) St. John, an adventive species.
First nominated for the Danube Delta in 1998, *E. nuttallii* spread into all of the Romanian Danube main channel and branches, replacing *E. canadensis*. Using the metrics Relative Plant Mass and Average Distribution *E. nuttallii* was assessed as “occasional” in the large river corridors and as “frequent” in the narrow channels.
The significant competitive power of this species is well documented in the distribution diagrams and maps in this paper. Regarding the knowledge on structural (protective tissues, parenchyma and stereome, vascular tissues), physiologic (photosynthetic pigments) and reproductive features of this plant it is of no surprise to find it so widespread in the Danube River Corridor today.

for notes

14-Man-made near-natural structures offer new habitats to macrophytes, as well as fish, in the Austrian Danube (Vienna, hydro-power plant Freudenau)

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Several artificial habitats were created in the course of constructing the hydro-power plant Freudenau (Vienna). They are located on the left bank of the main channel of the Danube River in the three hydrologically different reaches: head of the impoundment, transition zone, central area. They act as refuge areas during floods and as specially structured habitats in periods of regular discharge.
Macrophyte beds developed in these man-made side channels and bays. The influence of water flow velocity, temperature, pH, conductivity and chlorophyll-a on the abundance of hydrophytes were assessed for time period 2003-2005. Fish studies were carried out at the same time. Altogether, 19 hydrophytes and 15 helophytes could be detected in the artificial habitats, but only 5 hydrophytes and 3 helophytes were found in the main channel. The macrophytes provided protective structure and feeding space to the young and juvenile fish of the 37 species found in the main river.

15-Macrophytes and the predicted effect of changed flow conditions in a Danube floodplain restoration area in Linz (Upper Austria)

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This study is part of a floodplain restoration project in Linz (Upper Austria). Today the Danube floodplain in Linz is separated from the main river channel by the levees of the hydroelectric power plant Abwinden-Asten. A chain of water bodies with mainly standing water remained as part of the local backwater system and several endangered aquatic species are found there. An artificial channel system is planned to ameliorate surface and ground water conditions in the Danube floodplain. To predict the influence of Danube surface water inflow into the floodplain water bodies, the current flow velocity in macrophyte stands and in macrophyte-free sections was measured in the former Danube anabranch "Mitterwasser" in 2001 and 2002. Two different discharge scenarios were assumed: a permanent water inflow with 0.2 m/sec and a short-term inflow during floods with 0.8 m/sec. A prediction for the possible reaction of selected macrophyte species, such as *Nuphar lutea, Myriophyllum verticillatum*, *Potamogeton pectinatus* and *Sagittaria sagittifolia* to the changed hydrological conditions is presented.

for notes

16-Conservationally important macrophytes in the Bulgarian stretch of the Danube river and the near water bodies

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This paper brings the attention to nine conservationally important macrophyte species (Euphorbia lucida, Lemna gibba, Marsilea quadrifolia, Nymphaea alba, Nymphoides peltata, Salvinia natans, Thelypteris palustris, Trapa natans, Utricularia vulgaris), which were encountered recently in Danube river and the near water bodies in the course of several projects conducted by the Institute of Botany with the Bulgarian Academy of Sciences and the University of Vienna.
Every species is presented with its conservational categories. Brief description of the habitats in which it occurs is given, together with the places where it was observed, and the current status of its population in the studied area.

17-Rare and protected aquatic macrophyte species along the Danube River in Serbia

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In Serbian reach of the Danube River, the aquatic macrophytes were surveyed in the main channel, in the oxbows and in side arms directly connected to the main channel. A total number of 93 aquatic plant species was recorded. Among them were 43 species of hydrophytes and amphiphytes forming the aquatic vegetation of the river and the backwaters. Fifty species of helophytes grew along the banks. Nine species are classified as vulnerable (VU) by IUCN classification. Seven species are listed as endangered (EN) in the Serbian flora, which are either recorded in the first volume of the Red Book of Serbian Flora, or subject or proposal in the second volume.

for notes

CHALLENGES IN FISH ECOLOGY IN LARGE RIVERS (POSTER)

18-Longitudinal patterns of the fish assemblages in the Mosoni-Danube, Hungary

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Spatial distribution of fish assemblages were investigated along a 110 km long section of the Mosoni-Danube in 2005. Fifty samples were collected by electrofishing boat along the river margins and relative fish abundance and species number were estimated. The length of the sampling sites varied between 600 and 1500 m. Longitudinal distribution of fish assemblages showed differences of species richness and species composition. The highest relative species richness was observed in the lower 15 km long section. Importance of rheophilic species versus limnophilc ones slightly decreased from upstream to downstream. Relative density of fish species was highly variable at mesohabitat level according to channel morphology. The experiences of the survey indicate the importance of the careful sampling for ecological status assessment by the metrics of the European Fish Index.

19-Research on the changes of some physiological parameters in several fish species under the action of the thiametoxame insecticide

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In recent years, sustained research has been conducted on obtaining an efficient insecticide to fight against pests. Such an insecticide is supposed not to cause the resistance effect or to harm the environment. We investigated the action of such a product – „Actara" (in which the thiametoxame is the active substance), in different concentrations, on some physiological indices – lifespan, oxygen consumption, breathing frequency and the number of erythrocytes – in the case of three species of fish: *Carassius auratus gibelio Bloch, Alburnus alburnus* and *Perca fluviatilis*.

for notes

20-The use of fish macrophage aggregates of fish liver in pollution monitoring

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Macrophage aggregates (MAs), are distinctive groupings of pigment-containing cells within the tissues (spleen, kidney, liver) of heterothermic vertebrates. Iron capture and storage appears to be a primary function, but sequestration of products of cellular degradation and potentially toxic tissue materials and catabolic breakdown products are among other functions that have been ascribed. An epidemiological study was conducted to evaluate whether the density of pigmented MAs increased in liver of sturgeons (*Acipenser ruthenus*) captured in the Danube River downstream from industrialized and urbanized areas of the Novi Sad city. This bottom feeding fish may be exposed in the environment to a wide range of chemical contaminants, bacteria and viruses in sediments. Sturgeons sampled at Subic locality, situated at the left bank of the Danube River around 5 km downstream of the Novi Sad city main municipal and industrial wastewater effluent, as well as downstrim of oil refinery, exhibited higher densities of MAs (according histological and stereological parameters) in liver than fish sampled at Begecka Jama, the old meander of the Danube River some 15 km upstream of the Novi Sad city.

