General plan of the WP2 "The major challenges of river basin planning in Baltic Sea Region (BSR)", Watersketch-project

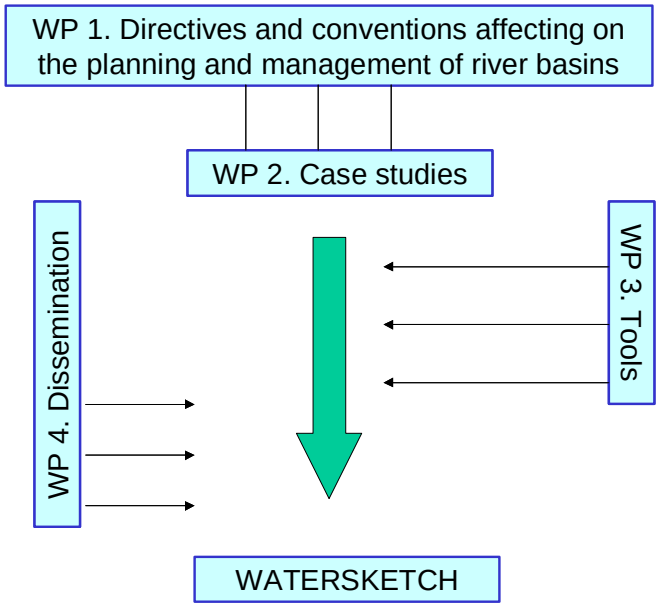
Miroslaw Imbierowich, Irek Zbicinski & Seppo Hellsten

Introduction

General aims of Watersketch case studies are;

- to demonstrate the alternatives of river basin planning at Baltic Sea Region
- to analyse the conflicts between different directives and types of use of watercourses

Additionally the case studies are preparing high quality data for other work packages 3 and 4 and further getting data from WP1. Schematic view and relationship between case studies is following:



In principle case studies are using as an input information from different legislation and directives collected in WP1 and producing outputs for tool development (WP3). Additionally WP3 is producing tools which can be applied further in case studies. All the results are first published as separate reports and further as a part of handbook and webpage of WP4.

Schedule and general structure of case studies

Case studies is following general schedule of the project with a links between different Work packages (Table 1). The structure of the case studies is following the table of contents of handbook chapters (Table 2). It should be noted that the first phase (up to milestone 3) of case studies includes only chapters 1 – 4, second phase is reported until the end of milestone 6 (Table 2). Case studies are further compiled to be a part of book, which limit the number of pages to 20 – 30 per case. There are no page limitations for separate case study reports.

Table 2. General structure of WP2 with different project periods and milestones.

2004			**Milestone 1: a) Common meetings with different partners b) Plan of case studies**									
		Jun	Jul	Aug	Sep	Oct	Nov	Dec				
		Start of the Project	Preparation of case studies are starting with contacts of stakeholders, water managers and spatial planners					Detailed case study plans with preliminary matrices will be finalised				
			Start of Phase 1		Kick-off meeting in Pori, 28-30-Oct.-04			WP 2 Watersketch meeting Hamburg 08/09 Dec.				
			---->	---->	---->	---->	---->	---->				
2005	**Milestone 2: a) Case studies in progress b) First impact matrices described**							**Milestone 3: a) Main uses and conflicts are described b) Internal mid-term WorkShop**				
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	Case studies in progress following IMA procedure National meetings with stakeholders, water managers and spatial planners						Case studies are reporting their findings and preparing report of first phase including impact matrices (Chapters 1-4) Public participation principles are applied in case studies					
						WP2 Watersketch meeting Lodz June - 05					Internal mid-term workshop	**End of Phase 1**
	---->	---->	---->	---->	---->	---->	---->	---->	---->	---->	---->	----I
2006	**Milestone 4: Participation on tool development**						**Milestone 5: Tools applied in case studies**					
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	Case studies supporting tool development						Case studies applying tools at their areas Case studies start to report their findings					
	Start of Phase 2		WP Watersketch meeting								WP Watersketch meeting	
	---->	---->	---->	---->	---->	---->	---->	---->	---->	---->	---->	---->
2007	**Milestone 6: a) Produce information for handbook b) Final workshops**											
	Jan	Feb	Mar	Apr	May	Jun						
	Case studies reporting (Chapters 5-7), Disseminating information in workshop Producing handbook, articles and reports together with WP4											
					Transnational closing seminar and international Workshop in Finland	**End of Phase 2**						
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Table 1. Tentative structure of case studies as a part of book chapter and their relationships between to other work packages. WP1 – 4 refers to work packages which are offering material for the chapters.

1. Summary	(WP 4)
2. Introduction	(WP 4)
3. Background Information (according to WFD Art. 5, see WFD)	(WP2)
• General characteristics of river basin (geography, hydrology, water body types etc.)	
• Description of significant pressures caused by human activities (eg. eutrophication, hydromorphological pressures, toxics, settlements, etc.)	
• Impact/risk analysis at national level (eg. usability of water, classification, official art. 5 report classes of risk analysis)	
• (Protected areas if necessary)	
4. Environmental and water related problems	(WP1 2 3 4)
• General environmental problems where study focuses	
• Conflicting directives and national legislation	
• Spatial planning dimension/problems	
• Public involvement, stakeholders dimension	
5. Potential or implemented solutions	(WP 1 2 3)
• Programme measures (according to WFD Art.11, see WFD)	
• Public involvement	
6. Experiences gained and contribution to sustainable river basin management	(WP 3 4)
7. Conclusions	(WP 4)
8. References	

Detailed plan of case studies WATERSKETCH

Watersketch case studies are representing major problems and conflicts of river basins at Baltic Sea Region. A full list of case studies is presented in Table 3 and different case studies are presented in Appendix.

Table 3. Basic information of the case studies of WP2.

Number	Case study	Aim	Institute	Contact person
1.	Finnish "Oulujoki River" case study: a) peat production b) forestry c) hydropower d) protected areas	a) Sub-study peat production focuses on creating a planning system, which uses mathematical run-off and loading models to evaluate best possible sites and orders for peat production,	North Ostrobothnia REC	Kaisa Heikkinen
		b) Sub-study forestry focuses on evaluation of harmful effects of forestry on small lakes and ponds to promote sustainable planning of forestry,	Kainuu REC	Sirkka-Liisa Markkanen
		c) Hydropower sub-study describes in detail different conflicts and options related to hydrologically and morphologically heavily modified water bodies,	SYKE	Seppo Hellsten

		d) Sub-study protected areas develops classification criteria for aquatic ecosystem related to protected areas and promotes spatial planners to take into account the needs of these areas.	SYKE	Ville Hokka
2	Finnish "Kokemaenjoki River Delta" case study	There are a lot of different activities from heavy industry to protected areas at the very limited and sensitive area. Case study will produce a consensus-based blueprint for the development of the Meri-Pori area and develop the interactive conflict management tools based on the multi-criteria-decision-makings approaches.	University of Turku	Juha Hiedanpää
3.	Danish "Catchment areas at Limfjorden" case study	EU WFD program of measures will be developed for the catchment area of Limfjorden. Emphasis will be given to the eutrophication of the fjord, public involvement and spatial planning,	County of North Jutland	Per Schriver
4.	Lithuanian "Northern part of Curonian lagoon" case study	Harbour reconstruction (dredging) caused in significant changes in hydraulic regime and salinity changes. This in a turn have an impact on water quality and eutrophication as well as fish stocks relevant to fishery and recreation.	CORPI	Arturas Razinkovas
5.	Lithuanian "Minija river" case study	Obviuos conflict between the need of alternative hydrower installions and rehabilitation of salmon stocks within the watercourse. Additionally conflict between the landcape protection anf recreational activities in the scenic river valley is envisioned	CORPI	Antanas Kontautas
6.	German "Elbe-Hamburg Harbour" case study	The project will focus on combining the spatial planning and implementation of the Water Framework Directive (WFD). Main problems, which will be discussed are point and diffuse sources of emissions in Hamburg waters. A risk assessment on the basis of the existing information will be carried out in order to prioritize risks and sources with regard to the implementation of the WFD.	City of Hamburg	Susanne Heise
7.	Polish "Lodz-Jeziorsko Lake" case study	An impact assessment on the basis of existing information will be carried out in order to recognize main conflicts between different use of watercourses with regard to the implementation of the WFD. Special emphasis will be given to the conflicting interest of hydropower, nature protection, scattered settlements, agriculture and other activities that are suspected to have the main impact on water quality in the Jeziorsko Reservoir basin	TU Lodz	Miroslaw Imbierowich

To help the case study leaders the following example of the table of contents of case studies during the first phase is produced (Table 4). Plan is in principle based on Art. 5 analysis of European Water framework directive.

Table 4. Detailed plan of case study during the first phase.

