Summary of Report with abstract in Swedish

WATER MANAGEMENT IN LITHUANIA, POLAND AND SWEDEN - Comparisons of the EU Water Framework directive in practice

Vattenförvaltning i Litauen, Polen och Sverige - praktisk tillämpning av ramdirektivet för vatten

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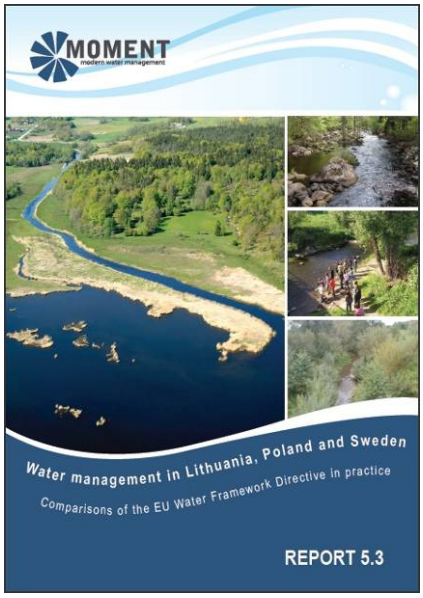
Report from the project MOMENT (Modern Water Management), supported by the South Baltic Cross Border Cooperation Programme, European Union.

Det övergripande syftet med denna studie var att jämföra vilka åtgärder som införs till följd av EU's ramdirektiv för vatten (2000/60/EC). Studien ingår i MOMENT, ett EU-stött projekt med 22 projekt partners som arbetar i 7 olika avrinningsområden som mynnar i Södra Östersjön. Det har också varit en målsättning att ge en översiktlig bild av vattenvårdsarbetet i Litauen, Polen och Sverige, för att öka förståelsen och utbytet mellan olika deltagare i projektet. Avrinningsområdena som jämförs är Akmena-Dane (Litauen), Bauda (Polen) och Bräkneån (Sverige). Jämförelserna behandlar vattenförvaltningsplaner och åtgärdsprogram för perioden 2009-2015.



Det grundläggande målet med ramdirektivet för vatten är att nå god ekologisk och kemisk status senast år 2015. Vattenförekomsternas ekologiska status bedöms tillhöra en av de fem klasserna; hög, god, måttlig, otillfredsställande eller dålig ekologisk status. Den kemiska statusen (handlar om miljögifter) bedöms tillhöra en av de två klasserna; god eller dålig kemisk status.

Åtgärdsprogrammen ska utformas så att alla vattenförekomster når god status år 2015. Alla tre länder har beslutat om en uppsättning *generella åtgärder*, t.ex. införa nya föreskrifter, se till att lagstiftningen följs, utredningar för att förbättra kunskaperna om vattenstatus och mänsklig påverkan. Utöver detta har Litauen och Polen har också beslutat om en uppsättning *specifika åtgärder* riktade till enskilda vattenförekomster eller enskilda föroreningskällor. Formuleringen av vilka specifika åtgärder som krävs för att nå god status är en viktig förutsättning för att åtgärderna ska kunna genomföras i praktiken.

Flera olika variabler används för att bestämma vattenförekomsternas ekologiska status. I denna studien har vi jämfört gränserna för näringsämnen. För vattendrag använder Sverige enbart parametern totalfosfor (Ptot) medan Litauen och Polen använder betydligt fler parametrar (Ntot, NH4-N, NO3-N, O2, BOD) - detta trots att de svenska övervakningsprogrammen ofta omfattar samtliga dessa parametrar. Jämförelser av klassgränserna mellan länderna kompliceras av att gränsvärdena utgår från olika uppsättningar av övervakningsdata; 3-åriga medelvärden, årsmedelvärden, årligt maxvärde, eller 90-percentilen av övervakningsdata under året. Det är stor skillnad mellan gränserna för god status i de tre länderna. Det behövs en djupare utredning för att avgöra om skillnaderna i gränsvärden kan förklaras av skillnader i naturliga bakgrundsvärden eller av uppsättningen av övervakningsdata. Bestämningen av kemisk status görs på samma sätt i de tre länderna med identiska klassgränser för god status.

I vattendistriktens förvaltningsplaner ska det bland annat ingå en bedömning av risken för att inte uppnå god status till år 2015. Studien visar att de tre länderna har utvecklat kriterier för riskbedömningen som utgår från helt olika antaganden. Siffrorna på antalet vattenförekomster som riskerar att inte nå god status 2015 kan därför inte jämföras mellan de olika länderna.

I de tre avrinningsområdena har vi jämfört bland annat *a)* administrativ organisation, *b)* övervakningsprogram, *c)* statusbedömningar, *d)* miljökvalitetsnormer för vattenförekomster, *e)* metoder för att bedöma mänsklig påverkan, *f)* riskbedömning, samt *g)* åtgärdsprogram och finansiering av åtgärder. Stora skillnader förekommer i flera olika avseenden. Ramdirektivet för vatten sträcker sig över ett mycket brett fält, där förhållandena inom olika segment av vattenförvaltningen är sammanflätade. Det finns en stor variation mellan de nationella vattenförvaltningssystemen som byggts upp till följd av ramdirektivet för vatten. Därför är det svårt att göra jämförelser av enskilda segment av vattenförvaltningen. För att göra rättvisande jämförelser av vattenförvaltningen i olika länder behöver granskningen göras ur ett brett perspektiv, med hänsyn många olika aspekter som har anknytning till frågeställningen.