21-The results of analyses of the diet composition of sterlet (*Acipenser ruthenus* L.) in the Danube River (km 1163-1173)

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During the investigation of the population of *Acipenser ruthenus*, during the period 2002-2003, the gut content has been studied. For the period of this preliminary investigation, a total of 37 individuals, from four locations within the area of Belgrade (km 1124-1173), have been examined. The examined specimens belong to 0^+ and 1^+ age class. The diet has been composed of 17 taxa, belonging to five aquatic macroinvertebrate groups. In gut content of one individual, the terrestrial insect adult, belonging to Diptera, has been found. In comparison with previous investigations, we have observed distinctions, above all, in important .role of Hirudinea and Amphipoda in the diet composition of examined specimens. In contrast, according previous studies, mentioned groups played insignificant role in the diet composition of starlets.

for notes

22-Changes in the fish stock in the lower flow of the Tisa River in the period 2001-2005

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The work describes a study of the changes in the fish stock composition and physiological state of fish species in the 2001-2005 period on the stretch of the Tisa River from the 62nd to the 152nd river kilometer (Martonos - the Becej Gate), which is, because of the backwater caused by the Becej Gate, an ecologically most sensitive part of the river flow. Compared to the year 1996, significant changes in the fish stock composition at Senta were found. The diminshed population of giant bighead carp can be partly ascribed to the Tisa River contamination with cyanides in the spring of 2000, and partly to the allowed fishing with the aid of nets made of artificial materials. A further decrease in the population of bighead carp has certainly been due to the river protection from discharging duckweed from the rice fields. With the exception of the perch and sturgeon, an increase in the naturally occurring fishes was observed. Significant differences in the fish stock composition were also found on the stretch between Senta and Backo Petrovo Selo. Neither the concentrations of heavy metals nor activity concentration of radionuclides exceeded the maximum tolerable values. A larger-scale fish dying accidents in the fish raising field at Novi Becej occurred three times during 2002. Two accidents appeared as a consequence of the local pollution by chemical agents, whereas one was caused by the appearance of *Dactylogyrus* parasites. In the open river, a smaller fish dying accident was observed in July 2002. The cause was most probably the chronic shortage of oxygen.

23-Food patterns of *Neogobius* (Perciformes: Gobiidae) species within the longitudinal profile of the Danube River

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Food habits of three *Neogobius* species (*N. kessleri, N. fluviatilis, N. melanostomus*) were studied in Austrian, Slovak, Croatian and Bulgarian stretches of the River Danube. The results were compared with the composition of macrozoobenthos with the aim to evaluate the level of food selectivity in individual *Neogobius* species and food competition between them. Crustaceans (*Corophium, Dikerogammarus* and *Jaera*) predominated in food offer in upper sampling sites (r. km 1901, Austria and r. km 1818, Slovakia) whilst lower sampling sites (r. km 1327 – 1423, Croatia and r.km 477 - 818, Bulgaria) were colonized mostly by molluscs (*Dreissena, Corbicula, Theodoxus* and *Lithoglyphus*). Besides them, numerous occurrences of the mysid *Limnomysis benedeni* were recorded in Slovak and Croatian section of Danube respectively.The diet of gobiids consisted mostly of dominating benthic animals – amphipods and molluscs. Gammaridae and *Corophium curvispinum* were regular food items recorded in the majority of examined fish, followed by water insect larvae. Fish and their remains have been found in stomachs of *Neogobius kessleri* but their proportion did not exceed 5 % of frequency of occurrence. In *N. melanostomus*, as well as amphipods, molluscs made up considerable part of stomach contents. The project was supported by Centre of Excellence LC 522 and Bulgarian Science Fund, Project B-1510/05.

for notes

24-Danufishbase – a biological database for fish in the Danube river basin

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The implementation of the EU-Water Framework Directive has led to an overall need for digital biological databases. Focus gets on fish as a sound biological quality element for hydromorphological impacts, structural degradation and interruption of the continuum since physico-chemical impacts loose dominance.
The existing scientific Austrian fish database is currently developed to an applied tool for the administration and analysis of fish metrics according to the demands of the river monitoring program. This new fish data base rests upon single fish data and provides all procedures for standard data analysis – as well as the calculation of both relevant fish biocoenotic indices: the Fish Index Austria (FIA) and the European Fish Index (EFI). The webbased front-end allows web-application and connection to GIS is provided using OGC standards.
In cooperation with the ICPDR (International Commission for the protection of the Danube River) the presented database will be adapted to the demands of the transnational monitoring network of the Danube river and its main tributaries. At first it will be made available as a support by the Austrian Federal Agency of Water Management for the second Joint Danube Survey in 2007.

25-Ichtyofauna of the upper course of Kolubara River and its tributaries

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Both investigations of fish fauna, in years 1977/88 and 1993, at particular localities of the upper course of River Kolubara and its tributaries (Rivers Banja, Pocibrava, Jablanica, Obnica and Gradac) revealed strong association in their fish fauna composition. In both investigations, in total 20 fish species were found, whereas in each investigation 16 fish species from four families were recorded. Only one locality, the spring of the River Gradac, was typical salmonid water, whereas all other localities were different enough to be recognized as upper and lower reaches of the River Kolubara. Tributaries in the upper reach of the River Kolubara were distinct from downstream direct tributaries and localities of Kolubara River. The saprobic status of these localities in 1993 was mainly worse in comparison to 1977/88 reports, suggesting anthropogenic influence that appears not that severe, since rivers mainly managed to cleanse them selves. The composition of fish fauna of localities in 1993 was mainly different in comparison with that in 1977/88, probably due to the shift of fish species. During the 1993 investigation, some fish species (i.e. *Gobio albipinnatus*, *Cobitis aurata*) recommended themselves as a rather good indicator of saprobity.

for notes

THE ROLE OF ALGAE IN LARGE RIVERS (POSTER)

26-Carbon and nitrogen cycling in complex floodplain landscapes

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Large rivers with their adjacent floodplains, riparian and instream zones provide an intense turnover of organic matter and are hot spots for biogeochemical processes. Due to transport, alteration and degradation of organic matter, these ecosystems contribute with their retention areas to the control and maintenance of river water quality. Physical habitat heterogeneity influences the rates of key ecological processes, as carbon and nutrient cycling. The regulation of these functions depends on the mode of carbon and nutrient delivery, the contact between water and soil or sediment and the occurrence of floods and droughts.
In a first phase of this study we want to focus on the benthic primary production as an autochthonous carbon source and on metabolic rates of micro-organisms (e.g. denitrification).
We want to locate and quantify hot spots of these processes and therefore we will choose sampling sits with different retention times and flow velocities within the Danube national park. A stabile isotope approach with spiked bicarbonate under controlled conditions will be used to quantify the benthic primary production and potential denitrification will be calculated with sediment incubation measurements.
We hypothesize that both processes are controlled by different hydrological and hydrogeomorphic conditions and that microbial processes are also affected by the composition and source of organic matter.