Introduction

Background Information of river basin (or part of it)

- General characteristics of river basin (geography, hydrology, water body types etc.)
- Description of significant pressures caused by human activities (eg. eutrophication, hydromorphological pressures, toxics, settlements, etc.)
- Impact/risk analysis at national level (eg. usability of water, classification, official art. 5 report classes of risk analysis)

Environmental and water related problems

- General environmental problems where study focuses
- Conflicting directives and national legislation
- Spatial planning dimension/problems

Workplan of the case study (until 3rd milestone)

- Who is in charge
- General workflow (eg. determination of research area, material and methods, field work, literature survey, data processing)
- Schedule (planned actions, meetings)

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
Meeting												
Practical work												
Reporting												

- Parties involved (remember to involve stakeholders and spatial planners)
- Estimation of outcome (remember to produce variables for further use)

Other significant notes

restrictions, problems, risks

App. 1

Watersketch, Oulujoki-case study, first phase 2005

Hellsten, S., Heikkinen, K., Hokka, V. & Markkanen, S-L

Introduction

Watersketch-project focuses on combining the spatial planning and the implementation of Water Framework Directive (WFD). Oulujoki is one out of seven case studies in the Baltic Sea Region describing environmental problems and conflicts of river basins and supporting sustainable development to create a proper river basin management plan.

Oulujoki-case study is described in this plan by the end of 2005 (milestones 2-3). Further plan (milestones 4-6) including application of multicriteria decision support system will be developed after finalizing the first phase.

Background Information of Oulujoki-river basin

The Oulujoki catchment is located in boreal zone in the Fennoscandian eco-region in Northern Finland. It is one of the largest river basins in Finland totalling 22841 km^2. The annual mean flow is 259 m^3s^{-1}. The river system in the upper reaches is characterized by chains of short river stretches and lakes. The total number of lakes over the size of 50 ha is 398, the largest one being the Lake Oulujärvi, with surface area of 928 km^2.

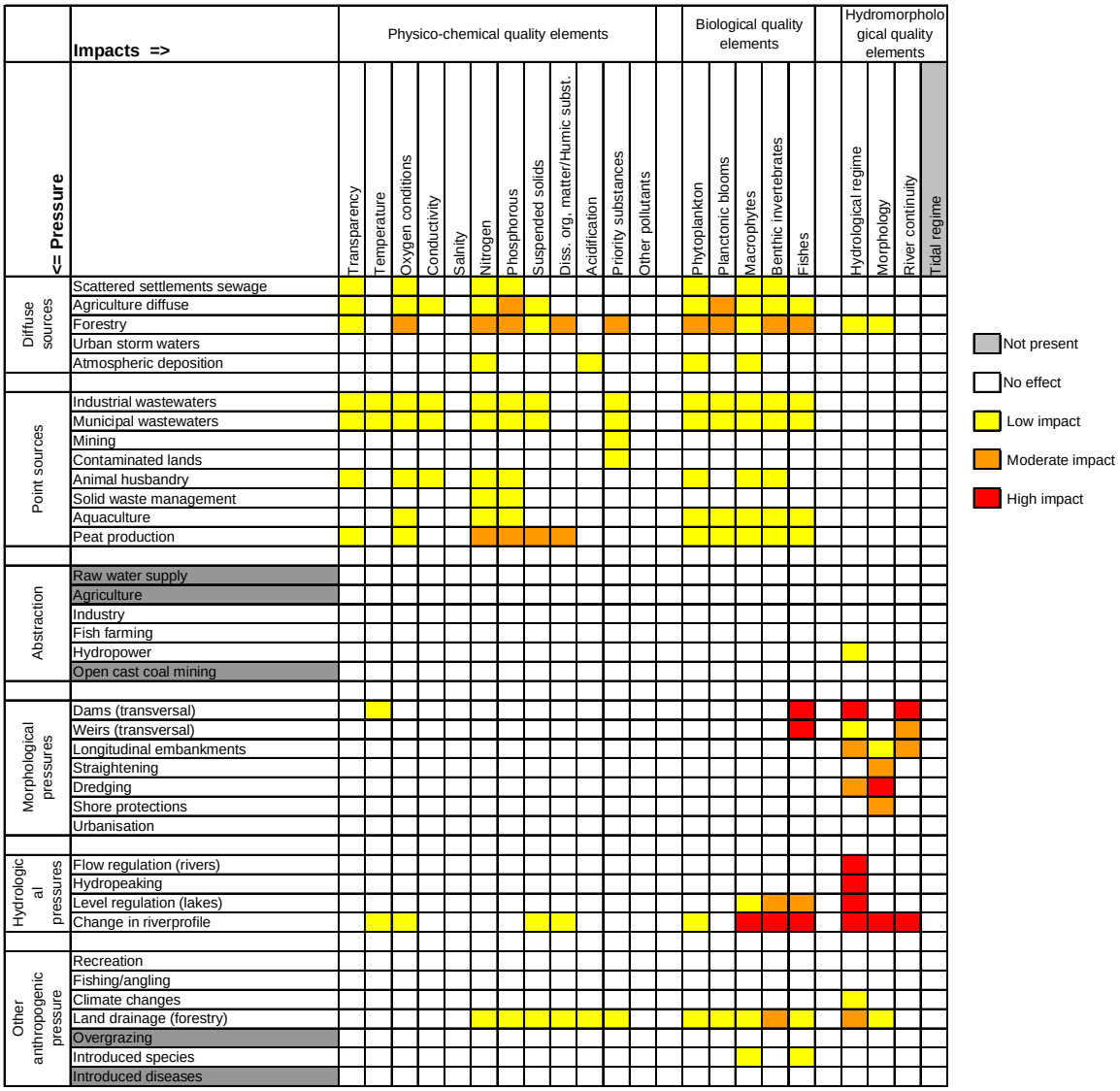
The basin is relatively sparsely populated, total amount of population is 226 000, which makes 11.5 inhabitants per a square kilometre. The population is concentrated to the western parts of the basin, mostly where the river discharges to the Baltic Sea. The catchment area is dominated by forests. Agriculture comprises only 3% of the land area, but it is concentrated on the lower reaches of the basin, where it has a major impact on water quality. The forestry operations, such as clear-cutting, drainage and tillage, may have significant impacts especially on the ecological status of the small upstream lakes and rivers. Locally, also peat production may deteriorate water quality and ecology. A large pulp and paper mill is located on the shore of the major lake (Lake Oulujärvi) within the catchment. The mill has an impact on water quality and ecology in the vicinity. However, the area of the impaired parts of the lake has reduced much due to pollution control measures realized during 1980s and 1990s. No other major industries are located within the study catchment.

The flow and water level of the Oulujoki river system has been regulated since 1940s mostly for hydropower production. Most of the river channels are dredged and series of rapids have been transformed to stable water systems under hydropower peaking. Presently, altogether 18 hydropower plants produce more that 2500 GWh, having power more than 550 MW. In order to facilitate the power production more than 1400 km^2 of the lake water levels are regulated.

According art. 5 analysis of the WFD a large part of the river basin is obviously in a good ecological status, but the main river stretches and some large lakes are initially designated as heavily modified. Some small lakes are also suffering of eutrophication and their ecological status at the present is obviously moderate.

Environmental and water related problems

The Oulujoki case study is divided to deal with four different problems related to implementation of WFD environmental goals and spatial planning. General description of different problems are described in the following preliminary pressure matrix:



1. Sub-study peat production

Land use in river catchment areas results in increased transport of nutrients and suspended solids (SS) to river channels. Eutrophication caused by nutrient pollution and siltation of the river bed due to SS loading are the most significant environmental problems in most Finnish rivers today. The most significant forms of land use are agriculture, forestry and peat production. Many times there are still needs to use new land areas for these anthropogenic purposes or to use the older areas more effectively. How can this be done without deteriorating the status of the river channels for the river biota and for the recreational purposes that are dependent on good water quality ?

In the sub-study a planning system for situating land use derived loading sources to river catchment areas is created. Peat production is used as an example of these sources. It suits well for the consideration, because it increases intensively SS and nutrient transport from peatlands to river channels. It is also known that recently established peat production areas, areas under intensive use and abandoned areas cause different levels of nutrient and SS loads to water courses, and also for this reason tools for integrated environmental impact assessment are needed. On the other hand, the suitability of peat production for the consideration is also increased by the fact that it is possible to decrease the loading using effectively the existing water pollution control measures. The planning system developed uses mathematical run-off and loading models to evaluate the effects of loading on water quality, and to find best possible sites for peat production.

In order to increase the general motivation to use the planning system developed, the sub-study includes also demonstrations on the effects of loading and water pollution control methods, and on the environmental impacts of SS and nutrient loading in the riverine environment.

In the sub-study the role of Regional Plans for Land Use in planning peat mining is also developed so that the environmental impact assessment of separate peat mining plans at the same watershed could be inte-

grated, and that the Plans were also important databases for peat producers, when they are making new applications for peat production permits. Also the process in peat mining permit application at the present is analyzed, points of contact sought with the regional planning process, and recommendations presented for the cost-effective environmental impact estimation process in regional planning of land use. The planning processes are developed in cooperation of all the parties concerned, workshops and meetings being important methods of the work.

2. Sub-study forestry

As described earlier, forestry is increasing silting and nutrient loading especially at the uppermost part of catchment; many small rivers and springs are suffering of siltation and increased amounts of suspended solids. Forestry is the major land use activity in Finland and almost 85 % of all land areas are used for forestry at upper part of Oulujoki catchment. Forestry authorities and wood processing industry are very well aware of environmental issues, but especially environmental changes in lakes are very slow and difficult to detect. Local inhabitants and recreational users have often noticed harmful effects caused by forestry.