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South Baltic PROGRAMME
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SUMMARY OF REPORT

Authors Valdas Langas, Cecilia Näslund and Kinga Skuza on field trip in Bräkneån River Basin, April 2011.

Is the actual implementation not more important than a difference in implementation?

CECILIA NÄSLUND: All EU-countries are obliged to follow the directive, and I think it is very interesting to see how the directive is implemented in various countries.

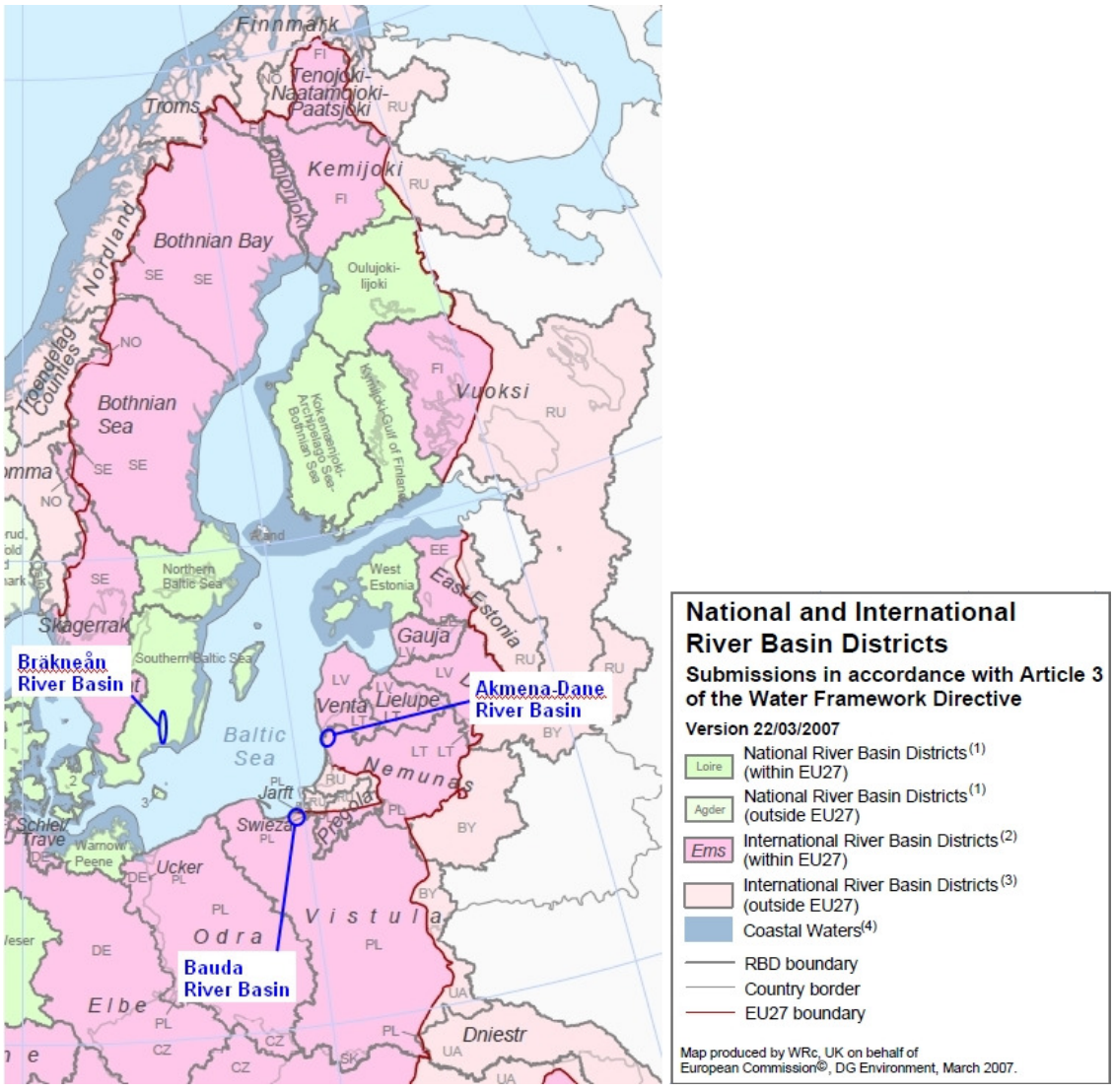
Many people I meet are somewhat sceptical towards EU-directives, and a common opinion is that the implementation is more rigorous in Sweden in comparison to in other countries. The results from this study do not support that opinion.

How do the differences in criteria for risk assessment of not reaching a good status influence the implementation of actual measures and thus the improvement of the status by 2015?

VALDAS LANGAS: Despite the differences in criteria for risk assessment and the programs of measures, the overall effect in reduction of pollution and improvement of the quality of water bodies will be positive. The formulation of the specific measures needed to achieve good status is an important step the planned measures to be implemented. However, the required financial resources should be also ensured for that purpose. Funding source for the supplementary measures is not yet clear in Lithuania.