27-Survey of quantitative phytoplankton investigations from the common Bulgarian-Romanian stretch of the Lower Danube River

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Many studies of the Lower Danube phytoplankton in the past despite their restricted character in space and time often supposed an eutrophication increase especially in long-term sense. The presented literature compilation of quantitative phytoplankton data from the common Bulgarian-Romanian stretch reveals considerable variations, from which no definite long-term tendency could be derived for the 1960-2002 period. A similar scatter on annual, seasonal and sampling site scale has been observed for the regular chlorophyll-a measurements, carried out by the Environmental Ministry of Bulgaria since the year 2001. This regular monitoring program allows an evaluation of characteristic seasonal and site pattern of the quantitative phytoplankton development, which was previously not possible on hand of all available phytoplankton investigations due to their sporadic character. A comparison between river discharge and phytoplankton concentration reveals a relationship, which seems to cause many of the observed variations in phytoplankton quantity and also a significant part of described eutrophication effect.

for notes

28-Similarity and dissimilarity of the phytoplankton composition in the Danube River at medium and very low water level conditions during summer

K.T. Kiss, É. Ács, K. Szabó, B. Tóth, Á.K Kiss

Water samples were taken weekly from the River Danube at Göd in the periods from April to October 2003-2005. Several physicochemical parameters of the water were monitored: conductivity, phosphorus and nitrogen content, O_2 content and saturation, suspended matter content and chemical oxygene demand. Beside these, phytoplankton abundance, species composition, chlorophyll-a content, furthermore protozoa abundance and species composition were analysed. The year 2003 was unusually dry with very low water level between July-September. In spite of the low water level, warm temperature and surplus inorganic nutrients, the phytoplankton and protozoa abundance remained extremely low in the late summer and autumn. The same phenomenon was repeated again in 2005: we experienced low water level and low phytoplankton and protozoa abundance values. Contrary to this, the year 2004 was characterized by medium water level and higher phytoplankton abundance values. In the paper, the possible causes of this phenomenon will be outlined, furthermore, the qualitative and quantitative composition of the phytoplankton will be analysed along with physicochemical parameters and protozoa composition of the water.

29-Diversity and Seasonal Dynamics of the Desmid Community in the Qualitative Sense on Vojvodina Segment of the Danube Basin

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According to its physical and chemical characteristics, the Danube river is not appropriate habitat for reach desmid flora. Detailed and concrete investigations of the floristical composition of the desmids on this part of the Danube river have never been performed, on the basis of available data. The samples of water for phytoplankton qualitative analysis and physico-chemical analysis were collected from seven lokalities on Vojvodina segment of the Danube, from April 2002. to May 2003. Algological analysis was performed in the Institute of Botany and Botanical Garden "Jevremovac", University of Belgrade. In total, 70 desmid taxa were found. According to the database of the Institute of Botany 45 taxa of desmids were new for Vojvodina part of the Danube river, whereas *Cosmarium kjellmanii* WILLE var. *kjellmanii* and *Staurastrum smithii* (G. M. SMITH) TEIL. were new taxa to the algal flora of Serbia. Genus *Closterium* was dominant in qualitative sense on all investigated localities. It was noticed almost regular seasonal dynamics of desmids in the scope of phytoplankton community.

for notes

30-*Euglenophyta* of the Danube River in Serbia

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Most genera and many species of euglenophytes exist worldwide. They usually occur during the summer months in slow-flowing and stagnant waters, rich with organic substances. Euglenophytes of the Danube River in Serbia were studied at 16 localities during 2002-2003. A total of 61 taxa was found, 21 belonging to the genus *Euglena* EHR., 8 to *Lepocinclis* PERTY, 15 to *Phacus* DUJ., 6 to *Strombomonas* DEFL., 11 to *Trachelomonas* EHR. The highest number of taxa was recorded at Bačka Palanka (35) during September 2002, but at the Tekije locality no Euglenophytes were detected at all.

for notes

INVERTEBRATES: KEY RIVERINE COMMUNITY AND BIOINDICATORS (POSTER)

31-Mussel fauna (Corbiculidae, Dreissenidae, Sphaeriidae) in the water system of the Hungarian Danube

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The importance of small-sized, but abundant mussels, especially in large rivers, is little known, because their identification is complicated due to their tiny body and simple shell architecture. This study discusses the faunistical investigation of small-sized mussels in the Hungarian Danube section in the last decade. Samples were taken from the littoral zone of the main arm, the tributaries and the whole Szigetköz wetland area. 16 mussel species were recorded, which presents 72,7 % of the nationwide mussel fauna. Among the species all of the frequent and four rare species of the Hungarian fauna and two invasive mussels occurred. The most widespread mussels are in order: *Dreissena polymorpha polymorpha, Pisidium subtruncatum, Sphaerium corneum, Pisidium henslowanum, Pisidium nitidum*. The spatial-temporal pattern of mussel fauna, and their relation to environmental parameters (current velocity, substrate quality) are also discussed. In the last decade the small-sized mussel fauna of the Szigetköz area became impoverished in all of the water bodies due to the alteration of the River Danube. After the different water supply measures a quick increase could be observed in species number, but the spatial pattern of the mussels reflected less and less the former flood-prevention classification of the Szigetköz area.

32-The ecological developement of the Iron Gate I reservoir

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The construction of the dam on the Danube in the area called the Iron Gates represents the essential factor of the transformations and ecological evolution of the river. During the construction of the dam, the Danube River acquired the characteristics of a fluvial-limnic ecosystem. The dynamics of the flooding process determined profound changes in the structure and functioning of the biocoenosis. The research emphasized three major stages in the ecological evolution of the reservoir:

- 1971-1972, disappearance of the terrestrial and reophile biological processes, as well as the intensification of the flooding process;
- 1972-1973, the relative stabilization of the flooding process, which is a determinant factor of the setting up of the fluvial-limnic biocoenosis;
- 1974 and further on, setting up of a dynamic balance of the fluvial-limnic ecosystem.

The dynamics of the biocoenosis transformation and evolution was obvious both at the level of the plankton and of the benthos. As a conclusion, from an ecological point of view, the construction of the dam and the forming of the largest reservoir on the Danube, as well as the alteration of the hydrological regime of the river has determined the transformation of a reophile ecosystem into a fluvial-limnic ecosystem.

for notes

33-A contribution to the knowledge on the parasites of the starlet (*Acipenser ruthenus* L.)

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Analized specimens of *Acipenser ruthenus* have been gathered during 2002. and 2003. on five sites along the Danube River in Belgrade Region (1,173 – 1,124 km). A total of 515 fish specimens ages from 0^+ to 1^+ have been examined. Parasites have been found in 342 fish specimens, which was 66.41 % of gathered sample. The examined individuals were infested by helminti belonging to groups Trematoda (four species), Nematoda (four species), Acanthocephala (four species) and Cestoda (one species). Trematoda *Skrjabinopsolus semiarmatus* was the only parasite species which was present in specimes from all investigated sites with infestation intenzity of 1–337 specimens per fish and its prevalence was 81.87 %. According to our investigation the degree of starlet parasite infestation is high and the further examinations are needed to determine the impact to starlet`s population.

underlined: presenting author

34-Diversity of the Gastropods along the lower sector of the Danube and its neighbouring areas

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The Danube and its neighbouring areas represent a sector, which through the variety of its ecosystems types (rivers, lakes, pools, swamps), ensure adequate conditions for a wide diversity of the Gastropods populations. On the basis of a synthetic analysis, there were noticed significant differences in the species' presence. This state reflects the species adaptability degree to the values of the environment conditions.
Thus, it can be noticed: - the highest number of species appears in the Danube (91 species); - in the lakes located within the easily flooded areas (64 species); - in the Danube Delta (59 species); - to the mouth of some of the Danube's tributaries (57 species).

for notes

35-Freshwater sponges (Spongillidae) of Danube floodplain waters (National Park Donau-Auen, Austria)

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In 2004 five of the six Austrian species of freshwater sponges were recorded in standing water bodies within the confines of the Donau-Auen National Park. Ranked from abundant to rare, these species comprised *Ephydatia fluviatilis*, *Spongilla lacustris*, *Ephydatia mülleri*, *Eunapius fragilis* and *Trochospongilla horrida*. The presence of hard substratum was essential for spongal growth. Suspended timber use near the water edges and drifting dead wood positively influenced the abundance of sponges. In addition, stony substrate was found to be important in *S. lacustris*.
Generally, sponges were lacking in backwater systems with high flow with *S. lacustris* and *E. fluviatilis* being significantly favoured by low connectivity whereas *E. mülleri* and *T. horrida* preferred habitats with higher connectivity with the Danube. The abundances of *E. mülleri* and *T. horrida* were positively influenced by increased Silica content whilst the reverse was true in *E. fluviatilis*.
In *E. fluviatilis*, the length of macroscleres was positively correlated with conductivity and negatively with pH. With respect to aberrant macroscleres (hooks, forks, centrotylots), *E. fluviatilis*, *E. mülleri* and *E. fragilis* were the most eco-sensitive species.