Sub-study forestry focuses on evaluation of harmful effects of forestry on small lakes situated at Kainuu region. Both impacted and reference lakes are selected for focus areas and effects of forestry are describes by using both land use models with historical data and field research to determinate present ecological status of water courses. Also paleolimnological methods are applied to estimate change caused by drainage of forest areas. Usability of databases of local forestry association (Metsäkeskus) is tested by analysing their data in impact assessment. Local inhabitants are interviewed to evaluate the changes in lake status caused by forestry activities. Sub-study will estimate the ecological status by general methods applied in WFD and uses load estimation tools developed in peat production sub-study to evaluate the effects of different forestry alternatives.

The role of Regional Plans for forestry is also evaluated. Present plans divides forestry areas in M (Forestry and agricultural area), MU (Forestry and agricultural area with specific recreational use) and MY (Forestry and agricultural area with specific environmental value). Specific watercourse protection measures can be focused on MY-areas. Sub-study forestry will evaluate the possibilities how these measures could have improved the status of these small lakes and gives recommendations how to apply these measures on regional planning. The planning processes are developed in cooperation of all the parties concerned, workshops and meetings being important methods of the work.

3. Sub-study hydropower

Hydropower is largely affecting on status of water courses. According to WFD these hydrologically and morphologically altered water bodies can be designated as heavily modified, which do have lower environmental goals called a good ecological potential. Definition of this ecological potential is relatively unclear, because mitigation measures to improve ecological status cannot cause significant harm for main use of water body. General trend of WFD is to limit modifications caused by hydropower. On the other hand commitments related to Directive of renewable energy sources demand to increase hydropower production by 10 – 20 % at national level.

Substudy hydropower will focus on determination of good ecological potential of rivers and lakes initially designated as heavily modified. Definitions of ecological potential are determined in more detail by applying the available methods and especially focusing on determination of different mitigation measures and their effects on use of water bodies. Value of hydropower production and the demands to enhance production capacity are taken into account. Possibilities to promote the recreational use of heavily modified water course are also considered. Case study will focus on modified downstream stretch of River Oulujoki and one or two initially designated lakes.

Sub-study hydropower will promote sustainable planning by increasing the awareness of large public related to modified water courses and enhancing the possibilities to improve ecological status without significant effect on use. Project co-partners are based largely on ongoing Oulujoki-pilot river basin project, where specialist group of hydropower producers, environmental authorities, nature protection associations, NGO:s and researchers were created. A common meeting is organized and different options of developing the river is demonstrated.

4. Sub-study protected areas

Areas harbouring aquatic ecosystems or aquatic biota of high conservational value need to be addressed and promoted in water protection as well as in land use practices. According to the Water Framework Direc-

tive (WFD) article 6 and annex IV, member states have to establish register(s) of several different protected areas. Of these, the "relevant Natura 2000 sites", as defined in annex IV (v), are of specific interest due to their conservational value. Furthermore, such sites need to be addressed in the river basin management plan in accordance to the directives that concern them.

However, identification, classification and evaluation principles of the conservational values (in the Natura 2000 areas) that are considered "relevant" under the WFD are currently unclear and not yet well established. Moreover, the relationships between the WFD objectives and the objectives of Birds and Habitat Directives need to be explored and further defined in order to apply them into water and land use management practises. Possible contradictions and differences between the objectives must be identified, investigated and solved before it is possible to carry out sustainable management practises accordingly. For instance, moderate eutrophication in a shallow lake may improve the living conditions of certain species included in the Birds directive even though the ecological status of the water according to the WFD may be less than good. In practise, then, such problems as how much eutrophication should be allowed and should some areas of the lake be designated specifically to the Birds directive species, have to be solved. In broader terms, the aquatic conservational values need to be addressed both in the management plans of Natura 2000 sites and in the river basin management plans of the WFD. Both management plans, that aim to secure the conservational values and improve the status of the water, may have substantial influence on future spatial planning solutions in the Natura area and the catchment.

Sub-study protected areas investigates the classification criteria and the objectives of the Birds Directive (79/409/EEC), the Habitats Directive (92/43/EEC) and the WFD and promotes spatial planners to take into account these in practical land use planning.

Workplan of the case study (until 3rd milestone)

1. Sub-study peat production

Sub-study is lead by Northern Ostrobothnia Regional Environmental Centre (Dr. Kaisa Heikkinen). Research area is situated at the tributary of the River Oulujoki or other rivers nearby. Reservations for peat production have been presented in the local master plan. General background information consists of water quality data with nutrient loading estimations. Geographical information data is imported to the River Life Gis system and different loading scenarios are created. Environmental effects are estimated mainly on the basis of changes in water quality. Also WFD preliminary classification schemes (EQR-calculations) are applied at some study areas, if the existing biological databases make it possible. Environmental effects are estimated by applying WFD preliminary classification schemes (EQR-calculations). As a final step different land use alternatives are created with estimations of environmental impacts.

- Schedule 2005

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
Meetings												
Planning system devel.												
Additional fieldworks												
Demonstrations												
Regional plan development												
Reporting												

- Parties involved: environmental authorities, peat producers (Vapo, Turveruukki), regional councils, consults (e.g. EIA ltd., Motiivi ltd.).
- Final outcome: Sub-project will produce a web-based planning system for situating land use derived loading sources to river catchment areas, demonstrations on the effects of loading and water pollution control methods, and on the environmental impacts of SS and nutrient loading in the riverine environment, and recommendations for the cost-effective environmental impact estimation process in regional planning of land use.
- Other significant notes: WFD classification is under preliminary phase and might be difficult to apply

2. Sub-study forestry

Sub-study is lead by Kainuu Regional Environmental Centre (Mrs. Sirkka-Liisa Markkanen). Research area consists of six different lakes situated at the upper part of Oulujoki river basin (Kainuu). Four of these lakes are surrounded by different forestry activities and two of them act as reference lakes. Area is reserved for forestry in master plan. General background information consists of water quality and available biota data. Intensive field period is mainly focused on collection of additional data of sediments (sedimentation rate, timing, heavy metals). Loading estimation tools developed in first sub-study are used. Environmental effects are estimated by applying WFD preliminary classification schemes (EQR-calculations). Finally effects of forestry are separated and different land-use alternatives are designated.

- Schedule 2005

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
Meetings												
Data collection												
Data analysis												
Reporting												

- Parties involved: environmental authorities, representative of forest owners (Metsäkeskus), regional councils, forest industry, forest research (Metla), consults (Env. research institute etc.)
- Final outcome: Sub-project will estimate the effects of forestry on small lakes and produce recommendations for spatial planners.
- Other significant notes: Information related to effects of forestry on small lakes is scattered and there is a need to collect a lot of new data.

3. Sub-study hydropower

Sub-study is lead by Finnish Environment Institute SYKE (Dr. Seppo Hellsten). Research area consists of main branch of Oulujoki river and of lakes which are initially designated as heavily modified under WFD Art. 5 analysis. General background information consists of hydrological and morphological data with data of fishes, benthic fauna and macrophytes. Existing restoration methods with data of their suitability are also collected. Additional data is gathered of river biota if necessary. Ecological potential options are created by applying WFD preliminary classification schemes (EQR-calculations) and experiences from Oulujoki Pilot River Basin study. Finally cost-benefit analysis is prepared and effects of different mitigation measures on biota is estimated.

- Schedule 2005

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
Meetings												
Data collection												
Eco.pot. calculations												
Reporting												

- Parties involved: environmental authorities, hydro power companies (Fortum, Graninge), regional councils, consults (e.g. Fortum env.).
- Final outcome: Sub-project will produce an estimation procedure to evaluate different alternatives for determination of ecological potential in heavily modified water courses. Procedure can be used when setting environmental goals in River Basin plan.
- Other significant notes: Ecological effects of mitigation measures are difficult to estimate

4. Sub-study protected areas

Sub-study is lead by Finnish Environment Institute SYKE (Mr. Ville Hokka). Research area consists of two or three Natura 2000 areas which are closely related to aquatic ecosystems. General background information consists of WFD article 5 analysis data, available water quality and biological data and management plans

for natura sites. Article 5 analyses (excluding the economic analysis) are performed during the first phase. Later criteria related to the aquatic conservational values in the sites are identified and the current management practices are analyzed. Finally, suggestions for river basin management plan i.e. programmes of measures (WFD art. 11) to promote water dependent values, in accordance with the WFD and the Birds and Habitats directives, are produced. The main aim of the sub-study is to produce suggestions that apply the objectives of the Birds and Habitats directives under the WFD into practice. These suggestions aim to integrate land use management practices with the water related values acknowledged in the Habitats directive (habitats and species), Birds directive (bird species) under the WFD. The study will 1) shed light in to the relationships between the three directives, 2) aid in setting the management objectives and 3) aid in setting the management practices in Natura 2000 sites included in the register(s) of protected areas (WFD art. 6).