Scope of study

The primary aim of this study was to compare measures introduced as a result of the European Water Frame Directive (2000/60/EC). As the study progressed it became clear that additional information on related issues was needed to understand differences between Lithuania, Poland and Sweden. An important part of the study was also to give a picture of the work concerning water environments and about the governing conditions in the three countries. In the comparisons we exemplify by studying conditions within three pilot river basins; Akmena-Dane river basin (Lithuania), Bauda river basin (Poland) and Bräkneån river basin (Sweden). The river basins have similar catchment size and they all flow to the Southern Baltic Sea. The comparisons primarily focus on issues related to eutrophication and hazardous substances in rivers and lakes within the three pilot river basins. The report also contains some information on other water related problems and some information related to ground water, transitional water and coastal water. This information is less complete but still it contributes to the wider picture.



Map presenting the national and international river basin districts surrounding the Baltic sea, as designated by member states. (Modified, source http://ec.europa.eu/environment/water/water-framework/facts_figures/index_en.htm)

The study constitutes part of the EU-funded project MOMENT - *Modern water management*. We address compilations and analyses performed in preparing the very first Water Management Plans and Programmes of Measures, concerning years 2009-2015. It has not always been possible to derive information at equal scale (river basin/ river basin district/ country) or at similar level of detail for the three countries. We are also aware that many things have changed in the three national water management systems since the decision of the Water Management Plans and Programmes of Measures for 2009-2015. However, it has not been possible to include the continuous progress in water management within this study.

Programmes of Measures

The Programmes of Measures for water management 2009-2015 within the tree countries show important differences. All counties have determined *general* measures, such as developing legal acts, enforcement of legislation, studies to improve knowledge about water status and human pressures, public information campaigns etc. I addition to these general measures, Lithuania and Poland also determined a set of *specific* measures, identifying individual water bodies or individual pollution plants or activities. There is a clear advantage that specific measures required are defined for Lithuania and Poland, even though funding of parts of the specific measures it not yet secured.

All countries determined *basic* measures (those required by other EU-directives) as well as *supplementary* measures that are needed to reach good ecological, chemical and quantitative status for water.

general measure – of general character, not specified for a particular location/ plant/ activity
specific measure – of concrete character, specified for a certain location/ plant/ activity
basic measure – measure required by other EU Directives
supplementary measure – measure not required by any EU Directives, but which is needed to achieve good status/potential for water bodies

Programme of Measures - Lithuania

The Programme of Measures contains general as well as specific measures. A significant part of the measures is constituted by various studies, research, enforcement of legislation, and pilot projects.

Within the Akmena-Dane River Basin (*fig. 1*) there are several specific measures, for example

- Reconstruction of 2 waste water treatment plants
- Construction of 4 km new sewerage networks

For the entire Nemunas River Basin District the Programme of Measures among others includes

- Reconstruction of 11 waste water treatment plants
- Construction of 18 fish passes
- Removal of barriers for fish migration in 18 dams
- A number of measures to reduce agricultural pollution

Funding of the investment cost is secured for the basic measures (those required by EU-directives), to 85% covered by EU-funds. The annual cost for basic measures within the river basin district is estimated to 67.25 M EUR (*1 LTL = 0.2896 EUR, 2011-05-25*). About 50% of this cost is related to measures regarding urban waste water treatment, for which municipalities are responsible. Ministries and state authorities are responsible for the rest of the basic measures (state and municipal budgets).

The annual cost for supplementary measures within the river basin district is estimated to 8.13 M EUR. More than 60% of the cost is related to measures against diffuse pollution. Ministries, state authorities and municipalities are responsible. Funding source for the supplementary measures is not yet clear.

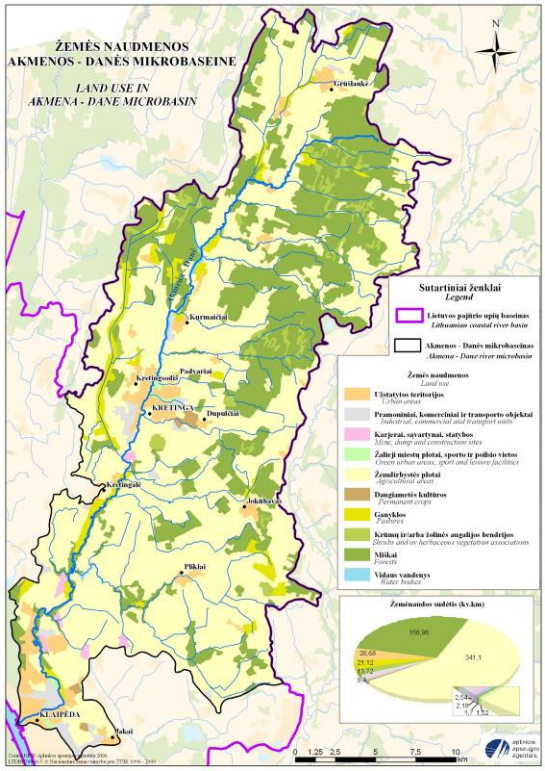


Fig 1. Land use in Akmena-Dane River Basin (catchment area 579 km^2).