36-The Danube River- biodiversity and habitat assessment based on Trichoptera assemblages and the Floodplain Index

W. Graf, J. Waringer, P. Wenzel, A. Chovanec, O. Moog

Within the last decade in-depth studies of wetlands along the Danube at Greifenstein, Altenwörth and Klosterneuburg west of Vienna were carried out. Trichoptera were chosen as indicators of overall habitat quality of wetland areas because they have evolved a wide range of physiological, morphological and behavioural adaptations, allowing them to colonise the wide range of lotic and lentic habitats typically present in functioning flood plain systems in a very specific way. Species composition is heavily dependent on backwater type and its connectivity with the main channel, thus reflecting environmental conditions as demanded by the EU Water Framework Directive. Species inventories are compared and Floodplain Indices as well as the ecological status of the investigation sites according to CHOVANEC ET AL. (2005) are given and discussed. The high biodiversity of water bodies of the Danube river forests is compared with the main channel and their importance as a vital segment of aquatic ecosystem functioning is documented.

for notes

37-Epi- and endobionts of Ostracoda (Crustacea) in some parts of Danube basin in Serbia

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Different groups of epi- and endobiont organisms were detected on ostracod crustaceans during investigations of aquatic communities in the period of spring 2002 to spring 2005. Material was collected from Danube tributaries, connecting canals and temporary and permanent ponds in their floodplains.
Several epibionts belonging to flagellates, peritrichs and helminths were found colonizing surfaces of ostracod carapace and appendages, while ciliates invaded their body cavities.

38-Cladocera, Ostracoda and Copepoda assemblages in different side arms of the Danube in Gemenc floodplain (Danube-Dráva National Park, Hungary)

A. Kiss

The Gemenc floodplain along Danube (r.km 1497-1467) is one of the largest inundated floodplains in Europe. 74 Microcrustacean (38 Cladocera, 13 Ostracoda, 23 Copepoda) species were detected from different functional units (eu-, para-, plesio- and paleopotamon) of Gemenc area between 2002 and 2004. *Monospilus dispar*, *Pleuroxus denticulatus*, *Pleuroxus uncinatus* var. *balatonicus*, *Cyclops scutifer* and the 13 Ostracoda species are new species to this region. The most frequent species were *Mesocyclops leuckarti*, *Bosmina longirostris*, *Chydorus sphaericus* and *Eucyclops serrulatus*. Significant differences were reported between the Crustacean assemblages of the main arm and the side arms as well as the isolated floodpain waters. The average taxon richness, the Shannon diversity as well as the number of the macrophyte-associated species and the Ostracoda species were the highest in the paleopotamon-type Nyéki oxbow lake, which was furthest and most isolated sampling sites from the Danube. The density of assemblages was notably higher in the isolated floodplain sites than the Danube and the side arms, except the plesiopotamon-type Grébeci-Danube side arm. The reported differences in the composition and the density of assemblages were explained with the differences in connectivity and the local hydrodynamical influences.

for notes

39-Comparative evaluation of invertebrates macrofauna from Kyliya Danube delta

A. Lyashenko, K. Zorina-Sakharova, V. Makovskiy

Invertebrates macrofauna is an important component for biodiversity formation in water ecosystems, which permit to fulfill monitoring works, to determine trophic status of water bodies and waters saprobity. Macrozoobenthic fauna lives in different bottom substrates: stones, plants or submerged objects, also on organisms buried in the bottom soil. For the detailed determination, the macrozoobenthic fauna was distinguished in different groups: zoobenthos, zooperiphyton, zoophytos, pelagobenthos and psamon. On one hand, all mentioned organisms are connected among each other in the framework of taxonomic composition and from another, on other hand, they have some differences. Level of scientific knowledge and research of these organisms in lower Ukrainian part of Danube are also different.
In this information, a review of long-term research of benthos, zoophytos and zooperiphyton biodiversity is presented. Also structure functional organization of the different types of water bodies of Kyliya delta of Danube will be shown. Ecological status evaluation of the water systems and water pollution level were fulfilled in according to the basic biotic and saprobity indices calculation. Obtained results confirmed edificatory role of the plants for the common biodiversity increasing in the ecosystem.

40-Macrozoobenthos of the Sava River and its tributaries in Belgrade region, Serbia, in the year 2004

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Paper presents the results of limnological investigations of the River Sava and its tributaries Kolubara and Zeleznicka River in Belgrade region during 2004. Samples of bottom fauna were collected in May and October at five standard localities along 61.5 km of the Sava river course and from sampling spots in the tributaries immediately before their confluences to the River Sava. Hydrobiological studies included qualitative, temporal and spatial distribution analyses as well as the analysis of community diversity. Shannon-Weaver index (H) and Sørensen's Quotient of Similarity (QS) were used to estimate the biodiversity of communities and their faunistical similarity. In spring, the bottom fauna of the Sava River was more diverse in regard to its tributaries (42 vs. 28 taxa each). In autumn, almost the equal number of faunistical groups was recorded in macrozoobenthos of the River Sava and tributaries (10 in both Sava and Zeleznicka River, and 9 groups in Kolubara River). The highest number of taxa – 45, was recorded in Zeleznicka River, 43 and 39 in the Sava River and Kolubara, respectively. During 2004, dominant groups in macrozoobenthos at all investigated localities were Oligochaeta and Chironomidae. Their contribution to bottom fauna depends on season and type of substrate.

for notes

41-The study of the bottom fauna from the lower section of the River Sava in Belgrade region

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Paper presents the results of four-year investigations of macrozoobenthos communities of the River Sava in Belgrade region. In the period from 2002 to 2005, samples of bottom fauna were collected during high and low water level periods (May and October), at five standard localities along 61.5 km of the lower river course. Qualitative composition of the benthic biocenoses, as well as temporal and spatial distribution of taxa were analysed. Faunistical similarity between assemblages at investigated localities was estimated according to Sørensen's Quotient of Similarity (QS). During the four years of investigation, the presence of 19 groups and 90 taxa in benthic fauna was recorded. However, only six faunistical groups - Oligochaeta, Chironomidae, Gastropoda, Isopoda, Amphipoda and Nematoda, were present during the whole investigated period. At the same time, biodiversity of these groups was high. Index of participation of the recorded taxa in macrozoobenthic communities vary and depend on season and the type of substrate at the investigated locality. Other groups showed sporadic spatial and temporal distribution.