- Schedule 2005

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
Meetings												
Art 5. analyses												
Definition of criteria and analyses of Natura 2000 site management plans												
Field research (tentative)												
Define management objectives and suggestions (integration of WFD and Natura 2000 management objectives)												
Reporting												

- Parties involved: environmental authorities, land owners (Metsähallitus), regional councils, possibly consults (e.g. Motiivi ltd).
- Final outcome: Sub-project will produce a practical approach (method) how to combine the demands of different directives (Birds directive, Habitats directive, and the WFD) to promote sustainable use and protection of water dependent protected areas. This approach, that integrates land use management practices with aquatic conservational values, is applied as a part of the river basin district management plan of the WFD.
- Other significant notes: Collection of back ground data may be time consuming

App. 2

Watersketch, The River Kokemäenjoki delta case study, the first phase 2005

Hiedanpää, J., Käki, T. & Ojanen, M.

General of Watersketch project

The Baltic-Sea-"Watersketch"-project intends to develop strategies and best-practice tools for a successful river basin management. The project partners in Denmark, Germany, Finland, Lithuania and Poland are working a manual, which will be an aid to decision-making in the fields of spatial planning, water course protection and sustainable use of river basins.

Background of the River Kokemäenjoki delta case study

There are a lot of activities at the River Kokemäenjoki delta (Meri-Pori) area and the area is limited. If one or several activities expand, it may cause problems the rest of activities.

The central activities of Meri-Pori area are:

- neighbourhood and services
- industry and energy
- harbours, boating and fishing
- recreation
- nature conservation
- sport and tourism.

The above activities impact differently on the environment. The impacts may be traffic, noise, air pollutant, damages of landscape or nature and a different kind of networks (e.g. road network). These impacts may complicate the other activities in the same area.

Meri-Pori scenarios

This case has two main goals. First, it will produce a consensus-based blueprint for the development of the Meri-Pori area. Second, it will develop the interactive conflict management tools based on the multi-criteria-decision-makings approaches.

Before the project started, two background reports were produced. In 2003, 19 local stakeholders were interviewed in Meri-Pori. The report documented their opinions concerning the state of nature conservation, land use problems, and desired directions of development (see Elina Kivinen ja Juha Hiedanpää, Satakunnan ympäristön-tutkimuslaitoksen tutkimusraportti 1/2003). In 2004, the structured interview-study focused on site-visitors' preferences on recreation, landscape, and desired future. A total of 279 visitors were interviewed in Meri-Pori (see Satu Riikonen, Saara Kankaanrinta ja Juha Hiedanpää, Satakunnan ympäristöntutkimuslaitoksen tutkimusraportti 1/2004).

The Meri-Pori scenarios -project started at the beginning of 2005 and finishes at the end of 2006. The project has three steps:

The initial meetings –phase with the key-participants, a collaborative identification of other stakeholders, and the preparation of Mission Statement are arranged. This will require two participant meetings of about three hours.

The scenario interviews – phase consists of following steps: the identification of developmental hot spots, an identification of suitable MCDM –methods, an interactive scenario analysis, and the signification of scenarios. About three participant meetings will be needed: two sessions before the interviews and one after them. The purpose of the two meetings before the interviews is to deepen the understanding concerning the problems, impacts and scenarios related to the selected hot spots. The meeting after the interviews will focus on

the interview results and other findings.

Finalizing the analysis –phase consists of sessions such as the expert-panel and a consensus dialogue of the stakeholders are arranged. With aid of the sessions the first version of blueprint is made. In the after-phase about two meetings are needed. Participants will have an opportunity to comment on the draft blue-print. After comments, final report is written by the end of 2006.

All in all, participants should be prepared for about 10 meetings during this project.

Schedule 2005

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
Preparations for case study												
Meetings												
Identification of hot spots												
Identification of methods												
Interactions and interviews												
Signification of scenarios												
Reporting												

App. 3.

Watersketch, Program of measures in the catchment area of Limfjorden, Denmark

Introduction

According to the Water Framework Directive, programs of measures must be produced by 2009 for all water bodies failing to meet the ecological objectives (WFD art. 11). As a case study of WaterSketch a program of measures will be developed for the catchment area of Limfjorden four years ahead of schedule. Emphasis will be given to the eutrophication of the fjord, public involvement and spatial planning.

Background Information on the catchment area of Limfjorden

- The river basin covers 7510 km^2, 60% of which is part of the County of North Jutland. 70% of the area is used by intensive agriculture, with a high density of livestock; in total 500.000 livestock units. There are streams and lakes in the catchment, but emphasis will be given to the fjord in this study.

- The main source for the eutrophication of the fjord is agriculture. 70% of the loading with Nitrogen and 37% of Phosphorus originates from agriculture. Toxics from ships and mussel fishing have also negative impact on the ecological quality of the fjord. See enclosed matrix.

- Impact/risk analysis has not been made for the fjord and the catchment yet. Only the classification of water bodies and identification of pressures has been made as part of the official art. 5 report. The produced maps covering the catchment area are available at: http://www.miljo.viborgamt.dk/sw27040.asp (in Danish). However there is no doubt that the fjord will fail to meet good ecological status, as transparency and the depth limit of eelgrass are low, and approximately 20% of the bottom area of the shallow fjord suffers from severe oxygen deficiency in a climatically normal year.

Environmental and water related problems

The case study will address the following:

- Relation between loading and ecological status
- GIS analysis of contrasting interests and geographic differences
- List of possible measures
- Cost Effectiveness Analysis (CEA)
- Public debate and political adoption

One working group will through ecological modelling describe the relation between loading and ecological status. What is the maximal loading allowing good ecological status? One working group will address historic data and climate. The different possibilities to reduce the loading with N and P will be evaluated in 10 different working groups. Two working groups will address the effects of toxic substances and mussel fishing.

General description of different problems are described in the following preliminary pressure matrix:

<= Pressure	Impacts =>	Physico-chemical quality elements												Biological quality elements						Hydromorphological quality elements				
	The entire river basin; streams, lakes and fjord.	Transparency	Temperature	Oxygen conditions	Conductivity	Salnity	Nitrogen	Phosphorous	Suspended solids	Acidification	Priority substances	Other pollutants		Phytoplankton	Planktonic blooms	Macrophytes	Benthic invertebrates	Fishes		Hydrological regime	Morphology	River continuity	Tidal regime
Diffuse sources	Scattered settlements sewage																							
	Agriculture diffuse																							
	Forestry																							
	Urban storm waters										?	?												
	Atmospheric deposition																							
Point sources	Industrial wastewaters																							
	Municipial wastewaters										?	?												
	Mining																							
	Contaminated lands																							
	Animal husbandry																							
	Solid waste management																							
	Aquaculture																							
	Peat production																							
Abstraction	Raw water supply																							
	Agriculture																							
	Industry																							
	Fish farming																							
	Hydropower																							
	Open cast coal mining																							
Morphological pressures	Dams (transversal)																							
	Weirs (transversal)																							
	Longitudinal embankments																							
	Straightening																							
	Dredging																							
	Shore protections																							
	Urbanisation																							
Hydrologic al pressures	Flow regulation (rivers)																							
	Hydropeaking																							
	Level regulation (lakes)																							
	Change in riverprofile																							
Other anthropogenic pressure	Recreation																							
	Ship traffic																							
	Fishing/angling																							
	Climate changes	?	?				?	?	?					?	?	?	?	?		?	?		?	
	Land drainage																							
	Overgrazing																							
	Introduced species																							
	Introduced diseases																							

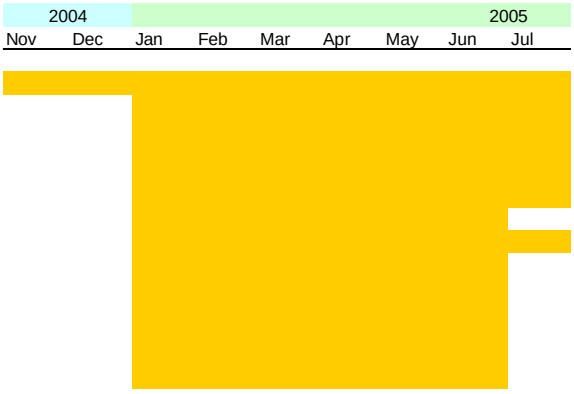
Not present
No effect
Low impact
Moderate impact
High impact

Work plan of the case study (until 3rd milestone)

- The County of North Jutland is in charge of the case study.
- Schedule

Case study Limfjorden

No	Working group
1	Empiric and dynamic modelling
2	Historic and climatic data
3	Mussel fishing
4	Hazardous substances
5	River basin modelling
6	N reduction from root zone to stream
7	Agricultural data, status and development
8	Loss of phosphorous
9	Status of the national action plan for water (VMP)
10	Environmentally friendly agriculture
11	Plantation of forest
12	Aquaculture
13	Wastewater
14	Environmental assessment of new livestock production



- The working groups will consist of experts from the 4 counties surrounding the fjord, agricultural experts and others
- All working groups will produce a short report on their topic. Public meetings will be arranged, and all results will be gathered in a final report. Political decisions on the spatial planning in the river basin will be made.