Programme of Measures - Poland

The Programme of Measures contains general as well as specific measures. Using a catalogue of all potential measures to improve water status, measures were selected for each consolidated water body (consolidated; a single or sometimes a group of adjacent water bodies). First the basic measures that are required by other EU-directives were chosen. If the water bodies were judged at risk of not reaching good status by 2015, and the basic measures were estimated not to be enough to achieve good status, supplementary measures were chosen.

The measures in the Bauda River Basin (fig 2) are of five main types;

1. Organization, law and education
   - Developing "water use conditions"
   - Inspection

2. Public utilities
   - Sewage treatment plant modernization
   - Providing individual sewage treatment plants where building sewage system is uneconomic
   - Providing septic tanks where other solutions are unfeasible
   - Making registry of septic tanks and individual treatment plants
   - Inspection of septic tanks and individual treatment plants
   - Treating leakage water from the landfills
   - Elimination of illegal landfills
   - Modernization of the landfills for Frombork and Mlynary
   - Sludge management

3. Water regulation, ecosystems
   - Developing the protection plan for one Nature2000-area
   - Building fish stair

4. Agriculture and forestry
   - Proper soil cultivation to prevent pollution run-off

5. Spatial planning
   - Regarding water intakes protection zones and flood-prone areas in spatial development plans

Most measures have to be introduced by municipalities.In the present study we have not been able to present estimated costs for measures in this pilot area nor for the river basin district.

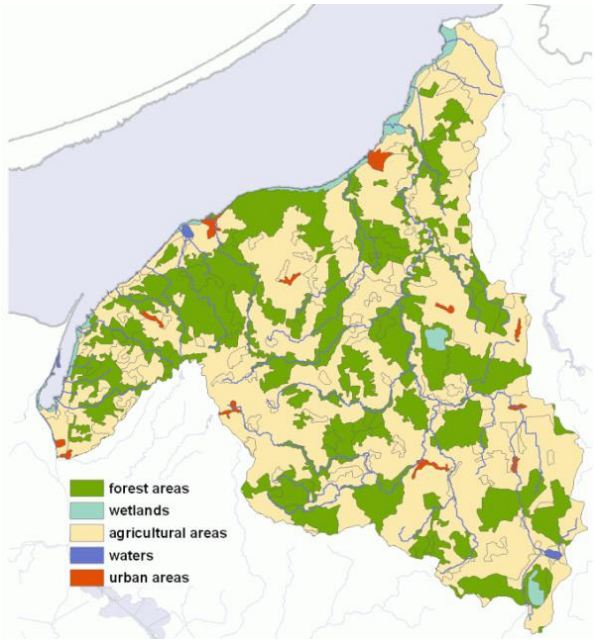
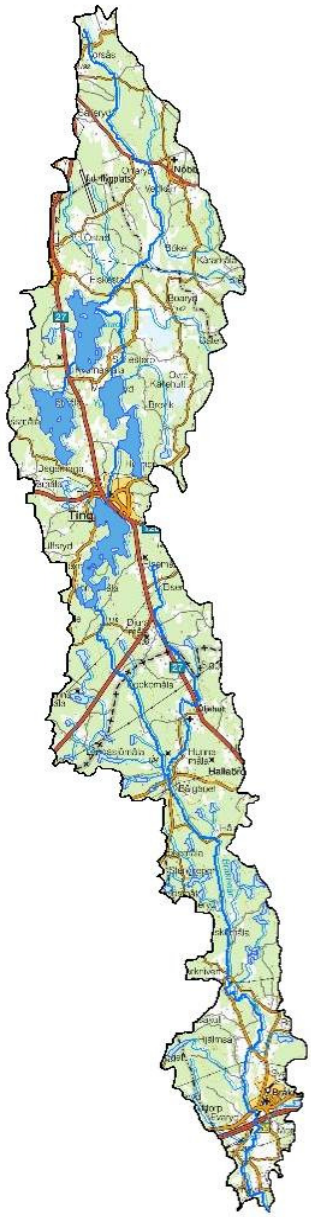


Fig 2. Land use in Bauda River Basin (catchment area 561 km^2).

Programme of Measures - Sweden

The Programme of Measures contains a list of 38 general measures directed to authorities and municipalities (37 identical measures are for all five Swedish river basin districts and one measure applying to the 2 southernmost districts). About half of the measures are regarded as basic and half of them as supplementary, but basic and supplementary measures are treated altogether. Some of the measures are formulated to require collaboration between attributed authorities. The measures are of three main types

- establish or improve legal regulations or other instruments
- perform investigations and compilations to clarify prevailing conditions and pressures
- enforcement of legislation



The Programme of Measures also contains a description of types of specific measures that are judged possible come out as a result after the implementation of the 38 general measures.
The measures are not linked to specified water bodies, but are consistently addressing especially water bodies that do not achieve, or may fail to achieve, good ecological-, chemical- or quantitative status.

Thus, there are no specific measures that can be presented for the Bräkneån River Basin (*fig. 3*).

Annual costs for the river basin district were estimated for the 38 general measures, together with the measures that were judged possible to occurr as a consequence. The indirect costs for the specific measures that were judged possible are highly unsure. However, the total costs were approximated to 83.64 – 145.63 M EUR (*1 SEK = 0.1122 EUR, 2011-05-25*).