42-The comparative study of potamobenthos communities of the River Danube in Belgrade region (1192-1126 r-km) and its course through Serbia (1252-864 r-km)

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Paper presents the results of potamobenthos studies performed on the Danube River at Serbian territory, Serbia and Montenegro (S&M, 388 river-km) during 2004. Biological material was collected at five standard localities in Belgrade region (66 river kilometres long reach of the Danube), and at eight localities distributed along the river part, the flow through reservoir and the lake section of the Danube river course through Serbia. Samples of the bottom fauna were collected in April, June, September and November of 2004. Hydrobiological studies included comparison between bottom fauna communities in Belgrade region and communities recorded upstream and downstream from Belgrade. Qualitative composition of the potamobenthos, as well as temporal and spatial distribution of taxa were analysed. The bottom fauna of the Danube in Belgrade region was composed of 62 taxa. Macrozoobenthos communities up- and downstream from Belgrade region were presented with 89 taxa. During the year 2004, at all investigated localities, 11 faunistical groups occurred.. Faunistical similarity between communities at investigated localities was estimated according to Sørensen's Quotient of Similarity (QS).

for notes

43-Macroinvertebrate studies at the Hungarian reach of the River Danube

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The sustainable management and rehabilitation of the large European rivers – such as the Danube – needs a deep fundamental and applied knowledge both in biodiversity and ecological status. Macroinvertebrate communities are widely accepted in small rivers for water quality assessment, due to the indicative power of their species, which represent the widest scale of taxonomic groups and functional feeding guilds. In large rivers, the assessment based on macroinvertebrates, in some cases needs only adaptation of procedures, but in most cases preparatory approach is necessary both in theory and methodology. The species identification and the quantifiable evaluation of the communities should take priority of the questions to be cleared up. In the Hungarian Danube Research Station, during the last years, lots of ecological researches were carried out in the field of macroinvertebrate biodiversity, as well as in that of the sampling and assessment processes. The presentation briefly summarises some of the results in the following topics: millenary macroinvertebrate checklist of the Hungarian Danube reach; comparison of the qualitative and quantitative effectiveness of the routinely used sampling techniques; the colonization and selectivity aspects of artificial substrates as quantifiable sampling method; water body types validation by macroinvertebrate communities; the applicability of biotic indices based on macroinvertebrates.

44-Comparative analysis of biotic indices based on macroinvertebrate communities

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Between 1999 and 2001, during 30-week periods three weekly macroinvertebrate samples were taken at the Danube section of Göd (1669 rkm) using the method of kick & sweep and that of the artificial substrates. The macroinvertebrates were determined on species level and counted (109 samples, 125,000 specimen). The comparability and applicability of the biotic indices (SI=saprobic index, QI=water quality index) calculated on the basis of these frequent sample series were assessed. The seasonally varying SI based on kick & sweep and artificial substrate samples steadily indicates the water quality of the given Danube section within the range of β-mesosaprobic class. At the same time, the QI values of the kick & sweep sampling and the long term colonization experiments using artificial substrates, calculated by the Hungarian Macrozoobenton Family Score system significantly fluctuates within the three-week short periods, changing two or three water quality categories. There is no correlation between the SI and QI, relatively wide range of the QI belongs to every SI value. The difference between the two assessment system is probably due to that the saprobic system needs identification on species level and calculates with the number of individuals, the family score systems does not do that.

for notes

45-Occurrence of metazoan parasites in *Neogobius kessleri* and *Neogobius melanostomus* in longitudinal profile of the Danube River

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Metazoan parasites of *N. kessleri* and *N. melanostomus* were observed in four stretches of the River Danube: Bulgarian (native), Croatian, Slovak and Austrian (non-native area of distribution). Parasite species richness was higher in *N. kessleri* – 23 species compare to 17 species in *N. melanostomus*. Structure of parasite community did not differ among sampling sites in both fish hosts. *Pomphorhynchus laevis* (Acanthocephala) and glochidia of *Anodonta anatina* were the dominant parasite species with highest abundances and prevalences in all assemblages. Total parasite abundance was higher in *N. kessleri*, but did not significantly differ among localities. In *N. melanostomus*, parasite abundance was the lowest in Slovak population, but Bulgarian and Austrian populations did not differ. All parasite species found in non-native areas are common parasites occurring in Danubean fishes. No *Neogobius* specific parasites (with the exception of *Gyrodactylus* spp.) were found. The importance of introduced fishes for spread of various non-native parasites in Danube was registered. Four non-native parasites used gobies as their hosts: larval nematode *Anguillicola crassus* and glochidia of *Anodonta woodiana* infected both goby species, acarid *Hydrozetes lacustris* infected *N. kessleri* and crustacean *Caligus* sp. infected *N. melanostomus*.
This work was supported by the grant No. 524/05/P291.

46-The Zoobenthic Structure from Vâlsan River, the Tributary of Argeş, in the Sector Alunu-Muşeteşti, in the Conditions of Year 2003

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Vâlsan River, an Argeş tributary, has a sector that represents a unique range of the endemic species *Romanichthys valsanicola* Dumitrescu, Bănărescu and Stoica, 1957 (sculpinperch or Romanian darter), which is included in "RED LIST" of I.U.C.N. The basic food resource of this fish is represented of the benthonic larvae of rheophilous insects, especially mayflies (*Rhithrogena semicolorata*) and stoneflies. The paper presents data referring to the structure of benthonic zoocenosis, during the year 2003, in the sector Alunu – Muşeteşti, the identified taxons as well as the number of individuals/m^2 and wet weight/m^2 and the list of the genera and species of mayflies identified inside the sampling.

for notes

47-Distribution patterns and habitat characterisation of aquatic Mollusca in the Weidlingbach, a fourth order tributary of the Danube near Vienna, Austria

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A total of 186 aquatic Gastropoda (plus 271 empty shells) and 141 Bivalvia (plus 182 empty shells) were caught from October 2003 to August 2004 at 15 sampling stations at the Weidlingbach near Vienna, Austria. The catch comprised 5 gastropod and 2 bivalve species with the neozoon *Potamopyrgus antipodarum*, together with *Radix labiata*, accounting for 92.6 % of total gastropods; *Euglesa personata* was the most abundant Bivalvia species.
Snails strongly diminished during the winter months whereas mussels maintained stable populations throughout the year. *P. antipodarum* reproduced throughout the year; in *R. labiata*, reproduction took place in fall and spring.
On the microhabitat scale, *P. antipodarum* significantly preferred boulder and poorly-sorted gravel sediment at current velocities from 10 to 20 cm s^{-1}, whereas *R. labiata* was most abundant at 30 to 40 cm s^{-1}. Among mussels, *Euglesa casertana* preferred habitats with finer and better-sorted sediments and lower current velocities than *E. personata*.
P. antipodarum, *R. labiata* and *Ancylus fluviatilis* were most common at higher stream order sites near the mouth whereas the two *Euglesa* species and *Bythinella austriaca* were most abundant near the source at low order sites.