App. 4

Watersketch, Curonian lagoon (northern part) case study, the first phase 2005

Arturas Razinkovas, Antanas Kontautas, CORPI, Klaipeda University

Introduction

The Watersketch-project focuses on combining the spatial planning and implementation of the Water Framework Directive (WFD). Curonian lagoon is one out of seven case studies in Baltic Sea Region describing environmental problems and conflicts of river/lagoon basins and supporting sustainable development to create a water resources management plan according requirements of WFD. The aim this case study is to evaluate the impact of the hydrotechnical activities in the Klaipeda port to the fish stocks and water quality. The results should be important for the sustainable development recommendations as well to mitigate the negative consequences

Background Information on the Curonian lagoon basin

The Nemunas delta and Curonian lagoon is a transboundary water bodies. The international border between Lithuania and Kaliningrad oblast of the Russian federation is drawn from east to west across the lagoon. The lagoon covers 1584 km^2 area with 413 km^2 of the water body lying on the Lithuanian side. The lagoon is shallow fresh water body with an occasional flux of saline water entering from the Baltic sea at the northern part of the lagoon. The water salinity varies in northern part from 0 to 8 psu. The maximum depth in lagoon is 5.8 m, and mean depth for lagoon is 3.8 m. The Nemunas delta is a dense network of waterways formed by the Nemunas river at its mouth. It consist of small lakes, polder channels, dykes, fish-ponds and shallow ground waters. The flooding take part usually two times during the year and total flooded areas cover 1310 km^2 . In Lithuanian side flooded areas cover 570 km^2 . The total annual discharge from lagoon to Baltic sea is 24 km^3. The riverine load of N to the lagoon is composed of 85-90 % ammonia and the other 10-15 % are other forms. A. Stankevicius (1995) estimated the average total riverine N load to the lagoon 4.6x104 tons/year (period 1985-1992).

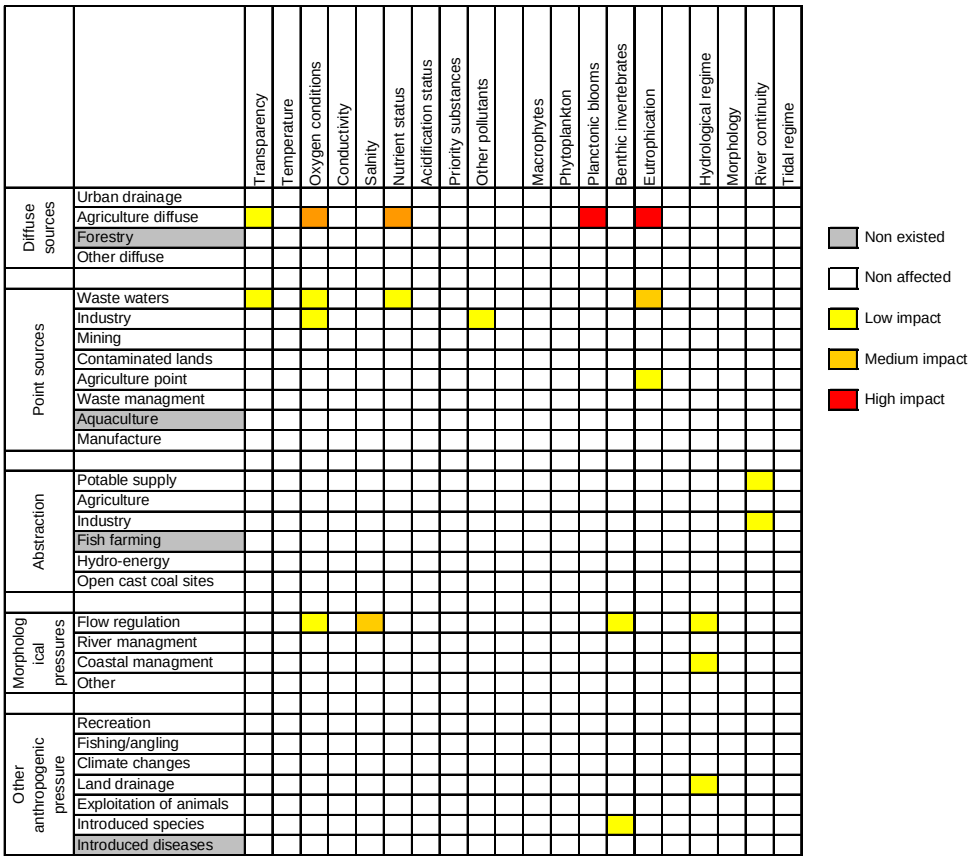
Accordingly, the following issues are important and may influence water qualities of the Nemunas delta and Curonian lagoon:

- harbour development and activities
- industrial activity
- agriculture
- recreational activity
- waste water from Nemunas river drainage area

The Klaipeda harbour is the main player in northern part of Curonian lagoon. The Klaipeda city have a population 200 000 habitants. The other cities are Neringa (mainly recreation and all area belongs to Curonian spite national park) and Silute. The Nemunas delta and litoral zone of Curonian lagoon is very important nature protected areas with high biodiversity and importance for the reproduction of different species (birds, fishes etc.). In relation to fishery Nemunas Delta-Curonian lagoon is the most important water body in the Lithuania.

Environmental and water related problems

Preliminary estimation of impacts and pressures in the Nemunas delta and Curronian lagoon area are presented in following matrix.



Problems that directly relate to the requirements of the WFD are point and diffuse sources of emissions in Nemunas delta and Curonian lagoon waters. Point sources of contamination are direct emissions from industries (including the port) (surface waters). The load of contaminants from Nemunas river upstream areas is one or the major impacts on lagoon water quality.

Maintenance of navigational depth in the Nemunas river delta and in the port basins to facilitate harbour activities needs to be done by dredging sediments which may by itself have a limited impact. Dredging activities in Klaipeda port have already altered the water levels and current regime resulting in the salinity changes and enhancement of water exchange between the freshwater Curonian lagoon and the Baltic Sea. This in a turn causes in deep ecological changes including the water quality and structure of fish communities. Both impacts are very important also from social-economic point of view because of the local communities' income is mostly generated from fishery and recreation.

Diffuse sources mainly derive from atmospheric input and land-runoff. In areas of high population density, surface run-off can contribute substantially to the quality of small-scaled water bodies. Significant input can also be expected by diffuse emissions from agricultural used areas in form of nutrients and fertilizers.

Workplan of the case study (until 3rd milestone)

This study is lead by the Coastal research and planning institute, Klaipeda University. General background information consists of hydraulic regime, water quality, fishery data and socio-economic data. A risk assessment on the basis of existing information will be carried out in order to prioritize risks and sources with regard to the implementation of the WFD.

- Schedule 2005

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
Meetings												
Data & information gathering												
Risk Assessment												
Reporting												

- Parties involved: environmental authorities, port authority of Klaipeda, fisherman associations, Curonian spit National park and Nemunas delta regional park administration, municipalities.
- Final outcome: Prioritization of different sources and activities with regard to their contribution to the water quality and fishery; recommendations for management activities

App. 5.

Watersketch, Minija river case study, the first phase 2005

Antanas Kontautas, CORPI, Klaipeda University

Introduction

The Watersketch-project focuses on combining the spatial planning and implementation of the Water Framework Directive (WFD). Minija river is one out of seven case studies in Baltic Sea Region describing environmental problems and conflicts of river/lagoon basins and supporting sustainable development to create a water resources management plan according requirements of WFD. The aim this case study is to evaluate the impact of the hydrotechnical and recreational activities in the Minija river drainage area to the nature protected areas, migratory fish stocks, water quality and biodiversity. The results should be important for the sustainable development recommendations as well to mitigate the negative consequences.

Background Information on the Minija river basin

The Minija river is the right tributary of Atmata, the northern branch of the Nemunas. The total length of Minija is 201.8 km, catchement area – 2942 km^2 , the annual average water discharge in the mouth of the Minija river is 39m^3/s, i.e. an average runoff coeficient of 13 l/s/km^2. Lakes cover only 0.6% of the basin, while bogs and marshes cover 5.2%. Thebasin of Babrungas, right tributary of Minija, differs significantly from the rest of teritory with 5.5% of lakes and 14.1% of bogs. The soil cover on the entire teritory is quit homogenous and only glacial highlands in the north east characterized by local diversity and contrast. The share of forested area of the Minija river basin is 21.4% which is less than the average percentage for Lithuania. The larger part of the forests is situated in the upper course Minija. The south-west part of the basin is the most cultivated one. Hydrochemical conditions of the Minija river basin are predetermined by the chemical compositions of rocks and water regime. Infiltration of precipitation and soil erosion in the Minija river basin take a longer time and are more intensive than elsewhere in Lithuania. It means that the amount of leaching of chemical elements is larger. It was experimentally established that under Lithuanian conditions, depending on type of soil and agricultural practices, the leaching of nitrate nitrogen ranges from 10 to 140 kg/ha/year.

The nice natural grasslands in the river and tributaries valleys are nature protected areas and belongs to some regional parks. The 155.9 km of river belongs to Minija river ichtiological reserve. Here are protected reproductional areas for Salmon, sea trout and vimba – all of this species are migratory. Minija river is mentioned as index river in ”Baltic salmon action plan 2010”, prepared by IBSFC and HELCOM.