Parts of the measures were determined prior to this Programme of Measures determined by the Water Authority. Measures to reduce eutrophication constitute about 40% of the total cost, with a large fraction representing administrative costs (permit processing, inspections and reinforcement), waste water treatment for single houses, and construction of wetlands. Measures to decrease dispersal of hazardous substances also constitute a big portion of the approximated total costs, mainly related to restoration of pollution damaged areas (financed by responsible operator, and when operator is absent/unclear by state funding). The distribution of costs between economic sectors was estimated to; the state ~40%, households ~30%, municipalities ~15%, industry ~12%, and agriculture, forestry and hydropower altogether ~3%. It is important to note that the distribution rely on assumptions about conduction of the specific measures that are possible to occur as a consequence of the 38 determined measures.

Fig 3. Bräkneån River Basin (catchment area 462 km^2).

Responsibilities within water management – administrative arrangements

Responsibilities for water management differ considerably between the three countries. An overview of the organizations is given below.

Lithuania
Major responsibility - Ministry of Environment
Number of river basin districts – 4 (1 big, 3 smaller)
Water Authority - Environmental Protection Agency (EPA) for all river basin districts
Controls of implementation - Regional Environmental Protection Departments (subordinate to EPA)
Coordination Councils - Agree Representatives of governmental and non-governmental institutions representing the main interested parties. Were set out in 2005 with main task to agree interests of state and municipal institutions, and public organisations. Advisory resolutions. Open meetings organised by EPA.
Monitoring and status assessment – performed at 3 levels:

- state monitoring activities are implemented by Regional Environmental Protection Departments, with data transfer to EPA;
- municipal monitoring are carried out by municipalities according to their need;
- self monitoring by enterprises in accordance with Minister of Environment regulations.

Poland
Major responsibility – President of National Water Management Board (NWMB)
Number of river basin districts – 10 (2 big, 8 small)
Water Authority - NWMB together with 7 Regional Water Management Boards (RWMB), each responsible for 1or more water regions (water region is an administrative unit covering or a part of river basin district or the whole one)
Monitoring and status assessment – Chief Inspector for Environmental Protection

Sweden
Major responsibility – Ministry of Environment
Number of river basin districts – 5 (all of similar size, relatively big)
Water Authority: 5 of Sweden's 21 County Administrative Boards (CAB) are appointed. Determines Water Management Plan, Programme of Measures and issues EQS (Environmental Quality Standards).
Assisting in assessment of status and risk, suggesting measures etc: the 21 CAB are responsible within their respective regions
Water Councils – voluntary organisations for river basins with representatives from public, operators and municipalities. Resolutions are advisory. Self organised with minor support from Water Authority/ CAB.

Types of water bodies – topology

Water body types are defined in order to make it possible to consolidate several water bodies to a group, and to compare waters with similar natural conditions depending on climate, ecoregion, geology, elevation, size and depth. The ways of defining water bodies in member states differ quite a lot. Different are especially the number of types, sizes of particular water bodies etc.

Lithuania, Nemunas River Basin District
No of water bodies: 584 rivers and canals, 276 lakes and ponds.
Types: 5 river types and 3 main lake types were distinguished within Nemunas RBD. The river types are mainly characterised by catchment size and bed slope, but also altitude and geology are attributed. Lake types are mainly governed by lake depths, but also surface area, altitude and geology are attributed.

Poland, entire country
No of water bodies: 4586 rivers and 1038 lakes.
Types: 26 river types and 13 lake types were distinguished. Main criteria for rivers were: ecoregion, altitude, size of catchment and geology. Main criteria for lakes were ecoregion, lake size relative to catchment size, stratification.
Consolidation of water bodies: to simplify the management, similar water bodies were consolidated and treated as a group. Main consolidation criteria for rivers and lakes were land use, protected areas, morphology, water regulation and dams.

Sweden; Southern Baltic River Basin District
No of water bodies: 968 rivers and 478 lakes.
Types: 22 river types and 31 lake types were distinguished. Main criteria for rivers were: ecoregion, size of catchment, concentration of humus-compounds, and alkalinity. Main criteria for lakes were ecoregion, lake depth, lake size, concentration of humus-compunds, and alkalinity.

Topology - designation of heavily modified water bodies
Alteration of hydromorphological characteristics may lead to important changes in aquatic communities. It is possible to appoint water bodies as *heavily modified water bodies* (HMWB) in cases when the restoration required to obtain good status has significant negative social or economic consequences. The requirements for status of aquatic organisms in such water bodies may be reduced; however, measures shall still be provided aiming at improvement of status, or as a minimum prevention of further deterioration.

The designation of HMWB differs between member states, and therefore it has an impact on the environmental requirements. Sweden applied a simplified procedure to determine *preliminary* HMWB *(pHMWB)* that will be verified during next management cycle.

	Water bodies defined as *Heavily Modified Water Bodies* - HMWB (percentages of total number of water bodies		
	Lithuania: Nemunas River Basin District	Poland: entire country	Sweden[1]: Southern Baltic River Basin District
Rivers and canals	9	31	0.9
Lakes and ponds	15	3	0.2
Transitional waters		3	
Coastal waters		27	5

The criteria for designation of heavily modified water bodies differ between the countries. Looking at the amount of water bodies appointed as heavily modified, the fraction is significantly lower in Sweden's Southern Baltic River Basin District, in comparison with Nemunas River Basin District in Lithuania, and the entire country of Poland. More detailed studies are needed to determine if the different criteria in the designation procedure applied by the three countries yield comparable results.