48-Plankton structure in Musura Bay (Danube-Black Sea system) in the conditions of year 2005

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Musura Bay (Danube Delta), located at the confluence of Sulina and Kylia arms with the Black Sea, is characterized by a very dynamic evolution. 150 years ago, the bay was widely opened towards the sea (13 km) and the depth was more than 12 m. The high amount of alluvia carried by Danube's water and the progressive advancement of a secondary delta (Kylia Delta) determined the decrease of the aperture (to 8 km) and of depth (to 2 m) in this bay.
In the last two decades, the colmation process was intensified due to the presence of a marine sandbank, created in the area by the Black Sea currents. As a consequence, the bay lost its marine characteristics, turning progressively towards a freshwater ecosystem.
In the particular conditions of 2005 year, with floods and high water discharge in the Danube catchment, the average salinity recorded in the bay was 0.2 g/l; the plankton communities were represented only by freshwater species. Phytoplankton and zooplankton communities recorded a high biodiversity (152, respectively 81 taxa), but low abundance and biomass; the rate of aerobic decomposition processes in the water column ranged between 160-590 μg/l/day.

for notes

49-Saprobiological evaluation of water of the Južna Morava River (second order tributary of the Danube, Serbia and Montenegro) using macrozoobenthos as bioindicator

I. Živić, Z. Marković

By using macrozoobenthos as a bioindicator of the waterquality, saprobiotical explorations of the Južna Morava River (second order tributary of the Danube), were conducted on sixteen localities in the period 2001–2003.The results of the saprobiotical analysis showed that β-mesosaprobic indicator organizms were dominant in all explored localities, which indicate that water belongs to the second class of quality. The highest average values of saprobity index were recorded in the localities JM3 (2.47) and JM6 (2.28). Downstream from locality JM6 saprobity index varied only slightly (from 1.79-locality JM13 to 1.88-locality JM8) up to localities JM14 and JM15 where the significant increase of 2.10 and 2.06, respectively, were recorded. The Južna Morava River is characterized by significant self-purification capacity, especially pronounced between localities JM3 and JM5

for notes

MISCELLANEOUS (POSTER)

50-Genesis and typology of riparian and fluvial landforms of the Kopački Rit within the Danube floodplain corridor in Croatia and Serbia

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The Kopački Rit at the confluence of the Drava into the Danube river and the adjacent areas build a floodplain corridor of more than 100,000 ha only in Croatia and Serbia. The area is characterized by long enduring floods during the early summer months, extensive soft woods and swampy vegetation patterns, muddy pioneer stands, a typical floodplain relief and oxbows as well as large reed stands and succession areas. In a first step a habitat mapping with following historical comparisons and a hydromorphological inventory of the Danube and Drava were prepared. In a second step a digital elevation model was used to determinate the flooded area for different water stages. In a third step the riparian and fluvial landforms were surveyed. The final analysis orders the collected landforms along a flooding gradient including additional parameters such as morphometry and vegetation to propose a fluvial landforms typology for the area. The genesis of the unique shallow floodplain lakes is one of the most challenging tasks. Summarizing, the Kopački Rit hosts still a great number of different fluvial and riparian landforms and as opposed to comparable sites in Western and Central Europe the structure and vitality of those forms are still intact**.**

for notes

MICROBIAL COMMUNITIES IN LARGE RIVERS (POSTER)

51-Some bacterial parameters in the Danube stretch near the Cernavodă nuclear-electrical power plant

I.Ş. Mirela, I. Doina

This paper analyses the microbiological standard parameters: colony count at 22° C, total coliforms and faecal coliforms. These are the standard bacteriological determinants of the water quality. The study was realized in the Romanian section of the Danube and in the channel with water used for the condenser cooling within electric power plant Cernavoda, during 1998-2002 period. The water quality from this section and channel belonged to the quality classes II (moderate) and III (critical), based on the mentioned parameter values and according to the EU-Bathing Water Quality Directive and new EU–expert proposals.

52-Microbiological Study of the Nature Reserve "Gornje Podunavlje"(the Upper Danube Basin) Monoštorski rit (Monostor Marsh)

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The Upper Danube basin consists of two big marsh areas, Monostor and Apatin. These areas are integral parts of "Kopački rit" Nature Park in Croatia and National Park "Dunav-Drava" in Hungary. Ecological status was assessed on the basis of water quality parameters such as number of organotrophs, facultative oligotrophs, coliforms, certain physiological groups of bacteria, phosphatase activity of water and concentration of chlorophyll *a,* examined from summer 2004 to summer 2005 at six locations. Microbiological and hydrobiological examination of the water of Monostor marsh indicates highest organic load, according to the described parameters in the water samples of the locality "Vagoni", weekend residential area. The lowest organic load was recorded at the locality "Pčela" in the inner part of the reserve. According to index FO/H water at the localities mostly retained satisfactory autopurification ability. On the basis of the concentration of chlorophyll *a* determined during the year 2004, the water was classified as meso-eutrophic or oligotrophic and during the year 2005 as meso-eutrophic, eutrophic or eu-polytrophic dependent of seasons. A serious concern is the fact that the water from canal Danube-Tisza-Danube in the area is reaching eutrophic conditions, obviously affecting water quality in the area.

for notes

WATER QUALITY ASPECTS: NUTRIENTS AND TOXIC SUBSTANCES (POSTER)

53-Development of standard procedure for biological monitoring of status of Danube basin water bodies in Ukraine

S.A. Afanasyev, A.V. Lyashenko

The experience of the last decades in the practice of aquatic ecosystems status and water pollution assessment made clear that a shift to assess aquatic ecosystems holistic with a focus on habitat structure and organisms. Within framework of EC Directive 2000/60/EC and integral ecosystem approach, hydroecosystems are considered as integration with priority to biotic components over the abiotic, their interrelation and analysis of quality of habitats. In Ukraine under the cardinal changes of social and economical conditions, necessity arises of re-interpretation of national basis of environmental assessment, which directly depends on such conditions. Processes of integration in Europe and in the world demand agreement to approaches in the issues of assessment and monitoring on the wide international scale, which is particularly actually in the Danube basin.
After analyzing the global practice of biological monitoring specific suggestions for organization of such monitoring in the Danube basin water bodies in Ukraine have been developed. The main goal is monitoring of biotic element in aquatic ecosystems status, biodiversity and bioresources. The developed tables content information essential for implementation of specific algorithm for carrying out hydroecological monitoring of biodiversity and bioresources of Danube basin water bodies in Ukraine.