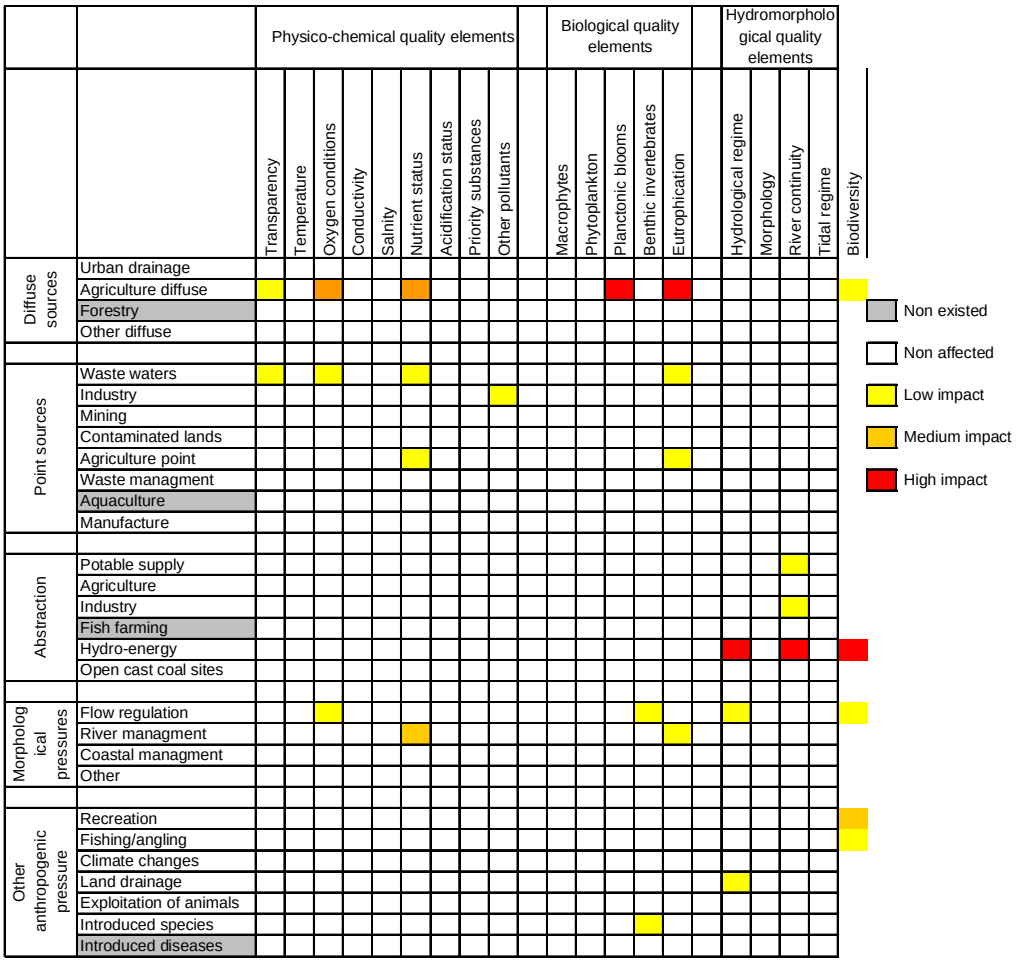
Accordingly, the following issues are important and may influence water qualities and biotopes for migratory fish species reproduction in the Minija river basin:

- agriculture
- recreational activity
- hydrotechnical activities (damming of river for hydropower stations)
- waste water from Minija river drainage area

The main player’s in Minija river drainage area is agriculture and recreation for the water quality and biodiversity.

Environmental and water related problems

Preliminary estimation of impacts and pressures in the Minija river drainage area are presented in following matrix.



Problems that directly relate to the requirements of the WFD are diffuse sources of emissions in Minija river basin waters, biodiversity protection and activities related with hydroenergy.

The importance of this river for the reproduction of migratory fish species, especially wild Baltic salmon and sea trout create here conflicts between EU requirements on protection of biodiversity, water quality and use of renewable energy sources.

Diffuse sources mainly derive from land-runoff. In areas of high population density, surface run-off can contribute substantially to the quality of small-scaled water bodies. Significant input can also be expected by diffuse emissions from agricultural used areas in form of nutrients and fertilizers.

Workplan of the case study (until 3rd milestone)

This study is lead by the Coastal research and planning institute, Klaipeda University. General background information consists of hydraulic regime, water quality, fish stocks data, nature protected areas, biodiversity and socio-economic data. A risk assessment on the basis of existing information will be carried out in order to prioritize risks and sources with regard to the implementation of the WFD.

- Schedule 2005

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
Meetings												
Data & information gathering												
Risk Assessment												
Reporting												

- Parties involved: environmental authorities, fisherman associations, administrations of nature protected areas, municipalities, hydroenergetics, recreational tourism companies.
- Final outcome: Prioritization of different sources and activities with regard to their contribution to the water quality, protection of rare fish species and biodiversity; recreation, recommendations for management activities

App. 6.

Watersketch, Hamburg/Elbe-case study, the first phase 2005

Introduction

The Watersketch-project focuses on combining the spatial planning and implementation of the Water Framework Directive (WFD). Hamburg/Elbe is one out of seven case studies in Baltic Sea Region describing environmental problems and conflicts of river basins and supporting sustainable development to create a proper river basin plan.

Background Information on the Elbe-river basin

The Elbe River is one of the major and transboundary rivers in Western Europe. From its spring in the Giant Mountains (Czech Republic) to its mouth at the North Sea near Cuxhaven (Germany) it covers a distance of 1.091 kilometers and a catchment area of 148.268 km^2 – one third of which is located in the Czech Republic and the other two thirds are in the Federal Republic of Germany. Along its way the catchment drains some of north and central Europe's major cities including Prague, Dresden, Berlin and Hamburg. The Elbe River flows through Bohemia, the Elbe Sandstone Mountains and drains the Ore Mountains before it reaches the Middle and North German Lowland. The Mulde flows into the Elbe at river-km 260 (from the Czech-German border), Schnackenburg (former Inner-German Border) at river-km 480, Hamburg at river-km 620 and the North Sea at about river-km 730. Downstream of the weir in Geesthacht the river is tidally influenced for more than 100 km up to Cuxhaven. In this tidally influenced area Hamburg is situated. With respect to the WFD the Elbe River basin consist of three different types of waters: river, estuary and coastal water.

Background Information on the area of Hamburg and the tidal influenced Elbe region

The tide-influenced Elbe Region downstream of Geesthacht belongs to three Federal states: Lower Saxony (Niedersachsen, 52 %), Schleswig-Holstein (42%) and Hamburg (6%). The Hamburg area comprises 755 km^2. Aquatic systems of high relevance with regard to the WFD in Hamburg are the River Elbe, the Alster, a lake in the city centre, and the small river Bille. The land use in Hamburg comprises open-air space and buildings (36%), agriculture (27%), traffic area (12%), lakes, rivers and canals (8%), recreational areas (12%), and others (5%). Hamburg's population size is about 1.700.000 people.

Being the second largest city in Germany (after Berlin) and a federal state, economical aspects within Hamburg are of major importance for political decisions, but also the requirement to offer recreational areas within the borders of the city-state are recognized. Accordingly, the following issues are important and may influence water qualities of the Elbe River and its tributaries:

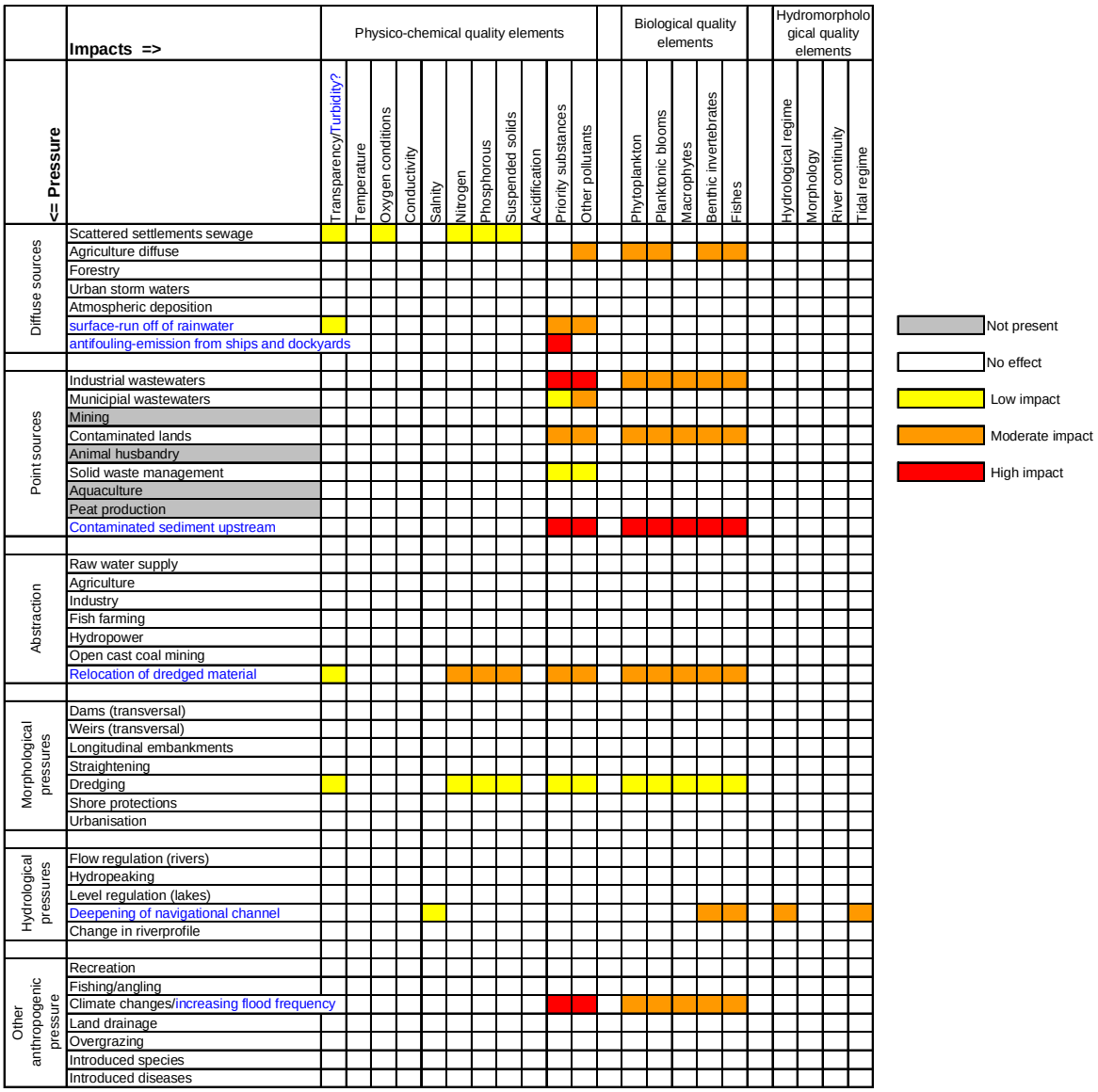
- harbour development and activities
- industrial activity
- effects of the metropolitan area
- recreational requirements
- Agriculture and forestry

The harbour is the main attraction of Hamburg and its oldest major employer. 125.000 jobs are directly or indirectly related to the harbour, which is about 12 % of the total employment in Hamburg. With an area of 74.4 km^2 the harbour takes up about 10% of the city's space. About 50% of the water fields in Hamburg belong to the harbour area.

With regard to the volume of trade and employment numbers, Hamburg is Germany's third largest industrial area (after the Ruhrgebiet and Berlin) with a main focus on mobile industry (automobile, aviation, shipping), precision engineering, mechanical engineering, chemical production, metal industry and oil processing industry.

Environmental and water related problems

Preliminary estimation of impacts and pressures in the Hamburg region are presented in following matrix.



Problems that directly relate to the requirements of the WFD are point and diffuse sources of immissions in Hamburg waters. Point sources of contamination are direct emissions from industries (including the port) (surface waters), legacies of the past in the Hamburg area (ground and surface water) and emissions and resuspended historic contaminated sediment from upstream of Hamburg (surface waters). The load of contaminants from upstream areas is one or the major impacts on Hamburg water quality.

Maintenance of navigational depth in the river and in the port basins to facilitate harbour activities needs to be done by dredging sediments which may by itself have a limited impact. Relocation of the dredged material inside the Hamburg area, however, has been discussed as an additional reason for water quality impediment. The deepening of the river Elbe in order to enable the passage of larger container ships is also controversely discussed with regard to potential environmental and human health impacts.

Point discharges can theoretically also derive from communal waste water treatment plants. Those in Hamburg and the tidally influenced Elbe region however are state of the art and will probably do not contribute to a significant extent to water pollution.

Diffuse sources mainly derive from atmospheric input and land-runoff. In areas of high population density, surface run-off can contribute substantially to the quality of small-scaled water bodies. Significant input can also be expected by diffuse emissions from agricultural used areas (20 % of the surface area of Hamburg) in

form of nutrients and fertilizers, pesticides, TBT-emissions from dockyards and ships, and remobilized contaminants from sediments.

Workplan of the the case study (until 3rd milestone)

This study is lead by the Technical University Hamburg-Harburg (Prof. Wolfgang Calmano). General background information consists of water quality and socio-economic data that have been provided by the city of Hamburg in preparation of the Water Framework Directive. A risk assessment on the basis of existing information will be carried out in order to prioritize risks and sources with regard to the implementation of the WFD. Special emphasis will be given to the contribution of sediment and sediment management activities that are suspected to have the main impact on water quality in the Elbe basin and especially on the water quality in the region of Hamburg.

- Schedule 2005

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
Meetings												
Data & information gathering												
Risk Assessment												
Reporting												

- Parties involved: environmental authorities, port authority of Hamburg, TU Innovation GmbH, consultants (BIS – Consulting Centre for integrated sediment management)
- Final outcome: Prioritization of different sources with regard to their contribution to the water quality and recommendations for management activities
- Other significant notes: The prioritization will have to include uncertainties due to lack of data. Uncertainties may be large but will be indicated in the report.

Contact:

Dr. Susanne Heise
BIS – Consulting Centre for Integrated Sediment Management
at the Technical University Hamburg Harburg
Eissendorfer Str. 40
21075 Hamburg, Germany
s.heise@tuhh.de
http://www.tu-harburg.de/ut/bis/

App. 7.

Watersketch, Lodz–Jeziorsko Reservoir case study, first phase 2005

Introduction

The aim of this report is to estimate water and sewage management in the basin of Jeziorsko Reservoir with special reference to conflicts related to spatial management on the area of scattered housing, with an insufficient sewage collection and treatment system. The Jeziorsko Reservoir plays various functions; it is an important element of a flood control system for cities located in the Sieradz Basin, a reservoir of water used for industrial and agricultural purposes, and it supplies tap water to big urban agglomerations. Owing to a biological role of the reservoir and its effect on regional economy, of special importance is the care for a proper ecological state of this reservoir and identification of conflicts resulting from its different functions.

Characteristics and description of functions of the Jeziorsko Reservoir

The Jeziorsko Reservoir was formed on 20 September 1986 as a result of lifting the middle course of the Warta river (at Skęczniew) by a 12 m high dam. It is the second biggest artificial water reservoir in Poland. A maximum surface area of the reservoir reaches now 42.3 km^2, and its total capacity is 203 mil.m^3. Primarily, the reservoir is used for storage of spring thaw water and protection of the Sieradz Basin against flood. The flood control covers also such important cities as Poznań, Konin, Koło and Uniejów. The water collected in the reservoir in spring is gradually released during the year, and the reservoir diminishes its capacity and water-table surface from 42.3 km^2 in spring to nearly 18 km^2 in autumn. Location of the reservoir, the profile of changes in the water flow rate and water-table surface in the reservoir are shown in Fig. 1.

Water in the reservoir is used also for power generation. A water power station on the dam in the Jeziorsko Reservoir started working in 1994 and had peak power of 3.8 MW at the flow of 35 m^3/s. The reservoir provides water for tap water intakes for Konin, Uniejów and Poznań, and industrial water from the reservoir is used by three big power stations: Pątnów, Adamów and Konin. Owing to its location, the Jeziorsko Reservoir provides water for irrigation of ca. 570 km^2 croplands in the region of the reservoir. The Jeziorsko Reservoir constitutes also a recreational facility for the inhabitants of Łódź and cities in the vicinity of the reservoir.

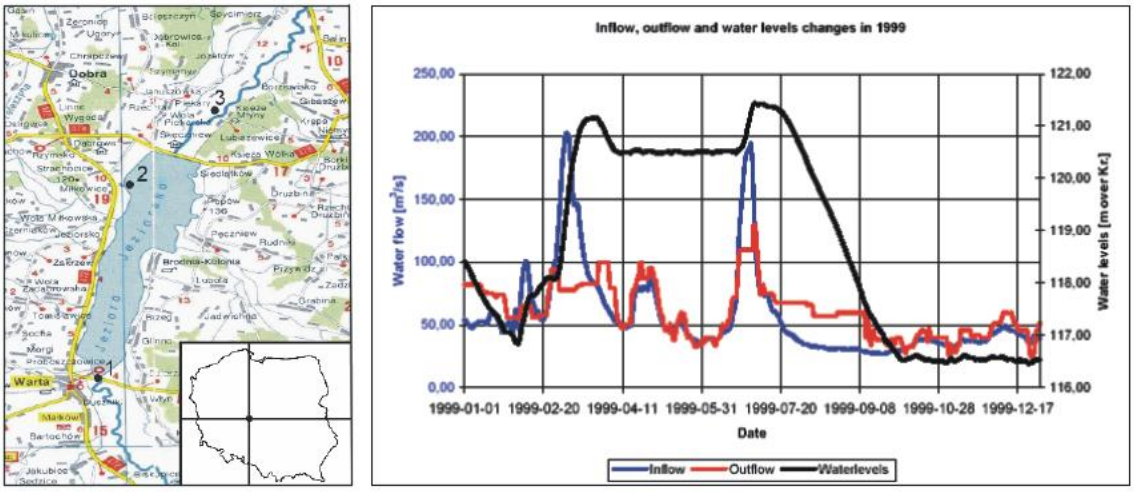


Fig. 1. Location, flow and profile of water level changes in the Jeziorsko Reservoir

The Jeziorsko Reservoir has changed remarkably the character of ecosystems in the Warta valley. In this region very favourable conditions for birds' habitats have been created because the Warta valley is located along one of the important routes of bird migrations. Annual fluctuations of the water-table uncover areas of muddy bottom which become a feeding ground for gulls, cormorants, terns and plovers. In general, in the region of the reservoir there are about 100 bird species, and in the period of summer and fall migrations even 230 different species were observed in the area. Owing to the presence of breeding areas, the southern region of the reservoir (north to Warta town) has been included into the protected area in the form of a quiet zone.