[1] Sweden made a *preliminary* determination of Heavily Modified Water Bodies.

Identification of human pressures and impact

In the preparation of Water Management Plans and programs of measures, EU-member states have to assess the characteristics of each river basin district, including identification of anthropogenic pressures and evaluating their impact on water.

Lithuania

For rivers, the modeling tool MIKE BASIN was used to model impact of point pollution sources and to calculate pollution concentration. The model was also used to derive pollution loads transported to the Baltic Sea. For lakes, pressures and impact were estimated through mathematical modeling using a GIS-spread sheet.

Important pressures and impact within Akmena Dane RB are municipal and industrial waste water, and storm water (surface runoff) in urban/ industrial areas. Akmena Dane river flows to the Curonian Lagoon, an water body which is strongly affected by transboundary pollution.

Poland

A general picture of driving forces was obtained through analyses of statistic data on various pressure types, such as number of inhabitants and tourists, numbers of habitants in areas with sewage water treatment plants and in areas without such plants, water intake and sewage discharge, amount of waste, area of arable land, animal units (AU). Using this general picture, more detailed pressure analyses were performed for selected areas. The detailed pressure analyses were based mainly on water law permissions registered in a GIS-data base, complemented by statistical data with info on the pressure types from the initial analysis, monitoring data and assessed status for water bodies.
Important pressures within Bauda RBD are five municipal sewage water treatment plants, areas with lack of sewage systems, and two old land fills with leakage.

Sweden

Ground waters; A national GIS analysis was performed to estimate potential pollution loads on ground water bodies. The pollution sources addressed were for example; environmentally hazardous activities, roads, railway, grave yards, pollution damaged areas, waste water from single houses, agriculture, forestry. Each pollution source was divided into classes that were rated regarding importance as polluter, and the ratings of all pollution sources with potential influence on each individual water body were summed.
Lakes and rivers; Similar principles were applied to estimate pollution loads of hazardous substances on rivers and lakes, but the analysis was less comprehensive.
Estimations of nutrient loads on individual water bodies were based on PLC5-data (Pollution Load Control 5). The PLC5-data was produced in 2007 for reporting to the HELCOM-comission about nutrient loads to the Baltic Sea. For Bräkneån river basin, the primary anthropogenic sources of nutrients For Bräkneån river basin is diffuse pollution from agriculture and forestry.

Sweden performed a preliminary identification of significant point sources, which means only reporting plants/activities that are subjected to the IPPC-directive (Integrated Pollution and Prevention) and the WWT-directive (Waste Water Treatment). Within Bäkneån River Basin there is only one waste water plant appointed as a significant point source.

Monitoring

The three countries monitor similar setup of physico-chemical elements, and they all have relatively little monitoring of biological elements. There is some variation between countries in the selected hazardous substances that are monitored. Within Akmena Dane RB there are 18 monitoring sites. At 2 of the monitoring sites, monitoring frequency of physico-chemical elements is 12/year, and at the rest of the sites they were surveyed once in a 2-year period. In Bauda RB there are 6 monitoring sites. At 2 monitoring sites several physico-chemical elements are surveyed 12/year, and at the remaining sites the monitoring frequency is 4/year. In Bräkneån RB there are about 30 monitoring sites. At 1 monitoring site the monitoring frequency is 12/year, and at the remaining sites the monitoring frequency ranges from 6/year to 1/6-years. The monitoring programmes in Akmena Dane and Bauda
RB are established in response to the WFD. In Bräkneån RB there are more monitoring sites surveyed according to two old monitoring programmes, and the monitoring is not yet well adopted to the WDF-requirements.

Lithuania
A new national environmental monitoring programme was implemented in 2005. The programme was designed to fulfil requirements on parameters and frequencies by the water frame directive and other EU-directives. This results in the introduction of monitoring biological parameters and also monitoring sites located in smaller rivers.

Within the Akmena-Dane river basin, there are two monitoring points with intensive surveillance monitoring (12 times/year) and 15 monitoring points that were surveyed once. The programme is comprehensive with monitoring of; general parameters (temperature, oxygen, nutrients, etc.), heavy metals, organic pollutants, pesticides, macrozoobenthos, phytobenthos and fish fauna.

Since 2007 the municipality Klaipeda City performs monitoring. Nine times a year the following parameters are surveyed; PO_4, P_t NO_2, NO_3, NH_4, N_t O_2, pH, chlorophyll a, bacterioplankton, phytoplankton and zooplankton. Once a year the fish fauna, bottom fauna, vegetation and heavy metals in bottom sediments are investigated.

Self monitoring is carried out mostly by economic entities listed under the IPPC directive (in total 18 IPPC objects are within river basin). Hazardous substances were surveyed in the study: *Identification of substances dangerous for the water environment in Lithuania* (2006) for selected nine dangerous substances groups and some other substances.

Poland
According to WFD requirements, there are 3 networks of the surface waters monitoring in Poland: surveillance monitoring, operational monitoring, and investigative monitoring. There are 2540 surveillance monitoring sites and 1670 operational monitoring sites in Poland. About 620 sites are in both networks.