54-Vertical differences in physical and chemical parameters of the water in three side arms at Gemenc floodplain (Danube-Drava National Park) depending on the Danube water level fluctuation

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Physical (temperature, oxygen concentration, saturation, light condition) and chemical (pH, electric-conductivity, redoxpotential) parameters in the water of the Danube and in three side arms were measured at Gemenc floodplain (Danube-Drava National Park). From the side arms the Grébeci-Holt-Danube is a pleisopotamon type with 5 km length, the Rezéti-Holt Danube and the Vén Danube are parapotamon types with 15 and 5 km length respectively. The lower water level of the Danube than the average level caused a decrease in water discharge and currency in the side arms. *In situ* measured parameters were recorded to assess the horizontal and vertical changed characteristic among the above mentioned habitats.

for notes

55-The assessment of nutrient availability for the growth of freshwater green algae *Chlorella kessleri* by bioassay (Lake Sakadaš, Nature Park Kopački Rit)

J. Horvatić, V. Peršić, Ž Popović

The influence of nutrient availability on the growth of *Chlorella kessleri* was investigated in water samples of Lake Sakadaš, from March to September 2005. A nutrient enrichment bioassay was performed to test nitrogen and phosphorus limitation of freshwater green algae *C. kessleri*. A statistically significant correlation ($r = 0.964$, $P<0.01$) was established between the total biomass of *C. kessleri* in original water samples and nitrate concentration *in situ*. In the nutrient enrichment bioassay, only the addition of nitrogen showed a statistically significant influence on the growth rate of *C. kessleri*. In order to quantify the established nutrient limitation, the effect of N (in final concentrations of 5, 10 and 100 mg l^{-1}) and P (in final concentrations of 0.15, 1.5 and 15 mg l^{-1}) addition was expressed as the degree of nutrient limitation (Δr in mg l^{-1} per day). The algal response to nitrogen enrichment showed a linear increase ($r = 0.997$, $P<0.05$) of the degree of N limitation from March ($\Delta r = 0.171$) to July ($\Delta r = 0.866$).

56-Heavy metals content in aquatic macrophytes in Slovak rivers and lakes

G. Jamnická, R. Hrivnák, H. Oťaheľová, M. Skoršepa, M. Valachovič

The research was focussed on the surface waters pollution with heavy metals in 17 localities in the catchment area of the Danube River with different types and degrees of pollution. We monitored amounts of Zn, Cu, Cd, Pb in water and in aquatic macrophytes. The individual concentrations of heavy metals were determined using the method of galvanostatic stripping chronopotentiometry, with a ECA Flow 150 GLP instrument (Istran Ltd., Bratislava). We obtained the following mean concentrations of the elements in water and in aquatic macrophytes, respectively: Zn 683.82 μg·l (SD 254.13 μg·l) and 35.87 ppm (40.91 ppm), Cu 3.92 (0.86) and 6.55 (3.84), Cd 9.50 (5.45) and 12.03 (11.35), Pb 4.70 (7.76) and 0.38 (0.50). The results of the analysis testify for a heavy load in the Hron River with heavy metals in the area of the Žiarska kotlina basin. The mean concentration of copper was the highest in the phytomass of aquatic macrophytes from Hron near Žiar nad Hronom (17.83 ppm). The highest accumulated amount of lead was found in the Ipeľ River below the village of Kalinovo (72.26 ppm), followed by the Myjava River at Kúty (Pb – 20.28 ppm). In the latter, we also found the highest amounts of cadmium (Cd – 1.7 ppm) and zinc (Zn – 171.66 ppm). The high values were always connected mainly with industrial and mining activities. We also examined the degree of bioaccummulation of heavy metals in selected species; the highest accummulation was found in *Batrachium aquatile*.

for notes

57-Heavy metal contents in Danube river at Belgrad

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Under the Programme of systematic water examination, Republic Hydrometeorologic Service of Serbia carries out the monitoring of heavy metals' contents in Danube river.
This paper presents the preliminary results of weekly examinations of these parameters on the localities of Belgrade, Zemun and Smederevo in the period January-September 2005. The aim was to determine the concentrations of dissolved heavy metals (Cd, Cr, Cu and Ni) by Atomic Absorption Spectrophotometry-non flame technique (graphite furnace).
It has been concluded that the concentrations of Cu and Ni mainly do not match the criteria for the II class of water quality, according to ICPDR classification. Concentrations of Cd are mostly under 0.2 μg/l that has been establish as a detection limit. Concentrations of Cr occasionally deviate from the criteria for the II class of water quality. Concerning the fact that the presence of heavy metals in water are very serious problem, these results are, but the small contribution to the general information of heavy metals` contents in Danube river.

58-Eutrophication impacts to the Black Sea Coast and some aspects about the littoral biodiversity situation

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During the last 30 years the Black Sea transformed from a diverse ecosystem with a rich variety of marine life to one dominated by eutrophication, particularly in the north-west littoral zone of the Romanian marine coast. The Danube, the second largest river in Europe, discharges some toxic substances and also nutrients, which cause trigger eutrophication, the most important impact of all. Since 1970 a distinct increase in algal bloom frequency, number of bloom-forming species and cell densities were observed, totaling 45 bloom species between 1980 and 1990. In accordance with this phenomenon, a distinct change in structure and biomass of the benthonic flora and fauna took place in Romanian coastal waters; from 19 Mollusca species and 24 Polychaeta species recorded in 1961 only 11, and 9 species respectively, remained in 1987. Thus many benthic filtering species have recently decreased dramatically and many species of fish disappeared from the Black Sea (e.g. *Engraulis encrasicholus ponticus* (Alex), *Conger conger* L., *Xiphias gladius* (L.), *Scomber japonicus* (Houttuyn). Some decapods and peracarid crustaceans species have disappeared (*Hippolite inermis* Leach., *Processa pontica* Sovinsky, *Pontophylus fasciatus* Hailst, *Hemimysis serrata* Bacescu, *H. anomala* Sars. Indirect influences reduced also the diversity and biomass of Chlorophyta, Rhodophyta, and Phaeophyta.

for notes

59-Data analysis of groundwater for drinking water use in an urban floodplain area, the Lobau in Vienna

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Floodplains like the Lobau, located along the Danube River in Vienna, provide a wide range of ecological and socio-economic services, including flood retention capacity, groundwater recharge and recreational values. Beyond its significance for supporting a high biodiversity, the Lobau plays a central role in the landscape water balance. It retains floodwaters, recharges the groundwater, and provides socio-economic values (e.g. drinking water supply for up to about 25 % of Vienna's inhabitants). The major regulation scheme 1875 and the following morphological development of the Danube main channel affected the hydrological exchange conditions with the Lobau. Thus, quantity and quality aspects of groundwater are of main interest for the drinking water supply in the Lobau. As a prerequisite for any future management activities the current status and the development of the groundwater quality during the last 12 years is needed to be studied. Thereby, the relationship of chemical and sanitary groundwater parameters and hydrological conditions is investigated in all wells of the drinking water plant in the Lobau. The main focus of the analyses is the dependency of groundwater quality on varying bank filtration conditions and changes in groundwater quality due to periodical back-flooding. The changing hydraulic conditions in the floodplain are respectively based on a simple classification model. The effects on quality changes will be analyzed by multivariate statistics like Cluster Analysis and Principal Component Analysis (PCA).