Assessment of water quality in the Jeziorsko Reservoir

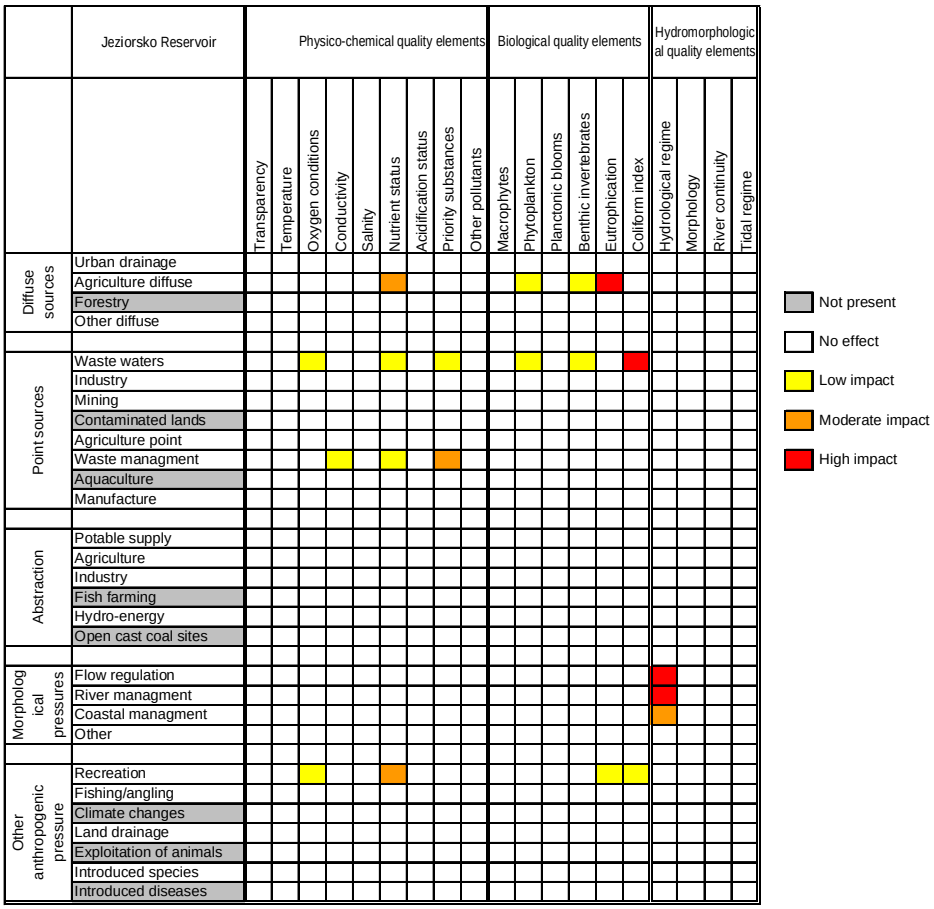
A current water monitoring in the Jeziorsko Reservoir including physical, chemical, oxygen and biogenic indicators, heavy metal content and industrial effluents, enables assessment of the ecological state of the reservoir. The most disadvantageous are microbiological indicators, including faecal *Coli* titre. Contamination of the Jeziorsko Reservoir with these bacteria is caused by untreated municipal sewage coming from towns located in the reservoir region. Domestic sewage from these cities is discharged to several rivers in the Warta catchment area and next they flow into the Jeziorsko Reservoir, thus deteriorating its sanitary condition. Part of faecal pollution comes from municipal sewage discharged immediately to the reservoir.

Water in the reservoir contained also elevated mercury concentrations ranging from 0.005 to 0.01 mg/dm^3. Concentrations of other industrial effluents are in the range characteristic of pure water. Worse are the indices that characterise the biological state of water in the reservoir. The concentration of chlorophyll “a” exceeds 50 mg/dm^3 in summer. Water transparency in this period also decreases down to 0.5 m, while in spring this indicator is 3.5 m. A problem are periodic blooms of algae and blue-green algae. The composition of the river seston biocenosis is also unfavourable.

A low biological status of water in the Jeziorsko Reservoir is due to a relatively high eutrophication of the reservoir and a continual flow of the load of biogenic substances. Their source are first of all waters of the Warta river flowing to the reservoir (90% of nitrogen load and ca. 80% phosphorus load). Local sources of emissions, i.e. agriculture, water tourism and also birds’ habitats are responsible for the remaining 10-20% biogenic substances cumulated in the reservoir.

Owing to variety of functions, the Jeziorsko Reservoir requires special protection. Water quality assessment in the reservoir proves that it does not satisfy sanitary standards required for waters used for domestic use and recreation. The water quality is most affected by untreated municipal sewage that comes from towns located in the Warta river catchment. The influence on the low sanitary state is also exerted by sewage from farms to which water is supplied by rural mains but the farms have no household (or central) sewage treatment plants. Water quality in the Jeziorsko Reservoir is also deteriorated by rainfall and surface runoffs from arable lands in the region of the reservoir basin. The reservoir trophism is strongly affected also by waterfowl because excrements contaminate water in the reservoir.

General description of different problems are described in the following preliminary pressure matrix:



The aim of study

The aim of study is the assessment of water management system in the region of the Jeziorsko Reservoir, with special reference to conflicts related to spatial management in the areas with dispersed housing, with insufficient sewage collection and treatment system. Within this study, plans of spatial management in the region of the reservoir will be analysed taking into account records contained in the regional and rural plans of spatial management as well as in branch plans, especially against the background of the "Warta program". Also environmental protection plans for the region of the Jeziorsko Reservoir will be assessed with reference to the tasks following from the estimation of the environmental impacts of the reservoir. Owing to this analysis it will be possible to identify conflicts resulting from various roles of the Jeziorsko Reservoir and referring to the protection of living nature resources and assurance of a proper ecological state of the reservoir.

In the report, solutions concerning improvement of water and sewage management on the analysed area and recommendations for correction of the spatial management plans will be proposed. The quality of water in the Jeziorsko Reservoir can be improved to the level specified in the Water Framework Directive 2000/60/EC by implementing a corrective program, including:

- building of new municipal sewage treatment plants in the cities located along the Warta river, above the Jeziorsko Reservoir and these which discharge their sewage directly to the reservoir,
- extension and modernisation of the existing sewage treatment plants, including improvement of removal efficiency of compounds (nitrogen and phosphorus) from the sewage directed to surface water,
- starting the wasteland afforestation program which will greatly improve rainwater retention and reduce surface runoffs from the neighbouring areas,
- formation of green belts (ecodam) around the reservoir, which will enable reduction of biogenic load (by ca. 70%) flowing to the reservoir with surface runoffs.
- renovation and modernisation of the existing drainage and melioration devices,
- building in the region of the reservoir several modern municipal landfills that would meet EU criteria,
- improvement of operation of the water monitoring system in the reservoir.

For many years, the Jeziorsko Reservoir has been successfully fulfilling its role as a flood control and retention system, due to which a big area of Poland managed to avoid floods and damages. The reservoir plays also important economic and natural functions. The care for its ecological status and improvement of the quality of water collected in the reservoir will require further actions in the nearest future, as indicated in the above mentioned Framework Directive 2000/60/EC.

Workplan of the case study (until 3rd milestone)

This study is led by the Technical University of Lodz (Prof. Ireneusz Zbiciński). General background information consists of geographic, water quality and socio-economic data that have been provided by the consultants and experts from the Regional Bureau of Water Management in preparation of the Water Framework Directive.

A risk assessment on the basis of the existing information will be carried out in order to recognize main conflicts between different uses of watercourses with regard to the implementation of the WFD. Special emphasis will be given to the conflicting interest of hydropower, nature protection, scattered settlements, agriculture and other activities that are suspected to have the main impact on water quality in the Jeziorsko Reservoir basin.

- Schedule 2005

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
Meetings												
Data & information gathering												
Risk Assessment												
Reporting												

- Parties involved: environmental authorities, the Regional Bureau of Water Management, TU of Lodz, consultants and experts,

- Final outcome: Prioritization of different sources with regard to their contribution to the water quality and recommendations for management activities.