In Bauda river basin there are monitoring sites in all the water bodies discharging to the Vistula Lagoon, except Kanal Rozanski which is artificial water body. There are also 2 monitoring sites on the rivers which are too small to be designated as water bodies. The monitoring sites are located close to the rivers mouth in order to provide representative results. Concerning water bodies there are 6 monitoring sites in the pilot area: all of them are surveillance monitoring sites and 3 of them additionally operational. The surveillance monitoring includes 1 biological element (once a year) and 18 physico-chemical elements (4 times a year). In the operational monitoring, 8 of the physico-chemical elements are surveyed with high frequency, 12 times a year. The surveillance monitoring also surveys extra parameters; copper, zinc, petroleum hydrocarbons, with a frequency of 12 times a year;

Sweden
Monitoring in the Bräkneån river basin is composed by the running monitoring programmes of liming effects (financed by state), and coordinated self monitoring of impact from environmentally hazardous activities (financed by operators). Both programmes have been running for 20-30 years, and they have other primary aims than to produce data for status assessment of water bodies.

In total there are 30 monitoring sites located within Bräkneån RB. Some monitoring sites are not located in a water body (WB), but in a tributary stream flowing to a W.B The monitoring frequencies rarely reach the frequencies prescribed in the water frame directive. At least one biological quality element is monitored in three out of four lake water bodies and in all river water bodies. At least one physico-chemical quality element is monitored in all water bodies. Monitoring of hazardous substances in Bräkneån includes four of the 33 priority substances (Cd, Hg, Pb, Ni), and is performed in all lakes and more than half of the rivers.

Status assessment criteria

The ecological status of water bodies is assessed to one of five classes; high, good, moderate, poor and bad status. The chemical status of rivers, lakes, transitional and coastal water is assessed to one of two classes; good or bad status. The general objective in the water frame directive is to achieve good status by year 2015.

Lithuania and Poland have determined status assessment criteria with type-specific reference values for principally all the normative descriptions set out in the Water Frame Directive (Annex V). Reference conditions are equal to conditions with principally no anthropogenic impact, and "type-specific" reference values means that reference conditions are adopted to natural conditions for individual water types according to applied topology. Looking at the reference values that have been determined, they are frequently equal for many lake- or river types.

In Sweden status assessment criteria have not been determined for all the normative descriptions in the WFD. Thus the status assessment of water bodies is based on less parameters. In addition, reference conditions were not fully developed for individual water body types. Instead, reference values are determined for each individual water body through empirical relations/models to influencing factors.

Table below shows limits for classification as "good status" for selected parameters related to nutrients for the three countries. Intervals describe the range of requirements for various water types, when distinguished.

Comparison of limits for good/moderate status for rivers used by the countries.

	Lithuania; entire country	Poland; entire country	Sweden; Southern Baltic River Basin District
Total phosphorus (mg/l)	0,14[1]	0,4[2]	0,01 - 0,10[3]
Total nitrogen (mg/l)	3[1]	10	*(1,25[4])*
Ammonium nitrogen (mg/l)	0,2[1]	1,56	-
Nitrate nitrogen (mg/l)	2,3[1]	5	-
Dissolved oxygen (mg/l)	6,5 - 7,5[1]	5	-
BOD (mg/l)	3,3[1]	6	-
	BOD7	*BOD5*	

[1] The status assessment is based on the annual average concentration
[2] The status assessment is based on the 90-percentile when there are 12 or more measurements per year, and on the worst value when there are less than 12 measurements.
[3] The status assessment is based on 3-years average concentration with 4 samplings/year (2 autumn, 2 spring)
[4] Refers to a previously used assessment scheme, corresponding to the limit high/very high concentration (constant limit throughout Sweden)

There are significant differences between countries in absolute concentrations limiting "good status". Sweden's lower limits for total phosphorous might be related to major differences in soils and geology. However, it is more difficult to understand the big differences between Lithuania and Poland. It is important to note that Poland bases the status assessment on the worst annual value or the 90-percentile from monitoring, while Lithuania uses the annual average. A deeper investigation is required to determine if the differences can be justified by which set up of monitoring data is used for the status assessment, differences in soils, bedrock, or river type according to the topology.

To assess the chemical status of surface waters, all countries follow the determined maximum concentration of 33 hazardous substances according to Directive 2008/105/EC. However, it is problematic that the limits in this directive are given as concentrations in the water phase. It is much more complicated to survey concentrations in the water phase compared to in other matrixes, such as sediments or biota. Poland has defined maximum concentrations in sediments for the 33 priority hazardous substances corresponding to the limiting concentrations in water.

Environmental Quality Standards (EQS) and exceptions

The environmental quality standards (EQS) states the environmental objectives required for water bodies and the deadline for achievement. According to the water frame directive, the basic requirements are good ecological and chemical status/potential, and the deadline is year 2015. Lithuania and Sweden issued EQS within their national legislations with similar juridical application. EQS must be considered in the permitting process for environmentally hazardous activities. EQS must also be observed at every stage of spatial planning; town and country planning, management of land and water resources, building and housing. Poland has a different system and will issue "Water use conditions" in 2012, which will be obligatory for all water users. The water use conditions states obligations, prohibitions and restrictions necessary to achieve environmental objectives in compromise with other water use needs.