60-The Ecological and Chemical Situation of Danube River – Development and Present Status

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The Danube and its most important tributaries are investigated by the Institute for Water Quality on behalf of the Federal Ministry for Agriculture, Forestry, Environment and Water Management as well as by the Länder governments of Upper Austria, Lower Austria and Vienna. The regular assessments take place according to the Austrian Water Act and the Ordinance on Water Quality Monitoring on one hand and to meet requirements of bilateral agreements (Border River Commissions) and international obligations (Danube River Protection Convention) on the other hand. The evaluation of chemical parameters formerly was based on the 1995 Draft of the Austrian General Ordinance on Immissions in Rivers and the classification systems of the German Länderarbeitsgemeinschaft Wasser und Abwasser (LAWA) and the International Commission for the Protection of the Danube River (ICPDR). With implementation of the Water Framework into national law the compliance of the results now has be to checked against immission limit values, so called Environmental Quality Standards, recently put into force by the Austrian Ordinance on Quality Objectives for Surface Waters. The results of the biological investigations are evaluated by the method of the Fauna Aquatica Austriaca with reference to the ECOPROF system and are presented in a saprobiological quality map. The classification of the trophical status follows the system of the Bayerisches Landesamt für Wasserwirtschaft 1998. According to the Water Framework Directive and the Austrian Water Act the Austrian stretch of Danube River was divided into basic and detail water bodies which form the units for status assessment and presentation.

for notes

61-The physical and chemical characteristics of Danube water quality near Kovin in Vojvodina

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The quality of Danube water was examined at the site of the collector discharge of the alcohol production industry (Alpis) wastewater near Kovin, as well as wastewater. The work presents physical and chemical quality parameters of wastewater and Danube water.
Wastewater samples were taken one time during a quarter of a year and they were analyzed for the general parameters (temperature, pH, oxygen, water electroconductivity, dry residue, calcined residue, suspended matter, chemical (COD) and biological oxygen demand (BOD_5), content of NH_4^+, total P and total N). Samples of Danube water were taken at the same time during a quarter of a year and analyzed before wastewater discharge and the second and sixth day after wastewater discharge for the pH, COD, BOD_5 and $KMnO_4$.
Danube water quality, before discharging Alpis industry wastewater in Danube, belonged to Water Quality Class I judged by most of the analyzed chemical parameters, with the exception of BOD_5 value, which indicated Class II. Following the collector discharge of Alpis wastewater into the Danube, Quality Class III was recorded. The results confirmed the poor water quality of the Danube near Kovin and the need for wastewater treatment of Alpis industry. Also, a regular monitoring scheme of the Danube water quality should be established.

62-Spatial and temporal changes in the benthic organic matter at the depositive and erosive zones of the Hungarian Danube

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The organic matter of the sediment is prerequisite for the detritivorous community in the river ecosystem. To quantify this organic matter content and its changes in time and space, investigations were performed at two typical sites of the Hungarian Danube, which differ in their local hydrological characteristics due to the deposition and erosion processes. The distribution of the benthic particulate matter and the organic matter content of that were analysed in the core samples of the river side and the near shore line in three layers (0-5, 5-10 and 10-15 cm) and in four fractions: coarse (2360-710 μm), fine (710-250 μm), very fine (250-63 μm) and ultra fine (<63 μm). In 80 % of all the cases very fine fraction was prevalent in benthic particulate matter, while the coarse fraction had the smallest amount. Generally, in 63 % of all the cases, the organic matter had the highest content in the coarse fraction, in 88 % of all the cases, it had the lowest values in the very fine or fine fractions. The variability of the organic matter content was highest in the coarse fraction (CV: 86 %), while it was the lowest in the ultra fine fraction (CV: 20 %). Considerable horizontal and vertical heterogeneity and in most cases temporal changes governed by the water regime were noticeable.

for notes

63-The analysis of the main perturbing factors and the physical–chemical description of the Vâlsan hydrographic basin, in the conditions of year 2005

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Our study on aquatic ecosystem with emphasis on physical – chemical description of the basin focused on the main perturbing factors, which have led to the ecologic disturbance and changes in the Vâlsan biocoenotic structure. At present, the Vâlsan is under a cumulative effect of the upstream perturbing factors caused by the hydroelectric constructions and the human activity and undergoes some depreciation of the water quantity and quality. This requires urgent measures to diminish them. Restoring the Vâlsan ecologic equilibrium is a necessity, which can be achieved by providing a minimum flow for aquatic flora and fauna protection as well as a proper quality of the flooding waters.

64-Long term investigations on hydrochemistry and hydrobiology of flooded gravel pits in the Marchfeld- region, Lower Austria

G. Weninger

This study is based on a 30 years- survey groundwater connected gravel pits in Lassee and Zwerndorf/March. The central Marchfeld- plains were heavily hit by sinking groundwater tables since the 1960/70`s, while the region around the river March is intensively influenced by the hydrology of the latter river, which causes sometimes long term floods and impacts by surface waters. On the other side the intensive agriculture causes high contamination, especially with nitrate in the ground water. In the water bodies of both catchments an increase of dissolved ionic contents was evident during the last 30 years (conductivity +12 % till +33 %, calcium/magnesium +7 % till + 23 %, chloride + 22 % till + 40 %, sulphate +4 till +56 %) ranging in balance between groundwater infiltration and substitution and the progressive processes of kolmation. Nitrate which is widely enriched in the groundwaters of the Marchfeld area, declines later in the water bodies of the pits due to the biological activities (bioproduction and denitrification. On the other hand ammonia increases corresponding to the progressive aging of the systems, except in those lakes where the rate of water substitution is high. The contents of total phosphorus decline in the slightly eutrophic water bodies of the Lassee pits (-4 % up to – 51 %), but increase during the last stages of the hypertrophic cycles in Zwerndorf accompanied by exceptional oxygen deficits and very high ammonia levels causing partially fish kills in lakes with extremely high fish-production. A sanitation project was started with the intention of mud-reduction.

for notes

65-Changes of vegetation in the rivers Naab & Pfreimd in the region „Oberpfälzer Wald“ north of Regensburg from 1972 – 2004

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From 1972 to 2004 vegetation and water chemistry were studied during four periods (1972, 1980, 1988, 2004) in two rivers Pfreimd and Naab having its source in the silicaceous bedrock of the region “Oberpfälzer Wald”, the latter running to the Danube. Data on water chemistry showed an improvement of water quality in both rivers from 1972 to today which is supported by the vegetation data. This trend is stronger in the river Naab than in the river Pfreimd which suffered less from sewage of local municipalities. The results strongly support the decision of the EU to include macrophytes as suitable indicators for water quality into the water framework directive.

66-Changes of vegetation in the river Moosach north of Munich from 1970 – 2004

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The macrophytic vegetation in the river Moosach and their tributaries has been studied since 1970. In 2005 the vegetation was recorded for the seventh time. Vegetation changes could be interpreted according to water quality changes and confirmed the suitability of macrophytes as water quality indicators. Additionally, the regeneration potential of the river was studied which included the drift of seeds by the running water but also the seed bank in the sediment. The results showed that only a low proportion of macrophytes.

The effect of water barrages on the vegetation dynamics of amphibious habitats (oral presentation, session 2)

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The construction of water barrages along the German part of the river Danube caused a strong decline in plant species of amphibious habitats. Despite this fact the causes are not well understood from an ecological point of view. Seasonal or occasional drainage seems to be one of the central prerequisites for the establishment of respective species. Therefore, samples were collected in the last part of the Danube in Bavaria where the water regime is unregulated to study the mechanisms of colonization and establishment in several experiments including the dispersability of the species in space and time and establishment along different water regimes.
The results clearly show that constant water levels cause on a long term the extinction of the species. However, dispersability in space and time can be very high in many species which means, however, that at least at some places the original water regime of the Danube has to be maintained in order to maintain the typical species for amphibious habitats as a pool for colonizing new suitable habitats.

for notes