Status of water bodies in 2009 and risk of not achieving good status by year 2015

The ecological status of rivers and lakes/ponds is generally not good in the three pilot areas (table below). There are four water bodies within the Bräkneån River Basin with good

Table below: Ecological and chemical status, and risk assessment for water bodies within pilot river basins
The differences reflect differing criteria applied in the risk assessment, and not differing conditions in the river basins. This clearly demonstrates that it is not possible to make comparisons "straight-ahead" of amounts or percentages of features presented in the Water Management Plans from the various countries. Knowledge on the assumptions and criteria used are vital for a proper understanding of the results.

Number of water bodies	**Akmena-Dane River Basin**	**Bauda River Basin**	**Bräkneån River Basin**
Total number in river basin	*6*	*12*	*11*
Worse than good ecol. status/potential in 2009	6	12	7
Worse than good chemical status in 2009	1	11	0*
At risk of not reaching good status 2015	4	1	7

** Excluding mercury compounds (a general exception for Swedish waters)*

ecological status, but the rest is moderate or worse. The problems with chemical status are less frequent. In the Akmena-Dane River Basin there is one water body with bad chemical status, with TBT exceeding the EU-criteria and diethylphtalat exceeding Lithuanian standards. In the Bräkneån River Basin all water bodies have good chemical status. In Bauda River Basin 11 out of 12 water bodies have bad chemical status. The ecological and chemical status derived for the pilot river basins are not representative for conditions in the countries as a whole.

The risk assessment of not reaching good status/potential by year 2015 is based on different principles in the three countries. In Lithuania, water bodies at risk are all water bodies that are likely to fail reaching good status/potential after implementation of the basic measures. For lakes monitoring data is evaluated for eventual exceedence of critical values of nitrogen, phosphorus and chlorophyll a. In Poland, primarily lakes and rivers with a status worse than good were examined for assessing the risk of not reaching good status by 2015. The risk assessment was primarily based on monitoring data (magnitude of deviation from good status, trend in monitoring data), possibilities to reduce the pressures in a short time, probability of new pressures to appear, and capability of the natural conditions allow to improve in short time. In the Sweden's Southern Baltic River Basin District, the risk assessment was based on the ecological and chemical status of water bodies, all water bodies were evaluated including those with good status. An expert assessment whether any measures would be needed to ensure reaching good status/potential.

Physical alteration of water bodies (such as hydropower dams, channels) may lead to important changes of the aquatic life. In cases when the restoration required to achieve good status has significant negative social or economic consequences, the requirements for status of aquatic organisms may be reduced. This is done by appointing the water as a *heavily modified water body*. The procedure for designation of heavily modified water bodies differs between the countries. The amount of water bodies with reduced requirements in the three countries follows; regarding rivers/channels and the lakes/ponds there are 9 respectively 15% in Nemunas EBD (Lithuania), 31 respectively 3% in Poland (entire country), and 0.9 respectively 0.2% in Southern Baltic Sea RBD (Sweden). It is not likely that Sweden's low amount of heavily modified water bodies fully can be explained by fewer problems with physical alteration of water bodies, but primarily by differing designation procedure. More detailed studies are needed to determine if the different criteria applied by the three countries yield results comparable.

Conclusions

We described conditions and made comparative remarks concerning a number of issues including; Programmes of Measures, administrative arrangements, monitoring, status assessment criteria, status of water bodies in the pilot river basins, environmental quality standards (EQS) and risk assessment of not reaching good status/potential by year 2015. The study gives a picture of the work with water environments in the three studied river basins in Lithuania, Poland and Sweden. The picture is not complete but nevertheless it provides a good basis for improved understanding of conditions in the tree countries. Understanding the differing conditions and situations in the participating countries is a central factor to develop a fruitful collaboration and exchange, which is the primary goal of the MOMENT-project.

The criteria for designation of heavily modified water bodies differ between the countries. The fraction of water bodies appointed as heavily modified is significantly lower in Sweden's Southern Baltic RBD as compared to the fractions in Nemunas RBD in Lithuania and the entire country of Poland. More detailed studies are needed to determine if the different criteria in the designation procedure applied by the three countries yield comparable results.

The three countries monitor similar setup of physico-chemical elements, and they all have relatively little monitoring of biological elements. There is some variation between countries in the selected hazardous substances that are monitored. The monitoring programmes in Akmena Dane and Bauda RB are established in response to the WFD. In Bräkneån RB there are more monitoring sites surveyed according to two old monitoring programmes, and the monitoring is not yet well adopted to the WDF-requirements.

The most important conclusion of the study concerns the design of Programmes of Measures. All three counties determined *general* measures, but Lithuania and Poland also determined *specific* measures. Specific measures are concrete and specified for particular locations/plants or activities. Definition of the specific measures that are needed to achieve good status/potential of water bodies is an important step in making the measures realised.

The report contains information that would allow for much more detailed analyses than were performed within this project. Significant differences were observed in several aspects. However, it is important to keep in mind that the results concerning several issues can not be regarded as representing the conditions in the entire countries. There may be important variations within the countries that are not reflected here. The water frame directive stretches over a vast field, and conditions in various respects or segments are correlated. The differences that appear might be explained by conditions in aspects that are not analysed in this study. An important conclusion is that there is a large variability in the national systems employed in response to the water frame directive, and therefore it is difficult to make justifying comparisons for individual segments.